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Proceedings of the Theme

Water and Cultural Diversity

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INTRODUCTION

The present programme outlines the events related to the Theme 'Water and Cultural Diversity' for the 3WWF. It is based on the firm belief that:

> 'Water is probably the only natural resource to touch all aspects of… civilisation – from agricultural and industrial *development* to the cultural and religious values embedded in society… and that the need and demand for water… have been a driving force of social, economic and cultural development throughout human society.'
>
> *(Koïchiro Matsuura, Director-General of UNESCO, Message for World Water Day 2002)*

The management of water resources is one of humanity's most ancient activities and has left its tangible and intangible traces in virtually all cultural settings. As illustrated by the World Summit on Sustainable Development, held in September 2002 in Johannesburg, South Africa, water resource management is today recognized at the highest political level as a key to peaceful and sustainable human development.

To create sustainable solutions for water-related problems and account for the needs of peoples and nature, we must better understand cultural – emotional, intellectual, moral, social and spiritual – interactions with water and their evolution in time and space. The cultural diversity of human interaction with water provides the very basis for resolving water related problems and offers an enormous potential for creativity. Understanding why and how diverse beliefs and practices have evolved yields precious lessons for today's urgent need to move on to a sustainable planetary water culture.

The Theme's Objective

The shared objective of the events surrounding this theme is to provide an opportunity for dialogue among experts, practitioners, indigenous peoples and the general public from various disciplines and knowledge systems on the vital cultural functions of water resources and their management.

The concept of cultural diversity implies in itself that culture is a universal bond among nations and a motivating force that is the motor of development. The theme therefore strives to contribute to the integration of the cultural dimension of water into development strategies and action plans at all levels and to improve water management. Ultimately through this theme, contributors to 3WWF seek to enhance existing means and to develop novel methods to further sensitize global society for the cultural dimension of this vital resource, water.

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Session 1: Opening Plenary

Opening Address

HRH Prince TALAL Bin Abdul Aziz Al Saud of Saudi Arabia

President of Arab Gulf Programme
for United Nations Development Organizations
and Special Envoy of UNESCO for Water

(presented on behalf of HRH Prince Talal by Janos Bogardi, International Hydrological Programme, UNESCO)

Honored guests, ladies and gentlemen,

It is my honor to speak to you today in my quality of UNESCO Special Envoy for Water. But also as an individual deeply concerned about the future of the planet, I am pleased to open the Third World Water Forum's Theme 'Water and Cultural Diversity'.

No matter who we are, where we live, what we do, we all depend on water; just like our ancestors did; and also the future generations will continue to depend on this irreplaceable, yet finite, resource.

The world's water-related problems have been recognized by the international community at the highest political level during the Second World Water Forum held in The Hague, three years ago. The gloomy background of this recognition has hardly changed since:

Still, a quarter of the world's population has no safe water supply and a half of it lacks adequate sanitation.

Some 5 million people are still dying annually from inadequate water services and water related diseases and disasters.

While population increase was threefold since 1900, water withdrawal has sextupled during the same period. Even more dramatic is the change of per capita availability over the last 30 years. While in 1970 it was around 13,000 m^3/person/year, by 1995 it dropped to almost half of this, that is, 7,600 m^3/person/year.

These trends are clearly not sustainable.

Now, given the combined effects of population growth, still likely to increase in the coming decades, the possible climatic change that may alter the spatial distribution of water on Earth, the observable increase of the occurrence of extreme hydrological events, such as floods and droughts, we might say that the world is facing a water crisis.

Crisis – etymologically speaking – is the time to decide. At such a turning point things may get better or worse, depending on the action taken. It is time for decisions, how to tackle this key question of human and ecological security!

At World Summit on Sustainable Development, held in Johannesburg, South Africa, last year, it was decided to take action and to reduce the number of those people without adequate water supply by 50% before the year 2015. To reach this commitment, 200 billion dollars of investment are needed – but also something else: a change of the water culture on our planet. Clearly, the way we deal with this most vital resource must be revised.

At the same time, some say that it would take only 7 per cent of the world's military expenditure to solve the dramatic water situation. Security is indeed a highly esteemed human aspiration. But we need also 'Water Security' in the 21st century as aptly formulated by the Ministerial Conference of the Second World Water Forum in The Hague in March 2000.

As a corollary it follows then that a variety of human actions can mitigate the water crisis and create opportunities for improving the quality of life, maintaining ecosystems and generating wealth and sustaining a process broadly called 'development', and, let me add, lasting peace, our most precious cultural value.

However, the gloomy trends, which I just described, are not destiny. And the best proof for this is the global mobilization for the event, which brings once more the world together in Kyoto: the Third World Water Forum. Together, I am convinced, we will be able to identify and take the actions leading us towards the solutions of today's water problems.

Water is indeed our most valuable resource as it plays a determining rote in all the global processes – both in nature and in human society. Thus the media was much to eager to jump on not well thought, populist prophecies concerning 'water wars' ahead…

Despite the looming water crisis and in contradiction with several, among them high-ranking, personalities we maintain that there will be no wars fought about water. Water is indeed a major challenge of this Century. But as such it is also a major chance: Throughout history, water has been the vector along which civilizations developed and cooperation between societies thrived. Even if we broaden the definition of war to any water-related violent action between competing groups or countries, violent conflicts remain a historical rarity during the last couple of millenia of human society. Historians may not like the proverb: 'history repeats itself', but it is indeed very heartening to see historical evidences of collaboration over water between states even being in the actual state of war over other issues like land, religion or simply dominance.

Water has been identified as a global problem. At first glance it is thus part of the package to be treated and solved within the sweeping globalization process. Let me elaborate on this hypothesis!

Recent events prove that there is a growing resistance against this process. The momentum of opposition might seem ununderstandable by those, who are, maybe even honestly, convinced that globalization is good for humankind.

Human history shows, how the ancient civilizations came into life in the valleys of great rivers: Euphrates and Tigris, the Mekong, the Yangtse and the Nile are among the most renown examples. Legends and mythologies of almost all cultures rightly describe water as symbol of life and fecundity. If in irrigation for agriculture, health care, transportation, industry and arts; water is the very essence of life and a primordial driving force of the development of human societies.

Could we actually find any human activity, which is not at all related to water?

And yet, despite its importance, we are not always respectful to Water. The need for development has often led to polluting and spoiling water resources in a general context of environmental deterioration. Have we noticed that most of the devastation caused by environmental hazards is not due to nature alone, but that the human activities, often setting out to control our very environment, contribute much to the losses we suffer? Water-related disasters cause more human and material losses than other any other type of cataclysms. But since the dawn of humanity, we have learned to adapt to the sometimes difficult conditions on our planet and shaped a diverse heritage of experiences, practices and thoughts. Our respective cultural backgrounds are all built around the same common goal: maintaining our physical, emotional and spiritual life under the best possible conditions.

The socio-economic development has led to steady increase in the need for natural resources. The progress of technology has in turn allowed us to exploit the nature to such an extent that if we keep going, our planet's resources are clearly in danger of penury. Assimilating socio-economic development to development in general is a risky thing, especially when it is spoiling the very source of our survival.

Nature has fostered humanity. But the humanity is in the position to impact upon the nature. This observation calls us to revise profoundly our current way of behavior and mentality in regard with the natural environment. This is why I find it very important that we consider cultural elements when dealing with environmental issues. By culture, I mean the set of emotional, intellectual, moral and spiritual values that guides the communities.

2003 is the International Year of Freshwater. It provides us with the opportunity to focus our attention on protecting and respecting our water resources. UNESCO together with UNDESA has been entrusted with the responsibility to coordinate the activities of the year. Our goal is two folds: the equal access for everyone to freshwater and its sustainable use. Having access to water is the matter of human right. Sustainable water provision maintains the quality of life and the human dignity. It is a shame that this basic principle is yet to be met elsewhere in the world and still remains a goal to be achieved.

While scientific and technological researches need to be further promoted, we know that they alone do not provide the solution to all the water-related problems. The Year is also an important occasion to explore the interface between culture and water especially where local tradition and customs regulate access and use. The local knowledge, which is an intricate blend of know how and spirituality often deals with the code of conduct for sustainable consumption and equitable sharing of natural resources amongst the community. Their wisdom tells that the water management is inseparable from culture namely moral and ethic values.

The Rio Summit in 1992 was an important step in recognizing the protection of environment as a key to sustainable social and economic. The Johannesburg Summit in 2002 made another step forward by further emphasizing on local traditional knowledge as vital source for sustainable environment. And we are amazed to discover how rich and divers asset this local traditional knowledge is.

'Cultural diversity widens the range of options open to everyone'. This is a quote from the UNESCO Universal Declaration on Cultural Diversity. We all know that one unique way of thinking cannot be almighty but could be even dangerous. The rich bank of wisdom and knowledge, that humanity has compiled thorough out time and space can provide, in turn a greater range of possibilities given to us. I believe that each people has an unique message to deliver and can contribute to enrich the world by sharing a part of their truth and beauty.

Since the dawn of history, the humanity has developed an intricate relationship to water. While we have venerated it, water has been also subject to exploitation. If it has been a source of Peace, it has also caused conflicts. Seeing water issues from cultural point of view is a way to understand this diversity of interface, both positive and negative, between men and nature. This is meant to warn ourselves to adopt a more responsible attitude towards nature. It should also guide us to open our eyes to others and to learn from their cultures and traditions.

Ladies and gentlemen,

This is why I am looking forward in the Water and Cultural Diversity Theme.

I am very much pleased to observe that quite a number of NGOs, specialists, artists and the delegates of the Indigenous peoples are here to debate and demonstrate the rich history of interaction between man and nature, the role water is playing in our culture and the role of culture in ensuring the sustainability of water.

On my part, I would like to renew my engagement in promoting 'water conscience' by bringing the critical freshwater issues before decision makers and heads of states and by encouraging countries to adopt appropriate institutions, policies and legislation for the dynamic relationship between water management.

I wish the Water and Cultural Diversity Theme all the success. Thank you for your attention.

Opening Address

Jean-Louis OLIVER

Deputy Secretary-General of French Water Academy

On behalf of the French Water Academy, I want to congratulate the Japanese authorities for their great organization and welcome. I also want to express all thanks to UNESCO and Minpaku which have been our partners in the preparation of this session about Water and Cultural Diversity. Finally I would like to thank all of you for coming to Kyoto for this Third World Water Forum travelling from all regions of the world. I also thank the interpreters for their efficient support.

The subject-matter that brings us together this afternoon is a very new and innovative one but it is also, and we must not forget this, a very delicate and sensitive one. Here we are in a very beautiful and historical city, Kyoto. And there are very close relationships woven here between culture and water. We have two very different bodies brought together here. On the one hand we have water which is something that might seem almost banal, trivial, but it is vital at the same time. On the other hand we have culture which is something abstract, immaterial, very difficult to grasp, to understand and of course it is something that is very differently interpreted by all of us here and I am sure this is something that we will realize over the next few days. Water and culture are both fundamental to human imagination, to its representation, to our mentality. Both together are very important factors in cohesion and solidarity. Water and culture do resemble one another in a certain way because they are both fluid. Of course one is tangible, the other not, but both do link mankind and society. There is one point that perhaps I should recall. Water has a very important place in our culture. And what is this culture that brings us together? We have got all sorts of different representations: artistic, religious, social, which caricaturize civilization. Culture is something that goes back for millennia and that has been adapted over the years. Culture is both, an individual and collective response to the fundamental questions asked by man over time. So the different cultures of different human societies are not in any way uniform. They vary from one region to another and these cultures also evolved over a given place in time. And therefore they are very closely linked to geography, and each has its own history. Water has a very important place in mythology, in believes, in rights. It reflects all the different relations that man has with water. There are economic aspects, utilitarian aspects, health and social aspects, Sometimes water is involved in mortal risks: epidemics, floods, etc. And there is also an ecological and environmental aspect, which is vital. Sometimes water is even more important than the earth itself, for fauna, flora and human beings. But we also have to bear in mind the value of the cultural aspect. There are spiritual and symbolic aspects to water. Because in certain civilizations, water is sacred as the source of live. So water does have its place in all mythologies, in all cosmologies, in all the religions of the world. It is live and death brought together in a metaphysical way.

There are number of water related myths. Most of the mythologies that we know about include traditions dealing with water. The very first divinities did have human or animal forms. Some divinities are more favorable and positive than others, but all are omnipotent and masters of destiny. And through these divine figures that were revered and adored, we find this duality: water is live and death. Water is very important in religions, both of today and yesterday. It represents live, it is a source of regeneration, it is a right of passage from one time to another. This is the case of the three large monotheistic religions: the Christian, the Jewish and the Islamic religion. In the bible we see a lot of references to water. Water is an important part of traditional blessings. It also plays an important part in number of other religions. Hinduism, Buddhism, Shamanism, Shintoism, Taoism.

Human beings do come from water. We are made up mostly of water. We come from this natural element, and all live depends of this element. Consciously and unconsciously we have a very close and special relationship to water. There is an emotional aspect to it too, that we must remember.

Rights involving water are also very widespread, because through the four elements, earth, air, fire and water, water, even more than air, is the one that transfers virtue and power. And water is associated with a number of symbols, some positive, some negative. Water is a symbol for live, fecundity, maternity, purification of the body.

Arts and literature are the very heart of culture and water has often been used as a manifestation of mans ver deepest, most intimate feelings. From the time when humans have lived together in groups and tribes, when they have lived together in villages or towns, the one thing that they shared has always been water.

Water is also language. Water is a concentration of culture. Water allows people to live together to communicate, to develop and to grow as a society. Language leads to literature which is a source of inspiration and meditation, reflection, creation and pleasure.

Writers, poets, philosophers of all areas have reminded us how important water is, how vital it is, that it is part of our soul and of our spirit. Number of songwriters too talk about rivers and seas, the oceans. Painting is another part of culture where water has a very important role to play. There are very many different ways of seeing water. There are some very spectacular aspects of water. Water is a very rich source of inspiration for the impressionist painters of the 19th century and it is also very important in Japanese art. Music is yet another aspect of the world of the arts. There is a very special music of water. Water is a source of inspiration for the eye and the ear.

Water has had huge influence on culture, and culture has a huge influence on our individual and collective behavior. The way we see water and use water.

We need a sufficient amount of water every day. Because of this, human beings have always established their communities next to lakes, rivers or the sea. The richest civilizations have always grown up in the valleys of great rivers. A lot of civilizations reflect the name of the river they have grown next to. Babylonian and Mesopotamian for example. Mesopotamia indeed means river in the middle (between the Tigress and the Euphrates), the Nile in Egypt, these are all rivers which are essential. The same goes for Latin America. The Incas grew up next to lakes. Looking at these different civilization show that water and development go hand in hand. Mankind has always developed his engineering with water as well. Historical experience on the present day also show us that there is a very close link between social and economical development even environmental and cultural development and water. All these are linked to political stability as well and to the equality of water supplies. But water is not inexhaustible. Human activity can cause problems: pollution and climatic change.

Two example for the influence of culture on the use and management of water. One is a very personal example. Water is important in our hygiene. Drinking certain waters from certain sources is something that people in the past thought is very important. A lot of health cure centers and clinics are established closed to water sources as well. Another example is the influence of water on parks and gardens. They are man made spaces where water is very important. Gardens and parks are creative for the pleasure of our senses, for smell, for sight. Gardening and the creation of parks, is a way of creating an image of paradise as well. French gardens, Arabic gardens, English gardens, Japanese gardens, all of these are very different indeed. They reflect certain views of culture. In a French garden it is all about symmetry and order. English gardens are characterized by a very natural style. And when it come to Arab gardens, we have the hanging gardens of Babylon for example. In Japanese gardens water also has a very important role and status to play. These gardens are designed for meditation and philosophy.

After these preliminary remarks, I would like to wish you a very successful and constructive workshop. Thank you very much for your patience and attention.

Water and Daily Life

Tadao ANDO

Architect, Professor of the University of Tokyo

During the second half of the twentieth century, the industrialized world enjoyed tremendous prosperity thanks to the use of fossil fuel combustion. However, the period's energy policies led to important environmental degradation, including depletion of the ozone layer, the destruction of fragile ecosystems and industrial waste. Despite the limited capacity of the earth, we have been destroying the nature to such an extent that humanity will be threatened with extinction if such practices continue. In the early twentieth century, the global population totaled about one billion. By 2050, it is expected to reach ten billion. Whether the earth can sustain such a population is a major question, especially when we know that in Africa, for example, some crops do not grow and many children suffer from insufficient or contaminated water.

Water has always been an essential element in our daily lives. Clearly, it has always been the key to the survival of humankind. Nowadays, however, the relationship between people and water seem to be less intimate. In the course of the three decades following the Second World War, people have progressively had less direct contact with rivers and become less familiar with water as it naturally occurs in the environment. Such attitude must be, however, seriously reexamined at the present time, when environmental issues have become so critical and threaten our very survival. We should realize how essential water is and accept that everyone is accountable for solving water-related problems.

One of the important issues concerning water is its relationship with forests, which play a vital role in ensuring the quality of water. In Japan, wild forests are increasingly lost in many areas where trees are cut down and waste is deposited, leading to water pollution by chemicals such as polychlorinated biphenyls (PCBs), dioxins and endocrine disrupters, which cause damage to human health. To give you a striking example, waste from big cities like Tokyo and Osaka are increasingly discarded in forests and islands, especially those of the Seto Inland Sea, as a solution to the shortage of disposal sites.

To support the construction boom that started in the 1960s, sand and rocks have been massively extracted from about 500 inhabited islands for use as construction materials. The vacant quarries were in turn refilled with waste, along with chemicals that contaminate water. Endocrine disrupter concentration is very high among the Japanese population. And yet, the fact that mountains and islands are filled with waste does not seem to shock anyone. People seem to be even indifferent to the questions of environment and quality of water. We must keep in mind that, when forests are lost, water is also lost. The city of Kyoto, where we are meeting today is not an exception. Much vegetation has been lost in this city over the last 100 years because of the industrialization that began during the Meiji period.

To resist environmental degradation, some people are now actively promoting reforestation, and such movements are continuously growing. Seto Inland Sea, for example, there is an initiative to plant 1.2 million trees. In addition to it, school children are encouraged to collect acorn seeds. Assuming that one school can collect about 3,000 to 5,000 acorns, if we secure the participation of 40 schools, we can help to produce trees accordingly. Over the long term, this initiative could eventually lead to the creation of one million trees! So far, 20 schools have joined the project, encouraging children to become familiar with the natural environment. If denuded islands are

replanted with trees and beautiful forests and landscape restored, it will lead in turn to ensuring cleaner water. Although I am not overly optimistic about its far-reaching impact, the project does at least provide children with the opportunity to learn about the importance of life. Many young people living in big cities nowadays are unaware of life in its natural environment. Their involvement in this project will undoubtedly help them to gain a fresh view on their own lives.

Industrialized countries, including Japan, must change their wasteful habits and become recycling-based societies. In Japan, most of buildings are demolished after only 20 years of use. As a result, the proportion of industrial waste attributable to the construction industry is quite high. Architects have therefore a responsibility to design buildings that last for 200 to 300 years.

As an architect, I hope to create designs that would remind people about the importance of respecting water – a value that is too easily forgotten in this era of industrialization. One such attempt is Komyoji Temple. The area is so abundant in fresh underground water that a hole dug in the ground, will quickly fill up with water. Inspired by this experience, when I was asked to restore this 300 year old temple, I designed the area so that the temple appears to be floating over water thereby showing the inherent relationship between people, nature and water.

Okami-no Kami and Kifune Shrine

Kazuhiro TAKAI

Kifune Shrine, Japan

Japan is blessed with a bountiful environment and a mild climate that give Japanese people many reasons to be thankful. The effects of the elements are sometimes harsh, but if people are accepting, these effects soon pass by.

Japan's Shinto religion is based on animism. The belief is that animals and plants have spirits. Shinto is a sophisticated form of animism, a religion that tends to be thought of as primitive, partly because there is no central, Christ-like figure. The word 'God' (a monotheistic concept) has no equivalent in Japanese; instead, the word 'kami', roughly meaning 'deity' or 'guardian' is used. Kifune Shrine is the best example of animism in Japan, and Okami-no-Kami (the 'Water God'), is enshrined there.

Long ago, Japanese people learned to respect the role of this kami, who is not the almighty God of water itself (the kami of water is Mizuhanome-no-Kami), but the provider of water to others, in the form of rain and snow. As plants and trees grow, water is kept in the ground. Okami-no-Kami resides in Mt. Kifune and controls the mysterious works of nature. The name 'Kifune' is derived from the Japanese word 'ki' (meaning tree), the word 'fu' (meaning grow), and the ward 'ne' (meaning mountain peak).

Kifune Shrine is very old. It's exact age is unknown but it is thought to have become functional around 1,600 years ago, after the water kami alighted on Mt. Kifune. Legend holds that Okami-no-Kami, a female kami, came to Kifune on a boat in search of a water source. She round a spring at Okunomiya, where the secondary Kifune Shrine is now located, and she was later enshrined there.

Soon after, she became a dragon (an incarnation of the water kami) and returned to the heavens. Her boat remained behind and was covered with stones and placed in Okunomiya, hidden from sight. Today the stones covering her boat can still be seen in the secondary Kifune Shrine.

Okunomiya was the original site of Kifune Shrine, but it was damaged by a number of disasters. In AD 1055, the main shrine was moved to the current site. In the Heian Period (AD 794-1192) Kifune Shrine was worshipped by the Imperial Court, and was designated one of Japan's 22 most sacred shrines. When people suffered from a drought or a long rain, the Imperial court sent delegations to Kifune Shrine and gave a white horse as an offering to beseech Okami-no-Kami for fine weather and a black horse as an offering to ask for rain.

Shrines used to be under the patronage of the state, but they became religious corporations after the Second World War. There are now at least 2,500 branches of Kifune shrine all over Japan. While

some areas have bountiful water, other areas suffer a shortage of water and still others are exposed to the dangers of floods. However, Okami-no-Kami remains enshrined in all of these places today.

Message on Behalf of the Indigenous Peoples in the Third World Water Forum

Evo MORALES

National Deputy,
Representatives of Indigenous Peoples' Organizations
Bolivia

Ladies and gentlemen, brothers and sisters of water

I would like to congratulate the organizers of this subject area for having included indigenous issues in this World Water Forum. There are two sessions on indigenous issues, among over 350 sessions in the World Water Forum. And how many indigenous people are there? Do you suppose that we are actually only half of one percent of the world population?

According to the United Nations, indigenous peoples have suffered from a situation of colonization or invasion and currently have a non-dominant status in society. It is true that indigenous peoples have been and are continuing to be subjected to colonization, invasion and exile within our own territories. It is also true that we are not dominant in wielding political power. However, in social weight, in number, I assure you that the sectors that are being colonized and subjugated in our own countries are over half the world population.

World-wide, there are over one billion persons with insufficient or poor quality water. Most of that billion are indigenous. Therefore, I feel that the first action that the organizers of the Third World Water Forum should take is to recognize that indigenous people, small farmers and poor people are not sufficiently represented here. We are not going to solve water problems without involving the true stakeholders. Similarly, how many societal, rural and indigenous organizations are on the World Water Council? None. So, if we are going to talk about actions and not just speeches, that will have to change.

I don't know how many of you have read the World Water Vision document approved in The Hague, at the second World Water Forum. Well, who approved that document? That vision? The social movements, the participants in the Forum? Or the consultants hired by the World Water Council? We have to abandon the practice of discussing among ourselves, and then having consultants and experts draft the final reports and conclusions.

Water is a human right. No one may be deprived of water. If we agree with this precept, why are mining, logging, electrical and municipal companies plundering the water resources belonging to the rural and indigenous communities throughout this planet? This Forum has to approve a call to the major trans-nationals, companies and mega-farms, to stop looting water from the indigenous people. But that is not enough; it is necessary to take advantage of the time during these two sessions on indigenous rights, to discuss how we are going to concretely, and effectively support indigenous movements in defending their water, fighting against pollution and preventing privatization of water.

We indigenous people do not want to be research subjects, but fellow combatants in the struggle against the privatization and commoditization of water.

Here, we are all in favour of cultural diversity, with preserving all forms of water management. But what do we see in practice? There is one model – of privatization and generalization – that is spreading and pushing out the others. It is imposing itself – because loans granted by the IMF and the World Bank for the water sector stipulate the condition of promoting privatization of the water sector. So we have to speak clearly: the World Bank and the IMF are against cultural diversity, and are opposing indigenous rights.

The other great danger is that water is being incorporated into free trade treaties. Europe has made a proposal to open its agricultural market to Latin America if, in exchange, we will open up our public water supply services to private European investment. This is also a way of putting an end to cultural diversity.

The World Water Vision from The Hague says that, if we fail to accept privatization, there will not be the necessary investment to resolve water problems. Excuse me for saying so, but that is a lie. In governments, in the public sector, there is enough money to cover all water needs in today's world and tomorrow's as well. All we have to do is get it out of military budgets and put it into water budgets. Stop spending on war and death and begin investing in water and life.

Señores y señoras, hermanos y hermanas del agua,

Quiero felicitar a los organizadores de este tema por el hecho de incluir la problemática indígena en este foro Mundial del agua. Hay dos sesiones sobre la temática indígena sobre mas de 350 sesiones en el Foro Mundial del Agua. Y cuantos somos los indígenas? Seremos acaso menos del medio porciento de la población mundial?

Según las naciones unidas los indígenas son pueblos que han sufrido una situación de colonización o invasión y que presentan en la actualidad una situación no-dominante dentro de la sociedad. Es cierto que los indígenas hemos vivido y seguimos viviendo una situación de colonización, de invasión y exilio dentro de nuestros propios territorios. También es cierto que no somos dominantes en el manejo del poder político. Pero en cuanto a peso social, en cuanto a número, yo les aseguro que los sectores que vivimos una forma de colonización y sometimiento dentro de nuestros propios paises somos mas de la mitad de la población mundial.

En el mundo hay mas de 1000 millones de personas que tienen agua insuficiente o de mala calidad. La mayoría de esos mil millones de personas somos indígenas. Por eso yo creo que la primera acción que deben asumir los organizadores del Tercer Foro Mundial del agua es reconocer que aquí no están suficientemente representados los indígenas, los pequeños campesinos, los pobres. No vamos a resolver los problemas del agua sin la participación de los verdaderos actores. De igual forma cuantas organizaciones sociales, campesinas e indígenas hay en el Consejo Mundial del Agua. Ninguna. Entonces. Si vamos a hablar de acciones y no solamente de discursos esto tiene que cambiar.

Yo no sé cuantos de ustedes han leído el documento de la Visión mundial del agua aprobada en la Haya, en el segundo foro mundial del agua. Bueno, quien aprobó ese documento? Esa visión? Los movimientos sociales, los participantes al foro, o los consultores contratados por el Consejo Mundial del agua. Tenemos que abandonar la practica de que nosotros discutimos y los consultores, los expertos redactan las conclusiones e informes finales.

El agua es un derecho de humano. Nadie puede ser privado del agua. Si estamos de acuerdo con este precepto porque las empresas mineras forestales eléctricas y municipales nos están despojando de nuestro recurso hídrico a las comunidades campesinas e indígenas en todo el planeta. Este foro tiene que aprobar un llamado a las grandes transnacionales, empresas y latifundios para que no despojen a del agua a los indígenas. Pero eso no es suficiente, es necesario que aprovechemos el tiempo de estas dos sesiones sobre derechos indígenas para discutir como vamos a apoyar de manera concreta y efectiva a los movimientos indígenas a defender el agua, a luchar contra la contaminación y a evitar la privatización del agua.

Los indígenas no queremos ser objetos de estudio, los indígenas somos compañeros de lucha contra la privatización y mercantilización del agua.

Aquí todos están de acuerdo con la diversidad cultural, con preservar todas las formas de gestión del agua. Sin embargo que vemos en los hechos? Que hay un modelo de privatización y generalización que se va generalizando e imponiendo sobre los otros. Imponiendo, porque los créditos que otorga el FMI y el BM para el sector agua son a condición de que se promueva la privatización de este sector. Entonces, tenemos que decirlo claramente: el Banco Mundial y el FMI están en contra de la diversidad cultural, están en contra de los derechos indígenas.

El otro gran peligro es que el agua esta siendo incorporado en los tratados de libre comercio. Europa ha hecho una propuesta para abrir su mercado agrícola a América latina a cambio de que nosotros abramos nuestros servicios públicos de agua potable a la inversión privada europea. Esta es también otra forma de acabar con la diversidad cultural.

La visión mundial del agua de la haya dice que sino aceptamos la privatización no habrá la inversión necesaria para resolver los problemas del agua. Discúlpenme, estas es una gran mentira. En los estados, en el sector publico hay dinero suficiente para atender todas las necesidades del agua en el mundo de hoy y del mañana, lo único que tenemos que hacer es sacarla de los presupuestos militares y llevarla a los presupuesto del agua. Dejar de gastar en la guerra y en la muerta y empezar a invertir en el agua y en la vida.

Water is Siwlkw (poetry)

Jeanette ARMSTRONG

Author and artist
Executive director of the
En'owkin International school of Writing and Arts
Traditional Science Council Member
of the Okanagan Nation
(Canada)

Good afternoon. I would like to give you a greeting in my language Okanagan, in British Colombia in Canada.

I give you greeting to the spirit of your ancestors. My people are from the river, a great Colombia river and I gave you greeting from that river.

I want, first of all, thank the organizers in coordinating this part of the Forum, the Canadian National Commission for UNESCO for having invited me to present at the Opening Plenary and to share some words as well as my poetry with you. It is an honor to be here to present the diversity of Canada and the Indigenous voice.

Before I share my poetry, I would like to touch on the extreme importance of recognizing the perspective and participation of the Indigenous peoples and our cultural voice in this dialogue with regard to water, in order to respect the diversity and the right of all peoples' cultures and our life forms in this world. I would like to thank my previous speaker, Evo Morales, to bring that up. Indigenous peoples contribute in a crucial ways to shape our future. Without substantive participation of indigenous peoples in all aspects, at all the level of this dialogue, the action coming out of it only finds itself unbalanced and in inequity. So I encourage all to be vigilant, to be courageous and to be creative in finding ways to structure in ongoing participation of the diversity of indigenous peoples views and solutions to this matter.

As a traditional knowledge keeper, it is also a duty given to me to provide reminder to all of us present here that we, as humans, approach and interact with the natural world in a specific way and that way is a responsibility with profound outcomes in the future. The way we interact affects the way we approach life and water. We must come of the principle and disciplines with regard to all life in this matter in the dialogue as regard to water. It is a spiritual responsibility for us, human, because water is life. From the tiniest life to the greatest, all equally require water in order to exist. Water is a basic element of life and is therefore sacred, as sacred is the life itself. We are all equal in that. Life belongs to all. Water belongs to all. We are water.

It is also the wish of my elders to remind you that all of our action impacts the life form in the future and that we cannot afford to think only for immediate needs. Each of us are filled profoundly with this responsibility and we must work in a spiritual way in to find a way to continue to assert that water is an alienable right accorded to each living thing, to each human being on this earth.

I want to share with you some words about water: 'Water is Siwlkw'. Siwlkw is a sacred word amongst our people. Siwlkw was medicine, the highest and the greatest form of medicines given to our people. This word, I translated from my language to make this poetry, was taught by my mother

who passed away recently. That medicine gives us all the health. It not only cleanses your body but also your soul. So we call out spirit of water to cleanse our mind for the task we have before us:

Water is Siwlkw

siwlkw she murmured is an emergence the subsequence of all else
a completeness of the design transforming to be lapped continuously
onto long pink tongues in that same breathing to be the sweet drink
coursing to become the body a welling spring eternally renewing
a sacred song of the mother vibrating outward from the first minute drop
formed of sky earth and light bursting out of the deep quietness
siwlkw is a song she breathed awakening cells toward this knowing
that you are the great River as is the abundant land it brings to carve
its banks then spread its fertile plains and delta's and open its basins
it's great estuaries even to where it finally joins once again
the grandmother ocean's vast and liquid peace as is the headwater glaciers
of the jagged mountains waiting for the yearly procession of thunder beings
bearing the dark cloud's sweep upward as spirits released from green depths
cradling whale song dance on wind as are the cold ice springs feeding
rushing brooks and willow draped creeks meandering through teeming
wetlands to sparkling blue lakes as are the silent underground reservoirs
coursing gradually up toward roots reaching down to draw dew upward
through countless unfurlings into the suns full light as much as the salmon
and sleek sturgeon sliding through strong currents even the tall straight
reeds cleaning stagnant pools equally are the marsh bogs swarming
multitudinous glistening flagella and wings in high country holding dampness
for the gradual descent through loam and luxuriant life to drink in silkw
she said is to remember this song is the way it is the storms way driving
new wet earth down slippery slopes to make fresh land the river's way
heaving its full silt weight crushing solid rock the tide's way smoothing
old plates of stone finally deciding for all the way of ice piled bluegreen
layer upon layer over eons sustaining this fragment of now so somewhere
on her voluptuous body the rain continues to fall in the right places
the mists unceasingly float upward to where they must and the fog forever
ghosts across the land in the cool desert wind where no rain falls and each
drop is more precious than blood balancing time in the way of the silvery
hoar frost covering tundra where iridescent ice tinkles under the bellies of
caribou her song is the sky's way holding the gossamer filaments
of rainbow together guarding the silent drift of perfect white flakes where
the moose stop momentarily to look upward her song in the forest insuring
a leaf shaped just so captures each glistening droplet to celebrate
the vast miles of liquid pumping through the veins of the lion parting
undulating savanna grasses lifting great Condor wings soaring last circles
in the mountains of Chile accumulating in the places it chooses to pool
in subterranean caverns moving through porous stone seeping and wetting
sand deep inside of her caressing thunder eggs and smooth
pebbles at her heart

This song is the way

Jeannette C. Armstrong, Feb. 2003

Water and Maori People

Roimata MINHINNICK

on behalf of Ngati Te Ata of Waiohua Waikato, Aotearoa New Zealand

Tihei Mauriora

Ko Matukutukutureia	*te Maunga*
Ko Manukau	*te Moana*
Ko Waikato	*te Awa*

Tena Koutou Tena Koutou Tena Koutou Katoa

Greetings from *Aotearoa* New Zealand

Tis the breath of life

Matukutukutureia	is our mountain
Manukau	is our harbour
Waikato	is our river

When a Maori introduces himself but does mention his name one should not be offended. For in our custom and ceremonies Maori introduce themselves through those things most sacred and treasured to them. In this regard, every Maori will mention the waterway within their tribal territory. So from a Maori perspective they are actually introducing themselves, they are the embodiment of that mountain, that river or lake, culturally and spiritually connected.

Nonetheless my name is *Roimata* which means teardrops. In our creation story, *Roimata* represents the teardrops or rain of *Ranginui* our Sky father who was separated from *Papatuanauku* our earth mother, and hence the tears. From that rain flow the rivers and are enshrined our lakes, our water giving life to all things on earth. Thus water is very much part of a holistic embracement of the total environment to Maori and its value well understood.

The purpose of this paper is to describe this cultural and spiritual relationship to water from the perspective of one Maori entity, the Ngati Te Ata Tribe who belong to the Waikato and Waiohua Tribal confederations. I will also make links to the historical concerns of our people.

To fully appreciate Maori cultural and spiritual ties to water, it is important to note that the medium between the two is *Te Reo Rangatira*, the Maori language. It is therefore worth mentioning at this point, the Maori translation for water is *Wai*. Again, the importance my ancestors placed on our relationship to this *Wai* is evident in our tribal namesakes: *Wai o hua* and *Wai kato.*

Wai kato, means the rippling waters and significantly, it is also the name of the largest river in New Zealand. And *Wai o hua*, refers to the many (waters of hua), or fully, (Huakaiwaka,) the founding chief of our tribe. From his ancient fortress, Maunga whau, one has a commanding view over both the Tasman and Pacific oceans, the Manukau and Waitemata harbours, the Waikato River and the many lakes, tributaries and springs that maintained our cultural and spiritual livelihood for over

1,000 years. Indeed like our host country, Japan we are both fortunate in this regard, to be surrounded by water on all sides. On this note, the caucas of indigenous peoples were honoured to have been invited to one of the sacred water sites (over 500 years old we were told) at the Nashinoki Jinjya shrine, an underground water construct next to the Kyoto Imperial Palace. Clearly all indigenous peoples have long appreciated that in water there is a spiritual link and cultural tie.

For Ngati Te Ata, the Waikato River and Manukau harbour were things that stirred the hidden forces within our tribe. They were (and it is hoped will always be) something much more grand and noble than a sheet of water that covers a muddy river bed. To Maori their rivers or lakes were striking features possessed of a *Mauri*or (indwelling life force) which bound them closely to the fortunes and destiny of the tribe. Gazed upon from childhood days, these waterways crew into the affections and life of the tribe, until they were an integral part of the tribe itself. To Maori these waterways were something that added rank, dignity and an intangible mana or prestige to the tribe. And on that account alone, they were highly prised and defended. Thus the supreme test of ownership even in the Maori view was occupation. This meant defending these waterways through the location of fighting fortifications, fishing villages, and the exercise of fishing rights on and throughout the boarders.

It is difficult to over-estimate the importance of the Manukau Harbour or Waikato River to our people. They are symbols of our existence. As even the Governments Waitangi Tribunal recognized in stating:

> The [Waikato] river is deeply embedded in tribal and individual consciousness. Like Manukau it has its own taniwha or guardians, but unlike Manukau, there is a taniwha at each bend [100 in all]. The River has its own spirit. It is addressed in prayer and oratory as having a life force of its own. The spirits of ancestors are said to mingle and move with its currents.

When Waikato people are sick, uncertain or about to undertake a journey or new venture they seek the blessing of the water and the protection of their ancestors by immersion of sprinkling.

It is also no coincidence that *Wai rua* is translated to mean (spirit). When interpreted and expressed individually however, *Wai* meaning water and *rua* meaning two does not equate to something as special. But when combined, the words come alive. Thus for example, at the top of the North Island of New Zealand there is a site called *Te Rerenga Wairua*, meaning 'the departing place of the spirits'. This sacred site provides us with some understanding of the Maori view and the connection between spirituality and water. Here, the two vast ocean currents of the Tasman and Pacific converge as one. Their *Ihi* or essence, their *Mana* or power, their *Mauri* or life force and pure beauty combines. That binding of these two great forces of nature is deemed in the Maori context to be, spirit itself, hence why the meeting of two natural waterways, for Maori, is a manifestation of spirituality itself. Within this spirit, were also recognized numerous other forms of *Wai.*

There is *Wai Maori* (fresh water) also the life-giving gift of the gods (*te wai ora o tane*) and it is this water which is used to bless or heal. There is *Wai inu* (drinking water) and separate streams or springs used for drinking, cooking and cleaning (explaining why no Maori will wash clothes in a kitchen). There is *Wai mate*, dead or waste water, which is purified by return to the earth, ritualistic purification or, with the exception of water containing animal wastes, by mixing with large quantities of clear water, (Wai marama). *Wai mataitai* (salt water) is separate (te wai ora o Tangaroa). It also provides food but its domestic use is limited. Water is life.

Historical brief

To also understand our cultural and spiritual ties to water, history has some important lessons to offer. One theme that has constantly repeated itself in our tribal history, has been the ongoing

attempts to right the wrongs concerning the loss of authority and control of our waters, sacred sites and fishery resources within.

During the proceedings of the Maori Parliament at Orakei, over 100 years ago (in 1879), my great great great grandfather, Hori Tauroa, affirmed current concerns at a relatively early period in New Zealand's colonial history when he stated that Maori:

> ought to have the authority over all our lands as well as the foreshore and fisheries…Another matter in respect to which I say that the Government did wrong was the Manukau [harbour]. I was not aware of the government taking all my large pipi-banks and shaols in the Manukau.

The desire to continue the exercise of this authority over foreshores and fisheries also highlights the importance our people placed on the cultural sustenance of water.

While MP for Western Maori between 1896 and 1911, my great grandfather, Henare Kaihau constantly drew the New Zealand Government's attention to water issues. He questioned the laws 'affecting the fish in the seas and rivers' and wanted to know 'by what right' did the European members 'legislate in such a way as to usurp to [themselves] those rights'. He also argued that the:

> Treaty of Waitangi specifically provided that all rights and privileges of ownership should be insured to the Maoris.

Henare also opposed legislation restricting access to 'shellfish along the foreshores', where in our neighborhood he contended , such food was a part of the staple diet as opposed to recreational. In 1896 he introduced his own Maori Council Constitution Bill to the House seeking Maori autonomy under a helm that would see Maori, having equal participation in regard to their affairs particularly concerning land and water issues. Parliament simply ignored the Bill. But undeterred Henare invoked the Government's own statutory powers in referring to the 1852 Constitution Act. Section 71 of the Act provided Maori the right to 'the Government of themselves' and to use their own 'laws, customs, and usages'. Although the Crown clearly had the legal mechanism to implement such requests, its failure to do so adds to a long list of Government breaches of our rights under the Treaty of Waitangi.

Henare's constitutional thought on that Treaty and ties to land and waters, is also apparent. In 1898 he stated:

> I think hat members of this house should make themselves acquainted with the provisions of the Treaty of Waitangi, because I affirm that the matters I am referring to were provided for in that Treaty. The provisions of that Treaty gave to the Native owners all their rights and mana [sovereign power and authority] to their lands, the administration of their affairs, their forests, fisheries and all other property that they possessed.

Another example of the desire to exercise some form of control of water and fisheries issues was in 1948. My elders applied under the Maori Social and Economic Advancement Act of 1945 to implement a provision that provided for the reservation of fishing grounds for the 'exclusive use' of Maori.

The Marine Department unwittingly declared at the time that it had no intention of implementing a regime that would enable Maori to exercise such exclusive usage. And once again our elders were misled in the powers they would have to control their laws and customs concerning waterways. This is not because exclusivity was the real concern although it had been guaranteed to them under the Treaty of Waitangi, but as eventuated, pollution, commercial fishing and general bad attitudes toward Maori values and interests was becoming a concern.

Thus in 1982, my mother, (Nganeko Minhinnick) lodged the Manukau Claim to the Waitangi

Tribunal, a statutory body empowered to determine alleged breaches by the Crown of the Treaty of Waitangi. The claim specifically referred to the: loss of water quality and fishing grounds, loss of customary fishing rights and traditional reserves, loss of lakes and loss of ownership of the waters of the sea, river and harbour. It also detailed the detrimental impact to the attitudes of decision makers in their lack of acknowledgement of our cultural and spiritual values.

The Waitangi Tribunal recommended to Government a change to the law to admit Maori values concerning our water rights.

Then in 1987, my mother, lodged an appeal against the decision of the Planning Tribunal in the case of *Huakina Development Trust v Waikato District Authority* which set a precedent concerning judicial recognition of cultural and spiritual values. That case involved objections based on Maori cultural and spiritual values to the discharge of waste from a local farmer into an estuary of the Waikato River that the Waikato District Authority consented too. Justice Chilwell found that:

> Maori spiritual and cultural values cannot be excluded from consideration if the evidence established such links to a particular and significant group of Maori. Nor should the benefit of all New Zealanders be given a degree of absolute emphasis so as to exclude Maori spiritual values from a branch of law, which has an affinity with the Treaty.

Those claims influenced Government changes in the law. The 1991 Resource Management Act specifically providing for the relationship of Maori to their waters, lands and sacred sites as well as the recognition of Treaty principles. Despite this relative success, the Tribunal and Government have still failed to recognize that the Treaty of Waitangi also reaffirmed to Maori the right to exercise the authority and control to govern, regulate and manage their water rights. Our ancestors had never had their waters confiscated, they had never sold them and had never consented to their acquisition by local authorities via Government. Indeed there was never any consultation in the alienation of the uncompensated ex-appropriation of this cultural interest. Importantly, our people did not seek at the hearing any form of compensation as they did not want our waters to be titled a property right that could be usurped and commoditized like our land.

Case study: The Waikato River and Manukau Harbour today

The Waikato River, Manukau and Waitemata harbours adjoin an area that constitutes the heaviest population concentrations in the largest city and fastest growing in New Zealand. Concerning the river, the Waitangi Tribunal noted:

From Lake Karapiro to the mouth of the river, the river provides water at 20 points to industrial developments in river towns and water sewage outlets to 21 towns. At four points its flow is harnessed for hydro-electricity and at two for coal-fired electricity. The lower reaches are increasingly important for the irrigation of a growing horticultural industry. We were informed that 203 water rights for irrigation have been granted. It is estimated that a massive 90 million litres of animal wastes are generated within the catchment daily and the river is under increasing stress due to difficulties in controlling agricultural run off. We are solely concerned with the part of the river near to the mouth. It was claimed that extensive fishing there has been seriously depleted by siltation of the bed and mouth, shifting sandbanks, commercial fishing and the effects of Maioro mine site.

And although last year a private company, Water Care Ltd. established a treatment plant on the River after a shortage sent planners into crisis mode, for our people they are still unpopular. The company now pumps thousands of tons of water per day through to its City wide users. We the traditional owners of the water must now pay water rates to local authorities and Water Care Ltd for using water that they allowed to be polluted and essentially stole from under us. The unresolved issue for our people, whom statistically speaking are at the bottom of the socio-economic rung,

highest suicide rates in the world, highest death by heart disease in the world, substandard housing, incarceration, etc. is definitely the loss of control over our own destiny our identity and thus our waters.

The challenge we pose to all Governments, businesses, organizations and the international legal fraternity is why therefore were Maori like aborigines in Australia and our indigenous kin of Canada and America and elsewhere, afforded rights to aboriginal, native or customary title over our land, river and river beds but not the actually water itself. The same principles of customary usage should apply. Indeed in the *Te Runanga O Ikawhenua* decision 1994, the New Zealand Court of Appeal stated that native rights cannot be extinguished otherwise than by the free consent of the native occupiers and only by means of a deliberate Act directed towards that end. It also stated that:

> to override or dispose of a concept of a river as a taonga, meaning a whole and indivisible entity, not separated into bed, banks and waters. It may not be appropriate to render native title conceptually in terms which are appropriate only to systems which have grown up under English law.

This decision suggests that waters are a part of customary title and that the Crown should treat with Indigenous peoples over waters as it had lands and river beds. Certainly to Maori who view the environment holistically but were and still are direct thinkers there would be no more reason for separating a river or lake from its bed or water (as to the ownership thereof) than from separating the rocks and soil that comprise a mountain. In fact our *rangatira* chiefs would have regarded it as a rather grim joke had any strangers asserted that he did not possess, did not own, the water of his own river.

Kia Ora.

The Ramsar Convention and Wetland Cultural Heritage[1]

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Summary

Wetland cultural heritage represents the legacy of past and present generations whose knowledge, safeguarding and management of wetlands are necessary contributions to the sustainable development of these aquatic-terrestrial environments. Today's landscapes are not exclusively the result of modern activities, but have gradually taken shape thanks to the supervision of the features that define the patterns of the different settlements of former civilisations. When it comes to classifying the features of cultural heritage, an initial dividing line between material and intangible heritage may be established.

A number of prominent international institutions have started recognising the beneficial links between nature and culture. The Convention on Wetlands has realised the need to study and to assess the relationship of culture with nature, especially in relation to wetlands and waters. During the 8th Meeting of the Conference of the parties (Valencia, Spain, 2002) it was approved the Resolution VIII.19 about Wetland Cultural Heritage *Guiding principles for taking account the cultural values of wetlands for the effective management of sites*. They include an analysis of cultural values and wetlands, and provide detailed guidelines for their management, as well as specific advice for each category of value.

Introduction

During the last few decades of the twentieth century the beneficial bonds that exist between nature and culture have started to be recognized as themes of great importance by public opinion. This has not happened unnoticed, for many international organizations have started to incorporate these topics in their objectives and plans of action. Thus, the World Heritage Convention, which was adopted by UNESCO's General Conference in 1972, created an international instrument that acknowledges and protects cultural and natural heritage of exceptional universal value by establishing a World Heritage List. In this context, for the first time it is considered that cultural heritage cannot be completely disassociated from natural environment in which it has been created.

1. Translation into English: DeMaria-Kinney, J.

The other is that not only tangible heritage (exceptional cultural assets), but also intangible heritage (i.e. all forms of traditional and popular culture or folklore) need to be taken into account.

The Rio Declaration on Environment and Development in 1992 specified in Principle 22 that '*The indigenous peoples and their communities, as other local communities play a fundamental role in the regulation of the environment and the development in their own development of their knowledge and traditional practices. The States will have to recognise and support their identity properly. Culture and interests make possible it's effective participation in the achievement of sustainable development'*.

On the other hand, the recent Convention on Biological Diversity (1992) considers traditional knowledge, the practices and innovations of the indigenous people and their local communities of great importance for the conservation of biodiversity. These cultures have profited from and adapted to environmental conditions through out time. The majority of these cases have been passed on orally from generation to generation.

The World Commission on Protected Areas (WCPA) has in its objectives the safeguard of sites with high biodiversity, important beautiful landscapes and with significant cultural importance. For these sites form an irreplaceable heritage for humankind. In addition, a great part of these protected areas are settlements of many indigenous people. Their culture and landscapes reflect their knowledge of nature and the long interaction between Man and Nature.

The International Council on Monuments and Sites (ICOMOS), is dedicated to the conservation, protection and enhancement of cultural heritage. In 1999 it devised the Cultural Tourism Charter, it recognised that excessive tourism could endanger the significant characteristics of the sites in connection with cultural heritage, as well as the natural environment in which it has been created. At the same time it is consistent with the benefits that cultural tourism can offer the distinct host communities, proportioned means and important motivations are to care for and maintain cultural heritage.

The European Convention for the Protection of Architectural Heritage recognised that architectural heritage constitutes an '*irreplaceable expression of the wealth and diversity of European cultural heritage and a common good for all of Europe'*. This Convention not only considers the architectural works per se, but the landscapes as well. They thus consider these sites as '*combined works of Man and Nature'*, those which must be preserved in their entirety.

The Ramsar Convention and Cultural Heritage

The Convention on Wetlands (Ramsar, 1971) is an intergovernmental treaty which provides the framework for national action and international co-operation for the conservation and wise use of wetlands and their resources. There are presently 136 Contracting Parties to the Convention, with 1.283 wetland sites, totalling 108.7 million hectares, designated for inclusion in the Ramsar List of Wetlands of International Importance.

The Convention on Wetlands has been highly receptive regarding the need to study and assess the relationship between nature and culture, especially in relation to wetland and waters. Work got underway at the technical session held in Djerba (Tunisia), in Abril 2000 on the occasion of the ThirdMeeting of the Mediterranean Wetlands Committee (MedWet/Com3) on this issue. In addition, the Ramsar Convention devoted World Wetlands Day 2002 (2 February) to this theme.

Studies carried out since 2001 have looked into the issue in depth and specific guidance on managing cultural values has been drawn up. In the 8th Meeting of the Conference of the Parties (Valencia, Spain, 2002) it was approved the Resolution VIII.19 about Wetland Cultural Heritage '*Guiding principles for taking account the cultural values of wetlands for the effective management of sites'*, which was proposed by the Standing Committee of the Convention. Accordingly, the Ramsar Convention recognised wetland cultural heritage, as well as the legacy of past generations.

This document constitutes the basis of future development of direct actions towards acknowledgement of wetland heritage as a tool for the conservation and management of wetlands.

Among other dispositions, this Resolution *'Encourages Contracting Parties to recognise cultural and heritage values relating to wetlands in their existing heritage protection, legal framework and policies' and, still, 'Encourages Contracting Parties to consider using the list of Guiding Principles, but only in relation the conservation and enhancement of the cultural values of wetlands'*.

Moreover, it urges the Contracting Parties to take actions on advice like inventory related to aspects of wetland cultural heritage, to integrate these elements in environmental impact evaluations and consider them as tools to promote the participation of the local communities in the planning and management of the sites.

Historically, The Ramsar Convention has recognised the participation of local communities as essential in wetland management. In Recommendation 6.3 on *Involving local and indigenous people in the management of Ramsar wetlands* (approved by the 6th Conference of the Contracting Parties in 1996), it asked the Contracting Parties to make efforts to encourage the participation of the indigenous people and local communities, such as their direct involvement in the management of their wetlands. In the annex of Resolution VII.8 on the *Guidelines for establishing and strengthening local communities' and indigenous people's participation in the management of wetlands* (approved in the 7th Meeting of the Conference of the Contracting Parties in 1999), recognises that the participation of the local communities and indigenous people in relation with the wise use of wetlands contributes considerably to the maintenance or the restoration of the ecological character. It is understood that sustainable wetland development is a global resource management process in order to insure their natural and cultural survival. Accordingly, this development must be founded on knowledge, experience and management capabilities of their own populations.

In the other part, it specifies that *'The Ramsar Convention has to work in co-operation with multilateral and regional agreements and other organisations that occupy themselves with the need to take decisive measures to conserve the cultural heritage, between others'*. It was mentioned among other agreements and organisations specifically that:

- the Convention Concerning the protection of the World Cultural and Natural Heritage (Paris, 1972);
- The Call of Granada (1975) of the Council Europe on Rural Architecture and its Landscape;
- Recommendation 881 (1979) of the Parliamentary Assembly of the Council of Europe on Rural Architecture Heritage;
- UNESCO's activities in the promotion of the conservation of cultural heritage;
- The general principles for conservation proposed by the Vernacular Built Heritage Charter (Jerusalem, 1996), ratified by the XI General Assembly of the International Council of Monuments and Historical Sites (ICOMOS);
- the various recommendations of the World Intellectual Property Organisation (WIPO) for the protection, conservation, legal status, economic exploitation, and international protection of folklore;
- the Convention on Biological Diversity, in particular concerning its Decision VI/10 of the Conference of the Contracting Parties on the *Outline of the composite report on the status and trends regarding the knowledge, innovations and practices of indigenous and local communities relevant to the conservation and sustainable use of biodiversity*, and the plan and timetable for its preparation; and on *Recommendations for the conduct of cultural, environmental and social impact assessment regarding developments proposed to take place*

on, or which are likely to impact on, sacred sites and on lands waters traditionally occupied or used by indigenous and local communities;

- the European Landscape Convention (Florence, 2000);
- the Convention concerning Indigenous and Tribal Peoples in Independent Countries (International Labour Organisation No. 169, 5 September, 1991); and the Permanent Forum of Indigenous People.

This resolution includes *27 Guiding Principles* (Table 1) for taking into account cultural values of wetlands for the effective management of these Ramsar sites. These principles will have developed them in the next three years and the preliminary results will be presented in the COP9 (Kampala, Uganda, 2005). In this sense, said Resolution, *'encourages Contracting Parties to establish appropriate consultation mechanisms at regional or national levels, in order to consider how the Guiding Principles might be applied in developing and promoting the cultural values of the wetlands'*.

Wetland and Cultural Heritage

Wetland heritage often does not correspond in many cases to relic civilisations, but is 'living' heritage although not for that reason free from many dangers that threaten to dilute or destroy traditional ways of life. Managing such sites therefore poses a difficult challenge, all the more so when they are islands in the middle of the technological civilisations.

A *cultural landscape* is the result of the interaction between Man and Nature but they are not exclusively related to modern activities. They have gradually taken shape thanks to the overlapping of the features that define the patterns of establishment of the various former civilisations. Some cultural landscapes have endured and are a living record of the historical civilisations that occupied or still occupy these regions, making up an important cultural and historic heritage.

When it comes to classifying the features of cultural heritage (Table 2), it is appropriate to establish an initial dividing line between material and intangible heritage. Material heritage may be regarded as cultural expression through material signs and tokens. It therefore includes physical heritage, within which it is possible to differentiate between movable cultural assets (movable heritage) (Fig. 1) and immovable cultural assets (immovable heritage) (Fig. 2). The former are movable objects that are the expression of human creation, with an archaeological, ethnological, historical, artistic, scientific and/or technical value, while the latter are works and products of human invention that cannot moved from place to another because they are either spaces that have been built over or are inseparable from terrain on which they occur. This category can also include the 'landscape' (Fig. 3) as a cultural element since it is the product of symbiosis between human beings and Nature over long periods of time.

Table 1.
Guiding Principles
for the consideration and effective management of wetland cultural value sites

Guiding principles	*Description*
1	To identify the cultural values and relevant associated partners
2	To link the cultural aspects of the wetlands to those of water
3	To safeguard the wetland-related cultural landscapes
4	To learn from traditional approaches
5	To maintain traditional sustainable self-management practices
6	To incorporate cultural aspects in educational and interpretative activities in wetlands
7	To take into account culturally appropriate treatment of genre, age and social role issues
8	To bridge the differences of approach between natural and social sciences
9	To mobilise the international co-operation in matter of cultural issues related to wetlands
10	To encourage research on palaeoenvironmental, palaeontological, anthropological and archaeological aspects of the wetlands
11	To safeguard wetland-related traditional production systems
12	To protect historical structures in wetlands or closely associated with them
13	To protect and preserve wetland-related artefacts (mobile heritage)
14	To preserve collective water and land use management systems associated with wetlands
15	To maintain traditional sustainable practices used in and around wetlands and value the products resulting from these practices
16	To safeguard wetland-related oral traditions
17	To keep traditional knowledge alive
18	To respect wetland-related religious and spiritual beliefs and mythological aspects in the efforts to conserve wetlands
19	To use the arts to promote wetland conservation and interpretation
20	To incorporate the cultural aspects, where available, in the Ramsar Information Sheet (RIS) for the description of Wetlands of International Importance of Wetlands, whilst ensuring the protection of traditional rights and interests
21	To incorporate cultural aspects of wetlands in management planning
22	To include cultural values in wetland monitoring processes
23	To consider the use of institutional and legal instruments for conservation and protection of wetland cultural values in wetlands
24	To integrate cultural and social criteria into environmental impact assessments
25	To improve wetland-related communication, education and public awareness (CEPA) in the matter of the cultural aspects of wetlands
26	To consider the possibility of using quality labelling of sustainable traditional wetland products in a voluntary and non-discriminatory manner
27	To encourage cross-sectoral co-operation

Table 2.
Cultural Heritage Classification of Wetlands

CULTURAL LANDSCAPE	Productive ecosystems	Agricultural ecosystems	- Rice fields - Traditional oasis - Grasslands - Afforestations
		Wetlands with mineral and fishing exploitation	- Salt pans - Wetlands with shellfish and fish farming exploitation
	Wetlands and art	Architecture Paintings Sculptures Literature Music Cinema	
CULTURAL HERITAGE	Material heritage	Immovable buildings or constructions	- Typical housing - Hydraulic devices
		Movable	- Rituals - Mythology - Religions
	Inmaterial heritage	Beliefs	- Rituals - Mythology - Religions
		Folklore	- Celebrations - Dances - Gastronomy
		Popular knowledge	- Animal domestication - Ethnobotany - Ethnomedicine - Traditional resource management methods

Fig. 1. Movable cultural assets (movable heritage)

Fig. 2. Immovable cultural assets (immovable heritage)

Fig. 3. Landscape: cultural element

Fig. 4. Intangible cultural heritage

Intangible cultural heritage consists of activities, procedures, customs, uses and beliefs (Fig. 4), and is closely linked to traditional popular culture. Many such activities carried out in wetlands have been passed on since ancient times from generation to generation on the basis of oral tradition. Along with customs, dialects, beliefs, music, dance, rituals, celebrations, popular medicine, culinary arts, etc. they gradually came to form traditional knowledge, and express the culture of the different peoples who settled in or near wetlands. This heritage is very vulnerable because it hasn't been registered on supported materials.

Future actions

The last decade has produced a growing appreciation of the landscapes associated with the collective memory and cultural attributes or symbolic of the generations that have populated them. In this sense, there have been numerous realised efforts in configuring a series of instruments that guarantee the protection of the spaces of cultural interests.

The Mediterranean Landscape Charter[2], defines landscape as 'the tangible expression of the spatial and temporal relationship between individuals and societies and their physical environment, shaped to varying degrees by social, economic and cultural factors. The landscape is therefore the result of a combination of natural, cultural, historic, functional and visual elements'.

The European Landscape Convention proposes the social awareness with respect to the landscape and the development of specialised education and training. In addition, it makes reference to

2. Passed in Seville (Spain, 1992) and elaborated under the sponsorship of the European Regional Council of Andalucía, Languedoc-Rosellón, Toscana, with previous colaboration from the Regione del Veneto.

account for the rapid transformations of many landscapes and acts to avoid their degradation, destined political development for *'protection, management and planning of all landscapes in Europe'*.

The UNESCO has been elaborating some *Guidelines for managing cultural heritage*, in order to assist site managers in the delicate balance between mankind and nature.

Most management strategies concerning cultural heritage have always tended more or less consciously towards conservation and research. Awareness of heritage is an ancient phenomenon, which has enabled objects from the past to come down to us in the present.

Nowadays, heritage management is understood as the series of actions programmed to achieve the best possible conservation of heritage assets. It is however, a more dynamic vision than in the past, which besides strictly preserving and overseening the heritage, includes comprehensive management and search for new social uses within the framework of a strategy for sustainable development, in which heritage takes on the value of a 'cultural resource'.

Technical aspects of the conservation of this heritage we remember the difficulty in their preservation due to their fragility and, above all, because they are scarce resources that are not renewable and their degradation or destruction would represent an irreparable loss. The extreme vulnerability of some resources, such as intangible ones, must be taken into account; merely preserving them represent a great challenge for cultural heritage managers.

However, a large part of heritage is available to be exploited for social ends. The educational potential of such resources, as well as the possible economic benefits for the local communities derived from their exploitation as attractions for interpretative cultural modalities of tourism must be kept in mind. Local communities should always be the primary beneficiaries of new forms of usage.

It is evident that there is increasing interest in knowing more about wetlands and their resources. This fact is interpreted as a positive factor for their conservation in the future. Knowledge is the first step in appreciation and awareness-raising about aspects of our natural and cultural environment and culture. Their disappearance would mean a loss of cultural identity and a moral debt to future generations.

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Presentation of Floating Sculptures

Marta PAN

Sculptress, France

Marta Pan has devoted her life as a sculptor to the pursuit of geometric simplicity, and the exploration of the themes of balance and equilibrium. Her site-specific sculptures were pioneering in their attention to the overall landscape, to subtly changing light, and movements of water and wind. They were typically placed in natural environments and sculpture parks, but in recent years are found increasingly in urban settings as Pan's interest has shifted to the scenery of cities, and to the creation of an environment in public space.

She has been much more active, and is more recognized, abroad, especially in Japan, than in France where she resides. Her works are appreciated in Japan for their abstract serenity, and for their harmony with nature, which perhaps recalls the essence of the traditional Japanese garden. Marta Pan was born in Budapest in 1923, and moved to Paris in 1947 after studying sculpture at the Academy of Fine Arts in Budapest. Her early work was mainly inspired by natural forms such as the hinge mechanism of seashells.

ln Paris, she met Brancusi, Fernand Léger and Le Corbusier. Her marriage in 1952 to Andre Wogensky, Le Corbusier's main assistant, and their intellectual collaboration, is said to have been the most direct cause of the introduction of architectural elements to her sculpture. ln 1956, her work *Le Teck,* which consisted of two large moveable parts, so impressed Maurice Béjart that he decided to create a ballet of the same name around it. It was performed on the roof of Le Corbusier's *unité d'habitation* in Marseille. It was the first of her works linked to dance.

Marta Pan uses a wide variety of materials for her sculpture, including wood, bronze, stone, and steel. Her large 1961 *Floating Sculpture* in the pond of the Kroler-Müler Museum's sculpture garden in Holland marked a turning point in her career. From this point onwards, Pan's art became more and more deeply related to architecture. Her first stay in Japan in 1969 to install a floating sculpture for the Hakone Open-Air Museum also proved to be a decisive landmark in her career. Her encounter with Japan, it seems, was something like a mystical union, and she now has about 25 major pieces here.

Pan participated in the Champs de la Sculpture in Paris in 1996, and in 2000 had a retrospective exhibition at Chateau Coubertin, near Paris, representing 20 years of her work. Among other recent projects, she participated in the design for the doors for the Year 2000 Jubilee in Rome, completed *Three Islands* (a floating sculpture made of stainless steel in the Lake of the Central Park at Plateau Kirchberg in Luxembourg), two monuments for Japan and a fountain in London.

Source: *Praemium Imperiale 2001*, Japan Art Association, 2001.

Session 2: Translating the Cultural Dimension of Water into Action

The Ideas of Water: Core, Concepts and Contexts

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Background

Everybody concerned with the history of ideas, knows that what we call the history of ideas, itself has a history. The history of ideas of water has, however, no such history, since it has not yet been written. This state–of-the-art reflects in itself an interesting and profound, almost global intellectual tradition. Although all social systems have a hydraulic dimension and water has been interwoven in social interaction from profane activities to religious ceremonies all over the world from time immemorial, few scholarly works have been produced regarding how people have conceptualized and understood it. Water has, perhaps because it is a necessary and natural component of human life, partly been regarded as naturalized nature, and as such, of no interest to historians of ideas. But as water makes history, the ideas people have had about water, have also made history. The water situation of the present is to a large extent an outcome of this past history of ideas of water.

The IWHA and the UNESCO volume aims to establish the history of how water has been understood and socially constructed as a global research field. IWHA had a session on this topic at the Bergen conference in 2001. We have a new session on this topic here in Alexandria. Both these sessions should be regarded as steps to establishing this field and broadening the research interest in it. This paper will present some tentative ideas for discussion regarding the analytical approach, the content and the organisation for the first volume of the up-coming UNESCO-series 'Water and Civilization'. The working title of the first volume is 'The Ideas of Water'.

So what does this imply – first on a more general level:

- The volume should include articles that explain how people have perceived different types of water in different historical periods and in different types of societies. That is: Ideas of water among hunter-gatherers and in the classical hydraulic societies, during the industrial revolution and in the post-industrial, urbanized world.
- The volume should also highlight how different types of freshwater have been conceived and conceptualised within different arenas of social practices; in science and philosophy, in religion, in popular mythologies, in politics, economics and art. Since water is an integral component in innumerable spheres of social activities, the way it has been understood also vary according to this cultural and social context. It is very important that the volume does not restrict itself to one or two of these spheres or arenas. It should on the one hand analyze, for example, the history of ideas of water in the European continental philosophical tradition, taking in German Idealism and Romanticism, as well as water in Chinese Taoism. But it should also analyse the ideas about water in all the major world religions and in traditional lore, in modern science and water cults, in purification rituals and in grand development projects, in urban architecture and in agrarian economies.
- In order to understand and explain the complex relationship between on the one hand the structuring role of particular and different man/water situations on social constructions of this universal phenomenon and on the other hand cultural diffusion and acculturation regarding ideas about water, a comparative and historical perspective is necessary. The volume should be organized in such a way that the usefulness of geographical, historical and thematic comparison are optimised. History of ideas are in general histories of a particular country or a particular continent's ideas; i.e. a history of European or Western Ideas, or of Asian intellectual traditions,

African mythology etc. A history of the ideas of water has to break out of these analytical frames, since it is not very rewarding to talk about specific Western or African ideas of water. The reason is partly that variations in water ecology and the physical character of rivers do not coincide with the borders of states or the boundaries of cultures. Secondly; most histories of ideas are written based on an assessment of the importance of particular philosophical texts. The analytical context is textual, so to speak. The approach to the study of the history of the ideas of water has to be different, since the relationship between the physical character of water and how it has been conceived, should be at the heart of our research. There is also a tradition that is concerned with ideas about nature, but the history of the ideas of water has to distance itself from this tradition, since water is not only nature but also a social fact.

- The volume is planned based on the assumption that hegemonic ideas of water reflect and produce the way people have thought about nature and society in general, not the least since all societies have been involved in water control and water control has served as a means of economic, political, social and symbolic power in all societies. The culture of water control and the way water has been conceptualised should be treated as inseparable though distinctive fields of inquires.
- This volume will of course demonstrate the very rich and diverse cultural traditions arising from the endless varieties of particular man/water situations. The approach will be based on an assumption that water is unique as nature, because it does not change by becoming socialized. It is this physical and social character of water that has made it possible for humans to spin webs of significance and meaning around water in ways that no other element can equate. The concept of water employed in this volume exceed the traditional opposition between nature and culture but in a different way than what is usually done. Many philosophers, especially among the 'constructionists', argue against the usefulness of a 'philosophy of nature' as a specialized sub-discipline, challenging the very idea of nature as a particular object of study. The very concept of nature should be refined, and by focusing on water alone, it becomes possible to understand and analyse the relationship between nature and culture in other ways, because of the particular character of water. One might say: Water is culture, but also nature. It is never either or, but always both. Despite the fact that water is in flux and constantly changes form, the most striking feature of water is nevertheless its sameness: Wherever the water is in the hydrological circle or in the 'social circle', whether the water is domesticated or forcing its way down huge water falls in remote mountain areas, the water is basically the same. This nature of water is a universal common to all people through history, and because of this shared variable water offers unique possibilities to compare human lives and societies cross-culturally. A world history of the ideas of water will therefore and can therefore also address important questions about how local local ideas really are or how universal apparently universal ideas really are in new ways.

The volume may be organised in four parts:

Part I: Water in religion and legend

A study of the role of water in religion and legend is world history – in its bradest meaning. Water has been and is an integral part in all major world religions and in many religious rituals. The procurement and control of water has not only been a realm for humans, but also a divine project. In many religions cosmos is created from water and the continuous re-creation of cosmos, gods and humans depend upon water, while the gods create, maintain and guarantee the presence of water on earth. This part aims at a broad presentation of the place of water in the major world religions as well as its importance in more localized religions and myths. It must also present analyses of how specific ideas about water have been diffused and transformed in meetings between cultures in different socio-ecological contexts.

We will also invite articles on how the intimate relation between gods and humans are described and understood in different but perhaps related forms of rainmaking rituals all over the world. To what extent and why are the gods invoked to modify the nature so as to let it rain? Is it a question of turning absence into presence as an enterprise that necessitates mobilising cosmic forces (or turning presence – flood - into absence)? Is it possible to claim that for example rainmaking rituals are sacrifices to the gods by humans for the return of water for harvest and further life?

The book should ask questions why everything good and pro-creative often has been seen as holy, and why exactly clear and fresh water has been regarded as good, and even often as godly? How can it be explained that holy water cleanses away the devotee's sins, be it a Hindu pilgrim along sacred rivers, a Christian devotee in baptism or a Muslim in his daily ablution? The volume should also analyse why some rivers are seen as powerful and masculine in some areas, but feminine in others, and to what extent these differences can be ascribed to notions about life-giving and fertilising. We will also invite articles on why different waters have various divine and human qualities and capacities, to explore possible connections between water gods and water monsters.

Since whatever flourishes, flourishes with water, and very many goddesses and gods in the world are expressed in and express themselves in terms of water, while at the same time, the absence of or the abundance of water may cause the most horrifying consequences, this volume will ask for articles that address such dichotomies and their development within different and across cultural or economic contexts.

We need empirical articles dealing with particular case studies, but we also need more overriding articles, in some way or another related to the following titles: 'Creation stories and ideas about water', 'The story of the flood myth in world religions and local folklore', 'History of baptism and the idea of running water', 'Cleansing rituals and their development in world religions', 'The dichotomy fire and water through history', 'A brief history of rain-making, from the distant past to the present', 'Holy Water – a cross-cultural perspective', 'Water and purification – an historical analysis', 'Water and gender – a comparative analysis of religious and mythical ideas', Water and Paradise – a cross-cultural perspective'.

Part II: Water in science and philosophy

One section of this volume will focus on how changing ideas of water have affected history of science and how changes in different areas of scientific developments have expressed different ideas of water and have affected dominant modern social and cultural constructions of water. It should take the reader many thousands of years back in time as well as to the recent advances in molecular science. It should be able to draw upon the conceptual categories and the research techniques developed initially in the study of the scientific revolution, also the general theory that the course of science has proceeded, not by gradual accretion of knowledge, but by discontinuous transformation of the perception of nature.

The volume should aim at identifying certain key developments of world historic importance. It should, for example, present analysis of how water was first measured and controlled in the riverain civilizations of the Middle East and Asia, and how such managerial approaches co-existed with the important role water had in religions and myths in these same areas. In Western history the 'Scientific Revolution' of the sixteenth and seventeenth centuries is such a major event that cannot be overestimated. It shaped most categories by which the world later has been conceived. The literature about this revolution is very extensive, but so far not much has been written specifically on how it also changed the understanding of water. It will also have to include analyses of the metaphysical foundations of this modern science, including the understanding of the water cycle as an expression of God's plan for the world, and how the understanding of the interactions with land surface, atmospheric and ecosystem processes changed how water was conceived. Furthermore; when hydrology as the science of the occurrence, movement and properties of water upon and beneath the land areas of the globe in relation to the global water circulation broke through in late

17th century and it was demonstrated quantitatively that river flow and groundwater are generated by the precipitation falling on the river basin, this had a far-reaching influence on how water was controlled and it also signified a shift in ideas about water. Fourthly; water continues to surprise science. From a sociological perspective, it is interesting that many new ideas about what water is and how it functions is analysed within molecular science at the interface between physics and biology. This volume must also include a chapter on some of the ideas developed within this research field. It should also present an overview of social science theory on the relationship between humans and nature (water), and how dominating intellectual traditions have conceived water and its social relevance.

More concretely we will invite researchers to write articles that deals with among other things the following topics:

'The role of water in the development of science and in scientific discovery', 'Philosophy and water – a historical and cross-cultural perspective', 'Water and the scientific revolution', 'The hydrological cycle, science and world view', 'What is water – a history of scientific theories and explanations', 'Water and the grand modernization strategies – a missing link?', 'The dammed water', 'From Hippocrates to the modern water cult'.

Part III: Water in politics and development

This part should analyse examples from different parts of the world of how the control of water has been at the very heart of state building and imperial legitimising since time immemorial. Dams, hydro-electricity and hydraulic systems are not mere technological inventions, but also symbols of power. Man has conquered nature, and by such demonstrations of power humans have also been subdued to those who conquered nature. Water is therefore a means of hierarchy and functions as a structuring principle in society, whether its distribution is egalitarian or stratified. This aspect of the ideas of water should be analysed by articles describing for example the notion of water and power in the great irrigation civilizations of the world.

This volume should include articles showing how the control of rivers by dams and irrigation systems has not only been symbols of power, but how particular ideas about water have established social systems and structures creating hierarchies and distributing wealth. Has water as a means of power been seen differently in areas and countries where there was a surplus of water as compared to water deficient regions? To what extent have the free access to this resource been seen as natural, and restrictions or limitations to this access been seen as a violence of a basic right? What happened when water became a commodity; are fundamentally different ideas of what water is, underpinning the disagreements whether water is for commons or a commodity? This volume should analyse the character and history of the global debate on whether water should be seen as a commodity, or as a precious community resource and a fundamental human right. It should also present analyses of how gender and social status have affected ideas about water and water management, and to what extent it is possible to argue that dominating ideas about water is a major reason why the world community has not managed to solve the growing water crisis.

This section should deal with notions of water embedded in different planning models (the river basin model for example) and in new models of planning for insecurity (climatic change), and how specific planning ideas have spread and gained hegemony nationally or internationally. It should also analyse how water and the water issue have been understood in theories of development and ecological evolution, and how this understanding has partly reflected and partly reinforced social and political power relations and power strategies.

Here we will invite articles on the following topics:

'Waters of empire – a global history', 'Waters of control – a comparative study', 'Who owns the water – a history of ideas', 'A history of the idea of the river basin', 'Water as life – a history of ecological discourse', 'Water and the medical sciences – ideas about health and water', 'The

modern water crisis – a historiography', 'Water Wars or Water For Peace – the development of a set of conflicting ideas'.

Part IV: Water in literature, art and music

Water expresses meaning and can in one perspective be seen as texts. Water has been important to everyone, but the elaboration and the explicit meanings of this importance have been cultural specific constructions. The social world of water is constructed, and perceptions of purity and safe water and of controlled water, have been basic in the social understanding of water. The role of water in garden architecture in Asia, the Middle East and Europe is a story that needs to be written, as is the role of water in city architecture. Because of its social role, its symbolic values, its potential as a source of metaphors, the conceptualisation of water is often emphasised and elaborated on in literature, art and film. Poets and novelists have all over the world used water as a framework and a metaphor for understandings and interpretations of their culture and society, as philosophers have given water different importance and meaning. This volume should present analyses of the history of water in art and literature, and how such notions of water have differed from country to country and from time to time, and been transformed as they have 'travelled' around the world.

The understanding and conceptualisation of water is as wide and varied as the waters themselves, and some of these different uses in cultures should be explored in particular case studies. By employing a broad comparative perspective it should be possible to show some of the varieties and similarities in how water as text and meaning has served as a means for expressing essential qualities of life. The wide scale of nuances and the numerous facets of which water is the essential and integral part of, give the literature and poets a rich base from which metaphors, metonymies and reveries can express social matters or aspects of life.

Suggested articles: 'Water as a poetic metaphor – a historical and cross-cultural analysis', 'Water, architecture and the history of urbanization', 'Water and garden planning – from Babylon to England', 'The River in World Music',

As you all will have understood – to produce a world history of the ideas of water is extremely challenging, both empirically and theoretically, but it is very important since how we think about water decides what we do with it.

Thank you for your attention.

ACCU Programmes on Implementing Water and Environmental Materials for Different Peoples in Indigenous Languages in Asia and the Pacific UNESCO Member States

Misako OHNUKI

Asia/Pacific Cultural Centre for UNESCO (ACCU)

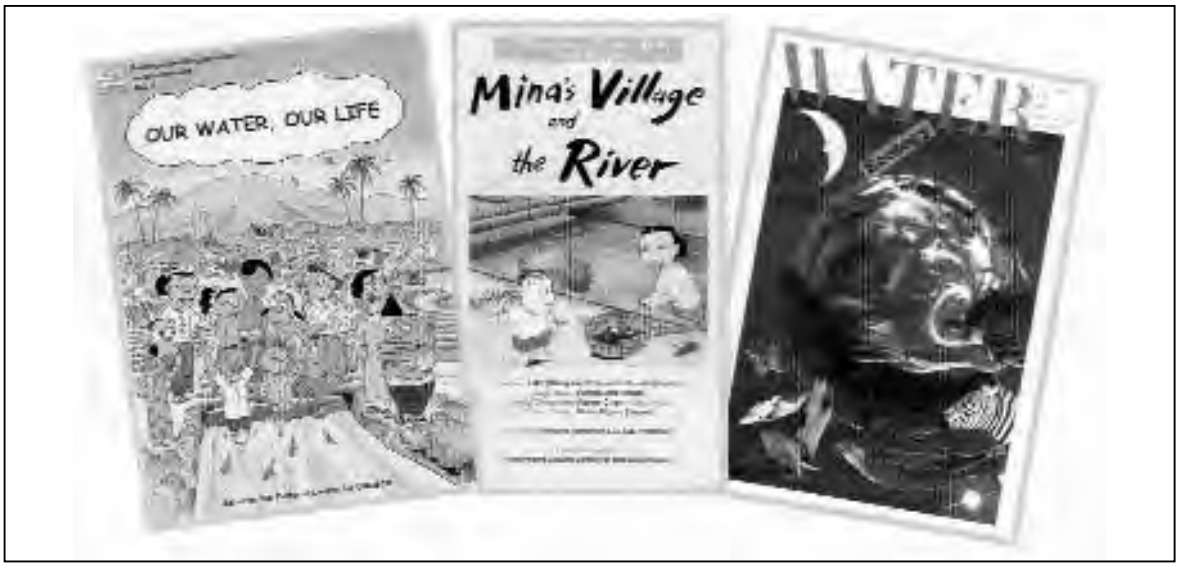
In 1996, just after the Earth Summit, there arose strong demands from Asia and the Pacific Member States, to plan and produce materials on environmental issues, especially on water and forests. These would be distributed among students at schools or at literacy education classes, as one of the strategies to raise awareness among peoples in the region and make them realize that environmental problems are issues they have to solve themselves. Daily life, thought, and culture in Asia and the Pacific are closely interconnected with nature, especially water, in ways which are very different from western countries.

Responding to these urgent needs, ACCU started two projects: one to produce books for children under the Asian/Pacific Copublication Programme (ACP) including three elements – culture related to nature, environmental problem report, and its related background science information (eco-system) and the other was PLANET, Package Learning Materials on Environment to provide as literacy learning materials in the region.

ACP launched the ecology book series for wide distribution in the region and the contents were all prepared by local journalists, writers and artists. Indigenous languages versions are published in different countries in the region. It is jointly organized by ACCU and UNESCO Member States in Asia and the Pacific, and originally started in 1971 with the objectives of encouraging and supporting UNESCO Member States in supplying attractive, low-priced, high-quality books that foster mutual appreciation of the various cultural values existing in the region among as many children as possible. ACCU and Member States co-plan, co-edit and publish books which are most needed by the educators of that region, and distribute local versions to schools, libraries and rural areas or, sell them at bookshops in the market. Through ACP, 28 titles including folk tales and picture books have been produced, more than four million copies of which have been translated and published in various languages of each country in Asia and the Pacific.

The aim of ACP was to report three elements (culture related to nature, environmental problems and their related scientific information) in Asia by incorporating them. 4 titles, TREES, WATER, THE SUN, THE EARTH were published. WATER, published as a second title, is a 64-page, full-colour book mainly consisting of two parts; introduction of cultural aspects of water, and articles on various phenomena caused by current water contamination in Asia and the Pacific. 52 writers, illustrators and journalists in 17 countries have contributed their articles, stories, photos and artworks.

PLANET's main objective is to raise awareness among learners in nonformal education classes and/or formal primary schools that people are part of nature, and propose concrete action people can take to improve the environment, while improving their reading and writing skills. 'Water pollution' is the first theme for the PLANET series. PLANET 1 consists of the following three different types of material: poster ('Think and Act for Our Planet of Water'), video ('Mina's Village and the River'), booklet ('Our Water, Our Life'). Mina, the maincharacter of the literacy animation video 'Mina Smiles' produced in 1992, appears again with her family and her new friends in all three materials. The video was co-directed by Mr. Lat, Malaysia's famous cartoonist, and Mr. Suzuki Shinichi, a Japanese animation specialist. The prototype version (in English) has been



distributed to literacy and environmental institutions in Asia and the Pacific to be translated into local languages of 19 countries in Asia and the Pacific. The local version of PLANET will be used in both non-formal education and formal education programmes.

When promoting environmental education in Asia, just providing them with information in the form of a serious report or instruction is not so effective due to their strong desire to have a better standard of living, resulting from rapid industrialization. Also, introducing domestic environmental problems in an international publication might cause political argument within the country because it discourages the people or creates negative images to other countries.

It was really a challenge for ACCU to promote the PLANET and ACP series, because it took much serious discussion to get more than 21 countries' consensus of the contents in the production process.

Sharing Water: an Educational Programme on Water and Cultural Diversity

Francis JOSÉ-MARIA

Syndicat intercommunal de distribution d'eau
de la Corniche des Maures

It is the source of life, the common denominator of all cultures, water is a unifying element which shows the absolute necessity for solidarity on local, regional and planetary levels to ensure its long-term management.

Water is also an element of diversity because if the various perceptions of it, what it symbolizes and the values that communities attach to it.

It is very important that education programmes, which aim to change attitudes towards water, cater for this unity/diversity dialectic in their approach.

The education programme 'Sharing Water' is principally for children and includes this concept of cultural diversity at all levels of its application.

It was designed by a multi-disciplinary team and is based on a pooling of resources enabling us to provide children with three different types of complementary learning:

- Formal learning pertaining to schools and their vocation to teach;
- Non-formal or extra-curricular learning through projects with professional organizations;
- Informal learning, NGO projects in connection with southern countries.

The methods used are child-centred, the 'learners' discover for themselves. With this approach, you have to take into account the diverse perceptions of water in one or various groups. Suitable activities like philosophy workshops, games and experiments encourage spontaneous questions from all the children, enabling them to re-think their ideas and this is linked with motivation.

This self-paced learning can be implemented on field-trips which encourage a real contact with the environment and make demands on all aspects of the child's personality: coordination, intelligence and imagination.

This resolutely systematic approach to the study of water, which gives priority to the understanding of interrelationship, puts the child in a sharing process with other elements, be they mineral, animal, vegetal or human.

Beyond the consideration of local cultural diversity, this programme enables children to come to grips with a wider cultural diversity by broadening their knowledge of the ecosystem in a Sahelian village in Burkina Faso. This 'breaking-away-from-normal-learning' makes them see the water issue in a planetary perspective and enables them to support the cause of these Sahelian village people and to help them in a concrete way by:

- Sending school supplies, corresponding with African school children and exchanging keeps-sakes;
- Organizing an annual exhibition called 'Sharing Water' which gives children the opportunity to show adults their different work projects on the problem of water and Africa. The proceeds from this exhibition go towards supporting the Sahelian village people in collaboration with several

NGOs. This exhibition is also an opportunity to meet people and have cultural exchanges with Burkina Faso. A group of story-tellers, musicians and dancers performed in our schools. Sahelian villagers and craftsmen participate regularly.

This education programme enables each child to show solidarity and take part in concrete actions that brings us back to the unifying aspect of water within a framework of cultural diversity. Children realize that they are in fact citizens of the world.

Method Guide for Water Education Actions: Water Classes and Two Case Studies: Gory (Mali) and Ngaoundere (Cameroon)

Claude SALVETTI

French Water Academy
President of the Water-Education Group

Getting to know the Water Academy

The Water Academy is an NGO composed by half of water specialists and by half of other field experts like medicine doctors, chairmen of industrial companies, elected personalities, sociologists, economists. Marc Gentilini is the Water Academy president. He's also a doctor and the head of French Red Cross. The Water Academy is divided into several working groups. Each of these groups is dedicated to a specific research field like Economy, Shared basins, Land deve1opment and sustainable development, Water and health, Water and agriculture, Water sociology and culture, Water and cities, Rivers transport, Water and industry, Water laws study, Water education.

The Water Academy sets up international conferences on different topics such as: health, laws and rights for water, sustainable development, social charter for water, water in Arab countries, water and town planning. It takes part in the main world water events, like the World Water Summit of Johannesburg (2002) and the Second World Water Forum in The Hague (2000).

The Water Academy undertakes water studies and publishes works and books that give a summary of the existing knowledge and the lacking information in the field of water.

Some texts of reference: *Social Charter for Water, Water and Town Planning, Water and Health*.

Presentation abstract

The Water Academy launched its Water and Education program in June 1999 during a symposium entitled 'The Learning Society and the Water Environment' that was he1d at the UNESCO Headquarters in Paris. Since then, the Academy has created a water and education working group that has prepared a document gathering information on the different public awareness, education and training programs used through the world.

This document is entitled *Method Guide for Water Education Actions.* Its the result of a survey held through the entire Planet that was turned into a book that could easily be sent to anybody in charge of water works programs. It is acknowledged by now that nothing can be successfully achieved in the field of water works programs without the involvement of the local communities and the concerned people. Therefore, it is necessary to pass on to the public the appropriate information about water in general and water in the specific situations of the water works programs.

- Water in general: What is the water? What is the raiD? What is a river? What is underground water? What is water pollution? What is the water cycle? What are the cost and the priee of water?
- But also, water in the specifie situations of the water works program implementation.

Because they will have to give their financial support for those works, people have the right to know what their money is used for.

The raw results of the survey provided us with 81 case studies in the world (45 in Europe, 19 in Africa, 12 in Asia and 5 in America). From these several case studies, 6 recommendations were listed:

- To clearly define and communicate with the public targeted by the program;
- To listen carefully to the public in order to create a true dialogue and participation that will make it;
- Possible to take actions;
- To heighten public awareness to water issues in order to motivate citizens;
- To set up training programs for the messengers and to create new professions with the help of experts;
- To make an evaluation of the action results;
- To provide financing for water issues information, public awareness and training campaigns aiming at the public.

The Guide was presented in several assemblies in order to take into account as many observations and comments as possible. It will also be the case in this 3rd Water Forum of Kyoto during which we hope to get a great number of new suggestions.

Taking into account all the suggestions that were received, it was decided to add a 7th recommendation asking to create a hygiene office at a local level, following a national hygiene code enacted by the state administration. This 7th recommendation was adopted on November 19th and 20th, 2002 during the 'Water, Health and Environment' workshop, organised by the Water Academy at the French Red Cross in Paris.

The presentation will be illustrated with 3 examples.

- The first one is an example of a water education action: the Water Classes. How to manage a Water Class? For what kind of public? How much does it cost?
- The second one is the example of a town of 5.000 inhabitants in Mali, called Gory, where a public fresh water service was created in 2002. In the mean time and as a supporting action, an educational program was set up for the children of this village in partnership with the children of a class in Paris. The two classes have been corresponding with each other by letter for one year, before the water works were implemented. The entire village was aware of the program and took fully part in it.
- The third one is the example of the city of Ngaoundere in Cameroon. There, again, a water class was held last October, in a high school (the Lycée Technique of Ngaoundere) for a group of young people from 16 to 18 years old. In the meantime a class of young people under the same age from a Special School of Paris (the EREA of Belleville) attended a water class in Paris. In October the French pupils and their teachers travelled to Ngaoundere and attended the water class of their Cameroonian counterparts. This education action was undertaken to support a water supply reinforcement in a little village called Dar A Salam (near Ngaoundere). This reinforcement was made necessary to provide water to a new School where 150 pupils could not access it before these water works.

'NETWA'
— a Pilot-Project: a Computerized Network on Water Anthropology for Engineering and Cultural Interaction —

Claudine BRELET

Summary

The NETWA project consists in an Internet-based planetary network of anthropologists working on water issues to foster the provision of regional research capacity, and education and training in order to integrate the cultural dimension to water resources engineering and management.

Keywords

Cultural diversity; human rights; anthropology; network, empowerment.

Access to water is a basic right that implies respecting not only organic, basic needs for safe water and sanitation, but also people's traditions related to water – namely their culture.

Throughout the world and particularly in developing regions, there is a strong need to harmonize modern engineering and management of water with the social, cultural and spiritual dimensions of this natural resource. Since the dawn of humanity and throughout the world, each culture has always had a specific relation with water which was and still is reflecting its *Reverence for Life*, its cosmology and normative values. Cultural diversity constitutes 'the common heritage of humanity'. As Mr Koichiro Matsuura, UNESCO Director General, stresses: '*cultural diversity is as necessary for humankind as biodiversity is for nature.*'

Anthropologists consider that each culture is a specific adaptative process to various and ever changing environments, and reflects human capacity for expression, creation and innovation.

Anthropology uses a comprehensive approach inasmuch as possible: it is both *emic* (study of the structure of a culture based on its inner elements and their functioning rather than a description stemming from a pre-established pattern) and *etic* (holistic, non-structural approach to provide information on the characteristics of a person or a culture).

Anthropology has introduced the new paradigm in social and human sciences. The new paradigm implies that in the same way as no life can survive in isolation, no sector of human activity (health practices, education, food production and processing, settlement, technology, division of labour, art, religion, feasting, politics, law, trading...) can be considered as a separated sector (contrary to the elementalist Aristotelian logic). Rather, it must be viewed as a dynamic phenomenon interrelated and interacting with all other activities. Like anthropology, NETWA data will take into account the fact that cosmologies mirror the paradigm which characterizes the qualitative dimensions of any culture, namely the emotional, intellectual, moral and spiritual life of a population that also shapes the patterns of its technological choices.

The 'NETWA project', the Network on Water Anthropology for stimulating engineering and sociocultural interactivity, aims to avoid a dangerous homogeneization of both rural and urban

areas which would increase the environmental and food production crisis, deprive the populations both from their right to safe water and from means to meet their basic needs, both organic and symbolic.

Since their crucial input in the design of the United Nations during the Second World War, anthropologists have always been considered to be the natural messengers and promoters of *Human Rights*, which warrant cultural diversity now promoted and protected, thanks to Mr Koïchiro Matsuura, through the *UNESCO Universal Declaration on Cultural Diversity.*

Today, the media play a significant role, but their one-way design is insufficient to fill the gap between the users and the deciders. Indeed information is not lacking. Yet, the most modern way and means to share it, like the messages conveyed by the old talking-drums within traditional communities, can now be made accessible to the most isolated people through the web, and in an interactive manner.

The NETWA project aims at using the web as a two-way traffic of information. It is therefore a true co evolutionary tool. Integrated in the International Hydrological Programme UNESCO's Water Portal, NETWA is designed on the one hand to empower populations through an access to vital information in this period of harsh climatic change (that otherwise would stay in the circles of academic expertise), and on the other hand to inspire deciders on populations' needs, talents and skills and to rapidly adapt public policies to extreme events.

In addition to a presentation of basic methods used by anthropologists, designed so as to help engineers, hydrologists, geologists, etc. to gain a deeper view of the users' rationality, to understand their claims for water rights and the social and cultural dimensions of water, to take into account health risks that can affect the local populations, the NETWA pilot-project has several aims:

- Promoting Water Rights and the empowerment of communities, especially women of developing countries;
- Providing practical examples of the cultural diversity (see: *UNESCO Declaration on Cultural Diversity,* Paris, 2 November 2001) as a pool of ideas and traditional technologies to face climatic change;
- Helping to innovate and cope with new situations and water extreme events by using the wisdom and experience of non-industrialized cultures;
- Bridging the gap between research and practice;
- Creating a body of data, a vehicle of communication and a source of information not only for historians, archaeologists, anthropologists and generally scholars, but mainly for hydrologists, engineers, policy-makers and political leaders;
- Stimulating the use of knowledge, experiences, practices and technologies of non-industrialized societies which can be scientifically adapted/updated, locally appropriated and integrated into policy research and implementation where the daily life, infrastructures and economies are threatened by water problems;
- Being used as a forum and chest of methods for inquiry into the present state and future change taking place in water problems which are to affect the human quality of life in our biosphere.

In short, NETWA will propose a series of experiences, practices, technologies and even pattern changes that can inspire deciders and professionals to meet water-related local needs ranging for example from traditional agriculture and cattle grazing to extractive industry and urban growth.

NETWA will constitute a network of professionals in applied anthropology specialized in water issues accessible to all. Hopefully it will offer a 'catalogue of records', of the most exemplary and ethical projects illustrating the respect of cultural diversity, the *Reverence for Life* in each of the six UN Regions.

Practically, NETWA is designed to follow the six UN geographical divisions (Africa, the Arab States, Asia and the Pacific, Europe and North America, Latin America), each including the following sections:

- Cosmologies, paradigms (including maps of their localization) and cultural concepts of Nature;
- Traditional technological resources and evaluation of their possible adaptation;
- Practical examples of 'ethical choices' based on people's participation;
- Regional lists of anthropologists working on water issues;
- Lexicon explaining some specific concepts and words used by anthropologists, and an international glossary;
- Annoted and updated bibliography;
- Help to formulate a project and build up a file for communities to receive support;
- Directory of resource institutions, persons, etc. Links with institutions, museums, NGOs, etc. Grants and scholarships.
- NETWA Newsletter: symposia, workshops, etc.; new publications; vacancies...

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Le fleuve Congo à travers divers fondateurs : l'espoir d'une reconstruction intégrée de l'Afrique

Lye MUDABAYOKA
(Democratic Republic of Congo)

Le fleuve Congo est un mythe. L'histoire de sa découverte au 19ème siècle par l'explorateur anglais Henry Stanley est tout aussi un mythe, autant que toute sa conformation hydro-électrique et géographique.

Avec l'indépendance du pays à partir de 1960, le fleuve Congo a été exploité dans les discours politiques comme le symbole de l'intégration régionale ainsi que de l'unité dans la diversité.

1. Les mythes cosmogoniques et ethniques

La cosmogonie bantu du bassin du Congo explique l'origine du monde à partir de l'eau.

A l'origine du monde n'existaient que des étendues infinies d'eau. Partout, à perte de vue. Régnait sur ces eaux infinies, le Génie des Génies, Maître suprême des Harmonies. A force de contempler les mêmes étendues liquides, le Grand Génie finit par s'en lasser lui-même. Il souffla trois fois dans sa main et récita des formules magiques ; aussitôt il y eut un grand tonnerre, un gigantesque tremblement de l'eau. Et voici qu'ici et là émergèrent des terres immenses, portant déjà des arbres, fleurs et toutes sortes d'animaux. Mais tous ces animaux étaient tous mâles. Au bout de compte, les mâles entre eux commencèrent à se lamenter et se mirent à protester auprès du Grand Génie.

Ce dernier les comprit et leur envoya à tous une sorte de fée des eaux, mais unique femelle, moitié –femme et moitié-poisson. Les mâles protestèrent plus fort encore à cause de la fée unique, et à cause de la femme-poisson inaccessible. Le Grand Génie, Maître du pardon les comprit encore. Il souffla dans sa main ; et aussitôt des femmes entièrement de chair apparurent en grand nombre sur terre, les femmes-poissons étant consignées dans le Royaume des profondeurs. Rien n'y faisait : les mâles étaient toujours mécontents, chacun enviant la femelle du voisin. Alors le Grand Génie piqua une grosse colère et il y eut le premier grand tremblement et de la terre et des eaux. C'est alors que sortirent la première femme et le premier homme désignés comme arbitres. Hélas, l'homme succomba aux mêmes tentations d'envie et de jalousie, surtout lorsqu'il découvrit les charmes de la femme-poisson, de la « mamiwata », déesse des eaux. Il en tomba follement amoureux, déclenchant une jalousie terrible de sa propre compagne, et le premier crime passionnel. La mamiwata eut le dessus et, usant des stratagèmes superstitieux, mit à mort sa rivale terrienne.

Depuis lors les mamiwatas sont les ennemies jurées des femmes terriennes. Les hommes eux sont devenus les ennemis des animaux. Pis : les hommes sont devenus ennemis des hommes. Voilà comment naquirent les guerres. Voilà pourquoi le Grand Génie se retira dans les profondeurs de l'eau, courroucé par l'ingratitude de ses créatures. Voilà pourquoi de temps en temps, dans sa mauvaise humeur, le Grand Génie leur envoie la foudre, les tremblements de terre ou d'océan …

Pour le cas précis du Congo, de nombreux mythes et légendes existent comme interprétations des phénomènes historiques.

L'historien Congolais Isidore Ndaywel raconte comment les premiers Blancs Portugais débarquant pour la première fois au 15^{e} siècle dans le Royaume Kongo sur la côte atlantique ont été assimilés par des riverains noirs à des génies sous-marins.

L'historien explique ainsi comment la conquête du Royaume Kongo a été d'abord une œuvre de domination psychologique avant d'être une victoire armée.

De même les « gens d'eau », les Bangala riverains de l'amont du fleuve Congo continuent jusqu'à présent à chanter les hauts faits de Lianja, héros de la grande ethnie mongo. La légende raconte comment Lianja, appelé par le destin vers un grand fleuve-talisman au delà des forêts, a commencé par dompter tous ses voisins ennemis, dont le plus redoutable fut Saü-Saü. Un des épisodes les plus épiques a été justement le duel entre Lianja et Saü-Sü au milieu de la clairière jonchée des cadavres des deux armées.

Saii-Saii et son armée seront vaincus. Saii-Saii sera tué. Or, Nsongo, la sœur jumelle de Lianja restait introuvable jusqu'au moment où il découvrit son corps inerte parmi les victimes. Le héros tomba à terre et pleura sa sœur à des chaudes larmes. Voilà qu'une mystérieuse hirondelle passa par là, et laissa tomber une feuille de « safoutier », l'arbre tropical nourricier. Sur la feuille perlait une goutte de pluie. La feuille et la goutte tombèrent aux pieds de Lianja. Voilà que la goutte se mit à s'épanouir jusqu'à laisser apparaître Nsongo, debout, vivante et plus belle que jamais. Mais Nsongo était fort en colère contre Lianja parce qu'il s'était laissé aller à l'ivresse de la barbarie et du massacre. Lianja en fut attristé et pleura de nouveau. Nsongo supplia la feuille magique de rendre les ennemis à la vie. Et à chaque pleur, à chaque larme de Lianja, les ennemis ressuscitaient un à un, y compris Saü-Saü. Ce dernier finit par devenir l'allié fidèle de Lianja et prit même en mariage Nsongo.

Alors le héros Lianja se lança avec un enthousiasme renouvelé à la quête du fleuve-talisman.

2. Fleuve Congo : un mythe géographique, anthropologique et historique

La découverte du grand fleuve par Lianja fut un événement exceptionnel car autour de cet immense cour d'eau fut bâtie une cité immense, lieu de convergence des affluents les plus puissants au cœur du bassin du fleuve ; mais aussi le rendez-vous et la réconciliation de toutes les tribus riveraines.

L'histoire du Congo de son côté a érigé le fleuve Congo en mythe. Les grandes puissances européennes du 19e siècle en avaient bien compris les enjeux stratégiques puisque grâce à la perspicacité et à la ruse du roi belge Léopold II, grâce à la témérité et à l'opiniâtreté de l'explorateur Henry Stanley, la Conférence Internationale de Berlin de 1885 consacrera le Bassin du fleuve Congo comme espace de libre échange et de libre circulation.

A vrai dire le fleuve Congo est l'héritage le plus précieux laissé par Dieu, l'histoire et la géographie aux Congolais. Ce fleuve est si tentaculaire que les Congolais, quelque soit le recoin où ils se trouvent, en ressentent les bienfaits en termes nourriciers et énergétiques et en termes de trait d'union géographique et socio-culturel.

Premier fleuve du monde avec ses 1 475 kilomètres de bief navigable, il est le deuxième, après l'Amazonie pour la puissance de son débit (en période des hautes eaux, il atteint 75 000 mètres cubes par secondes à l'embouchure). Ses chutes à 40 kilomètres de l'embouchure, sur le site hydro-électrique d'Inga, en font une des plus puissantes réserves d'énergie du monde avec ses 370 milliards de Kwh, soit 6 % du potentiel mondial.

Notons en passant que la République Démocratique du Congo couvre à elle seule près de 130 millions d'hectares sur les 200 millions de tout le bassin du Congo.

De plus les affluents du fleuve, puissantes autoroutes naturelles, enlassent toutes les bourgades jusqu'aux recoins du pays. Au point que les Congolais se disent « Bana Mayi » (« Enfants de l'eau »).

« Enfants de l'eau », cela veut dire que tous nous sommes des rivières, que nous n'avons pas de terre d'attache, que nous rivières sommes appelées à rencontrer d'autres rivières, à former des grands lacs, à soutenir la marche et le destin du « fleuve-tutélaire » vers l'avant, toujours vers l'avant. Au delà des cascades et entre monts et vaux…

Les « Bana Mayi » ne disent-ils pas que « le fleuve est capricieux, comme le destin humain, avec ses hauts et ses creux de vague », que « l'amour est à l'exemple de la pirogue otage du fleuve, et du fleuve otage de la pirogue », que « le fleuve n'a qu'un sens unique, une parole unique, sans pli, sans détour ni retour, rêvant toujours plus grand que lui », que « le poisson pourrit par la tête d'abord », que « le fleuve est incapable de mentir à ses propres vagues »…

L'on comprend pourquoi les beaux-arts et les belles lettres au Congo soient pour ainsi dire noyés et inspirés par le mythe du fleuve. Passent encore toutes ces illustrations des « mamiwata », ces génies féminins des eaux, terribles de jalousie et de possessivité, et qui sont les thèmes courants des toiles des peintres populaires comme Cheri Samba ou Moke.

Mais lorsqu'on relit les premiers romans à succès de l'époque coloniale comme « Ngando » du Kinois Lomami Tchibamba ou « Au cœur des ténèbres » de Conrad, ou ceux relativement contemporaines de l'Antillais Naipaul, « A la courbe du fleuve », ou « la vie et demie » du Brazzavillois Sony Labou Tansi, on voit combien le fleuve Congo est le lieu-limite de toutes les magies et de tous les dangers, frontière entre réalité brutale et fiction merveilleuse.

A ce titre « Ngando » est une sorte d'« Orfeu Negro » à la congolaise : le héros Munsemvula est à la recherche de son enfant Musolinga enlevé par les mauvais génies de l'eau. La « descente aux enfers », après d'innombrables péripéties peuplées de monstres, se termine plutôt tragiquement à cause des tabous transgressés. Le père et le fils seront anéantis et engloutis à cause de leur négligence et de leur désinvolture face aux interdits sacrés.

Cette fascination du fleuve s'exercera sur les autres artistes de l'époque coloniale jusqu'à aujourd'hui. L'artiste musicien brazzavillois Mundanda parle du « fleuve sans arête, mais gouffre de tous les dangers » ; le musicien kinois Lutumba considère le fleuve comme le ravisseur des êtres aimés que l'on emporte au loin, sans espoir de retour. Mais Boukaka de Brazzaville ou Kabasele de Kinshasa chantent :

Ebale ya Congo
Ezali lopango te
Ezali nde nzela

(Le fleuve Congo
N'est pas une clôture
Il est une passerelle)

Ou encore

Congo moke ekoma
Congo monene

(Le seul Congo est
le grand Congo)

La métaphore du « fleuve-trait-d'union » sera le leitmotiv des hommes politiques. Le premier à avoir compris cet atout du fleuve comme lieu de la diversité et du dialogue des cultures est le Président Mobutu. Dans sa mégalomanie de créer une grande puissance au cœur de l'Afrique, il s'assimilera au héros mongo Lianja, changera le nom du fleuve « Congo » en fleuve « Zaïre », reprenant malgré la tautologie, le vocable Kongo de « nzadi » (qui signifie « fleuve »). Pendant le règne de Mobutu, le fleuve sera le totem. Les grandes décisions politiques comme « la radicalisation de l'Authenticité et de la Révolution» se prendront dans son yacht sur le fleuve Congo ; les chefs traditionnels riverains seront constamment consultés pour contribuer à renforcer le régime politique par des rituels puisés au fleuve. Et même, par une intuition propre à l'héritier des « bana mayi », il consacrera le village des pêcheurs, Kinkole à l'entrée de Kinshasa, comme le haut-lieu des meetings et des grandes « messes » politiques avec les masses populaires. Il ira jusqu'à changer l'hymne national congolais : le nouvel hymne, « La Zaïroise », comportera une strophe en hommage au « fleuve-majesté »…

Malheureusement, comme on sait, toute cette fascination et toute cette mythologie qui récupère la magie intégrative du fleuve Congo ne serviront en fin de compte que le culte de la personnalité d'un Mobutu devenu lui-même demi-dieu régnant sur toutes terres et sur toutes eaux.

3. Grandeur du Bassin du Congo et décadence de la région des Grands Lacs

On peut donc se poser la question : comment un fleuve qui a une vocation à la fois naturelle et historique d'intégration et d'unification a-t-il été le théâtre des guerres sauvages, contredisant ainsi tous les rêves et les légendes, au point que l'Afrique centrale n'est plus connue aujourd'hui que comme « la région des conflits des Grands Lacs » ?

En réalité dans leur hypocrisie, les hommes politiques congolais n'ont retiré du fleuve Congo qu'un mythe désincarné, négligeant le pouvoir essentiel du fleuve-totem en tant que lieu de la reconstruction et de la réconciliation nationales. En fait, dès lors que les richesses issues de l'énergie hydro-électrique (comme le projet fou inachevé d'INGA) ou de la variété halieutique (la nationalisation au profit des proches du régime des grandes pêcheries privées) ont été acquises pour n'enrichir qu'une oligarchie prédatrice ; à partir du moment où, dans les grandes villes congolaises, les abords touristiques du fleuve sont confisqués par la bourgeoisie et envahis par leurs pharaoniques ; à partir du moment où des populations riveraines ont été manipulées et entraînées dans des divisions fratricides au profit de quelques seigneurs de la guerre, le cours de l'histoire congolaise a pris un coup sérieux. Et l'on a vu le pays se défigurer, on a vu surgir des guerres interminables ; on a vu émerger des enfants-soldats, surnommés « maï-maï », c'est-à-dire soi-disant invincibles parce qu'adeptes des rituels fétichistes consacrés à l'eau comme talisman « pare-balles ».

Dès lors, le fleuve a cessé d'être le haut-lieu de providence pour devenir l'enfer des pratiques barbares et cannibales ; et le cimetière des citoyens innocents, notamment les femmes et les enfants.

4. Fleuve Congo: havre de paix?

Mais la paix semble revenir ; et le fait que la navigabilité du fleuve est de nouveau en partie possible constitue un signe encourageant.

De plus, de nombreuses initiatives politiques sont prises pour que le bassin du Congo soit non seulement l'oxygène écologique de l'Afrique et du monde, mais aussi un havre de paix, un rendez-vous des civilisations dans leur richesse et dans leur solidarité.

La création de la Commission Internationale du Bassin du Congo-Oubangi-Sanga (C.I.C.O.S.) en 1999 est de bon augure. D'autant que l'idée finale du C.I.C.O.S dont le siège est à Brazzaville, est d'installer une sorte d'observatoire de l'Eau, instrument d'évaluation de tout le bassin du fleuve Congo dans toutes ses dimensions économiques, écologiques et politiques.

Enfin, peut-être devrait-on signaler cette formidable initiative des artistes congolais des deux rives jumelles du fleuve Congo, qui se rencontrent tous les deux ans depuis 1995 à Brazzaville et à Kinshasa à l'occasion du Festival Panafricain de Musique (FESPAM). Ce Festival est devenu au fil des temps, dans une zone fort sensible de post-conflit, une occasion de catharsis et de catalyseur des hommes et des femmes de bonne volonté qui n'ont que le chant comme arme. Le FESPAM est devenu un espace de dialogue et de culture de la paix.

Tous ces gestes et ces exemples de bonne volonté venant aussi bien des autorités politiques que de la société civile finiront, souhaitons-le, par faire tâche d'huile, par créer une puissante et vaste dynamique au service de la tolérance et de l'amitié des peuples.

The Cultural Interaction of the Congolese with the River as a Traditional Data Base for International Cooperation

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Among the most visible groups inhabiting Central Africa are the *Kongo*, *Ngala*, and *Teke*. The culture of these people can better be understood if reflected by a particular mirror : water. *Kongo* was the name of a Kingdom whose life was profoundly influenced by a namesake, the Congo River, which goes on elbowing its way through the present-day Congo republics: Congo-Brazzaville and Congo-Kinshasa. That the *Kongo* group accepts to be called Congolese, whether from Brazzaville or Kinshasa, is easily understandable. How is it that the *Ngala*, for instance, have always accepted their country to be called 'Congo', and that they be consequently termed 'Congo'or 'Congolese'? What are the relationships between the Congo Basin's peoples and water, How could the traditional cultural dimension of the river be transformed into positive attitudes and actions than can help develop and maintain peaceful relationship in present day Central Africa,

A region where people bear the names of rivers

The Congo Basin's peoples have very close relationships with water. Many Kongo, Ngala and Teke can be identified but through their dealings with what is not only their liquid environment, but their liquid self. These relationships are not merely physical, but also spiritual.

The Kongo are to be found in Angola, Congo-Brazzaville, Congo-Kinshasa and Gabon. A most visible section of the Kongo people of Congo-Brazzaville is the *Laadi* or *Lari* group, named after a rivulet of the Pool region. Traditional chiefs would send their most bold tribesmen to dwell along the river *Lari* as a punishment. Nowadays, the *Lari* live in Brazzaville and many areas of the Pool region, one of the 11 regions of Congo-Brazzaville.

Around the Stanley Pool, the lake between Brazzaville and Kinshasa, live the *Babali* – literally 'those of the river'– a subdivision of the Teke, one of the principal ethnic groups of Gabon, Congo-Brazzaville, and Congo-Kinshasa. These 'river Teke' are fishermen, unlike the majority of the group, who build their villages away from rivers.

The water dwellers par excellence to be found in the two Congos is the *Bobang*i group, better known as the *Ngala*. The group's original and real name is *Bobangi* because in the past, they would practice *lobangi* 'commerce' up and downstream a river which came to be known as the *Ubangi* River – in fact *Bali* o *Lobangi* (the river of commerce), upon which the traders were nicknamed *Bobang*i by their neighbours. Even though we call the very people *Ngala*, this new name is borrowed from another river, the *Mongala*, a tributary of the Congo. The *Mongala* dwellers *speaking* a purer *Bobangi* language than many neighbours, the Belgian missionaries considered that, being the owners of the language, the latter ought to be named after them. Consequently, the river commercial language – *Lobobangui*, or *Bobangi* – was renamed *Lingala*, its best speakers being the *Ngala* – people dwelling along the *Mongala* River. Furthermore, a great many *Bobangi/ Ngala* sub-groups share names with rivers. Such is the case of the *Ngiri* who inhabit the banks of the River *Ngiri*, a tributary of the *Ubangi* River. Some *Ngiri* are known as *Ballloy*, since they had

migrated from the section of the *Ngiri* River known as the *Loi* River. Nowadays we have *Ngiri* people inhabiting northern Congo-Kinshasa and, practically facing them in Congo-Brazzaville, dwell the *Loi* (thus *Balloy*). Other *Ngir*i Congo-Brazzaville are the *Bongili* of the *Sangha* region, and the *Likuba* of *Boyoko-Biri* who call themselves *Mpama Bangili* and those of Nkonda declared in early the 1880s that they were *Mpama Bakutu.* No one is surprised to know that *Mpama* is both the name of another tributary of the Congo (Congo-Brazzaville) and of an ethnic group of Congo-Kinshasa. The most famous commercial centre where *lobangi* was practiced is Bangui, the capital city of the Central African Republic.

Paddling downstream the Congo, we reach the mouth of the *Likwala* River, the territory settled by the *Likwala*, another sub-group of the *Bobangi/Ngala*. Near the mouth of the *Likwala* River, is the mouth of the *Sangha* River, a very important tributary of the Congo. If we go upstream the *Sangha*, we meet a people, the Sanga-Sanga. 15 km downstream the mouths of the *Likwala* and *Sangha* rivers, begins the mouth of the *Nkongo*, pouring itself on the *Ndeko* river, which receives its water from the *Bwenyi* river, where the *Bwenyi* people practice fishing and commerce.

Spiritual interaction with water

As can be seen from these examples, when someone names a river, he/she names a human community. Tradition has taught the Congolese that they are but ephemeral passengers going up – and downstream the eternal rivers. That is why many of them have established special relationships with rivers and seas.

Ngala people accept to be called Congo or Congolese because the term *Kongo* is familiar to them. First of all, *Nkongo* or *Kongo* is the name of a small tributary of the well known Congo River. Near the mouth of this small Kongo river dwell an important section of the *Ngala* people, the Likuba, named after the ancient name of one of their most important cities: Likuba.In the 1880s Likuba, the present day Bohoulou was peopled by some 5,000 inhabitants whose warriors, together with those of Mbandza, battled against French explorer Savorgnan De Brazza in June 1878 on the Alima river. In addition, *Kongo* is these very *Ngala*'s word for kingfisher, a bird practicing their principal economic activity: fishing. In sum, the *Ngala* are Congo's human *Kongo*s-kingfishers, be it along the small *Kongo* river or the large Congo river where, with their nets or hooks, they can catch the lo-*Kongo* – the trumpet fish. This is no pun at all, mainly if we add that 'profession' is rendered by the Ngala with the word *e-kongo!*

Furthermore the *Bobangi* tale generally begins with the sentence *'mwasi na mobali, ba liki na mboka, ba liki na nganda'* (literally 'the wife and husband possessed a villlage, they possessed a fishing camp'). The Western counterpart for this sentence is 'once upon a time'. While the Westerners insist on *time*, the Bobangi insist on the *human being* and his liquid space. Indeed *mboka* does not really mean 'village' as translated in French or English. Instead, it is 'land taken from water'. The right translation of *mboka* in a single word is therefore to be found in Holland where, like the Bobangi, people are lowlanders: *polder*. As for *nganda*, a fishing camp is always on an island, that is, a tract of land surrounded by water.

Besides bearing the names of rivers, the *Bobangi* could be identified in the past thanks to the fish, an inhabitant of the river. Scars on faces or temples are identity cards. The *Bobangi* scars on the temples represented the caudal fin of the fish – Belgian explorer Coquilhat mistook it for *'palmettes'* (palmettos). These scars on the face are an unbreakable and visible link with water.The Bobangi are so close to water That each baby must be introduced to the river as soon as it is born. The child is put on the water: if it floats, it is declared sound; if it has a tendency to drown, then everyone knows that its health will be a matter of worry. The child is introduced to the river in order to be presented to its *bweta*-protective water spirit or genius. The baby has gone from the inner protective water of its mother to the external protective water of its new environment, that of

the river. If the baby falls ill, it will be given the water taken from its *bweta* so as to recover its health.

The King of *Loango*, the *Mani-Loango* – shortened as *Ma' Loango* – would never dare look at the Atlantic Ocean, whose eyes were perhaps too powerful for him. Nor could he shake hands with the pale human beings debarking from the Ocean. The fuse to protect him from the glare of the Ocean and any evil brought by the foreigners was his Prime Minister, the *Mani Mboma* – shortened as *Ma' Mboma*, and pronounced Ma'Mbom.

Likewise, the king of *Anzico*, the *Unko*' – a title misspelled by French explorer De Brazza as *Makoko* – would never stare at the Congo River. A heavy blanket protected him from the eyes of the river. It had been suspected that *Unko' Iloo*, the *Teke* King with whom De Brazza had signed the treaty yielding the Congo to France, had caught a glimpse of the river little before his death: there might have been holes in his protective blanket. His successor also died because he had been forced to stare at the river while being transported from the Ngabe area downstream the Congo river to Brazzaville by the French authorities.

To the Congolese then, water is not simply water. It is that element of nature which brings life, strength, food, money, etc. to man. The world is primarily water, and water – be it a small river, or an immense ocean – ought to respected for, without water, there is no life, there is no human being. Therefore the culture of the Congolese people, principally the river dwellers, is full of myths and legends, attitudes and actions, words and expressions wherein water is king.

The river culture as a traditional data base for cooperation

The *Teke* and *Ngala* are still quarrelling over *Ngobila*. Was he an ancestor to *Bobangi/Ngala* people, or a *Teke* 'king of water'? The truth is, the man called Ngobila and whom both De Brazza and Stanley had met in the 1880s was a *Bobangi*. How is it that Ngobila is also a grandee in the *Teke* hierarchy, The details given by Guiral and Stanley reveal that the Ngobila of the 1880s was a *Bobangi* trader living on a *Teke* territory, given the fact that the *Teke* and *Bobangi* had established blood ties. We have then two different peoples claiming one ancestor.The situation is not strange since the *Teke* and *Bobangi* had also established mixed villages along the Congo river and some of its tributaries, from Mpouya to Brazzaville on the right bank, and from Tshumbiri to Kinshasa on the left bank. In these villages justice was rendered by mixed tribunals : when a *Bobangi* was being judged, *Bobangi* judges settled the case, the *Teke* judges sitting as observers. When a Teke was sued to court, the *Teke* judges settled the case, in the presence of their *Bobangi* counterparts as observers. The cultural diversity of people was preserved by the river culture.

This complicity went so far as to reach economic activities. It is through a Bobangi name that the riverine *Teke* are known: They are Babali ('those of the river' not in *Teke*, their mother tongue, but in Bobangi). Added to this, these *Babali* had become fishermen. Two ethnic groups, but one major economic activity. When *Mfaa* developed and became Brazzaville, the complicity helped the *Teke* to sell land to *Bobangi* at lower prices than to other ethnic groups. In fact, the two groups had concluded a compact, the *Teke* controlling the hinterland while the *Bobangi* would take care of the rivers.

Congo-Brazzaville and Congo-Kinshasa share two *national languages: Kikongo* or *Munukutuba*, and *Lingala*. The latter is the language of the river. Though essentially composed of *Bobangi/Ngala* words (perhaps 75%) the language has been enriched by *Teke* and *Kongo* words. *Lingala* is the language in which many Congolese songs are performed. The river as thus given a language to modern Congolese music.

The culture of the river teaches the Congolese to settle their fishing camps without paying any attention to the political boundaries introduced by the Europeans. That is why in many such camps, it is difficult to know if the fishermen are from Congo-Brazzaville, Congo-Kinshasa, or the Central

African Republic. The frontier is not part of the river culture. This can be understood in the way the villages are established all along the rivers. There must be one village on one bank, and an alternative village on the other bank, so that if there is a problem on one bank, people paddle across the river to have refuge on the other bank. Thus we have Brazzaville facing Kinshasa, *Maloukou-Tréchot* facing *Maluku, Ngabé* facing *Kwamouth, Mpouya* facing *Tshumbiri, Boualanga* facing *Bolobo, Loukoléla* facing *Lukolela, Irebou* facing *Irebu, Liranga* facing *Ngombe, Dongou* facing *Imesse*, Bangui facing *Zongo*, etc.

The river people consider that all people are their friends. That is why when Bobangi paddlers met other paddlers, they shouted: 'Bakoyi !'

If the Governments of Congo-Brazzaville, Congo-Kinshasa, and the Central African Republic for instance follow the river culture as traditionally established by the river people international cooperation and peace will prevail in Central Africa. For, traditionally, the river dwellers practiced :

- The respect for cultural diversity;
- Absence of frontiers between the banks of the rivers;
- Unity of language;
- Solidarity among people;
- A diplomacy of the palaver.

There is hope in the relationships between Congo-Brazzaville, Congo-Kinshasa and the Central African Republic since the creation of a joint patrol on the Congo river to guarantee peace among the river dwellers of the three countries. By March 20 the third such patrol will be in operation. Said Bombenga and Kalle in their song *Ebale ya Congo* ('The Congo River'), 'Ebale ya Congo e zali lopango te, e zali nde nzela' ('The Congo River is not a frontier, it is a street').

Women and Water in Muslim culture

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Summary

Muslim culture is dominant in the Middle East region. Water is one of the scarce commodities in the arid region and is limiting its food security, controlling its political stability and general economic development. Islamic religion is giving great emphasis to water resources as mentioned several times in the Holy Koran, as the source of all living things and men and women has the equal right to access it and should be protected by all. Women in the region learn from mother to daughter how to conserve it and use it for ablution, cleanliness and food security. Women are highly respected according to Koran the holy book for Muslims and its guidance is getting more and more deeply rooted in the behaviour of all Muslims in the region. Educating Muslim women about their religion should be a very effective way to increase their knowledge about the current issues of water policies in the region. Their played role is vital as educators to the new generations basis of conservation and protection from pollution and as a health care takers. Muslim religious leaders should recognize women important role in managing water resources in order to get their support from political and social leaders.

Keywords

Women, water, Muslim culture, Koran, Islamic education.

Introduction

The Middle East Region is one of the high Muslim populated areas in the world. Islam is the majority religion for the different countries in the region. Islamic religion is also dominating in densely populated countries in Asia, Africa and Eastern European countries. This paper will focus on the Islamic culture in the Middle East Region in relation to women perception to their role in dealing with water issues and its resources management.

Countries in the Middle East Region have their natural resources limitations in addition to a wide diversity of environmental degradation sources of pollution. Population rate of growth is one of the under mining factors for its development. Limited water resources concomitant with the increasing population is imposing a lot of developmental constrains, which need serious consideration from the region development planners.

Water resources are creating a lot of political and social turmoil. Most of the region countries are under the water poverty limits of 1,000 m^3/capita. Several countries they have their water sources coming across the boundaries with other countries which is creating a lot of political unrest in the region. Due to the current global climate change increasing areas in the region are facing less water precipitation leading to more desertification in rain fed areas. Increasing efforts in several countries are focused on exploring areas where underground fresh water could be utilized as a basic pivot for countries development. Yet if those sources are not renewable this development will not be sustainable and other surface water should be used as in case of brackish and marine water desalination. Desalination is an expensive investment and it needs the availability of energy resources to support it as currently happening in Gulf countries.

Food security is a major issue impacted by the limited water resources in the region as agriculture policies is always controlled by the water availability. Securing food and water resources in the families of the region are the main concern of women. So they are the one who really suffer from those resources limited availability.

Water is one of the major natural resources created by God, even prior to the origin of life forms, forming the bulk of biomass (Saleem, A. M., 1995).The world water, rivers and sea water are mentioned several times in the Holly Koran to emphasis its importance according to the following data based on a computer search in the Holy Koran Text (Sakhr Version 3).

Word	***Number Mentioned in Koran***
Water	63 times in different verses of the Koran
River and rivers	51 times
Sea water or sea or seas	38 times

Muslim women are looked at a very high rank according to profit Mohammed sayings as he requested Muslim men to take care of women and specially their mothers at the first place followed by their fathers because of their pivotal role in developing Muslim Society by giving birth and delivering health care, and education. Their role in securing water for the family is an important one since the early days of Islam. They have been given the equal rights to access the water sources exactly as men since the era of profit Shoaib who is one of the mentioned previous profits to Profit Mohammed as stated in the Holy Koran ‘tell them that water is to be divided between them’ (Holy Koran 54:28).

Water as the source of life in the Muslim culture

The Holy Koran stress two types of water one is potable and fresh and the other is salty and bitter (Holy Koran 15:22). To show Gods’ power he stated that between them there is a natural barrier, which prevents them from mixing to protect the fresh water resources for people use. The benefits of this gift of Allah are mentioned through the Holy Book. God has stated in the Holy Koran ‘then we cause the rain to descend from the sky therewith providing you with drinking water’ (Koran 15:22). To stress the cleansing power of water God stated ‘and He sent down upon you water from the sky that He might thereby purify you’ (Koran 25: 48-49).

God Stated in the Holy Koran, that he created every living thing from water (Holy Koran 21:30). This brief and powerful statement made it clear that although the holy Koran is not a science book and does not discuss the chemistry or physics of water, but rather, it is the book for ‘the guidance that no body should doubt’ (Holy Koran 2:2). Muslims have to respect water value and do their best to keep it in its cleanest form to secure the best forms of life. Men and women in the Islamic

Culture realize this fact and as a reflection they offer it for their guests as an act of good gesture and generosity. As water is acknowledged to be one of the dearest natural resource, its access, collection and storage is an equal right for men and women. Women in the previous days where water was harder to get were given the equal right to make their reared stock drink from the well as men Shepard do.

Currently the Middle East countries are facing a massive urbanization, which put a great stress on water sources distributed for urban housing. Yet urban as well as rural women in most countries are still the most who suffer lack of water availability during their working time at home. Due to its scarcity and the current increasing water poverty experienced by most countries in the region, Profit Mohammed in the early days of Islam has clearly stated that it is an obligation for all Muslims to conserve their water use even if they are conducting ablution while standing at the bank of a running river. The profit meant to send the massage for all Muslims to consider the water needs for others and not to be selfish.

Running water is a symbol of purity and all Muslims are required to conduct their ablution with it before praying. Scientific evidence indicates that stagnant surface water are usually more contaminated and as a result can have accumulated toxic compounds from the excessive growth of algae which can harm its user.

For all Muslim males and females bathing and cleaning the body is a must for Tahara from all unclean sources whether from the body or from outside the body. Adult females are required to have a water bath after their menses or any blood discharge from their bodies. Men and women as well are required to have a bath after marital sexual intercourse.

When a baby is born the water has to be boiled as an act of securing its disinfection and cooled for giving the newly born baby a bath. Heat disinfected water is also used for cleaning the delivering female to insure her freeness from any disinfection after delivery as she could be easily prone for infections. Water boiling for the tools used in the delivery is stated very important in the practice of Muslim midwives in areas where public health services may not be available. The religion is giving very important massages in health protection of females and males. Body cleanliness could be also achieved by rubbing the body by any dry clean material in case water is not available.

Muslim Women are acknowledged for their important role in educating, feeding, and child bearing of the new generations. Their values for water are conveyed from one generation to another. Modern Muslim women are among the majority of scientists concerned about water issues and do really caring for the health of their families and societies.

Control of water pollution in the Holy Koran

God has stated in the Holy Koran that ‘Spoilage in the land and the seas is getting obvious as a result of people hand earnings’. Water pollution as impacted by the industrial revolution is seen everywhere and is impacting people’s earnings from fishing and marine life catch. Rivers are also polluted increasing the health impacts of their fresh water resources when used for drinking purposes. Currently Muslim women in the Middle East Region are considering water pollution as one of the highly rated issues they should focus upon during their surveys and action plans development (Engs, R. C. and L. H. Badr, 1984). They even address it in their religious meetings to discuss what should be done towards educating their children and societies to reduce water wastage and pollution. They are also utilizing their religious meetings to educate themselves about their role in controlling water roof tanks pollution through regular cleaning. Water roof tanks are the most commonly used to secure the availability of water in many urban areas in several cities around the Middle East Region.

Mosques usually have especially dedicated areas for women prayers and it is also used for their social gatherings and conversations after praying. In addition Mosques in several urban areas now

have social activity areas where it could be used for religion teachings. Lately Islamic leaders tend to mix daily life issues with religious discussions to make it attractive for their male and female audiences.

In addition in Muslim societies respecting others properties and feelings is a vital issue to be obeyed by every body (no harm and not to harm others). Industrial firms, which are not controlling their wastewater, are designated as hurting others and causing harm to them which is a forbidden action to be done by any Muslim. Muslim women are taking after this religious fact and trying in several industrial communities to force the decision makers to stop those polluters. Religious societies as Muslim Youth Organizations are giving a lot of their dedicated efforts to this area of educating male and female youth about their future role in protecting the natural resources of the country to insure its sustainable development. Water is one of the highly addressed resources.

Role of religious organizations in Muslim culture

Muslim countries societies as well as governments are giving Religious organizations are currently receiving an escalating attention. The governments are realizing their increasing power in guiding people and changing their behavior to the better true Muslim Religious rules. Governments of most Middle East countries where Islam is the religion of the majority would like their people to understand their religion without being fanatic about it. One of the aspects they mandate the religious organizations to focus upon is the concept of conservation and prevention of all forms of wastage. Muslim organizations are always a very strong venue of changing as most of Muslim people are strong believers in the religion. Water resources are one of the main focuses of their teaching. Those organizations acknowledge Muslim women social role in changing the habits and attitudes of the community who believe very much in their religion, and are currently paying a lot of attention for Muslim female awareness and education as leaders.

Current means of education in Muslim culture

In countries like Egypt, Tunisia, Lebanon and Syria the religious teaching is usually taking place in mosques and the social centers affiliated to them. Public Television channels are also addressing the issue of water resources and their managements with emphasis on the role of both women and men in religion teaching programs. Audio massages through Radio transmission are reaching wider society in rural and isolated areas where Female Muslims may not have access to TV transmission. On Friday during the pre-prayer of midday all Muslim gather for it. Many males can hear the prayer and the educating massages. The role of Muslim female religious educators is increasing in several countries in the region as they can reach secluded females in several Muslim societies

At El Azhar, which is the oldest and the highly recognized Muslim Educating Center, religious leaders are educated about life issues as supported by the holly Koran verses. Water related issues are one of the areas addressed by the El Azhar University in Male and Female undergraduate and postgraduate curricula. In the university females are equally educated to be Muslim leaders as well as scientists, doctors, etc. to integrate both religion and sciences in their professions.

In Egypt, the Ministry of Water Resources and Public Works is utilizing the Muslim Mosques leaders to make the needed rapid change in people’s attitudes towards water conservation and protection from pollution among many other daily life related issues. The ministry recognizes the role of women in water conservation and they utilize the religion female leaders for educating rural women how to conserve and protect their drinking water resources from contamination and stress the Koran verses requesting such a change.

In order to achieve the strong needed change it is needed to verify the relevance of the education massages to Islam, by means of evidence from Koran and Hadith. As a second step the educators

should stress the achieved benefits and the evils that could be avoided by adopting those massages with respect to individuals, the family, the community, and humanity in general

The final stage is to develop one or more plans of action in order to put those ideas into practice and prove their effectiveness. One of the proved successful plans for integrating the environmental education in the Muslim female's health educators studying at the Oman Institute of Public Health tested action. Relating the water protection education to Islamic bases proved to be very convincing for them to adopt the massage and perpetuate it in their communities (unpublished data from Oman Institute of Public Health, Sultanate Oman Ministry of Health, 2002).

Conclusions and recommendations

The strong faith of Muslims in their religion makes the religious education a very powerful and useful means of change for women and men behavior. There is a growing concern in most Muslim countries to stress female religious education to establish female religious leaders base especially in issues related to the community survival.

Water as an increasingly scare determinant for life and community development is one of the seriously addressed issues especially with Muslim women who utilize it, and educate the new generations about ways and means of its conservation and protection from pollution.

It may be claimed that there is no need to stress religious education in water issues and that all those issues are scientifically well established. In answer to that the difference is great since the Islamic religion teaching is much strongly attached in both men and women's minds as they feel it is something they will be rewarded for by God.

Governments and development organizations working with the region country should stress the religious avenue as a way of getting a quick response from the community.

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Water People

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Abstract

An archipelago of 7,100 islands in Southeast Asia, the Philippines and its people, the Filipinos, bred a culture rooted in water. Evidence of this is seen in two cultural indicators. The first is in the naming of the islands' major ethnic groups, major dialects, and in how the people orient their locations. The second is in its colonial history as a people earlier known as shipbuilders and as marine navigators.

For the first indicator: Examples are the Pampanga region (from the native word *Pampang* which means "riverbank"), the Tagalog region (from *Taga-Ilog* which means "river-dweller"), the ethnic group Tau-sug ("people of the sea current"), and the direction *I-lawood* which means "toward the sea." Other indicators, such as language similarities between islands and inter-island transport further demonstrate that early Filipino culture was one that was based on water.

Contemporary Filipino culture, no doubt affected by globalization, seems to have lost touch with its roots as a water-culture. Much of present day transportation is by land and air. With the growing popularity of the internet, the transition from a culture of water poses questions of concern regarding cultural integrity and identity in the background of globalization of cultures.

This presentation is an inquiry on the changing identity of the Filipino people as shown through its literature. In myths passed along generations through oral tradition, water has played a major role as an element of creation, destruction, and punishment from the gods. A review of contemporary children's literature indicates that the thematic role and presence of water has declined.

As an artist, this researcher is concerned with safeguarding his cultural identity in a world whose cultural borders are fast disappearing, thus the need to review the myths of the past and use them as backdrop for reviewing contemporary literature.

This researcher's thematic review of Filipino myths and contemporary children's stories shows that even though water as a thematic element has a lesser presence, other themes that have emerged such as safeguarding the environment, contributing to the community, placing importance on the elderly, and children's rights, are being given value.

Institution's activity

The Department of Communication of the Ateneo de Manila University, through the Center for Communication Research and Training (CCRT) is the research, consultancy and professional training arm of the Department of Communication, Ateneo de Manila University. It is envisioned as a locus for dialogue and collaboration on relevant communication issues and topics among industry practitioners, government officials, non-government organizations, special interest groups, parents, teachers, academics, and other interested individuals within and outside the university sphere.

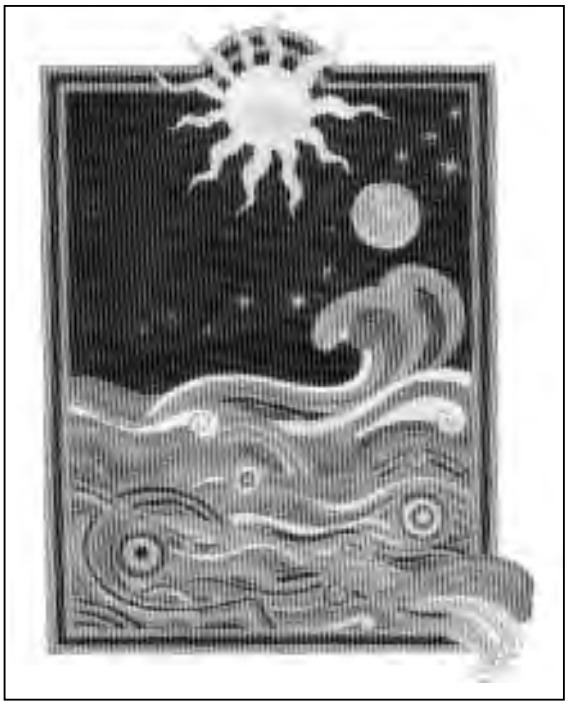

Figure 1. In the Sulod creation myth, a long time ago there was no land. There were only the sky and wide expanse of water called linaw. (Ilustration by Felix Mago Miguel)

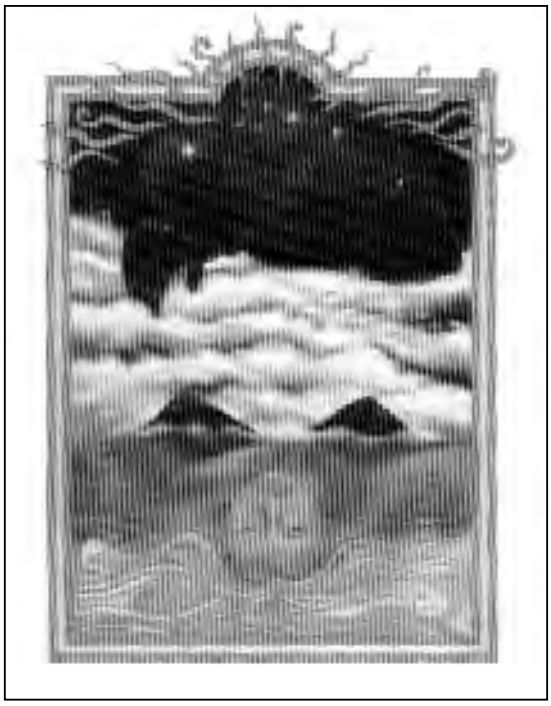

Figure 2. Illustration by Felix Mago Miguel

Project Hydroscape

Masayuki AIZAWA

Nippon Koei Co.,Ltd.

Summary

Hydroscape is the landscape of water based on a hydrodynamic mechanism and cultural background. It is newly defined concept to deal with the relation between nature and culture, as well as the relation between culture and engineering concerning water. This concept has originalities in Japan, but at the same time, it is internationally valid by rearranging the cultural background in time and space. Rearrangement process is secured by the physical investigation of the mechanism of water including full-scale experiments and by the analysis of cognitive process of expression of water as a physical phenomenon, as an image, and as a symbol. Solving many problems of foreign countries, of historical heritages, Hydroscape is not only important as a design methodology but also has a very important role to solve complex problems of the world. It is because water is itself the vital sources of our lives and has the strong power to lead the future. Here is the new challenge of this new concept Hydroscape.

Keywords

Hydroscape, texture of water, hydraulics mechanisms, expression-form, rearrangement of cultural background.

Introduction

In human beings' history, it has been a long time since progress of technology stopped the rise of new art. Progress of technology does not go hand in hand with an excellence of art. These days the technology and art have been highly specialized and subdivided and both parties past their ways rather than cross. Even if art originates in very inner individual intuition and imagination, a possibility could not be denied that change of the external environment by progress of technology gives rise to the new possibility, shakes an intuition and an imagination of an individual, and makes them exteriorize as an expression-form of art.

To give engineering the true meaning of its own and to make possible the sustainable development of water environment, I advocate new concept 'Hydroscape'(Aizawa 2002) based on cultural and engineering background.

The origin

The physical property of water is the same all over the world. However, the expression differs according to the topographical features of the land. We call the landscape of water based on a hydrodynamic mechanism and cultural background as 'Hydroscape'. It is this concept which has its origin in Japan, but at the same time, it is internationally valid by rearranging the cultural background.

Japan has a special aesthetic world of its own. It is based on its cultural background and topographical features. In Japan, rivers are short and fast flowing. It is because that most rivers in Japan flow directly to the ocean through up-stream region of deep gorge and middle-stream region, lacking the down-stream region of fertile delta areas. As a result, rivers flow and fall vertically, and make many expressions (Fig. 1).

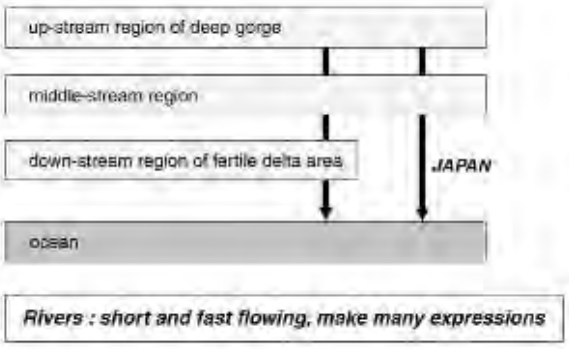

Figure 1 Topographical features of Japan. Most rivers in Japan flow directly to ocean through up-stream region of deep gorge and middle-stream region, lacking the down-stream region of fertile delta area. As a result, rivers flow and fall vertically, and make many expressions.

Though Japan is a maritime nation, in the scene of the sea drawn on pictures, many scenes of the crest of a wave, the coastline and the land in the background, and a mountain are used as a material rather than the scene of the horizon of the ocean. It defines the peculiar composition of a Japanese painting. There is a landscape 'The Great Wave off Kanagawa' of the '36 scenes of Mt. Fuji' which expressed Mt. Fuji by Hokusai Katsushika [1760–1849] as a remarkable example (Fig. 2). This work addresses very many things about the ocean and the art of Japan. Mt. Fuji is the highest mountain (3,776 m) in Japan mostly located in the centre. The mountains of the highest peak of one country can be directly overlooked from the sea, as a result of geographical features of Japan lacking the loose delta region which is a down-stream region. In addition to it, 'The Great Wave off Kanagawa' has told us the remarkable talent of expression-form which made it exteriorize symbolically as an artist who stood high in the idea and of abstracted image about the expression of wave as a penetrating observer. While the process which expresses the crest of a wave breaking up concretely as a geometric form represents an artist's viewpoint, it also makes a scientist's viewpoint. The sharpness of the observing eye to Nature will be common in Leonardo da Vinci [1452–1519] who was the leading scientist in the Renaissance term, and was also an excellent artist in going back from Hokusai about 300. Thus, the relationship between the water in Japan and art is condensed in one picture at once.

Geographical features of Japan as physical conditions, climate, and scenery peculiar to Japan have had great influence on water and art of Japan. A special feature roots in the soil of the culture for hundreds of years. The cultural background of Japanese artist and Japanese art differs from other cultural spheres.

As an example, I will look at another work of Hokusai. There is expression of various waterfalls which Hokusai is drawing clearly the structural frame as a geometric form of waterfalls. Hokusai shows us a homogeneous material called water by the various expression-techniques. The work of eight figure groups entitled 'Waterfalls in Various Provinces' shows how water, which is homogeneous and hard to catch, would change with the falling conditions (Fig. 3). The feature of expression of Hokusai's waterfall classifies the streamline in a waterfall clearly, and shows it, without using continuous gradation. It is considered that Hokusai grasped the structural frame of a waterfall in the form meaning clearly that expression of a waterfall is looked at by the same painter by various expression-forms.

Figure 2 "The Great Wave off Kanagawa", by Hokusai KATSUSHIKA. From "36 scenes of Mt. Fuji". We can see the highest mountain (Mt. Fuji, 3,776m) directly from sea because of the short distance between the mountain and the sea.

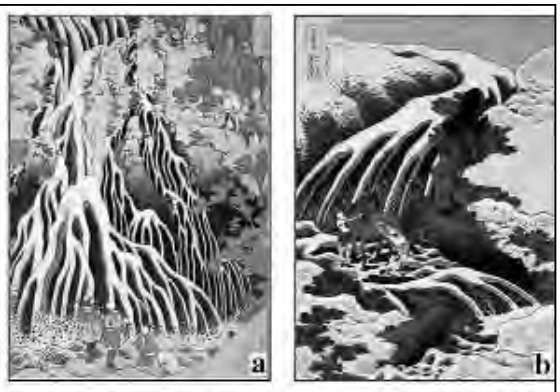

Figure 3 "Waterfalls in Various Provinces", by Hokusai. **a**, "Kirifuri-no-taki at Kurokami-yama in Shimotuke Province". **b**, "Yoshitsune-uma-arai-no-taki at Yoshino in Yamato Province". There are many expressions of water in Japan.

The mechanism

The texture of falling and flowing water has its own variety of shapes. Combining river structure and this texture in a good design will only be possible with the establishment of a hydraulics derived estimation methodology. There have been many famous studies on mechanical stress (Chen and Davis 1964, Hagerty and Shea 1955, York, Stubbs and Tek 1953, Schlichting 1968), but almost no studies on texture and shape of water in three dimension.

The following two kinds can be considered as a method of approaching the texture of water from a hydrodynamic viewpoint.

(1) Method to draw a solution from a basic equation theoretically, and to apply through verification by experiment.

(2) Method to grasp the phenomenon experimentally, and to take a mechanism into consideration.

About the former method, there is the equation of Navier-Stokes which describes movement of viscous flow. However, texture of water is the problem about the three-dimension-form of an interface water called the free surface. This equation itself is a complicated nonlinear differential equation, so, it is impossible to solve it generally. And calculation time required for one case when solving numerically is too long to use actually.

The latter is the method to facilitate a full-scale experiment, to collect the data about form change of the texture of water accompanying flux change, then, to build and apply a theoretical framework which can explains the continuous change as the whole.

It is difficult to calculate a general solution theoretically. In a reduction model experiment, it is difficult to grasp a real phenomenon at a relation with a similarity rule. As a result it can be called the realistic hydrodynamic approach, to grasp the phenomenon of the texture of water by full-scale experiment and to consider the mechanism of the texture of the water by the fundamental amount of physics.

Three types of full-scale experiments on falling and flowing water were carried out to accumulate basic data (Fig. 4).

The texture of falling water was classified into three categories for both free falling and slope falling type according to the increase of Reynolds number: (1) stability of free surface, (2) transition, and (3) whole turbulence (Fig. 5). In the first category the stability of the free surface was

Figure 4 Experimental equipment. Those are 5m high, and the max flow rate is 0.1 m^3/s.

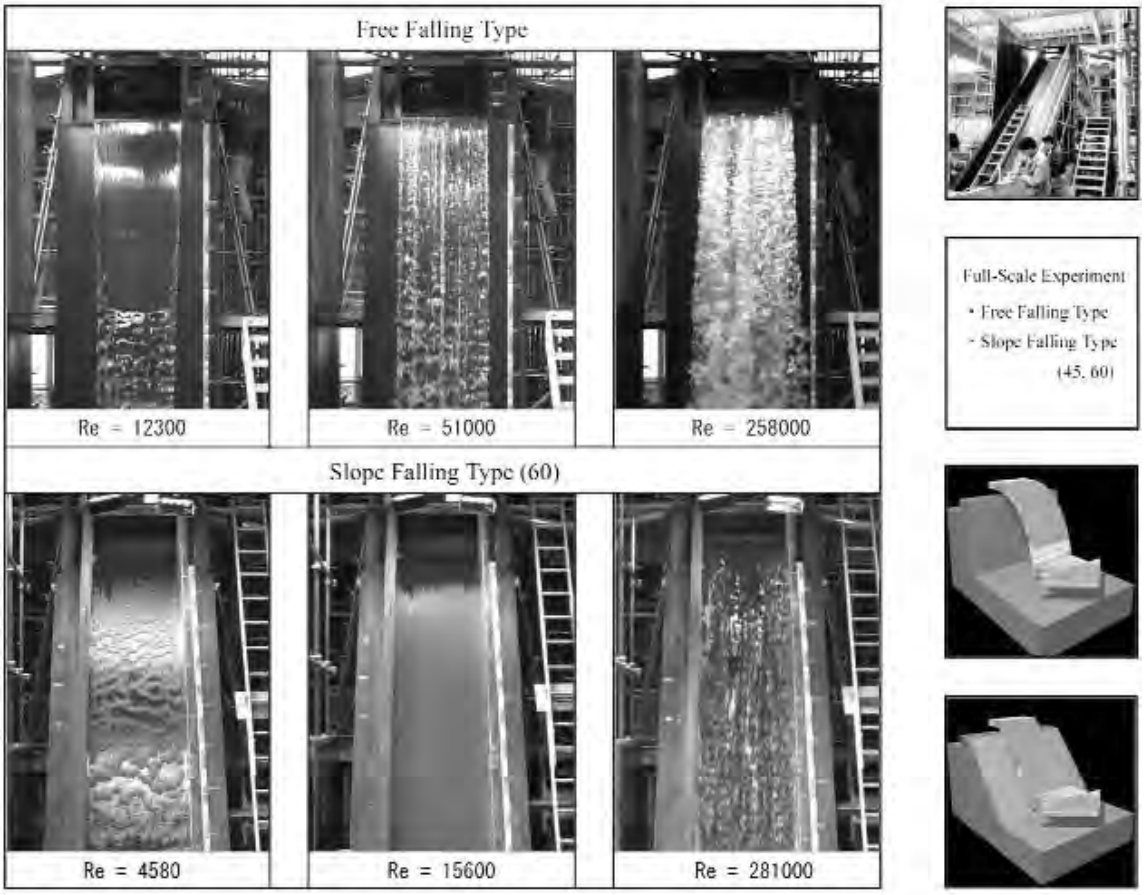

Figure 5 Texture of falling water. The texture of falling water was classified into three categories for both free falling and slope falling type according to the increase of Reynolds number: stability of free surface, transition, and whole turbulence.

related to the growth of minute disturbance. Surface tension works as a counter force to the disturbance in free falling water, and gravity in slope falling water. We made those experimental equipment only for this purpose. Those are 5 m high, and the max flow rate is 0.1 m^3/s (Aizawa 1996, 1998).

The shape and texture of flowing water was classified into another three categories according to the patterns of artificial roughness and Froude number: (1) repetition of a piece, (2) linear divided pattern, and (3) undivided complex pattern (Fig. 6). The principal hydraulics factors which determine the shape and texture are hydraulic jump, the mutual interference of wakes, and the volume balance of flowing water (Aizawa 1996, 1998).

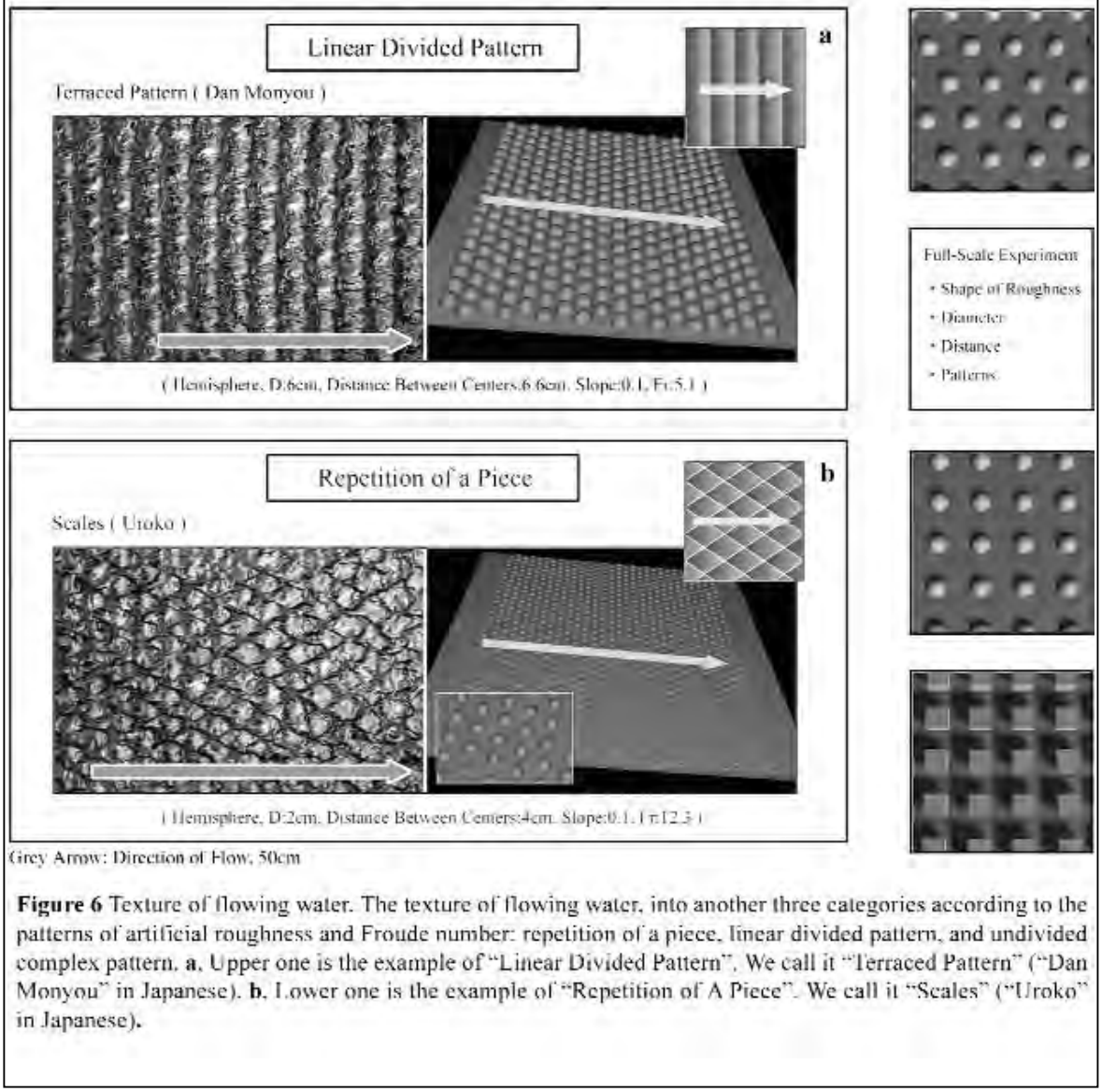

Figure 6 Texture of flowing water. The texture of flowing water, into another three categories according to the patterns of artificial roughness and Froude number: repetition of a piece, linear divided pattern, and undivided complex pattern. **a**. Upper one is the example of "Linear Divided Pattern". We call it "Terraced Pattern" ("Dan Monyou" in Japanese). **b**. Lower one is the example of "Repetition of A Piece". We call it "Scales" ("Uroko" in Japanese).

Also we got enough data about Acoustic Features. We have the data about the relationship between Texture and Sound (Fig. 7).

The expression of water which occupies an important position in natural scenery cannot be scaled down physically like other elements at the relation of a similarity rule. The expression of water is only the expression of the water in the scale. Here lies the importance of our experiment and possibility of Hydroscape. It also has a cause in this point that the technique of designing water without actual water, like a dry garden style in Japan in which main theme is to reproduce nature only with sand and rocks, has developed. It is one of the remarkable features of water and art in Japan that if you try to introduce natural water into art, then you go far from actual water.

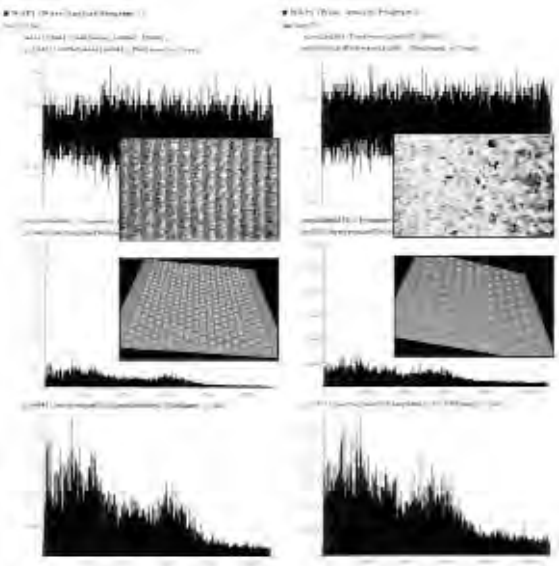

Figure 7 Example of acoustic features. We have the data about the relationship between Texture and Sound.

The expression

Art is not the mere copy of the actual situation. To investigate the expression of water, we must think about three phases (Fig. 8).

1. Expression of water as a physical phenomenon;
2. Expression of water as an image;
3. Expression of water as a symbol.

Abstraction of the 'expression of water as a physical phenomenon' in the brain (cognitive process) is the 'expression of water as an image', and the exteriorization by expression-form of the 'expression of water as an image' is the 'expression of water as a symbol' (Cassirer 1923, Langer 1957). It is the last 'expression of water as a symbol' that we see as a work of art, also still there exists the 'expression of water as a physical phenomenon' and the 'expression of water as an image'. It can be said similarly about the three-dimensional work of the molding and two-dimensional work of the painting. And, as for the literary production and the music work as well. So, Hydroscape includes the design of water as a symbol without actual water as a physical phenomenon (Fig. 9).

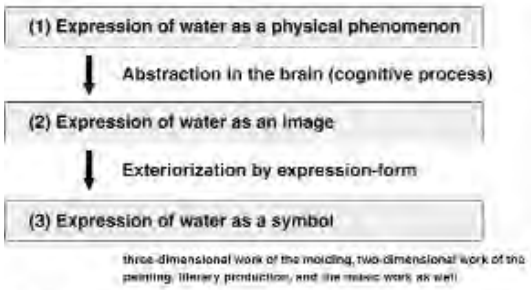

Figure 8 Cognitive process. Abstraction of the "expression of water as a physical phenomenon" in the brain (cognitive process) is the "expression of water as an image", and the exteriorization by expression-form of the "expression of water as an image" is the "expression of water as a symbol".

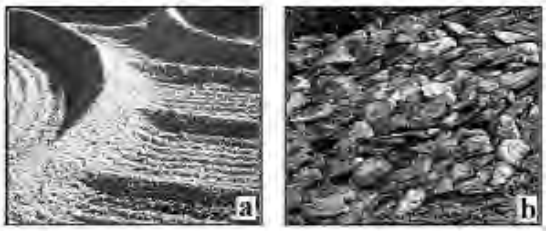

Figure 9 Examples of water without water. **a**, "The Ryugen-in Temple" in Kyoto. Karesansui express the ocean. **b**, "The Sinnyo-in Temple" also in Kyoto. Karesansui express the river. There are many arts in Japan which can express water without water.

The Japanese have various techniques of expressing water in arts in a garden. There is traditional nature peculiar to Japanese which may be grasped as an expression which can articulate the form of water in the background. In addition, the idea of the abstract feeling is exteriorized by expression-form to an art. The artist has not only necessarily copied the actual situation.

The traditional garden in Japan did not take in the fountain that in a Western geometrical formula garden used, from a viewpoint of imitating natural scenery. Moreover, in order to express the wave of an open sea in the limited space which had been divided, expression-form of not using actual water has been taken. The choice which eliminates even use of actual water itself while investigating thoroughly the posture in which the expression of natural water is pursued can be called what just expresses the relation between Japanese water and art.

We can see one reaching point of water and art in amusement to 'Imoseyama Onna Teikin Yosinogawa no ba (1771 premieres)' called as a grand and masterpiece leading with the dramatic composition which is full of a romance also in many masterpieces of the kabuki play (Fig. 10). Here, it is suitable magnificent stage space in a profound and splendid drama with the beauty of the text which puts the foundation on Joruri-gidayu-bushi (traditional Japanese music) which set the river (Yoshino River) as of art expression on the centre of the stage.

Figure 10 "Imoseyama Onna Teikin Yosinogawa no ba". In this famous kabuki play, river symbolizes the image of sad love affair.

All stage settings exist to outstand the tragic love of young couple. The torrent of the Yoshino River is inserted among the Yoshino mountain of luxuriant cherry blossoms in full bloom, and the tragedy of young couple's love develops. Different from the stage setting of other kabuki play, the stage is uniquely developed to right-and-left symmetry. The torrent of the Yoshino River is allotted in the center and the upstream of a river is shown as a background in perspective. By flowing the stage in the direction of length toward the seat for audience of the lower berth from the upper row, the stage setting of the Yoshino River provided in the center bisects stage space right and left, and is expressing man and woman's tragic love torn symbolically.

Rearrangement of cultural background of 'Space'

Hydroscape is not only a mere design methodology but also a very important concept to deal with many complex problems of the world. I have prepared some examples of rearrangement of cultural background, Space and Time.

As an example of rearrangement of cultural background of Space, there is 'Hantan-gang Dam Grand Design Project' I was involved last year (Fig. 11). The location is in the Korean Peninsula, between North Korea, and South Korea, and Dam Site is near the DeMilitarized Zone called DMZ. So, it includes many complex problems. In the short-term, there are many military purposes. But, in the long-term, after the Unification of North and South, It must be a symbol of peace. There are many good natural landscapes. But, we must build artificial structures there. There are cultural background, history and tradition. But, we must introduce new technology there. Each concepts, opposite directions. To solve the problem, we decided to use the concept 'Project Hydroscape' in a wider meaning. Not only for structure design, but also for the master plan,that is 'Grand Design'.

Hantan-gang Dam Grand Design Project

includes many complex problems

- short-term : Military Purposes
- long-term : Symbol of Peace

- Natural Landscape
- Artificial Structure

- Cultural Background (history, tradition)
- New Technology

Figure 11 Hantan-gang Dam Grand Design Project. The location is in the Korean Peninsula, between North Korea, and South Korea, and Dam Site is near the DeMilitarized Zone called DMZ. So, it includes many complex problems.

Those are military traps against the attack of tanks. In case of an emergency, supports are blown up, and heavy weights down, and close the road (Fig. 12).

The cultural background in Japan and Korea is different. So, I started to make geographical model with Korean engineers (Fig. 13).

And also, to understand the cultural background, I visited many dams all over South Korea with a Korean engineer and discussed the differences. And I checked many natural landscape of water. Then I decided to call them 'Natural Hydroscape Network of Hantan-gang' (Fig. 14). And I made a master plan based on the concept of Hydroscape.

Figure 12 Military traps against the attack of tanks. In the case of emergency, supports are blown up, and heavy weights down, and close the road.

Figure 13 Model study. In Japan and Korea, cultural background is different. So, I started to make geographical model with Korean engineers.

Figure 14 Natural Hydroscape Network of Hantan-gang. **a**, Jaein waterfall. **b**, Jiktang waterfall. **c**, Sambuyeon waterfall. There are many good natural landscapes.

Figure 15 Landscape of dam site. According to the landscape, we decided to use straight line and low raised arch for design motif. This is the form-standard to decide the shapes of structures.

About the form-standard. According to the landscape, we decided to use straight line and low raised arch for design motif (Fig. 15). This is the form-standard to decide the shapes of structures. I have prepared several patterns of dam site design study, which is 700 m long (Fig. 16a). The problem is to balance the un-symmetric shape. I used straight line and low raised arch. And another examples of the bridge design study using the form-standard (Fig. 16b).

By using the concept of Hydroscape, we could deal with this complex problem systematically from a master plan to the structure design.

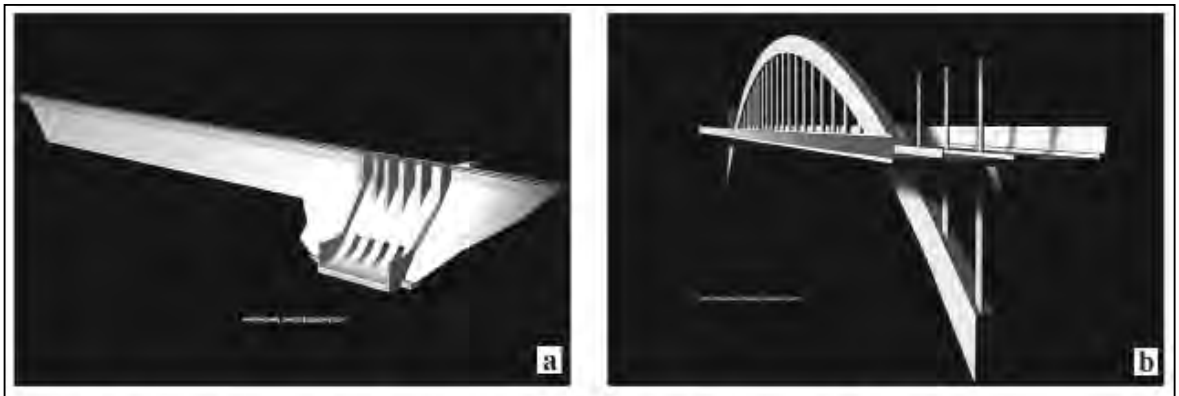

Figure 16 Example of design study models using the form-standard. **a**. dam site. **b**. first bridge.

Rearrangement of Cultural Background of 'Time'

Another example, 'Ishiibi River Dam Design' in Japan (Fig. 17 a,b). To rebuild a stone river dam which was built 400 years ago by Samurai Warrior, Hyogo Narutomi, the problem is how to understand the history and make a new design. In other words, it was a conflict between culture and engineering which can easily arise concerning heritage matters. We decided to use the concept Hydroscape to make the master plan.

Figure 17 Ishiibi River Dam Design in Japan. **a**, Location. **b** Total image. To rebuild a stone river dam which is built 400 years ago by Samurai Warrior, Hyogo Narutomi. The problem is how to understand the history and make a new design.

We made a structural analysis, water flow experiment, and many other engineering tests. But it is not enough as a rearrangement of Cultural Background of 'Time'. It is easy to make CG (Fig. 18a). But it was still not enough(Fig. 18b). Finally, I decided to meet some stone masons to get the answers (Fig. 19). I checked the field, stacked the stones myself. And I found out that it is very important to understand the stone itself in many meaning and the engineering technology of old age.

We also call this case example of Project Hydroscape. It includes the design of texture of water. But in this case most important point was to rearrange the cultural background of time.

Figure 18 Design study. **a**, CGI. **b**, Study models.

Figure 19 Stone masons. Finally, I decided to meet some stone masons to get the answers. I checked the field, stacked the stones myself. And I found out that it is very important to understand the stone itself in many meaning and the engineering technology of old age.

The future

Public structure is not a mere article of consumption. Further, development of water must not only be a trial without the consideration of cultural implement. Originally, those must have the quality which should be designed as a permanent infrastructure rooted in each culture. This is the problem in connection with the essence of sustainable development and cultural dimension, and where the new concept Hydroscape can play an important role on water and cultural diversity.

Although the public structure is generally used as a permanent structure or as a semi-permanent structure, the life currently assumed in fact is called dozens of years (30 years and 50 years). It can be said somehow that the design standard itself is carrying out article-of-consumption treatment of the infrastructures depending on a view.

Originally, the public structure as a permanent infrastructure must be designed fully in consideration to what thing it must leave over the future by interpreting history, tradition, and place using the newest technology of the time. Rather considering history and tradition, the public structure itself must serve as history and tradition, and it must form the landscape and environment of the area itself. Time is long and flows. Although something will newly be created at the time of each development, the work which advances the historical flow in the better direction is done in fact, therefore, we must do our best. There lies the possibility of cultural diversity and sustainable development.

All we have to do is to consider a public structure to be a kind of permanent structure, to understand an infrastructure maintenance to be a work where we create history by our own hands, and to play an affirmative role socially toward the future.

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Tools for a New Strategy of Water Management

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Summary

Changing of practices towards the resources of water appears to-day as a major problem for societies. Sociological studies can propose at least two approaches favoring development of awareness to the urgent need of protection of the water resources.

- The study of mental representations of water among the public must be a preliminary step to every water policy as the cultural diversity of the relationships to water has been put in evidence all along our Sessions,
- Analyses of the relationship between people and their territory is the second step to undertake since the territory is at the basis of the links between a community and its history. Each group establishes a special interpretation, understanding and belief related to water within its own land use occupation. Cultural diversity is the expression of the specific anchorage of the group into the territory.

Keywords

Sociology, water perceptions, mental representations, environmental psychology,

Introduction

Risks linked to water, as underground water pollution or flooding, have been stated, all along our works, as becoming more and more situated within an unlimited period of time, in an unlimited space and, often, dreadfully missing suitable management; this acknowledgement raises awareness of the evident need of taking care of the water resource at a global and individual level as it discloses the tight dependency of the societies of each others.

At the same time, we have developed a lot of knowledge about water properties, or water management; but this knowledge needs multiple interactions and transformations at various levels in order to be easily accessible for appropriation by each of us. The innovative means of communication offer new possibilities of interactions, but they imply at the same time a radical change in the usual way of thinking and acting, what we call ‘a rupture in patterns of actions’.

What do we consider as being to day ‘good practices’ of water? What is the part of cultural legacy? How to conciliate traditional knowledge and new technologies, economic development and nature protection?

In order to answer these questions, during the last years, the sociological taskforce of the French Water Academy worked on tools which meet the evident need of developing new approaches of

water management. In this paper, we will summarize some of the sociological tools that could be used to develop an efficient dialogue between decisions makers and water users: listening to what people think and enhancing participation of the public in decision making process.

1. *The theory of mental representations and its application to the definition of water-related attitude profiles*

The mental representation theory was developed by Moscovici in the late nineteen seventies. What he calls representations is the process and the product of a mental activity through which we reconstruct the world we are faced to in reference to our knowledge, our beliefs, and our experiences in order to give a meaning to what we are living. We are not reacting to the reality but to a reality rebuilt from what we are, what we expect and what we believe. The theory suggests that mental representations often induce behaviour more directly than the facts themselves.

In our daily lives, representations are used for a large variety of mental processes; at first they are used to decipher new events, to master the strange and to classify new facts into well known categories. But they also guide our actions and they help us to communicate, to anticipate, and to plan for the future. For example how to choose food without a representation of what is eatable? And what is eatable for some of us is firmly rebuked by others! Cultural diversity plays its part in our most basic choices.

At the same time, our water representations are an abstraction and a synthesis of our water experiences, and daily renewed water perceptions. They are sometimes inaccurate, untrue, incomplete and based on truncated information. But they are also characterized by their strength to resist to modifications. The inertness of water representations helps to understand the gap between people's water representations and the actual features of the resource, linked to the recent changes in social and environmental contexts: pollution, visible degradation of water, increase of population and urban concentration.

The gap between water representations and behaviours throws some light on the apparent contradictions stated in the different cultures: on one hand people have a good knowledge of the frailty of the water resource but at the same time it is difficult for them to take this knowledge into consideration within day to day practices since they keep the idea of water as a 'gift of God', abundant, regenerated easily, and inexhaustible.

Therefore, the first step proposed is to develop systematic surveys on water representations in order to put in the open and to understand how people perceive water, how they consider water related events and how they assess the qualities of the resource. Analysing the organisation and evolution of the mental representations is a way of concretely 'listening to people'.

The author of this paper in collaboration with members of the Laboratory of Environmental Psychology[1] conducted a pilot study on water representations and water management perception in four French towns and six metropolis through out the world. Based on the results of the French surveys, the commons elements of the collected representations were used for building a general scheme and to define profiles of attitudes towards the water resource. The results obtained from the six other towns demonstrated the impact of cultural backgrounds on these representations, the main dimensions which influence the representations and the potential triggers existing in each culture to modify or reinforce a respectful use of water. Both studies were qualitative ones; but, if coupled with quantitative surveys, the data could be used for the elaboration of information campaigns directed to the public and the decision makers.

Which outcomes do we expect from water representation studies?

1. Laboratoire de Psychologie Environnementale, CNRS.

a) Finding anchorage for new knowledge

Finding the *anchorage points* on which it will be possible to build new knowledge; psychological studies have proved that new information can only be integrated if they are congruent with existing knowledge. Dissonant information is often implicitly refused as it requires a change of practices or routines.

The theory of 'dissonant information' was developed by Burton (1972) and tested in different contexts. The theory explains why residents appear to have a pervasive tendency to deny the threatening aspects of their environment and markedly underestimate the probability of future environmental risks or calamities.

If modern technical knowledge on water resources, change of climate, pressure on the underground water and pollution factors, are to be accepted, appropriated and implemented, we need a better understanding of what people already know on these subjects, how they assess their impacts, who or what they take for accountable of water degradation, and how they conceive its protection.

From the enquiry we did, we put in evidence that every one knows precisely how the water he drinks is tasting; some people even move from one district to another to obtain a better water quality; some others put tap-water in the fridge for deleting the chlorine taste; more and more people rely only on mineral water to keep themselves in good health. To speak in the open on these topics is a way to find consensual solutions to the present problems.

Formerly, in various cultures, water was protected or guarded by a large variety of deities, fabulous monsters, dragons, etc. Spoiling the sources could be a case of prosecution. To-day in Europe this marvellous pandemonium has been deleted from our memories. The sacred character of water has faded and we become aware that the risks linked to polluted water are more and more situated within an unlimited period of time, in an unlimited space. What can we propose today to replace the ancient values and feelings related to the resource and its protection? This question opens the field to a new type of reflection.

b) Creating better conditions of dialogue

In order to create better conditions of dialogue some principles drawn from sociological studies on communication, must be reminded: listening to people is a mark of respect, a will to create a relationship of exchange on a peer basis; it is a mean to reinforce our partner in its own identity; by considering the person we listen to as an 'expert' of water, we insure him that his advises will be seriously taken into consideration. This allows to speak about real needs and demands.

On another hand, psychosocial studies have also built models of communication and developed theories about group influence. These models and theories could be used to improve communications with people coming of various cultures.

- Models of communication

  A lot of models are quoted in the literature. What is presented here is a simple model explaining the impact of the size of the group on the quality of communication. It is said that communication will be better if the size of the group is relatively small. Two types of functions play parts in the model: liability and proximity. Within a small group liability of each one becomes visible to the other, engagement is more prized, work accomplished is easily attributed to its operator. On the other hand proximity implies links between people and facility of exchanges; communication is made on a friendly basis.

- Group influence

  Experiences show us how individuals can be affected by the unanimous opinion represented by the group majority. The famous experience developed by Ash can easily be reproduced in different contexts.

P. Bourdieu, in France, developed the theory of 'habitus': he shows that we tend to reproduce the main characteristics of the social class we come from.

How to incite, in groups of different culture, the merging of leaders having the capacity to introduce changing of practices to water ?

- Methodology for developing consensus

  In the case of development projects it is essential to create a dialogue with the public about their cultural related water practices before implementing new technologies for water supply and management. To day the training given to NGO, in charge of improving water practices in DVD, underlines that cultural diversity is a preliminary and basic data for their work. Methodology for analyzing cultural context has been developed. The 'Capacity and Vulnerability Analysis (CVA) suggests that 'convergent thinking necessarily emerges once it is recognized that present vulnerability is linked both to the development process and to the livelihood strategies of households or individuals'. The method requires questioning residents on how they view themselves as a society and what is their perceived ability to affect their environment. Questioning includes what people's beliefs and motivations are and how water resource degradation can affect their perspective for the future.

c) Defining profiles of attitudes

In the Water and Citizens studies [2] we crossed personal practices with diagnostics given on the state of the water resource, in order to define different profiles of environmental attitudes.

In terms of personal practices we distinguished between people who usually save water and practice water re-use, people seeking for a control on their water consumption and people spoiling water and being unconcerned by the problem. Data concerning the diagnostic on the quality of water was classified in three water problems. By crossing the two functions we designed six attitude profiles: militant, caring for the environment, general attitude of sparing, ethic attitude based on sharing with future generations, guilty attitude funded on the doubt on the individual capacity to improve the situation and a fatalist attitude characteristic of unconcerned people (see figure beside).

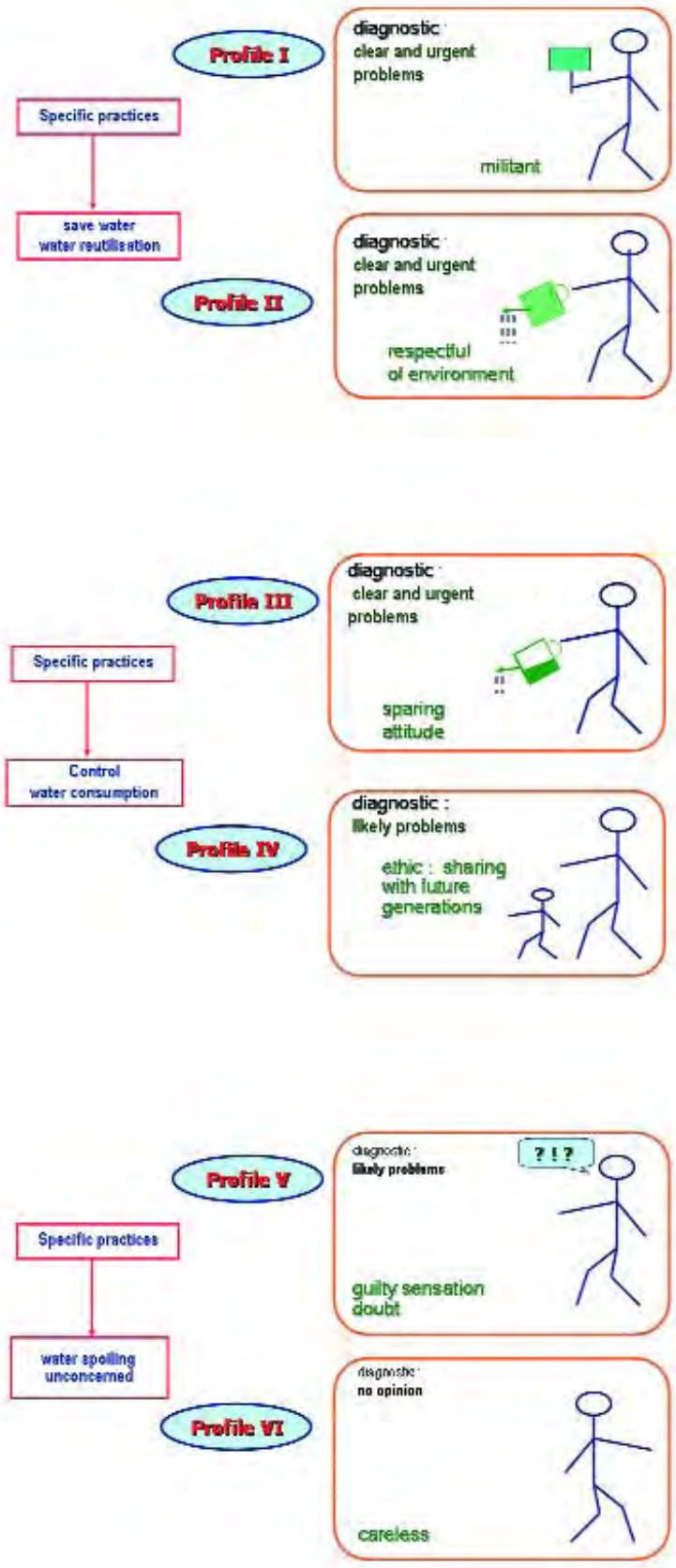
We also crossed the functions 'consumption of mineral water' with 'assessment of institutional agencies' and we obtained again four new profiles.

These results raise the question if we can we use the same information campaigns for such a variety of people's attitudes? Taking into account such a diversity of the water representations and behaviors leads to develop and adapt specific information training for the different cultural groups. But can we meet the need of a diversified information? Does it not imply 'a rupture in the usual patterns of communications'? Obviously, water managers and decisions makers have to find new partners. It seems that local associations can be the best relay for communication towards the public, but what kind of support do they receive to-day?

The sociological taskforce of the French Water Academy, realized a short enquiry[3] on the work done by the associations related to water learning. Results of this enquiry showed the following:

- On one hand, decision makers and water managers perceive associations as lacking of legitimacy.

2. De Vanssay, B. et al. *Water and Citizens*, AESN 1997–1998.
3. De Vanssay, B. and Boehler, J. *Les associations et l'eau*, AESN, 2001.



Profiles of attitudes regarding water personal practices and diagnostic on the resource

- On the other hand, the associations appear reluctant to engage themselves in a network of associations because they fear to loose their independence and they doubt about what the network can possibly offer them in return of their engagement.
- We proposed a network model of reciprocal information between the grassroots-level and decision makers. But a lot of mental obstacles need to be removed if such a network is to work effectively.

Moreover we proposed to reformulate recent scientific knowledge according to cultural groups in order to facilitate participation of the public in decision-making process. Our century has developed a lot of knowledge about the extraordinary properties of water. They must be integrated in the mindset of each of us.

Marvelling at the properties of water is also a mean to raise citizens awareness and feelings of protectiveness.

But the first need is *to find the links between ancient and new knowledge* for each culture.

Then the knowledge must be disseminated by relays of opinion as associations; it seems necessary to increase the number and the financial support given to associations working on the relationship between man and water. The goal is to develop exchanges of experiences on a friend to friend basis. To-day, associations are a place of cultural exchanges.

2. The approach of environmental psychology

Environmental psychology analyses the impact of human beings on their environment and, reciprocally, the impact of environment on human beings. In this perspective, we can raise following questions: how are we managing water related sites? and how do water related sites influence our feelings and behavior?

We generally consider that the actual system of water management has lost its capacity of protection of the resource. Which values do we have to reinvent and to introduce in order to create new capacities of water management?

When the survival of a system is at stake, we still have at least two possible approaches to keep it alive: operating a ‘creative rupture’, and looking for ‘lessons from other experiences’. A creative rupture might result in a change of mind, (but under which kind of pressure?); further results can be obtained by reinforcing classical values such as curiosity, innovation and anticipation, on one hand, and ethic and aesthetic on the other hand.

Some answers can be found in the theories developed by environmental psychology. Introducing a reflection on the meaning of space for people, and particularly of water spaces, appears as a possible way to address the question of water protection.

For Fisher (1981), space is not only an external frame but it is also a matrix within which individual life is unfolding itself as a result of social, cultural and institutional factors. G.N. Fischer developed a theory of space perception including three dimensions for inhabitants: identity, habitability and territoriality; space is perceived as creating a personal identity, we all come from somewhere; space is perceived as offering liberty or setting constraints; space is always appropriated by the people who use it. For environmental psychology, space is perceived according to its capacity to offer opportunities of use.

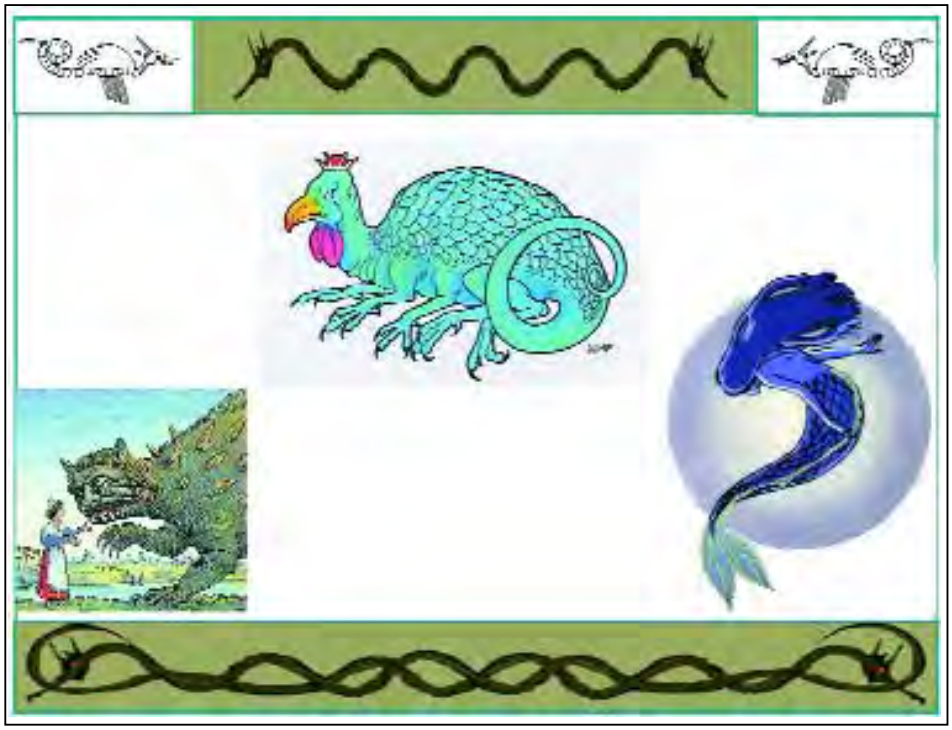
Water can be perceived as revealing *a space of liberty* that is to say a space deprived of constraints: at the sea side, we quit our garments, we sit down on the ground and we keep looking at the slow movement of the waves; as such, water spaces (lakes, rivers, seaside) have always had a strong attractive power explaining, to some extent, the urbanization of well known flood prone areas. Building a house in front of the river is indeed very tempting. Civilizations were born on the river-banks; mobility was given by water.

Reconnecting people to water, by introducing water into urban landscapes for example, will offer citizens the possibility to experience the resource as a space of liberty, of personal identity, creating a stronger sense of belonging. Water landscapes are *appropriated by people through affective links* in tight reference to beauty, leisure and home feeling. People develop personal links to water through their own marks and experiences.

These positive experiences and feelings related to water can be a powerful motivation for resource protecting behavior.

Conclusion

Water organization and infrastructures reveal links between the ancient decision makers and their population. Today we can admire water equipment erected by Celtic or Roman civilizations. In France the Roman aqueducts testify of the passed occupation of land and culture by the Latin civilization, and our filiation to Roman culture (see figure below).



Which lessons can be learnt from ancient water infrastructures?

In the domain of domestic water, these infrastructures underline the importance of investments at long term: large human, financial or material investments were necessary to build up these water roads leading to newly born towns. Today, they also demonstrate the strength and resistance of what, formerly, was well designed and constructed.

As social needs changed, existing water infrastructures became useless. Today they represent *the testimony* of another time, another way of life. Changes within the society implied changes and adaptation of water organization.

We must accept that change is in the order of the world. This acceptance can be developed through a participatory decision making process, through the common elaboration of ways and means of changing. All citizens must be implied in a new process of water management.

Session 3: Water Management and Cultural Heritage

Traditional Practice of Water Management for Fire Prevention in Shirakawa-go and Gujo-hachiman in Gifu, Japan

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Summary

Many wooden houses in the traditional style were lost in fires during the 1995 Hanshin-Awaji Earthquake because of the shortage of water supply for fire fighting. Japan is a country of wood culture, but at the same time, a country resting upon active faults – making it susceptible to earthquakes. Ample amounts of water must be made available in order to protect our wooden cultural heritage from fires which may occur anywhere in Japan during earthquakes in the near future. The traditional practice of natural water management in Japan was inherited by the communities of Shirakawa-go and Gujyo-hachiman in Gifu Prefecture. This proven practice shows us how they have managed to protect their wooden architectural heritage from fires. By collecting rain and river waters as a continual flow in canals, channels and reservoirs, it can be shared as common property among people of a community. They have devised a supply system to bring enough clean, drinkable water for daily use, and moreover for emergency situations, such as in the case of fire. The norm that emerges when a community is united through their interdependent use and management of a constant stream of clean rainwater given by nature is that the community itself becomes sustainable. Along with its cultural heritage.

Keywords

Wood culture, earthquake fire, irrigation canal, common water, water community.

1. Introduction

Japan, which lies within the Asian temperate monsoon climate, receives plenty of rainfall. This climate has cultivated rich forests in the mountains, and supplies clean water to villages, bringing about the development of both a wood culture and rice culture. A distinct four seasons has given straight and fine grain to the Japanese timbers which helped the emergence of sophisticated Japanese architecture. Historically, Japan has been teeming with wooden architectural heritage. Traditional wooden houses in Japan are designed to cope with humidity in summer, typhoons in autumn and snow in winter, while these climatic features are giving plenty of water to this country. It is also the nature of wooden architecture that it should be powerless against fires. As Nature has shaped by the earthquakes on numerous active faults, so the rich water has created our culture of wood and paper, and reduces its vulnerability to fire.

Fig. 1. Relevant sites

2. Lessons learnt from the 1995 Great Hanshin-Awaji Earthquake and Fire

On the 17th of January 1995, a devastating earthquake occurred in the Hanshin-Awaji area of Japan. 6,400 lives were lost, and in addition, considerable damage was done to the modern edifices, such as the Kobe Port (Fig. 2), the Hanshin Highway (Fig. 3), and new soft-story buildings (Fig. 4). It was also prevalent in the building damage that many traditional wooden houses had collapsed (Fig. 5). The heavy tiles used for the roof, though effective against typhoons, accelerated the collapse. The fire loss of wooden buildings was an issue, too. In the aftermath of the event, 175 fires broke out in Kobe City in ten days and burnt down about 7,400 buildings, among which 5,500 were wooden houses (Fig. 6). The major reason for the fire loss was the deterioration of public fire service. Due to the crucial shortage of water supply for fire fighting (Fig. 7), hydrants provided no water and the water of cisterns and reservoirs had run out quickly. Due to breaks in water supply pipelines, the use of hydrants as a source of water for fire fighting, which reaches up to 76% usage ordinarily, had decreased to a mere 0.7%. Cisterns were also broken and caused water leaks. The initial delay of fighting fires has proven fatal to the spreading of the fire.

Fig. 2. Kobe port

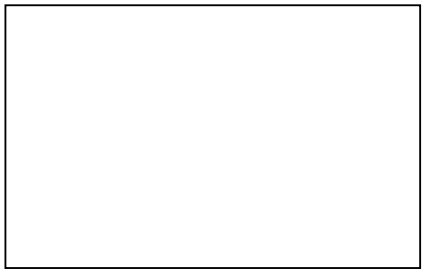

Fig. 3. Hanshin highway

Fig. 4. Soft-story buildings

Fig. 5. Wooden houses

Fig. 6. Fire in Nagata ward

Fig. 7. Fire fighting water shortage

3. Kyoto, a historic city of cultural heritage resting on an active fault

Kyoto, an ancient capital of Japan, has been the center of Japanese culture for more than 1,200 years. The city still has many traditional wooden houses (Fig. 8), important cultural assets (Fig. 9) and World Heritage sites in its downtown area (Fig. 10). On the other hand, there are several active faults that are running along the base of the surrounding mountains. Earthquakes are expected to occur within a limited time frame in the Kyoto area. Most of the Japanese cultural assets are made of wood and paper. If Kyoto is hit by an earthquake as severe as the 1995 Hanshin-Awaji, it is widely acknowledged that most of the cultural assets inherited so far would be lost to earthquake and fire damage. Looking at the dry riverbed of the Horikawa River (Fig. 11) in Kyoto, it becomes

Fig. 8. Tea Houses in Gion, Kyoto

Fig. 9. Daihoon-ji Temple (National Treasure)

Fig. 10. Shimogamo-Shrine (World Heritage)

Fig. 11. The Horikawa River

obvious that Kyoto does not have stock of enough water for fire fighting against earthquake fires. Kyoto is not yet prepared for the impending earthquake.

4. Gravitational water supply system in Shirakawa-go (Fig.12)

It was December of 1995, the same year the Great Hanshin-Awaji Earthquake occurred, that Ogimachi Village in Shirakawa-go, Gifu Prefecture (Fig. 13), was designated as a World Heritage asset by UNESCO in consideration of their traditional 'Gassho style' houses (Fig. 14). *'Gassho'* in Japanese means 'praying hands', suggesting the form of hands raised in prayer to the Buddha. The term 'Gassho style' refers to a style of farmhouse with a thatched gable roof only found in the Shirakawa-go/Gokayama area. In light of the vulnerability of these thatched roofs to fire, every year in October fire fighting drill is exercised on a village scale (Fig. 15). A fire-extinguishing system had been installed in 1981, composed of 59 water jets equipped with fire hose apparatus (Fig. 16), 62 additional independent fire hydrants (Fig. 17) and a 600-ton concrete water tank buried into a hill above the village (Fig. 18) to store the water taken from the Ushikubi River by a dam (Fig. 19) to supply high-pressure water to the system. Thus all of the Gassho houses are protected entirely with all buildings within reach of the water spray. In the Ogimachi area we can also find numerous traditional open reservoirs covered by steel netting used for fighting fires (Fig. 20), which are connected to a canal network running throughout the village. The canal water is also taken from the Ushikubi River and distributed to all Gassho houses. Household water is supplied first to the kitchen (Fig. 21), then for gardens (Fig. 22), and ponds for use in fire fighting (Fig. 23), in due order. The current canal network which has been developed was originally for the irrigation of rice paddies (Fig. 24).

In each village of Shirakawa-go, neighborhood households operate under a special cooperative system called *'Kumi'*, a mutual help organization, which has remained active continuously since the Edo Period. The Kumi in each area organizes seasonal or daily tasks, done together in cooperation

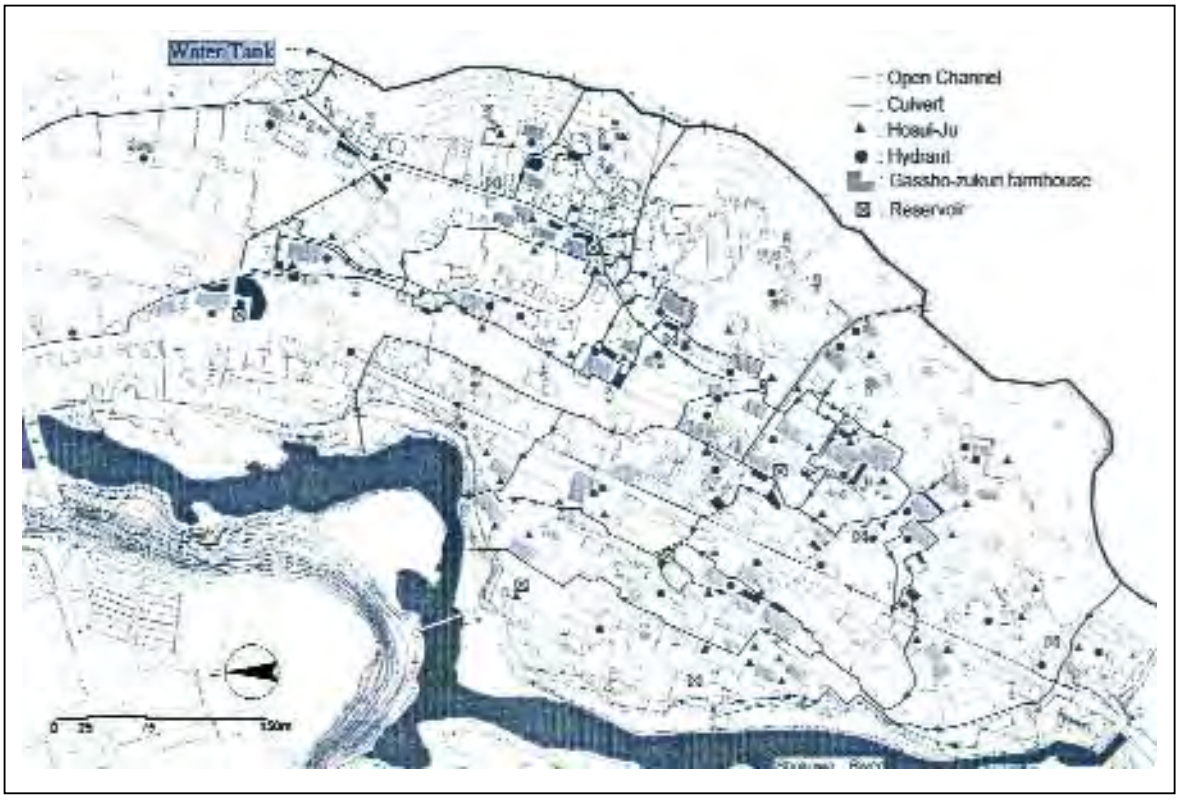

Fig. 12. Canal network in Shirakawa-go

Fig. 13. Shirakawa-go

Fig. 14. Gassho-style house

Fig. 15. Fire fighting drill

Fig. 16. Water jet

Fig. 17. Hydrant

Fig. 18. 600-ton water tank

Fig. 19. Dam in the Ushikubi River

Fig. 20. Open reservoir

Fig. 21. Kitchen water

or shared in rotation. These tasks include such duties as grass-cutting along mountain roadways, cleaning the canals, making the rounds to call out fire-prevention warnings, and performing roles in religious functions (Fig. 25, Fig. 26).

Also part of the traditional mutual help system, is a custom known as *'Yui'*, which refers to two pieces of thread entwined, or literally, a knot in Japanese. The Yui tradition of mutual cooperation is observed during marriage and funeral ceremonies, or to complete special projects such as house construction or the re-thatching of Gashho style roofs (Fig. 27). It can be said that this type of

Fig. 22. Garden stream

Fig. 23. Pond water for fire fighting use

Fig. 24. Traditional irrigation canal

Fig. 25. Parade of local festival

Fig. 26. Localshrine

Fig. 27. Re-thatching by 'yui'

cooperative social system was essential for survival in a deep mountain area with very limited production capacity under severe natural conditions. But it should also be pointed out that the evolution of this social system was no doubt influenced by the strong spiritual connections generated among the people by the Jodo Shin Sect of Buddhism.

5. Channel network for fire fighting use in Gujo-hachiman (Fig. 28)

A similar but more sophisticated channel (*'yosui'* in Japanese) system is found in Gujo-hachiman, Gifu Prefecture. Gujyo-hachiman is a castle town located in a basin into which the Nagara, Yoshida and Kodara rivers are flowing. They still have many traditional wooden *'machiya'* (merchant) houses in town and, as they have suffered conflagrations many times in the past, dug a network of channels for fire fighting. The channel system is more refined and sophisticated than the network of irrigation canals in Shirakawa-go, but still uses gravity to direct the flow. The channels were designed and constructed to supply enough water for the fire fighting of wooden houses which are densely built side-by-side in a limited space of downtown.

Of the five channels in town, the Shimatani Channel has the largest volume of running water, which is taken from the Yoshida River at the Hachiman-Ohashi Bridge through a sluice gate (Fig. 29). The carp-filled channel, running parallel to the Yoshida River, is loved and enjoyed by the entire community (Fig. 30) as it supplies water to a densely built-up area. It runs alongside a very narrow

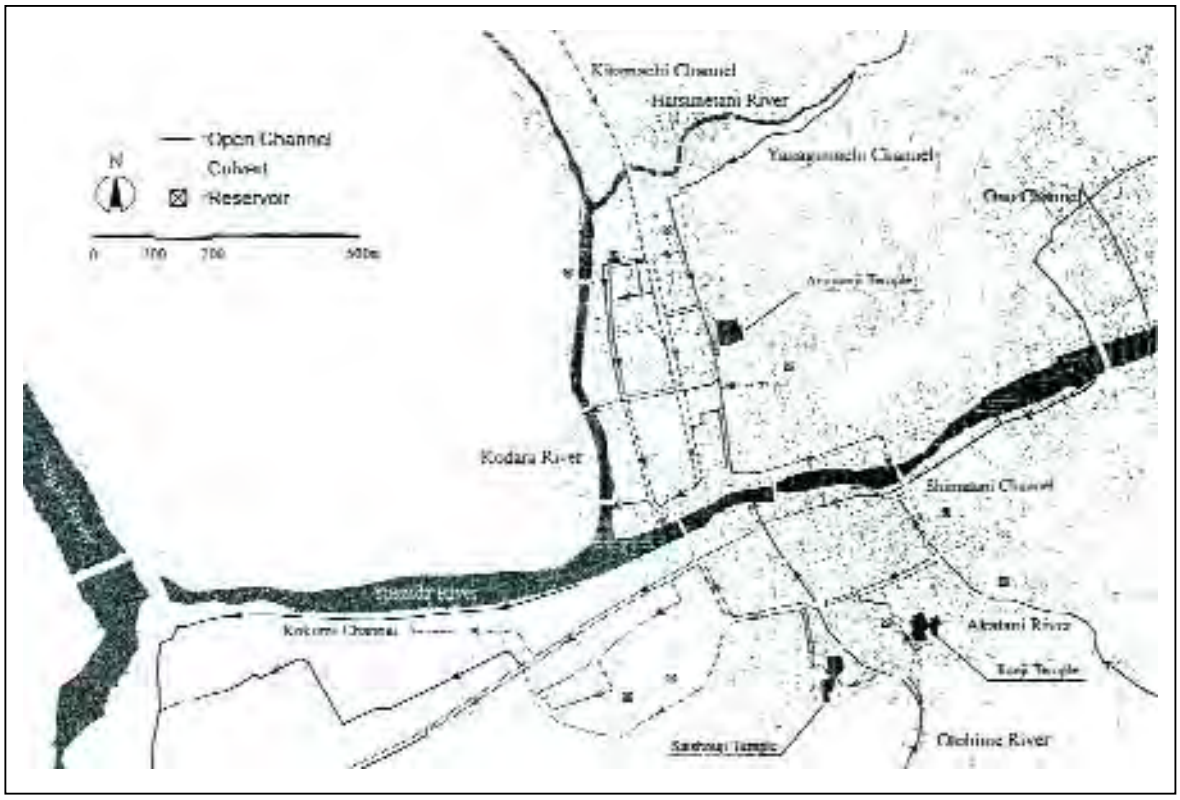

Fig. 28. Channel network for fire fighting use in Gujo-hachiman

lane named 'Igawa-komichi' surrounded by wooden houses (Fig. 31). The rich flow (10 m^3 per minute) reaches up to the path level and surplus water is returned to the Yoshida River by a simple mechanism of overflow (Fig. 32). The channel is used by the community for daily tasks (Fig. 33) with the names of families who belong to the community given the right and responsibility to use the water listed on a board (Fig. 34). Major temples in the town have reservoirs for use of fire fighting that are connected to the channels (Fig. 35). For the areas further away from the channels, the trenches were dug and extended alongside the streets. Clean water is always running in the trenches, so when needed, they can insert a board called *'segi-ita'* into slots in the trenches to raise the water level (Fig. 36). The Segi-ita is a portable wooden board, or sluice, to dam a water flow; these are hung on the wall of each house in the Kitamachi area (Fig. 37). The sluices are so easy to handle that should a child end up tinkering with them on the way home from school, they would easily understand their function (Fig. 38).

Fig. 29. Sluice gate at the Yoshida River

Fig. 30. Shimatani channel

Fig. 31. Igawa-Komichi

Fig. 32. Simple overflow system

Fig. 33. 'Kawado' washing place

Fig. 34. Members list

Fig. 35. Anyo-ji Temple reservoir

Fig. 36. 'Segi-Ita' in a gully

Fig. 37. Segi-Ita on a house wall

Fig. 38. Children play to practice water control

Fig. 39. Water control system for channels

Fig. 40. Water control for gully

In order to control the flow of water, the channel system uses sluices throughout the network at merging points so that enough water can be collected and supplied to the place where it's needed (Fig. 39, Fig. 40). There are unique facilities in town to show community members how to use precious common water to keep it clean and sustainable. They are wooden tub of fountains on the street called 'Mizu-fune'(Fig. 41) and a shrine deifying the fountain called "Sougi-sui" (Fig. 42).

Fig. 41. 'Mizufune' drinking fountain on the street

Fig. 42. 'Sogisui' shrine for the fountain water

6. Conclusion

Japan has been blessed with a wealth of fresh water. By collecting rainwater from the sky, drawing well-water from the ground, damming river-water and supplying it to a community through a network of channels, we can prepare these natural gifts of water to cope with emergency needs and supply plenty of water in case of earthquakes and fires.

The traditional practice of 'Community Water Management' is a heritage given by Nature to Humankind in order to sustain their culture, society and the earth itself. The stream of clean, natural water is the bond of traditional communities in which the members are united and interdependent. The stream behaves like the capillaries of the human body, providing sustainable means for all the members of a community. It will suggest a new paradigm for a society that is different from the current standard based upon the lessons of an oil economy inevitably reaching a dead end. The forthcoming ideal is not dictated by the amount of stock, but instead, delivers a pure and natural flow of communal water.

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Proposal: Environmental Water Supply System (EWSS) for Protection of Cultural Heritage from Earthquake Fire

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Summary

Natural water has been used in citizens' lives with simple management systems such as open channels, wells, and rainwater tubs. But in the modern industrial period, those environmental water devices were replaced by modern waterworks and sewerage systems, losing their function in urban areas. By the time of the Hanshin-Awaji Earthquake, serious damage in modern infrastructure caused a lack of water to extinguish fires. In the case above, natural water within neighborhoods was used. It is important to improve the potential of natural water usage in urban areas to develop an 'Environmental Water Supply System (EWSS) for Disaster Prevention'. This water supply should be uninterrupted, protect cultural cities that have a substantial number of wooden structures – wooden cultural cities – from fire, and preserve the urban water environment. EWSS leads the way to water management for any wooden cultural city in the world to be protected from fire due to earthquakes. The concept of EWSS will be effective in the necessitation of a sustainable water environment and for the restoration of historical cities, maintaining beauty and safety, for future generations. These kinds of projects also have potential for increasing safety measures in developing countries, with regional capabilities and low cost development.

Keywords

Water management, wooden cultural heritage, disaster prevention, environmental preservation, citizen participation, project proposal, Kyoto Japan.

1. Background and objectives

In Monsoon Temperate Zones, including much of Asia and Japan, the climate has nourished the wooden cultural city with rich natural water throughout history.

Natural water has been used in citizens' daily lives for drinking, washing, transportation (Fig. 1) and agricultural use with simple management systems such as open channels, wells and rainwater tubs. However, during the modern industrial period, those environmental water devices were replaced by modern waterworks and sewerage systems, and have lost their function in urban areas.

Fig. 1. Takasegawa-river, Kyoto

On the other hand, cultural heritage is the result of the crystallization of traditional cultural raised by regional environment throughout history. Once it is lost, 'culture' can never be reconstructed; unlike 'civilization', it is lost forever.

It must be our duty to maintain cultural assets and pass them on to the next generation for a diverse and sustainable future.

In case of wooden cultural cities, it is essential to prevent wooden heritage buildings from burning down, because they are highly combustible and can not easily be saved from a fire.

The highest risk of destruction of wooden cultural cities and heritage buildings in the world is due to fire caused by earthquakes. An earthquake will cause innumerable, fires over a scattered area to breakout in a very short time. It also results in road blockage at the same time, interfering with the capability of fire engines to arrive in time.

In the case of Japan, the archipelago was created by movement in the earth's crust. Earthquakes have periodically shaken the archipelago in every century.

The most essential safeguard to fight these earthquake fires is to keep enough water in each area and to make it accessible to citizens in communities.

During the Hanshin-Awaji Earthquake (1995), serious damage in modern infrastructure caused the lack of water for fire-fighting (Fig. 2), and at that time, natural water within the neighborhoods was used to initially fight the fires.

The improvement of natural water systems is vital in urban areas. 'Environmental Water Supply System (EWSS) for Disaster Prevention' is an unobstructed water supply that maintains the safety of wooden cultural cities from fire damage, and also preserves the urban water environment (Fig. 3).

Fig. 2. Lack of fire fighting water in Hansin-Awaji Earthquake (1995)

Fig. 3. Image of EWSS

2. Concepts of EWSS

The concepts of EWSS were realized from experiences of the Hanshin-Awaji Earthquake.

EWSS must be built using various water resources to assure water supply at all times, and provide enough water to fight fires in all phases – from small to spreading fires.

The three fire fighting phases (shown in Fig. 4) were originally defined by the Kyoto City Fire Department.

The first phase is that of a small fire, besieged by citizens with small amounts of water. The accessibility of water is most important in this phase.

The second phase is deemed as a standard house scale fire, fought by professional firemen. The amount of water must be sufficient for professional use.

Finally, the third phase is block scale fire, grappled with by various support teams for fire fighting, usually from other cities. Continuous and ample amounts of water are needed particularly in this last phase.

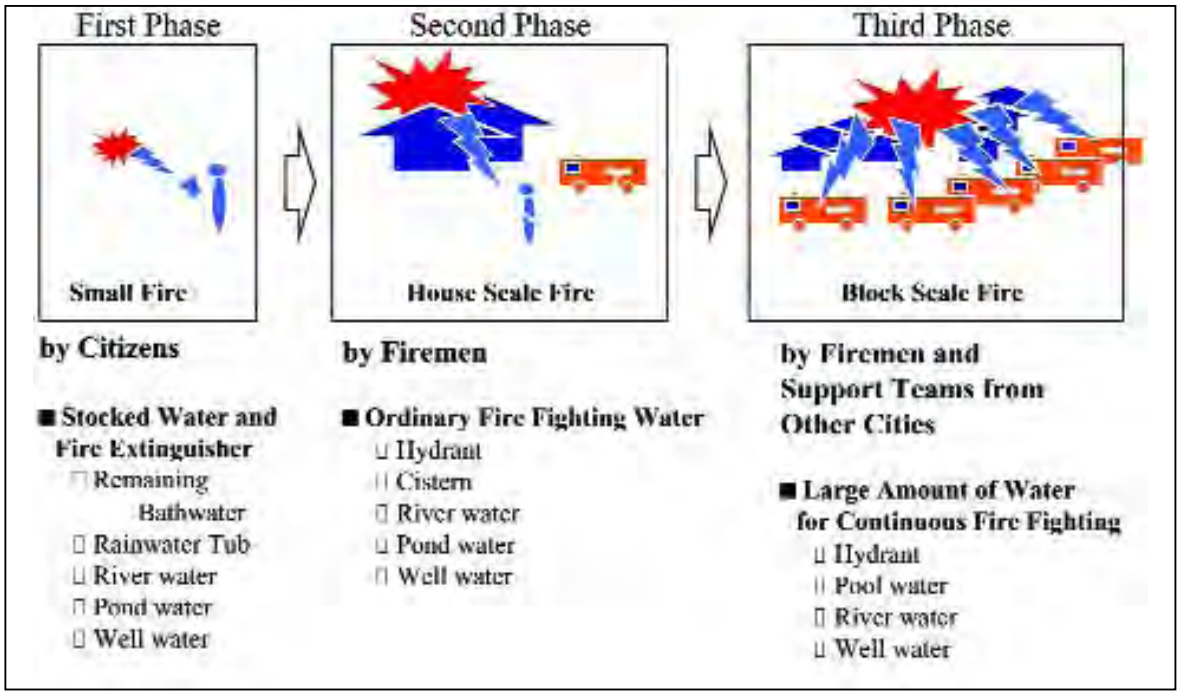

Fig. 4. Multiple phases of fire fighting

To uphold the 'fail-safe' performance requirements and 'redundancy' in safety measures of EWSS, the system must be designed with 'diverse' water resources, and be effective in any of the fire fighting phases.

The objectives of EWSS performance are as follows:

- Easy operation by citizens,
- Safe and Endless water supply,
- Contribution to the environment,
- Back up system for usual fire prevention,
- Low cost development.

The EWSS will be able to regenerate the water environment, preserve traditional wooden cultural heritage, restitute beautiful country and develop community with safety and ease.

3. Estimation of earthquake fire hazard area in Kyoto, Japan

Kyoto City, Japan was selected as the case study site for planning EWSS due to its diverse wooden cultural heritage.

There are a countless number of wooden structures, including fourteen world heritage sites – the highest number of any city in Japan (Fig. 5). In addition, there are four historical preservation districts that have been declared national treasures (Fig. 6).

Kyoto city is also at risk for a serious earthquake. There are three major active faults, which are responsible for the formation of the Kyoto Basin (Fig. 7), causing the next periodic earthquake to be expected during this century.

In order to choose the case study site, simple research to estimate the earthquake fire risks was carried out. The characteristics of the city area were analyzed via three viewpoints. The statistical data from the Hanshin-Awaji Earthquake was used to index risk factors such as risk of fire, the

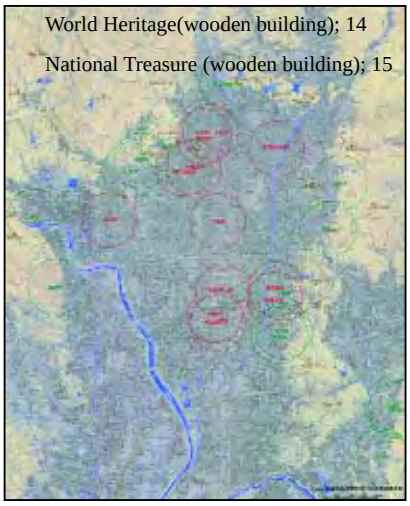

Fig. 5. Cultural heritage buildings in Kyoto

Fig. 6. Historical districts in Kyoto

Fig. 7. Three major active faults in Kyoto

percentage of people of advanced age, and the average number of people in each family. Furthermore, the risk of the fire spreading, and the density of flammable structures were also checked. These three hazard areas were mapped out and the estimated hazardous area was revealed (Fig. 8). The case study sites used in the proposal of EWSS are shown on the area colored in red.

In addition, the risk of isolation of an area caused by an earthquake was analyzed according to the width of the roads around the area. In the Hanshin-Awaji Earthquake most road blockage occurred where the street width measured less than twelve meters (Fig. 9). All of the roads in Kyoto were examined, and those that measured more than twelve meters in width were checked for the passage of fire engines (Fig. 10). In usual cases, the prospect of fighting a fire depends on its distance from the fire engine – which is the water resource. The usual length of fire hose in Japan is 400 meters, leaving the minimum radius of the fire fighting circle at 250 meters, due to loss caused by twisting roads (Fig. 11). The map in Figure 12 shows the area available for fighting fires within 250 meters of these major roads. The parameter of this available fire fighting area lies in the potential hazardous area for usual fire fighting methods with fire engines or pumps.

The capacity for a fire to spread from neighborhoods and cause damage to cultural heritage structures was checked with a simulation.

In the estimated results of earthquake fire hazards for cultural heritage buildings and districts in Kyoto, Dai-houon-ji Temple and Sannei-zaka Historical Preservation District proved to be the most dangerous points, because they are within the estimated hazard areas, but outside of the available fire fighting areas. They were selected as specific case study sites for the proposal of EWSS.

4. Case Study Planning of EWSS (Case 1) in Dai-houon-ji Temple Area

Dai-houon-ji Temple is a wooden national treasure surrounded by a high density of wooden houses in close proximity (Fig. 13). The temple was built in 1227, and is the oldest wooden building in Kyoto City. Its wooden roof is made by a large number of small cypress roofing plates (Fig. 14).

The Tenjin-gawa River lies within 250 meters west of Dai-houon-ji Temple. In the planning for this study, this river was observed for use as a water resource, and the route of water was designed to lead the water to the temple (Fig. 15).

It is very important to lead a natural and endless water flow, without any mechanical system, for more security. This water circulation route was designed from research of geographical altitude.

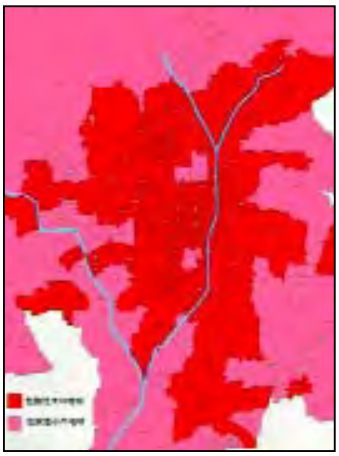

Fig. 8. Estimated hazard area of earthquake fire, in Kyoto

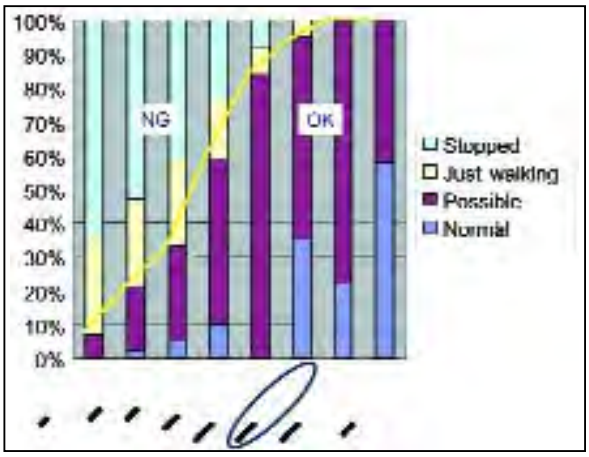

Fig. 9. Percentage of road stoppage × width

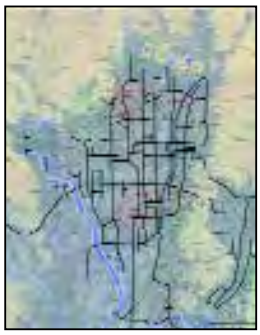

Fig. 10. Kyoto roads over 12 m in width

Fig. 11. Available covered area for fire fighting

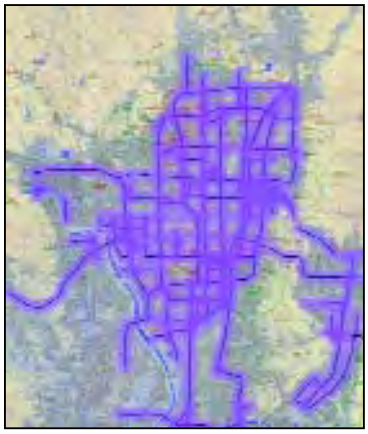

Fig. 12. Available fire fighting area along the over 12 m roads

The source of Tenjin-gawa River comes from a mountain side within one kilometer, making the quality of water quite good for use. However, the level of the water surface is approximately seven meters deeper than ground level at the water feeding point.

From the feeding point, the open channel is designed beside the river, in order to raise the water level to ground level. Also, scooping pits are located at points every 250 meters in the open channel. Citizens will be able to scoop fresh water with any kind of bucket at these points, despite the shallow water depth (Fig. 16). It will be useful for the first phase of fighting a fire, lead by citizens, since the early stages are crucial in any case of fire fighting.

The cisterns are designed as a kind of park with water, to keep an adequate supply of water for the first and second fire fighting phases, as well as citizens' daily use. The use of the cisterns daily by citizens is a very important point as it will enable people to commune closely with the water. The surface of the water should remain open so that people are able to maintain the water more easily, not only for daily use, but also in case of an emergency (Fig. 17).

The amount of water held in the cistern should be calculated for the third and final phase of fire fighting since it needs the greatest supply. Field research concerning building structure was carried out and five major areas where fire could spread around the temple were considered (Fig. 18).

Fig. 13. Site of case study-1: historical building

Fig. 14. Dai-Houon-Ji Temple

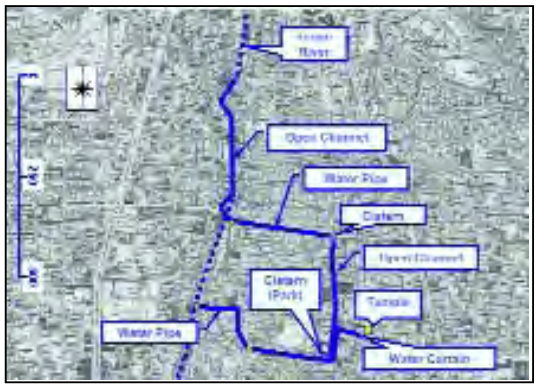

Fig. 15. Water route planning for case-1 area

Fig. 16 : Image of [Scooping Pit] in open channel for citizens' usage (first fire-fighting phase)

Fig. 17. Image of cistern (park with water) for first-second fire-fighting phases

Fig. 18. Estimated 5 major fire spread areas

The specification of the water curtain system is set to keep the temperature of radiant heat less than 200 degrees at the edge of the wooden heritage structure to protect the temple from a block scale fire in case the fire reaches the third phase (Fig. 19). At least, 3,000 tons of water is needed in the cistern for two hours of use to fight a fire. Dual pumping stations for the water curtain were designed to retain its fail-safe quality (Fig. 20).

For the second fire fighting phase, four water nozzle systems, which will be able to cover the 50 meter radius circle, were designed to guard the neighborhood from the spread of fire (Fig. 21). It will be effective, not only to protect the temple, but also for the safety of neighborhoods.

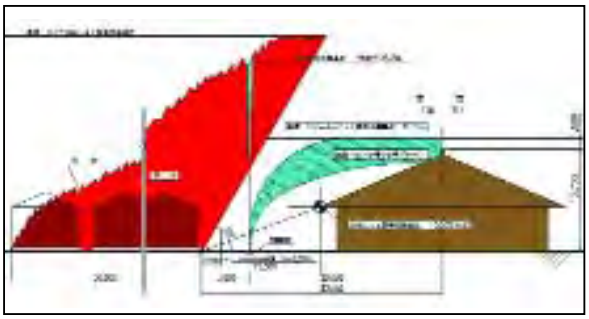

Fig. 19. The specification of the water curtain system (for third fire fighting phase)

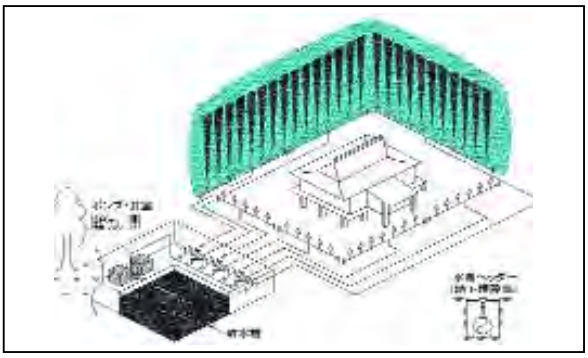

Fig. 20. Image of dual pumping stations and water curtain

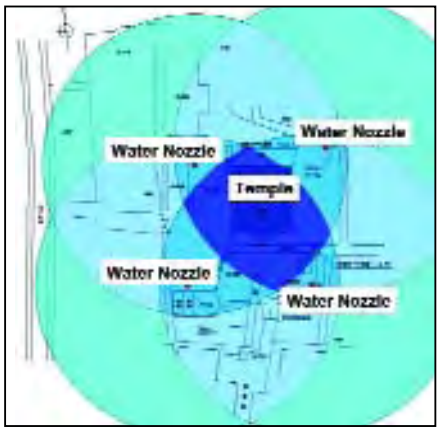

Fig. 21. Image of water-nozzle system for neighborhood fires (second phase)

5. Case Study Planning of EWSS (Case 2) in Sannei-zaka Historical District

Case Two deals with the 'Sannei-zaka Historical Preservation District', as a region of wooden historical buildings. The district is a region of 'National Heritage', and is also included in the 'Kiyomizu-Temple World Heritage Area'.

In designing EWSS, research of geographical characteristics of this site was carried out, leading the proposal with a practical view point.

This district is beside the Higashi-yama Mountains. It includes two high density areas of wooden structures, the Sannnei-zaka area and Ishibe-kouji area (Fig. 22). The area has very narrow streets and stairs, and is pinched between high density wooden structures.(Fig. 23). Due to route blockage, this situation will cause difficulty for firemen coming from outside to extinguish a fire in the case of an earthquake. The EWSS must be designed with the 'citizens' easy operation' in mind; it is critical in the concept of this system.

An existent rain water dam is found on the mountain side, holding roughly 600 tons of water. For maintaining "redundancy', two routes of water supply pipeline were designed. One is above ground, and the other is laid underground. An isolation valve is located in the middle of the two districts. It will sustain the water pressure if the water network is accidentally broken in the primary route (Fig. 24).

The altitude difference between the rain water dam level and the preservation area level can be used to derive water pressure with gravity. Amazingly, the difference shows availability for sustaining enough water pressure for fire fighting systems (Fig. 25). It is important to use simple, natural forces, without complex systems such as pumps, to keep it fail-safe.

This pressurized water will be used for fire fighting instruments such as hydrant and sprinkler systems. Sprinklers are located along narrow streets and hydrants are to reach each wooden

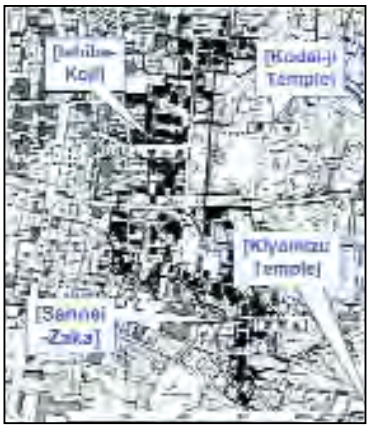

Fig. 22. Site of case study-2; Sannei-Zaka historical preservation district

Fig. 23. Sannei-zaka (left) and Ishibe-Koji (right)

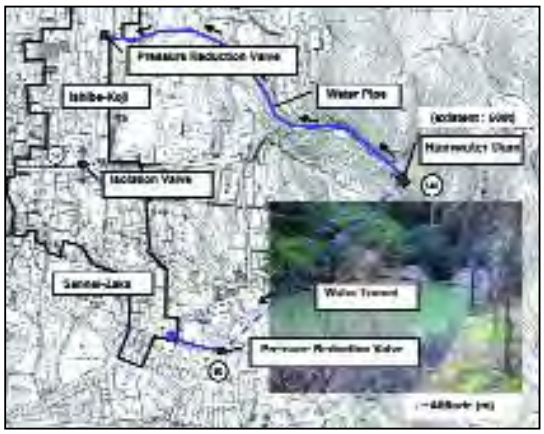

Fig. 24. Water route planning for case-2 area

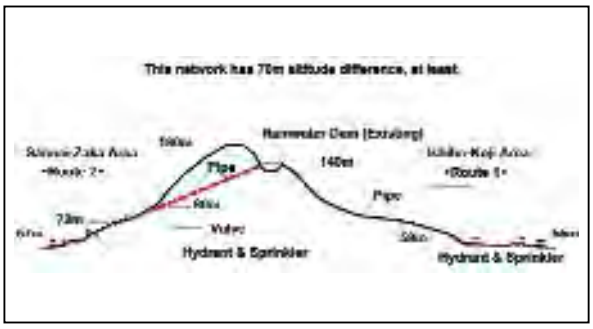

Fig. 25. Utilize gravity for water pressure (section)

structure within a 25 meter radius. (Fig. 26) These hydrants are designed for citizens to use easily, without special professional knowledge, for the first phase of fire fighting. (Fig. 27) People will also be able to use this equipment daily, such as 'Uchi-mizu watering' – a traditional custom of wetting the surface of the road to settle the dust every morning. The sprinkler system along narrow side streets is designed for citizens to operate easily in order to keep the surface of wooden structures wet in the second phase of fire fighting. (Fig. 28) It is effective to keep the surface wet to keep the fire from spreading beyond the second stage. Should the first phase of fire fighting fail, the second phase would require the citizens to simply turn on the taps for the sprinklers and then maintain a safe distance.

To keep the performance fail-safe, cisterns and channel networks are designed to back up these pressurized systems. In the present condition, there are a few areas which are outside the supported fire fighting circles which have existing cisterns at the center of them. The traces of previously existent small rivers around this district will be regenerated as open channels, and the new water flow will be led into two more cisterns to cover the rest of the area (Fig. 29). Also, the scooping pits built in the open channel will be able to be used to pump out water without air inclusion by fire engines, in spite of the shallow water level. In any case, it is important to adapt the design to the water environment to provide easy and safe access of citizens. When the design is modified to act as a park incorporating a water basin (Fig. 30), citizens can maintain the channel more easily, and access the water, not only for daily use, but also for emergency use.

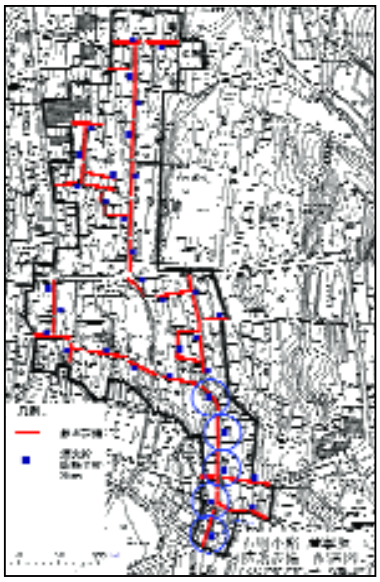

Fig. 26. Site planning of hydrants and sprinklers

Fig. 27. Image of hydrant system for citizens (first fire-fighting phase)

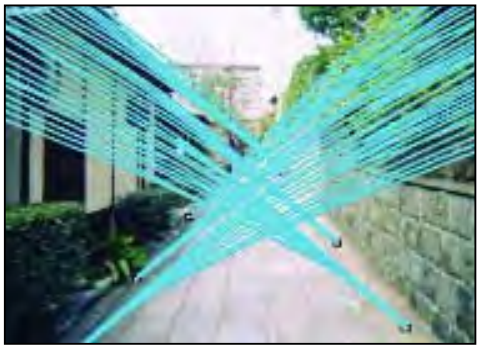

Fig. 28. Image of sprinkler system for narrow street (second fire-fighting fhase)

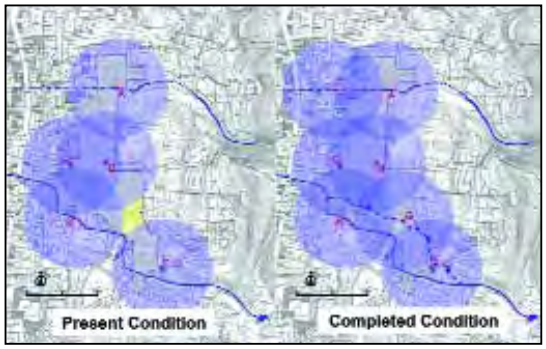

Fig. 29. Cisterns, channel network system for *back up*

Fig. 30. Image of approach adaptation to water

5. Conclusion

It is important for us to get back to the natural water environment in urban areas.

We should regenerate the water environment to create a safe, natural environment that assures the preservation of wooden cultural heritage structures in communities.

The EWSS is a leading system of practical water management, protecting against the most dangerous instance of fire – in the case of an earthquake – for the wooden structures in cultural cities around the world. The concept emphasizes the necessity of a sustainable water environment, and for the restoration of historical cities with beauty and security in mind. These kinds of projects also have the potential to increase safety systems for developing countries, with regional potential and low cost development.

It is our duty to leave these treasures for future generations.

Acknowledgement

For preparing contents of this study, I have collaborated with Kyoto City Fire Department and technical members of the NPO for Protection of Cultural Heritage from Disaster. I would like to express to them my deepest gratitude for their cooperation.

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The Sacred Spaces of a Water Culture: the Temple Tanks of South India

Kamya RAMACHANDRAN

Summary

Temple tanks of South India are ancient water bodies that are integral components of temples. These tanks are a manifestation of a cultural sensitivity to water that is given a Godly status within Hindu philosophy. Tanks are important for the sustainability of the environment and the economy of the village they serve. Temple tanks are a vital link in the water system and cater to the community scale of use, while the irrigation tanks cater to agriculture and the wells cater to domestic use. They harvest and store rainwater that is used for direct consumption through the year. However, their most important and often unnoticed function is providing percolation points within the precincts of inhabitation of a town. Designed for recharging groundwater, they maintain the aquifer balance. The loss of this important environmental contribution is now being felt with urban tanks going dry. Temple tanks cater to various cultural, ritual, community and utilitarian functions. The connected temple tanks of the Brihadesvara temple of Tanjavur exemplify this system. This traditional system gives us clues on how to improve our unsustainable urban water management mechanisms.

Keywords

Temple water tanks, Hinduism, cultural influence, rainwater harvesting, aquifer recharge.

Introduction

Water in the Indian context is a diverse, multifaceted issue. When related to Culture, it takes on many interesting twists and tales. Being largely an agrarian economy, with the mass of our population of one billion in the rural sector, water becomes all-important, and the center of life. It is not looked upon as a mere element for practical use, but is elevated to a Godly status and thus revered and respected. In addition to such agricultural, industrial and domestic needs, water in the Hindu culture is intricately associated with religion and is looked upon as Divine. It has the role of not only being the physical purifier, but also and more importantly, the spiritual purifier.

The water crisis world over is reaching alarming levels. The situation in India is only an exaggeration of this bleakness. The scarcity of water is becoming an annual event in most parts of the country. The Indian problem though complicated, is largely due to the pressures of an exploding population with the development of infrastructure unable to keep pace. No study on India can neglect the intense and extended history that forms the foundation of its culture and people. So also the issue of water, where one has to understand it not in isolation of the current status, but in the totality of its history over the last few centuries. This is an ancient culture, with infrastructural systems set up through time. These systems are faced with the challenge of acclimatizing themselves to the extreme and rapid changes of the modern day. India has faced drastic transformation in its various systems and thus ways of life. Starting from the Industrial Revolution, and its direct impact due to the British Colonial Rule, polarities of tradition and modernity have surfaced. Ideologies of centralized vs. decentralized systems not only of political governance, but also of

infrastructural and economic modes and have become stark. These transformations are affecting mechanisms of living.

General angst over the scarcity of water, a situation that only worsens with every coming year, urges us to look into our traditional water management systems that have survived the test of time through centuries. India has a wealth of these indigenous water harvesting and management systems in place, in various states of use and disuse. Proof of this exists in a variety of archeological material, sites and scriptures making the Indians, the one of 'the oldest water harvesters'[1].

One such traditional system is that of the Tanks of South India. Realizing the potential of the South Indian peninsula, the inhabitants of this soil, over centuries have invested their energy in constructing various kinds of tanks. This system of 'tanks' caters to the different aspects of the water requirements of the community.

Of these, one unique category is that of the 'sacred water tanks' found dotting the Southern landscape. These tanks are attached to the numerous large and small temples, mainly of the Hindu faith. They serve various functions for not only the temple, but also the community. The paper looks at a traditional water system, which still exists in parts of South India, where indiscriminate urbanity has not invaded and taken over. It begins with situating these tanks within the socio-cultural and political context of their time, their history, and their many uses and finally lends into a discussion of the current status of these tanks within the changed cultural context of India. It focuses on understanding the wisdom of simplistic and holistic traditional methods. The case of the tenth century Brihadeshwara temple at Thanjavur has been looked at in closer detail to exemplify these systems. Temple tanks are the eloquent fusion of science and religion, to inform a culture that revered water. The paper looks into the story behind such sacred tanks and aims at a critical examination of this traditional system within the modern milieu (Figs. 1, 2, 3).

1. Hindu philosophy and water

A major influence on the culture of India is among other things, the Hindu philosophy. In order to recognize the relation between Hindu culture and its reverence for water, it is necessary to briefly understand certain aspects of the religion and its philosophy. We go back into the Aryan era[2], which laid the foundations for Hinduism, as we know it today. In accordance with the Aryan beliefs, the very creation emerged from the ceaseless primordial waters. They laid forth legends that the universe was born from the churning water, which spewed a Golden egg called the *'hiranyagarbha'*. The egg split into two to release the creator *'Prajapati'*, with the earth from one-half and the heavens from the other. *Prajapati* the self-existing or *'swayambhu'* went on to create the universe and it living beings.

An ever-recurring phenomenon that measures up to the birth of the universe is the formation of the foetus, in the womb of a mother. It is the water in the womb that comes together to unite into the living mass of an unborn. It is creation retold.

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1. 'This evidence translates to a proliferation of types of harvesting systems – rainfed, stream or riverfed, and groundwater-based. And in awesome variety. Each of India's 15 ecological zones has systems adapted to local needs and micro-ecological peculiarities. Artificial wells like khadins, typical to Rajasthan but which can be made and used to store rainwater wherever land is available. Intricate networks of bamboo pipelines that carry water over inhospitable terrain in southern Meghalaya and are technologically adequate to function as a drip irrigation system for betel leaf plantations. Or the Mughal groundwater-based water supply system in Burhanpur town in Madhya Pradesh, so well engineered that people use it to date. And it does not fail them'. Ed. Ararwal, Anil and Narain, Sunita; *Dying Wisdom.*
2. The exact dates have not yet been established. In keeping with astrological position mentioned in the Vedic scriptures said to be of the Aryan time, the possible dates are between 4000 and 12000 BC. According to some western analysts, the Aryan age dated from 1500 BC to about 1000 BC. However, these facts have not been proven yet.

Fig. 1.

Fig. 2.

Fig. 3.

Water, was thus revered as holy, and took its position among the *'panchabhutas'*, or the five basic elements that makes the universe: *Akasa* (ether or space), *Vayu* (air or wind), *Agni* (fire), *Apah* (water), and *Prithvi* (earth).[3] Since the Aryan age, these elements have been worshipped, as the primal manifestations of the Almighty. The Cosmic Trinity of *'Surya'*, the Sun God, *'Agni'*, the Fire God, and *'Vayu'*, the Wind God was created. They were the sons of Mother Earth (*Prithvima*) and the Sky (*Dyaus*). Worship was carried out in natural surrounds, to the Gods of nature, using natural elements like fire and water. Trees, mountains and rivers were worshipped. Sacrifices, sometimes even human were made to please these Gods. *'Varuna'* is the Aryan God of the Oceans, the guardian of the cosmic law, the Water God. He was believed to cause rain to fall and rivers to grow and was thus worshipped as the sustainer of creatures on Earth. Water is represented by the colour white, the form of a half moon and the symbol of a lotus.[4] The Aryans gave to India the Vedas, the rulebook of life and happiness. The cannons of Hinduism were founded on these Vedas and stated that

> Man formed by such a tradition *(panchabhuta)* lived in harmony with his surroundings and expressed a deep reverence towards the earth on which he dwells, the air he breathes, the water which purifies and gives life, the fire that transforms and the space that gives him the vastness to live.[5]

The Aryan era formed a base to the Puranic or the Brahmanic age, which brought in early Hinduism. It was in this time that the Cosmic Trinity of the Sun, Wind and Fire God, gave way to the Hindu Trinity of *Brahma*, the creator, *Vishnu*, the preserver and *Shiva* the destroyer. These are the three main gods worshipped even today. Each of these deities has intricate associations with

3.

Ether	*Wind (air)*	*Fire*	*Water*	*Earth*
sound	sound + touch	sound+ touch + sight	sound+ touch+ sight+ taste	sound+ touch+ sight+ taste+ smell
ear	skin	eye	tongue	nose

4. And how rightly so, during one of my studies of the temple tanks, a priest shared his experience with me. His story was that he had worked in the temple for 27 years and the tank never went dry until 12 years ago, and has remained dry ever since. In an attempt to revive the tank by the local Rotary Club, the tank received water. With the first rain, the first signs of hope and revival were the sprouting of the lotus in a small patch of water. In his mind this was the divine hope.
5. Prakrti. *The Integral Vision*. Vol. 3; The Agamic Traditions and the Arts, p. 1.

water. As per the myth, while *Bramha* (also *prajapati*) was born of the waters, Vishnu resides in the seas on a coiled serpent, and Shiva holds the origin of the mighty River Ganges in his hair (Fig. 4).

This age brought in the numerable myths and legends that make the Hindu mythology. Deviating from the elemental form, man now made God in the image of himself. Worship in the nature, to nature was replaced by idol worship, in the temples. Indian rivers were elevated to the position of Goddesses. They are still worshipped as the life giver and and physical cleanser, but more importantly, the spiritual purifier.[6]

Every Indian river has a shrine to its Goddess. Hinduism being based on an Aryan or Vedic way of life regarded the natural surrounds as holy. It believes in '*Sanatana Dharma'*.

'Roughly translated, this means 'the eternal essence of life'. It is the essential quality, which unites all beings – human, animal and plant – with the universe that surrounds them and ultimately with the original source of their existence, the Godhead. This perception of the underlying unity is what causes Hindus steadfastly to refuse to separate their religion from their daily life, or separate their own faith from the other great traditions of the world'[7] (Fig. 5).

Fig. 4.

Fig. 5. Reverence for an ecology (Painting on the ceiling of a temple)

It is very interesting to note here, the origin of the word 'Hindu' It essentially means the people belonging to the River Indus or the Sindhu as it was called. 'How apt that in naming the religion of India we should call it after its bioregion. Hindus with their reverence for sacred rivers, mountains, forests and animals, have always been close to nature'.[8] To name a whole culture and philosophy on a river is indicative of the weight of these holy natural water sources.

2. The socio-cultural and historical background

Like all other civilizations, human settlements in India, originated on the banks of rivers. The oldest civilizations of Mohenjodaro and Harappa took place along the River Indus, while the holy Puranic cities of Banares and Ujjain were located on the banks of the most important Indian river, the

6. 'Gangeha Yamunaa Chaiva Godavari// Saraswati Narmade Sindhu Kaveri//Jale Asmin Sannidhi Kuru//'
This Vedic hymn used even today, calls upon the various river deities, invoking them to make their presence in that water being used for daily chores.
7. *Hinduism and Ecology. Seeds of Truth*; Prime Ranchor, p. x.
8. *Hinduism and Ecology. Seeds of Truth*; Prime Ranchor, p. ix.

Ganges. The Ganges, the Indus and the Brahmaputra are principal north Indian river systems. They have their origins in the Himalayan Ranges. In the south, the Kaveri and the Krishna are the major water lines. Apart from a number of smaller rivers, the River Kaveri is the largest and most important river for the South Indian people, popularly revered as The Ganges of the South. It flows across three states, creating fertile belts of inhabitation along its way.

Settlements moved inland from the rivers and societies became agrarian. The productivity of this region encouraged the agrarian settlers to form a number of self-sufficient villages and towns. Water was the source of life and livelihood. In order to cater to their practical as well as religious water needs, they developed manmade systems that were rain fed, river fed or groundwater-based. An elaborate system of tanks and wells was evolved in the South of India, combining all these three concepts. The tanks in focus here are those associated with temples.

Every one of these villages had a temple in its core, with the settlement around and the fields beyond. Infact there is popular local saying is that states, 'A village without a temple is like living without a heart'. 'The temple alone gave the necessary social cohesion to people divided by caste and creed.' [9] Likewise, a temple without the sacred water source was forbidden. In order to build a temple, the scriptures say, three factors are imperative. The *'sthala'*, or the sanctified place, the *'thirtha'* or the sacred waters and the *'murthy'* or the idol. Temples were usually built near a water source for various reasons that will be discussed below.

Understanding the social structure of the time is fundamental to the history of temple tanks. Community was stratified into castes, based on occupation. In a broad categorization it can be said that people belonged to the warrior caste or the *'Kshatriyas'*, the trader community or the *'Vaishyas'*, the priests or the *'brahmins'* and the service community or the *'sudras'* [10]. Within these castes, there were further differentiations. The important thing to note here was that such classifications, helped people to develop a bond within the community, and the community worked together with the rest of the castes to function as a singular organism of society. This concept contradicts with the modern notion of individualism taking priority over the community. People were thus community oriented, and had strong relationships that extended into ownership of common property like lands and infrastructure such as the temple tanks, village and irrigation tanks.

It was also the duty of the citizens, especially of the wealthy sections of society to partake in community service for achieving spiritual value. In keeping with this custom, rich patrons built temple tanks to earn religious merit. Tanks were usually built with the benefaction of the king, the merchants, the landowners and even the heads of villages.

> The advantage of this spiritual value was that the person who built the tank did so to give it away as an act of charity to be used for public good. The receivers assumed a collective responsibility over the tank. But water did not assume the character of a commodity.[11]

Once built, the power and control of the temple tank was handed over to the local users, in this case, the temple and the community it served.

The temples of the South were economic and religious foci of the villages. They owned land through charitable endowments from the rich. These lands were cultivated, and incomes were

9. Subramaniam N. *Tamil Epigraphy, A Survey*, p. 147.
10. The caste system is an intensive discussion that is beyond the scope of this paper. This system has been abolished due to the evils that had crept into it, creating the class of untouchables. This was the lowest class of the society that did the impure menial work such as cleaning. Due to the degree of pollution, they were never allowed to use the temple tank. However, the whole community, irrespective of caste and creed, reaped the indirect benefits of the temple tank that worked as a groundwater recharger.
11. Ed. Ararwal, Anil and Narain, Sunita; *Dying Wisdom*, p. 299.

generated to sustain the temple society. The temple servants included a wide range of people starting from the priests who did the daily prayers, to the gardeners, the cooks, the accountants and administrators, the caretakers, the vendors and a host of other types of servants. The temple sustained this large community, through the cultivated temple land and donations from patrons. The temple tank required maintenance like repairs, cleaning of the inlet systems, de-weeding and desilting[12], and controls preventing its misuse. Great merit was attached to repair and maintenance of a tank. Since the controls of the temple were in the hands of the users closely related to it, the upkeep and maintenance of the temple and the tanks were done meticulously and regularly.

The scriptures write of *'saptasantanam'* or the seven kinds of wealth a person can achieve. The important ones to note here are the building a temple and building water tanks.

The construction of a tank conferred religious merit.

> An inscription of 1369 AD extols the merit accruing from the provision of water by constructing a tank: 'A shed for distributing water, a well and a reservoir, a canal and a lotus tank – the merit of (constructing) them is millions and millions (of times) higher in succession; as the water of a tank serves to nurture both movable and immovable creation on (this) earth, even the lotus seated(Brahma) is unable to recount the fruit of merit attached to it.[13]

The physical expression of the theory *'santanadharma'* or the universal Godhead discussed earlier, is the veneration of the *'sthala vriksha'* or the sacred tree, the *'kovilkaadu'* or the sacred grove and the *'kovil kulam'* the sacred water tank. The tank had living beings ranging from fish, to plants like the lotus and water lilies. It behaved as a self-sustained, living breathing organism. It was a formalized water ecology that was revered (Fig. 5). The rituals that took place on its banks, made offerings into the water, which was literally the formulation of an act of feeding the fish and other creatures into a religious ritual.

3. Temple tanks: as a link in the larger water system

Broadly looking at the rivers in India, the rivers in the North are perennial, their source being the melting snow of the Himalayas. The South Indian rivers on the other hand are rain fed and thus seasonal. Since the climate and culture of each region varies, water systems have evolved to suit such differences.

Looking at the lay of the land in the Southern peninsula, one finds the Western coast along the Arabian Sea, a strip of land bordered by the Western mountain range. They flatten eastwards to become the Deccan plateau that mellows down into the eastern plains, leading to the eastern coastline of The Bay of Bengal (Fig. 6). Most rivers originate in the Western Hills, flow down the Eastern plains, to join the sea. These rivers are seasonal, receiving intermittent rain during the Southwest monsoons between June and September, and the Northeast monsoons between October and December. Being a land with variable seasonal rainfall, harvesting structures became imperative. Due to the gradual slope towards the east, with a little effort, of obstructing the flow of water, harvesting structures were created. The South Indian terrain is thus ideal for the construction of tanks (Fig.7). In addition to being river fed, tanks also harvested the rainwater from its surrounds, and many a time, their beds being below the water tables, were even groundwater based.

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12. The silt obtained from th desilting process, was used in the fields as rich soil or fertilizer.
13. Ed. Ararwal, Anil and Narain, Sunita; *Dying Wisdom*, p. 281, quoted from Anon 1943, Epigrapihca Indica, quote by VRR dikshitar, A history of Irrigation in South India, Paper presented at the Indian History Congress, Aligarh, December 1943, Vol. XIV, p. 94.

Understanding this potential, the natives exploited the situation, to establish an extremely well worked out system. It was hierarchical and interconnected, catering to the different water requirements of the community at varied scales of its use. An elaborate system of veers, canals and tanks to collect and store water for the rest of the year was developed (Fig. 8). Agricultural prosperity is vital for the financial health of a village. In spite of being a drought prone area, the peninsula is home to what was said to be one of the richest spots of the world, Tanjavur. This was only due to its agricultural systems. It remains one of the most fertile parts of the country, commonly referred to as its 'rice bowl of India'. According to a British irrigation authority, 'for the most part, the soil is naturally poor, and it is the irrigation (water systems) alone which makes the province such a scene of fertility'[14] .

Fig. 6.

Fig. 7. Satellite picture of the area studied, with the dark grey indicating tanks

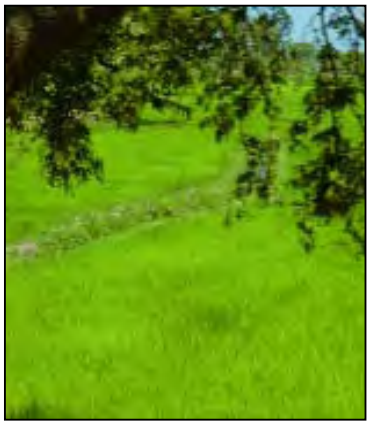

Fig. 8. Fertile delta with canal running through

As mentioned in the Sangam literature that dates as far back as second A.D the Chola rulers were the first to have dammed the River Kauvery with the *'anicut'* or diversion dams. The water system in this region stems largely from a network of rivers and their tributaries. Small earthen *anicuts* were built across the flowing water. This raised the levels of water, allowing it to flow into the canals shooting off from the flanks of the river. This was probably the predecessor of the modern day dams. The water thus wound its way through the canals to various fields, filling reservoirs and tanks of various kinds. Each *anicut* serves to irrigate a certain amount of cultivated land area called the *ayacut*. The Chola rulers of the 10th AD had mastered irrigation systems, and have left us a legacy that is still in use, though dying a slow death.

While Canals, reservoirs and large tanks were used for irrigation, the community used the village and temple tanks. Each household had an individual well for domestic water consumption. Tanks are of different kinds, each having a different name depending on its use. The irrigation tanks are called the *'eris'*. The village tanks or the *'kulam'*, and the smaller *'kuttais'* are tanks used for washing and bathing of animals, and other functions that did not require a high level of purity. (Fig. 9) The drinking water ponds were called the *'oorani'* or the 'jewel of the village'. The *'sunnai'* is a water source made out of a cavity in a boulder or a rocky area. Here there is no percolation, and the water is used for drinking. Temple tanks are called *'thitrham', 'pushkarnis' or 'kovil kulam'*. The translation into the English 'temple tank' would not do justice in capturing the

14. Ed. Ararwal, Anil and Narain, Sunita; *Dying Wisdom*, p. 245, quoted from Registrar General and Census Commissioner 1988, Census of India, Regional Divisions of India – A Cartographic analysis, Andhra Pradesh, Series 1, Vol. 1.

mood of these words. *'Thitrham'* has a sacred connotation; pilgrimages to holy grounds are called the *'thirtha yatra'* or the journey of the holy waters. Similarly, *'Pushkarnis'* exudes a flavour of the sacred flowers used for worship, which are grown in temple tanks.

The Cholas were the first to set up the system tanks. Here there was a chain of about five to seven tanks, each at a level lower than the previous one. The overflow from one tank would reach the next. One of the oldest evidences of this system is the case of the Brihadeshwara temple and its connected tanks built in the 1010th AD.

The ecosystem within the temple tanks is its filtration system. The hierarchy of living beings from the fish to the microorganisms and plants are the cleaning mechanisms, as in the case of wells within the individual home (Fig. 10). It is important to note here that this system of cleansing the water is not working anymore due to the different forms of pollutants in the water collected. Set up in an era when lifestyles were more sustainable, these tanks did suffer, with the non-biodegradable and chemical pollutants that are beginning to affect the water. The movement of the water due to the inlets and outlets, along with the porous tank bed also aided this filtration process. The surface of the tanks usually has the broad-leaved lotus and water lily, the leaves of which helps in preventing loss of water through evaporation.

Fig. 9. Village tank for community use

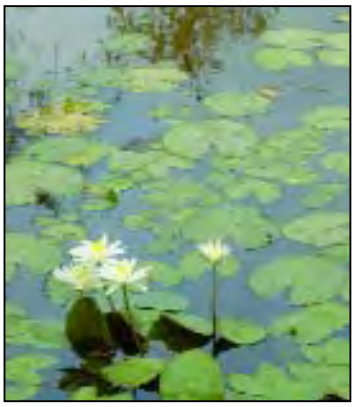

Fig. 10. Plants as filtration system and to prevent evaporation

The temple tank, in conjunction with the other village tanks, served the community scale of water requirements. That is, it worked as a link between the large reservoirs and the domestic wells. Within the village, these tanks replenished the groundwater and sustained life.

The temple tanks play a more important role in that apart from serving these practical needs, it also caters to the temple requirements. The tank could not run dry, as the temple had to carry on. There is hence ritual and cultural codifications that made sure that these water sources were used carefully, ensuring water lasted throughout the year. The water is used only for drinking and temple activities. It was sacrosanct and no wastage took place, thus lasting longer.

3.1 Tanks: to prevent disaster

- Temple tanks work as large water troughs. They are very often formalizations of natural springs, into a sacred space, in order to preserve the water source. Some tanks are river fed through canals. However, all tanks harvest the rainwater from the surrounding areas. This is

important keeping in mind the climatic context of South India, where rain is infrequent and unreliable, and rivers are not perennial. The collection of every bit of rain is vital.

- They store fresh water, which depending on the situation, caters to the community for the entire year until the rains of the next season. It is thus used as a direct consumption point.
- Having collected and stored the water, they work as percolation ponds, recharging the aquifers. Tanks manage the available precipitation in order to increase the soil moisture availability. Thereby, they ensure the sustainability of flora and fauna. By maintaining the water balance of the aquifer, they also make certain that wells of the community in their surrounds always have water. This important and understated function of the temple tanks is now gaining significance. Where temple tanks have gone dry, the balance has been disturbed, and the wells are also dry (Fig. 9).
- Tanks help to reduce ground water run-offs. This factor has two advantages. Firstly by collecting the run offs during the rains, it impedes fresh water from draining into the sea. It also prevents soil erosion that is otherwise an environmental hazard.

The temple tanks aid the process of drought proofing in the above-mentioned ways.

- Most tanks are connected through a system of inflows, outflows and channels that work with the gradient of the land. These system tanks as they are called provide ways for water to be taken away from on overflowing source, and thus temple tanks also work as an anti-flooding device.
- During times of disaster, war and siege, communities gathered within the safe stone precincts of the temple, which acted like a fort. The temple tank was the water source during such events. It is said that some tanks have enabled entire communities to survive for almost six months until the crisis subsided.

4. The temple tanks and its uses

Having looked at the importance of water in the Hindu culture, the social and historical setting that was conducive for the emergence of the temple tanks, and the important link it is within the water system, this section will discuss the details of the tanks and its multiple uses. Tanks are of various sizes and shapes and differ in terms of their location with respect to the temple. They have varied sources of water and take on different architectural expression. These differences are largely due to the patronage of the temple, the importance of the temple within the society, as well as the time in which it was established.

Temple complexes were layered, with the innermost zone as the sanctum. The larger complexes that had more zones, have the temple tank in the outer precinct. In such cases, there is usually a well in the sanctum area (Fig. 11). Many a time, the tank lies outside the temple confines, although with direct access to the temple. Temple tanks can be as small as ten feet wide and as large as a thousand feet. Similarly, the depths vary from tank to tank, and thus the water storing capacity varies. The tanks are fed by different water sources.

The embankment around the tank is usually formed by access steps that lead to the water level. While in the summers water levels could get extremely low, in the *monsoons*, it could even overflow. For this purpose, most tanks have outlet and inlet channels. When the entire embankment is not in the form of steps, elaborate pillared pavilions enshelter the steps that lead to the water. In many a case, pillared corridors run across the length and breadth of the tank to accommodate the rituals conducted by the water. Embankments were of simple stone construction and acted as retaining walls to keep the earth from silting the tank. In order to aid its primary function of percolation and ground water recharge, the stone bunds were made of dry masonry, the joints thereby allowing the two way process of either filling the tank or recharging the ground waters,

depending on the aquifer water balance (Fig. 11, 12) The tank bed was never sealed or clayed to retain water. In contrast, they were left as earth to serve the process of percolation. The beds were built below the then existing water table[15], Many a time, the bed of the tank even had wells that served as the water source during extreme drought conditions.

Tanks usually have a central island shrine called the *'neerazhi mandapam'*, which either houses a permanent idol, or the temple idol during festivals. This is essentially a water level indicator. When the water level is dangerously low and more of the foundations are exposed, it warns the community. This artistic expression of a practical necessity was elaborated into a pillared shrine that ranged from four, eight and sixteen pillared halls. These halls are used during the float festival, where the deity is placed on a float and circumambulated in the waters of the tank. It is then placed in this central shrine for the devotees to view, before it continues its processional journey back into the temple (Fig. 13).

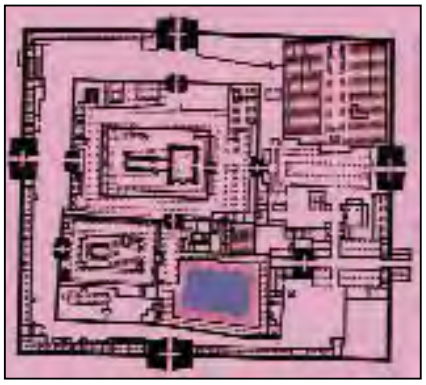

Fig. 11. Temple complex of Madurai with temple tank in the outer zone

Fig. 12. Dry masonry stone steps for embankments

Fig. 13. The central shrine as a water gauge

For something that seems so deeply attached to religion, temple tanks serve a multitude of practical purposes. It helps in safeguarding communities from the unreliable and intermittent rains received, being attached to the temple, it has ritualistic functions, it caters to the day-to-day community water needs, and it was also used during the construction of the temple. In most cases, temples were situated near water sources, and if not, a water source was first created before the temple was built.

4.1 Ritualistic functions

Daily religious rituals involve water in a vital way. Water and fire of the *panchabhutas* are the basic elements used in Hindu worship. The water here not only physically cleanses, but also the action is symbolic of a spiritual cleansing.

- Every morning the idol of the deity in the temple is bathed, along with the purifying chants, called the *'abhishekam'*. This water, upon touching the deity, is believed to attain divine energy and is distributed to the devotees of the temple as *'prasadam'* or blessed offering from the gods. Every other item used for worship is likewise cleansed along with specific chants.

15. With the current situation of indiscriminate groundwater exploitation, water tables have fallen so drastically that this idea no longer holds.

- Prayers are offered only after a holy dip in sacred waters. In many temples, the sacred and important functions, especially those for the rituals use the water from a well that is connected to the temple tank. When wells served the more sacred functions, the temple tank was meant for ablutions. The devotees were meant to take a bath and cleanse themselves before entering the sanctum of the temple. Today this custom has been reduced to washing of the hands and feet due to the lack of water in the tank as well as the quality of it (Fig. 14).
- Prayers are the offered at dawn to the Sun God, as he emerges from the seas and at dusk, when he takes his resting place in the waters (Fig. 14).
- During the chanting of prayers, holy water is offered to the idol and the sacrificial fire.
- For a philosophy that believed in rebirth and reincarnations, worship of ancestors was very important. The *'pitr-tarpana'* is a ritual that is carried out with fire, on the banks of a water body. Here once again it is believed that the five basic elements being the unifier, it becomes the medium of the message.
- The *'theppam'* or float festival is a festival celebrating water that is held annually. In this festival, the deity is placed on a decorated float that would circumambulate the tank. Devotees gather around the banks of the tank to watch the Lord. The festival is held in the night and the surrounds of the temple and tank are heavily decorated adding to the atmosphere of gaiety. This takes place during the harvest time, where the God blesses the waters for a good yield of crop. The weight laid on this festival, demanded a guarantee that water remained in the tank until then.
- The tanks were used to grow herbs and flowers like the lotus and the lily that were offered to the idol during worship (Fig. 8).

4.2 Utilitarian necessities

Water tanks were essential for some very basic requirements even before and during the making of a temple. Temples of South India were not mere religious centers, but they were important as socio-cultural and educational nuclei of the villages. Apart from serving the spiritual needs of the society, they were centers of learning for dance, music and other disciplines. Many a time, they served political functions like coronations and *'sabhas'* or meetings. Due to this multi-functional aspect, temples were large complexes, with shrines, pillared halls, water tanks, shelters, gardens and other services. They occupied the cores of villages, and were present as landmarks due to their towering gateways called *'gopurams'* that marked their entrance (Fig. 1, 2, 3).

- The basic lower structure of the temple including the foundation was made of stone. The tall spires built over the sanctum and the entrances were elaborately carved with stories from the myths and legends of Hindu Philosophy. These intricate carvings were done with brick. Epigraphical evidence state that digging the ground for a tank, served the purpose of supplying clay for the brick and hence sites with such possibilities were chosen.
- With the idea of the permanence of the religious core, temples were largely built of stone.[16] Stone construction used lime mortar, which is a water intensive construction process

16. It was not until the 2nd AD that the Hindu temples were made of more permanent materials like stone. Up until then, they were made of perishable materials like wood and sometimes brick. This was because Hinduism based on the Aryan philosophy, worshipped in nature. With the coming of Buddhism in 5th BC, the Buddhist stupas were constructed. These were burial shrines made of stone, which began to be worshipped. Hinduism seems to have borrowed from this concept to make stone temples that have lasted centuries.

requiring large quantities of water. The proximity to a water source was necessary, and in most cases was the tank.

- Temples took many years, sometimes upto a few decades to build essentially for three reasons. Firstly, they were large complexes, second, they were made out of stone, and third, the kind of labour intensive technology of those times. Water was an essential requirement for the sustenance of the worker and the artisan community (Fig. 15).

4.3 Community functions

Apart from keeping the aquifers moist, and thereby indirectly benefiting the community at large, temple tanks had many direct benefits too.

- Drinking water: The tank serves for the drinking water needs of the immediate temple community and in many cases; the village was allowed to use the tank for drinking water during times of a water shortage owing to its level of purity.
- The tanks supply water for the '*nandavanams*' or flower gardens and the sacred groves.
- In some cases, it also provided water for irrigating the temple lands, through which the temple got its income, and economically sustained itself.
- It was used to rear fish, that produced a small income.
- To serve as a cooling mechanism for the immediate microclimate.
- It is an aesthetically pleasing place for the socio-cultural hub that the temple grew to be (Fig. 16).

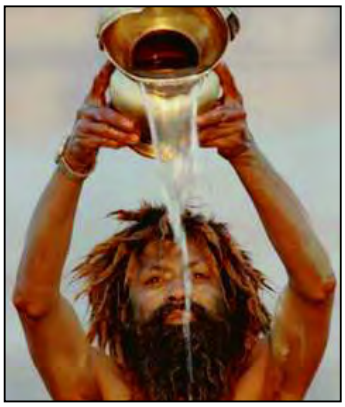

Fig. 14. Rituals using water

Fig. 15. Methods of construction (Painting on the ceiling of a temple)

Fig. 16. The temple tank as a community space

5. The case of the Tanjavur Brihadeshwara (UNESCO World Heritage monument)

The Brihadeshwara temple at Tanjavur was constructed more than a thousand years ago. It was the product of the Middle Chola Reign, from 985 to 1070 AD. It marks the pinnacle of Chola art and architecture, built by Rajaraja Chola I in 1010 AD. Temples until then were small structures, scattered within the village precincts. It was for the first time, that a temple was conceived in such

enormous proportions and as an entire complex. It was the earliest complete stone structure of its scale.

The Cholas were staunch Hindus of the Shaivite sect. With the glory of Buddhism and Jainism through the first few centuries of the first millennium, Hinduism took a back seat. The 7th Century AD saw its revival by the Pandya kings. The Chola rulers took over the region, and continued the patronage. In order to do this, they built temples with a scale and grandeur never seen before. The Brihadeshvara temple is set within a substantially large enclosure made by a pillared colonnade on all four sides and the only entrance gateway or *'gopuram'* marks the east. The spire of the temple is almost 67 meters high, and is completely made of carved stone. The temple is known as the *'Devalaya Chakravarti'* meaning the Emperor among temples (Fig. 17).

Tanjavur is a district in the state of Tamil Nadu, South India. The River Kaveri spreads out her distributaries in this region as she makes her way to the sea. This is responsible for creating one of the most fertile deltas of the country. Tanjavur is also one of the oldest towns of this region. The land is best suited for paddy cultivation, thus making it the famed 'Rice Bowl of India' (Fig. 18).

The temple has a large temple tank, the *Sivaganga* that almost equals the size of the temple campus that is about 240 meters long by 122 meters wide. The temple along with the tank and some gardens are set within a smaller fort that abuts a larger fort, which holds within it the palace and the settlement. A moat surrounds this fort complex (Fig. 19).

The Sivaganga received its water from a large irrigation tank once called the Sevappan Nayakkan *Eri*, located about120meters away. The water was brought by means of a well-protected aqueduct through gravitational force. This irrigation tank in turn received water from a canal originating from a distributary of the River Kaveri. The Sivaganga provided drinking water for the whole city.

This large tank is the first in a chain of system tanks that work to provide the fort city with water. Once the Sivaganga was filled, water subsequently wound its way to the other six tanks and wells within the city that were filled by the overflow method (Fig. 20). Water was carried by underground channels that were built beneath the main roads, with manholes at intervals for maintenance. The primitive unembellished form of the water gauge is present in these tanks, to indicate the water levels. The moat around the fort also contributed to the percolation of water to maintain the aquifers. Excess water from the large reservoir and tanks was let into the moat in times of excess.

In its current state, the temple is completely cut off from the Sivagangai tank. The tank has lost its religious value and is now used for recreational purposes. The irrigation tank has succumbed to urban land pressures being occupied by slums. Thus, the source of water ceases to exist. The tanks

Fig. 17. The Brihadeshwara temple at Tanjavur, with the stone spire and the large temple tank, Sivagangai

Fig. 18. Map showing the location of the Tanjavur in the Kaveri delta

wholly rely on rainwater and hence the connections between them are defunct. Although the tanks cease to work like system tanks, each of them are still surviving as individual units, harvesting the little water it catches, and allowing percolation intro the ground.

Fig. 19. Stone steps to reach the water level, here a dry urban tank, with the well in the bed exposed

Fig. 20. Stone steps to reach the water level, here a dry urban tank, with the well in the bed exposed

6. Tanks today

With the coming of the modernization and westernization, social and economic institutions in India, including those relating to natural resource management, have declined. Temple tanks today are struggling to overcome many obstructions that pose a threat to their survival. They are challenged with the task of fitting in to the ever-changing modernity that races ahead, leaving behind such traditional systems.

All water supply systems are mechanized. One of the serious and environmentally hazardous consequences of this is excessive ground water exploitation. Mechanized tube wells are being dug deeper into the ground in search of water. We are exhausting water that is believed to be almost seven thousand years old. As the agricultural, industrial and domestic reliance on such systems increase, the water tables have reached an all time low. In addition to affecting the environment in general, this has caused the temple tanks to go dry, especially in most urban areas. Tanks are not able to retain the little water they collect. In addition, since cities and towns, and most villagers have water in the convenience the home, the reliance on wells and tanks is insignificant. Negligence has taken over due to the lack of use, and these spaces of prime religious importance have now turned into dump yards (Fig. 21).

Urban land pressures are causing construction over catchments leading to degradation of tanks. Open grounds that were used to harvest water, have now been indiscriminately built upon. Moreover, most temples and their tanks were located in the hearts of villages that have now turned into cities. Prime urban land was occupied by temple tanks. With the tanks going dry for the various reasons, it tends to be reclaimed by the ever growing city.

Modern mechanisms of administration and governance are based on the theories left behind by the British Colonialism. This drastic change from the traditional administration systems and control mechanisms have contributed to the decline of such long established set ups that were in place for centuries. Similarly, the systems of temple administration today have also changed. Once in the hands of a local administration, all temples and their lands have come under a government board. The controls were removed from the users and the locals, and were replaced by a third party. The

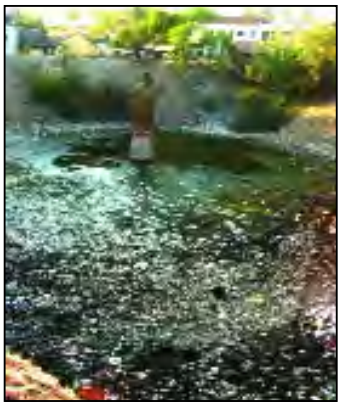

Fig. 21. The pitiable state of temple tanks today

local bodies do not claim responsibility over the temple tanks as both the ownership and control belong to the third party, the State government in this case. On the other hand, this removed administration has its visible drawbacks. The sheer quantum of responsibility vested in the hands of the State, which has to administer and manage almost twenty five thousand large and small temples introduces an element of ineffectiveness. This situation of unclear responsibilities of ownership and control, as well as the state of disuse has compounded the problem for the temple tanks, leading to its degradation.

Another factor that has aided this rapid downfall is the mindset of the modern society. A shift from a community based thought process to the individual, has gained priority. Urbanism has brought with it the break down of the community structure as it existed traditionally. However, a new mode of community formation is still in progress. The attitudes of society are also undergoing change, where a certain amount of loss is felt in terms of religious attachment. As one of the direct effects, the temple tanks do not receive patronage as they once used to. In the older days, patronage from the affluent that took the temple through, helping it flourish. We are at a time when we are struggling to keep stomachs from going hungry, and mouths from going thirsty. Priorities of people have changed from a mindset that was largely influenced by religion, philosophy and the community, to one that is wholly dependent on the economic survival of the individual.

Conclusion

There is an immense wealth of wisdom in traditional technologies, which have evolved themselves to climate and culture. Temple tanks epitomize this marvelously.

Temple tanks are the exemplification of a deep cultural sensitivity to water, something that is missing in our ‘modern’ lives. We treat water as a commodity to be bought and even sold. We have reduced this element to ‘a use and discard’ status. As our ancestors did, the time has come to re-sensitize ourselves to this indispensable and exhaustible natural resource.

They were cultural codes that were followed, in order to provide for percolation points within a city that is dense and built-up. They act as provisions for water, that could otherwise not penetrate into the ground due to the building density.

Temple tanks are simple and sustainable solutions to cater to our basic water requirements. They are low energy consuming and straightforward, making themselves accessible to the common person (in terms of understanding and use). This contrasts to the highly engineered hydraulic systems we have today, that are beyond the scope of everybody but a body of experts. However,

they require public participation, with every user consciously contributing to keep the system alive. It is time to look at such sustainable approaches in order to salvage the vast damages already meted out to our environment.

The existing water systems are overburdened, as they have to singularly cater to the demands of a growing urban populace. Today we have a centralized government system that is responsible for supplying the city with water. Tanks offered a decentralized system that involved locals and users in the managing of their resources. Even today, the revival of such water harvesters could release the pressure from the singular centralized organizations, allowing people to take on more responsibility for their basic needs. Tanks would aid the current inadequate water management mechanism.

In these times of severe water shortages, we realize that it is the over exploitation of the aquifers that have caused our dire situation. Temple tanks could be looked upon as available infrastructure to help replenish the ground water levels. If we could only drain the rainwater from the surrounding areas, with minimal filtration, the design of the temple tanks would encourage percolation, and in a few years, water tables would rise.

We need to change our outlook of tradition vs. technology into one that preaches 'technology to aid tradition'. With the coming of modern science, traditional science has been disregarded. Instead of discarding infrastructure and knowledge that has been built over centuries, we need to use modern technology to re-link these distanced phenomena. The story behind temple tanks gives us clues and pointers to where and how we can save and improve our existing dire situation.

Glossary

Brihadeshwara	name for Lord Shiva
Hiranyagarbha	golden womb
Prajapati	the creator
Syambhu	the self existing
Panchabhutas	five elements
Akasa	space, sky
Vayu	wind, air
Agni	fire
Apah	water
Prithvi/ Prithvima	earth / mother earth
Surya	Sun god
Dyaus	Sky god
Varuna	Water God of the oceans
Brahma	Brahmanic name for prajapati, the creator
Vishnu	main Hindu deity, the preserver, Hindu trinity
Shiva	main Hindu deity, the destroyer, Hindu trinity
Sanatana dharna	eternal essence
Sthala	place; holy
Thirtha	water
Murthy	idol
Kshatriyas	warrior/ kingly community
Vaishyas	trader community
Brahmins	priest community
Sudras	service community
Sthala vriksha	holy tree attached to temples

Sapta santanam	7 kinds of wealth attained
Kovilkaadu	sacred forest
Kovil kulam	temple tank
Anicuts	earthen dam
Ayacut	land under cultivation served by the anicut
Kuttais	village tanks
Oorani	jewel of the village or drinking water tanks
Sunnai	water ponds in rocks
Thitrham	holy water tank
Pushkarni	tanks that grow lotus
Thirtha yatra	pilgrimage to holy waters and their temples
Monsoons	The rainy season in India
Neerazhi mandapam	pavilion within the waters
Abhishekam	the pouring of water etc. over the idol as offering
Prasadam	divine offering from the gods to devotees
pitr-tarpana	homage to ancestors
theppam	float; float festival
nandavanams	flower forests/ gardens
Sabhas	Meeting or gatherings
Gopurams	unique, tall spires at entrances of South Indian temples
Devalaya Chakravarti	the Emperor of temples

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Figures

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Living in a Proto-type Prehistoric Alluvial Environment: Water and the Villagers of Samrong Sen in Kampong Chhnang Province, Central Cambodia

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Summary

We know much about the potentiality of water in its social and cultural contexts in ancient Cambodia, through the study of historical inscriptions (e.g. Yoshiaki 2000) and through the investigation of water-management for agriculture-associated features in the Angkor period (e.g. Groslier 1967, 1979; van Liere 1980). But there seems to be little that is known about the intimate relationship that existed between people and water in prehistoric Cambodia. Archaeological investigations conducted in the last few years at the shell midden site of Samrong Sen in the floodplains of the Tonle Sap River, have revealed that people and their socioeconomic subsistence must have been intimately interrelated with water and other physiographic features since prehistoric times. This paper raises some interesting questions: Why has the prehistoric village of Samrong Sen been occupied until now? What major natural factors that sustain the life of the people can be delineated? And how can people earn their living from the availability of natural resources in water? Based on the archaeological and ethnographical data from the prehistoric village of Samrong Sen, all these questions will be argued and explicated.

Keywords

Shell midden site, subsistence, floodplain, Samrong Sen, Tonle Sap River.

1. Introduction

The central part of Cambodia, especially the core areas of the Tonle Sap River, is dotted with many archaeological features and sites, ranging from prehistoric settlement sites (Vanna 2002*a*, 190–203) to historic temples and villages (Aymonier 1900; Dumarçay 1998). All those settlement sites are mostly located near the natural lakes, ponds, and streams or along the riverbanks. Recent archaeological investigations in the alluvial plains of Kampong Leng, located on the north-eastern banks of the Tonle Sap River, 22 km from the provincial port of Kampong Chhnang toward the northeast along the Chinit River (Figs. 1, 2 and 3), have confirmed that these vast alluvial plains have been inhabited since the first quarter of the 3rd millennium B.C. and persistently occupied until the present time (Vanna 2002*a*, 206). The areas were first dwelled by prehistoric fishing, wild animals-hunting, pottery-making and rice-cultivating communities and later on by the present contemporary fishing and rice-farming communities. These early human communities had selected

Fig. 2. Distribution of prehistoric shell-bearing sites in the central floodplains of the Tonle Sap River (modified in part from the map prepared and published by the Defense Mapping Agency Topographic Center, Washington D. C. 1971, with addition of new prehistoric sites discovered during the 2001 distributional survey)

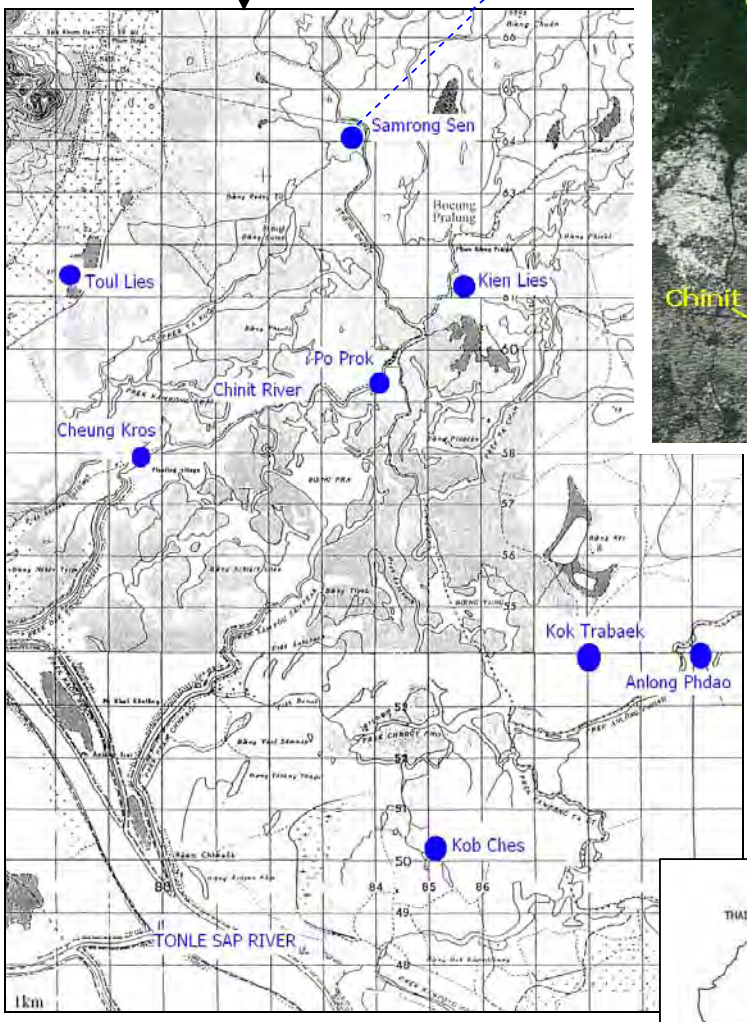

Fig. 3. The shell midden site of Samrong Sen, located along the Chinit River (Finnmap Oy/Imc Cambodia, 1/25000, roll 26, strip 63-6333, Dec. 1992)

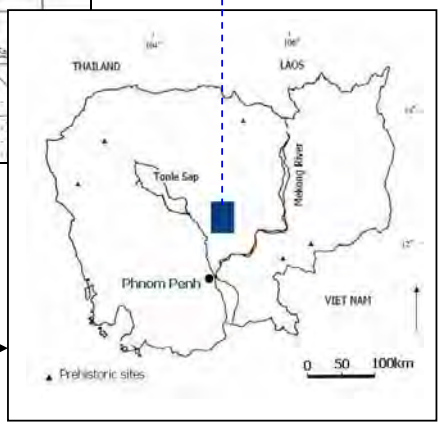

Fig. 1. The map of Cambodia with the area under investigation, extending in a periphery of 150 km squares on the northeastern banks of the Tonle Sap River (Vanna 2002, Fig. 1, in p. 282)

such vast flooded plains and managed their lives by skillfully manipulating all natural resources available to them. This pattern of culture as adaptation and selection is attested by all kinds of tangible evidence seen in the form of the archaeological record, ranging from a single artifact, a group or many groups of artifacts and features up to a complex mosaic of networking settlement sites in the area. But what we need to understand more can be raised as the following questions:

Why most of the prehistoric settlement sites in the central floodplains of the Tonle Sap River have been constantly dwelled until the present day? How had people involved with water and its associated eco-environmental features in prehistoric times? Can the ethnoarchaeological study of the socioeconomic subsistence of the present villagers living at the prehistoric shell midden site of Samrong Sen tacitly explain a living proto-form of prehistoric communities in the flooded areas of the Tonle Sap River? In order to understand all these research inquiries, the prehistoric shell midden site of Samrong Sen is selected for investigation; the occupational stratigraphy and archaeological finds of the excavated areas at this site need to be studied in detail; and the present living pattern of the villagers in the site is also necessarily ethnographically documented.

The paper is developed into three parts. In part one, the history of human occupation in the shell midden site of Samrong Sen will be explained from the archaeological point of view. In this section, the general aspect, occupational stratigraphy, and archaeological finds of the site are descriptively presented. The results from the examination of the site stratigraphy and from the analysis of archaeological finds will lead us to postulate the process of social change in relation with water. For example, the existence of both cultivated-and-wild rice remains used to temper pottery by prehistoric potters has pointed out that rice cultivation had been carried out in the area as a floating species since prehistoric times. In part two, the paper will examine the pattern of prehistoric settlement locations of new sites recently discovered in the Tonle Sap River floodplains. In part three, the focus of socioeconomic subsistence of the prehistoric people in the area will be considered. In this part, the paper will examine biological remains produced by a series of archaeological excavations at the shell midden site of Samrong Sen. Data obtained by means of analysis and identification of the faunal remains will help us to predict the diet patterns, to explain the impact of human on faunal species, and to recognize what species were mostly consumed and why were there imbalance in the ratios of each faunal species in the occupational deposit.

2. History of human occupation at Samrong Sen

Geomorphologically, the prehistoric shell settlement and burial site of Samrong Sen is located in one of the three definable physiographic regions of Cambodia, called the region of Soils of Active Floodplains (White and Oberthür 1997, 5).[1] This site and other contemporaneous settlement sites found in the area dot sporadically along the middle stretch of the small rivers (e.g. Anlong Phdao, Po Prok, including Samrong Sen itself) and around small lakes or ponds (e.g., Kok Trabaek, Kob Ches, Kien Leas) or along natural levees and back slopes (e.g. Toul Leas) (Fig. 2). All these natural features with which those prehistoric sites are associated stretches on a vast old alluvial terrace, called the Meander Floodplains (*ibid*. 6). Annually, from July to October, these sites and their surrounding natural features submerge gradually under the floodwater which becomes over 2 m deep and the sites continue to enlarge their vertical and horizontal dimensions with depositional muddy sediments and other biological materials.

Socio-politico-geographically, the site of Samrong Sen (12°20'N, 104°50'E) or the village of Samrong Sen is classified into the Samrong Sen commune, Kampong Leng district, Kampong Chhnang province, central Cambodia. It is situated about 22 km from the main port of Kampong Chhnang province (Figs. 1 and 2). J. B. Noulet (1879), Corre (1879), Cartailhac (1890), and Mansuy (1902), had already reported that the shell mound had once been disturbed by the activity of river shell extraction for lime, regardless of the natural impact on the site. According to the

1. White and Oberthür (1997, 3-7), have classified the geomorphologic patterning of Cambodian rice lands into three physiographic regions – soils developed on the old alluvial and/or colluvial plains, soils developed *in situ* from underlying parent material, and soils developed on the active floodplains of rivers and lakes that receive annual alluvial deposits. The latter of these is divided into three groups: meander floodplains, expansive floodplains and lacustrine floodplains.

villagers of the area, a heavy disturbance took place from 1975 until the present time. From 1975 to 1978, the site was used as an agricultural development center, and as a regional collective center for stocking rice; subsequently, the site and its surrounding areas were deforested and flattened almost completely by tractors. From 1979 until 1995, the site was used subsequently as a military base, and most parts of the mound were trenched either by soldiers or by villagers. Such unrecoverable drastic damage creates, for archaeologists, difficulties in studying and analyzing the cultural stratigraphy of the site. Apart from the disturbances described, certain other parts of the site have been used as housing areas, modern burial sites, and as land for cultivation.

Archaeologically, Samrong Sen is one of the well-known prehistoric settlement and cemetery sites in Mainland Southeast Asia, which is located on the northeastern bank of the Tonle Sap River (Fig. 2). The site and its archaeological properties are integrally associated with a natural intermittently flooded mound stretching on the western embankment of the Chinit River, one of several estuaries flowing into the Tonle Sap River through the confluence of the Prek Dak Kong[2] (Fig. 2). The site has an elongated shape with irregular contours of roughly 500 m x 300 m (Fig. 4).

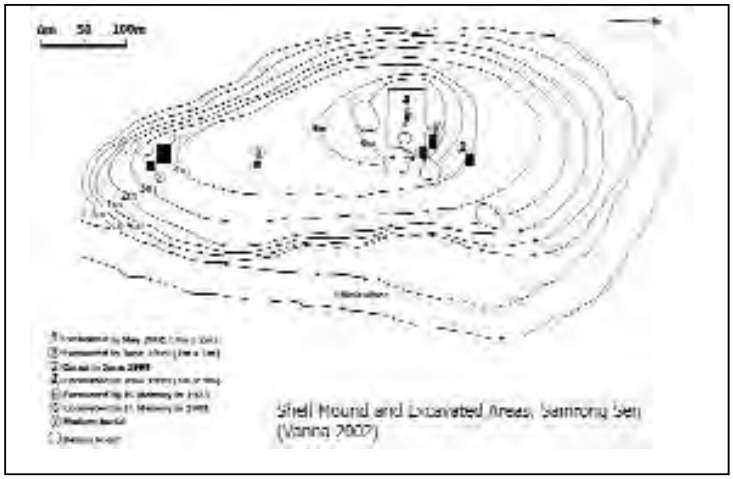

Fig. 4. Shell midden site of Samrong Sen and excavated areas

The occupational layers of the shell midden site of Samrong Sen were reconstructed from the results yielded by a series of archaeological excavations carried out in 1999 and in 2001, through a grid system. A selected area of 2 m x 3 m, which is located in the southern wing of the site, was subdivided into 6 units and excavated through this grid system. This grid system-based excavation method allows us to record in detail all archaeologically depositional behaviors of an area confined by an excavation unit (Fig. 5). The whole sequence of the culture history of the site was archaeologically documented and all material culture recovered from each depositional layer in the deposit was also studied in detail.

We have observed that the depositional processes of the site, especially those of the areas demarcated for excavation, display a matrix of stratigraphic patterns in which several sectional sub-layers can be defined and four distinct archaeological layers stretching in three dimensions were also distinguished.

Layer 1 presents its early deposition at different points in all excavation units: the oldest deposit of the layer is located at a depth of 140 cm in Unit 5, 130 cm in Unit 4, 9 cm in Unit 3, 8 cm in Unit 1 and 3 cm in Unit 2.

2. To reach to the site, one has to take a small engine boat from the main port of Kampong Chhnang province, going south-eastward along the Tonle Sap River and heading north-eastward to the Prek Dak Kong in order to go up to the Chinit River. By proceeding along the serpentine course of the river, especially in the dry season, one may arrive at the site after a 2 or 3 hour-trip.

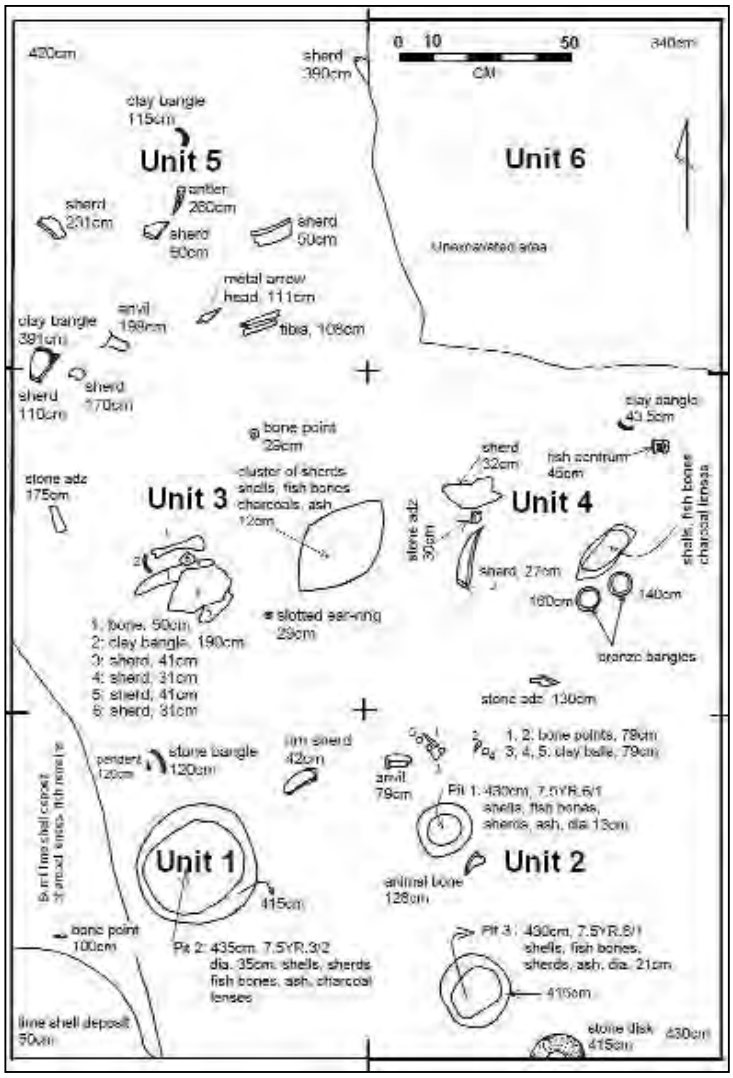

Fig. 5. Different juxtapositions of occupational remains distributed in different depths of excavated stratigraphy (Plan, 2 m x 3 m, enlarged from • in Fig. 4, amrong Sen) (Vanna 2002)

Layer 2 exhibits its latest occupational layers in all units at all the oldest deposits of Layer 1 down to its earliest portions at different points in all units. The earliest depth is seen at a depth of 330 cm in Units 1 and 5, 320 cm in Units 2 and 4, and 300 cm in Unit 3.

Layer 3 precedes its late depositional deposits from the earliest archaeological depths of Layer 2. The earliest depositional floor is encountered at a depth of 338 cm in Units 1 and 2, and the next later floors at a depth of 370 cm in Units 3, 4 and 5.

Layer 4 is very thin, compared with the other preceding layers. A depth of 410 cm in all units is the oldest or earliest floor of human occupation in the southern area of the site, and its later layers are noted to be at a depth of 380 cm in Units 3 and 4, 390 cm in Units 1, 2 and 5. Other preceding deposits are supposed to be the non-cultural or sterile floors since they do not contain artifacts or faunal residues.

Based on the occurrence frequency of bronze-related artifacts in the selectively excavated area, a more than 4 m thickness of occupational stratigraphy of the area was tentatively divided into three different but interrelated cultural phases. The first phase is termed as Pre-Bronze phase, the second as Bronze and Iron phase, and the third as Iron phase.

The earliest part of the first phase is confirmed by an AMS (Accelerator Mass Spectrometry) radiocarbon date on a charcoal lens associated with a pottery shard unearthed at a depth of 4 m below the site surface. The date falls between 2205 B.C. and 1887 B.C. (2-sigma interval) or

between 4154 and 3836 years B.P. (95% of area). The occupational stratigraphy with which this earliest cultural stage is associated does not produce bronze-related objects, but does produce potsherds, polished stone and bone tools. All the layers belonging to this first phase stratigraphically extend from the earliest occupational layer at a depth of 420 cm upward to a depth of 270 cm. The phase is associated with all of Layers 4 and 3 and with the early portion of Layer 2. In general, artifacts that were associated within this first phase consist of pottery, clay and stone bangles (Fig. 7a), clay balls, whetstones (Fig. 6c) and stone discs. Pottery vessels developed into two categories. The first is characterized by a series of uniform vessels with a thinned wall, undecorated and red-orange surfaces. The paste is mixed up of sand, small red pebbles, rice husks and tiny flints of quartzite rock. The second shows the beginning stage of pottery evolution. The vessels of this second category present a variety of different types, ranging from flat-bottomed vessels with a short foot-ring up to globular-bottomed ones, with many kinds of rim curvatures and decorations (Fig. 9). As food residues, we also found rice remains, both in husk form and in carbonized form in pottery clay, and turtle, fish, crocodile, shellfishes, and small size mammal remains, but not so abundant compared with other phases.

The second phase represents the stage from which bronze and iron were apparently in use along with pottery, polished and flaked stone (Fig. 6b, 6d-g) and bone tools. This phase occupies the whole of Layer 2, succeeds from the first phase at a depth of 270 cm and continues upward until a depth where there are no bronze artifacts, but only iron ones, about 160 cm depth below the present site surface. Those bronze and iron artifacts include fragments of a bronze vessel (Unit 4, Spit 19/20, Layer 2, Depth 200–210 cm) and complete bangles (Fig. 8(6)); and other fragments of decorated bangles (Unit 4, Spit 16/17, Layer 2, Depth 160–170 cm) (Fig. 7b); an iron tool (sickle?) (Unit 5, Spit 26, Layer 2, Depth 260 cm) (Fig. 6a, upper), and another iron-related artifact is a metal slag which was discovered in 1999 at this same layer. Other specimens of artifacts are recognized as a whetstone (Fig. 6c), clay and stone bracelets (Fig. 7a), shouldered axe (first appearance) (Fig. 6d), an adz-chisel and abundant bone awls. Pottery vessels associated in this phase are rich in decoration and have various shapes of rim, lip and paste (Fig. 9). Most vessels have heavy lips and thick walls. The most dominant faunal remains are the Corbicula species, turtles, fish and large size mammal bones. The most interesting artifact, one that expands our archaeological idea about the social form of this phase, is the appearance of marine shell beads (CS21/200–210cm)[3] (Fig. 8(2), (3), (4)) This indicates clearly that people living around the period at which this phase was humanly made up may have socioeconomic interactions with the coastal communities. Some charcoal samples collected from the layers of this second phase were tested for their ages by AMS radiocarbon, but the results could not satisfy the range of our estimated chronologies.

The third phase is characterized by the appearance of a crystal pendent (Fig. 8(1)) and many slotted earrings made from fish centrums (Fig. 8 (5a, 5b)), and by the exclusive occurrence of iron-related artifacts in the last occupational deposit. The phase extends from a depth of 160 cm up to the upper portion of the deposit (later portion of Layer 2 and the whole of Layer 1). The iron artifact that appears in this last phase is known as an arrowhead (Unit 5, Spit 11, Layer 1, and Depth 110cm) (Fig. 6a, below). The phase also presents the same pattern of other specimens of artifacts as those encountered in the second phase, but the new advent of glass beads (yellow and red) (Fig. 8 (7)) points out that this third cultural phase may have corresponded to the general chronological framework of the Iron Age of Southeast Asia. The typical sites representing this period in Cambodia include the necropolis of Phum Snay, northwestern Tonle Sap Lake, and Angkor Borei, southern Mekong Delta. The latest occupational portion of this phase also produced some recognizable artifacts belonging to the Angkor Period: ceramics with zigzag incised and groove decorations coated with red-dark-brown glazes (surface collection).

3. CS21/200-210 cm: column sampling, spit 21, depth 200-210 cm.

Fig. 6. (a, upper) an iron sickle, (a, below) an iron arrow-head; (b) basaltic chisel-adzes; (c) sandstone polishers;(d) a shouldered adz; (e) a basalt adz; (g) basalt hand-axe-shaped adz; (f) a flake with one face retouched (Vanna 2002)

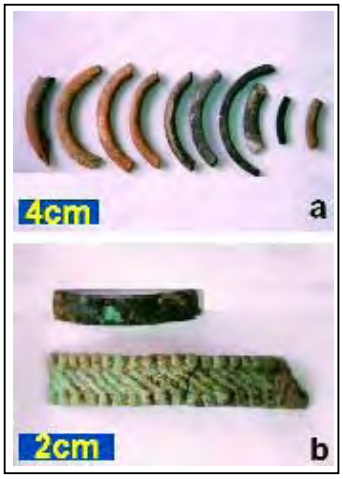

Fig. 7. (a) clay and stone bangles; (b) bronze bangles (Vanna 2002)

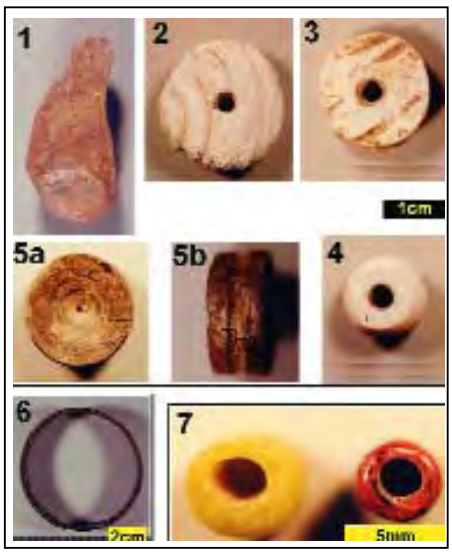

Fig. 8. (1) a crystal pendent; (2), (3), (4) shell beads; (5a,b) fish bone modified into a slotted ear-ring; (6) bronze

Based, therefore, on the above-presented results, some alternative perceptions with regard to the cultural complexity seen from the archaeological point of view at the shell settlement and burial site of Samrong Sen can be synthesized as follows.

A type of society composed of hunter-gather-fisher-rice cultivator-pottery maker households did exist since the earliest stage of human occupation at Samrong Sen. Those household communities are certainly not isolated from each other. The last stage of social evolution that can be observed in the area may be involved with a transition stage from the early stage of hunting-gathering-fishing-complementarily rice-cultivating society to a chiefdom tribe stage, when the people have close contacts with the Angkor Empire. The historical finds belonging the Angkor Period (ceramics) remain on the site surface; the shell involvement in social and cultural organization since prehistoric times until the Angkor Period and the sporadic historical temple complexes scattering in the area, all may be supportive evidence for the above assumption (Vanna, 2002*a*).

The absence of bronze-characterized context in the earliest deposit clearly indicates that the form of social organization may be less complex. This cannot suggest any implication for metallurgical

specialization and socioeconomic change into a wider periphery of exchange and trade in local products with other communities in the region. The presence of bronze and the iron-related materials suggests that another form of social organization may have been more rigorously and hierarchically arranged and socio-economically improved by frequent contacts with other communities in the region. And the appearance of exclusive iron-related context may bring about a new constant form of resource competition and warfare within the region. The occurrence of many varieties of artifact specimens, ranging from coarse vessels with different types (Fig. 9)[4] up to bronze-iron objects, may support or strengthen the postulates regarding human involvement or technological innovations in manipulating the people's surrounding ecological environments for sustaining their permanent life.

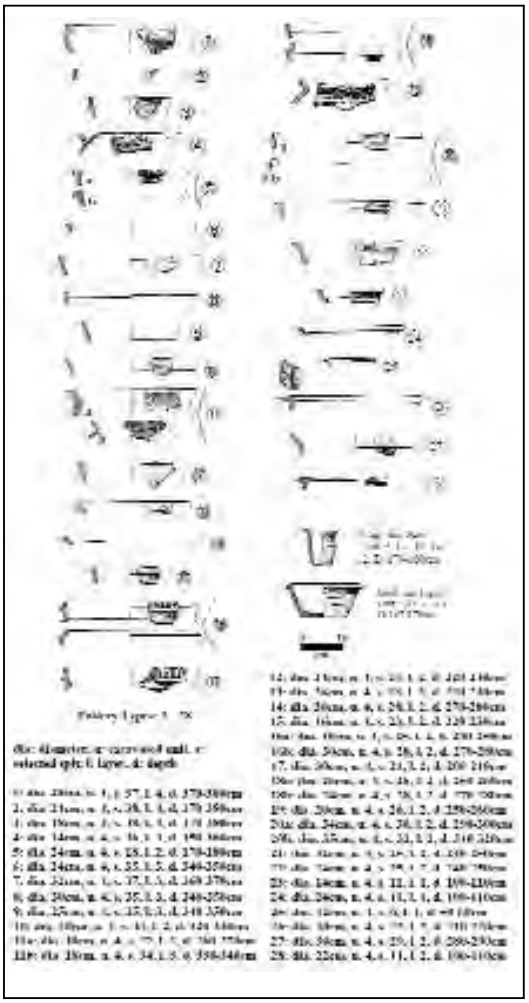

Fig. 9. Distribution of different rim sizes in Unit 4. 28 types of pottery rims sorted out from the 2001 excavation at Samrong Sen (Vanna 2002)

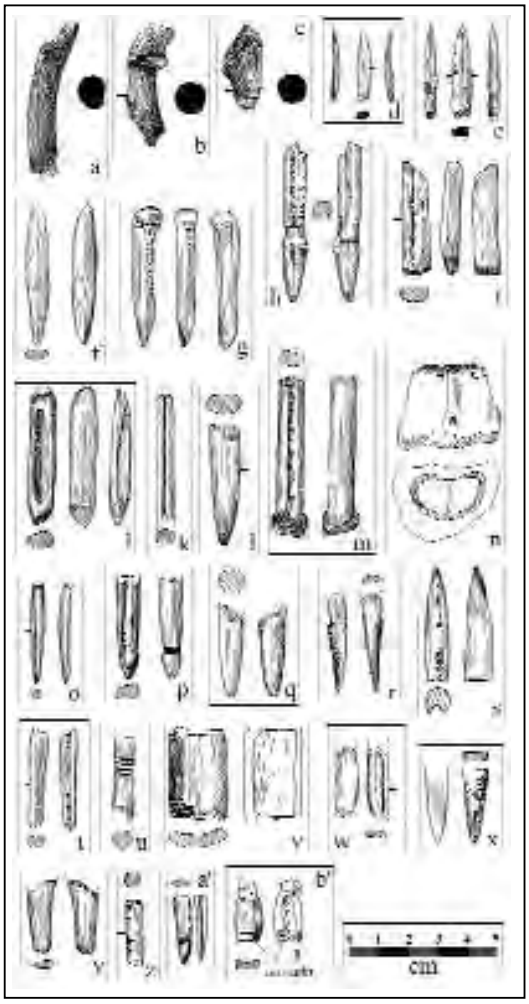

Fig. 10. Antler and bone tools from different occupational layers, Samrong Sen (Vanna 2002)

4. Pottery rims presented in this figure were classified from all the rim shards excavated from Unit 4. 28 rim types are recognized as belonging to different sizes of pottery scattered in an occupational deposit of more than 4 m in the southern portion of the site.

3. Settlement pattern

The adoption of an area for a settlement location or for an activity area is without doubt closely connected with the ecological niches surrounding those selected areas. All prehistoric settlement sites and catchment areas, which have recently been discovered in the central floodplains of the Tonle Sap River (Fig. 2), present a pattern of settlement system intentionally created by the prehistoric people of the area. Some of those settlement sites, such as Samrong Sen, Anlong Phdao, Kien Leas, Kop Ches, Po Prok, and Kok Trabaek, are all located in the lacustrine floodplains extending between the old alluvial terraces and colluvial-alluvial plains. But the settlement of Toul Leas is situated on expansive floodplains.

Lacustrine floodplains are defined as vast plains surrounding the Great Lake of Tonle Sap. These plains are by and large flat and featureless with finely textured sediments, but the nature of the sediments may depend on the lithology of the surrounding area and on the watershed pattern of many serpentine rivers pouring into the lake. Expansive floodplains are represented by a set of lower stretches of river. These areas in general have a main river channel, a levee of medium or heavy soil texture, behind which there is a wide and flat extending basin with few features. The basin can extend up to several kilometers and is traversed by shallow secondary channels with levees. Those basins and levees are submerged under water more than 2 m in depth of water for an extended period of the year (see White et al., 1997). These two zones are the most important landforms for agriculture, including rice cultivation, especially floating rice, and other cash crops. This naturally prosperous soil pattern along with the availability of rich natural resources have attracted the decision-making of prehistoric people in initiating their sedentary and semi-sedentary settlements in the area.

Anlong Phdao. It is a shell mound, almost flat, relatively smaller than Samrong Sen, located in Trop commune, Batheay district, Kompong Cham province, about 12 km in the southeast of Samrong Sen, geographically at 12°15'05.4"N and 104°54'31.3"E, and its elevation is about 12.5 m. The site is associated with Prek Anlong Phdao (Anlong Phdao canal). The surface collections reveal that the site bears artifacts similar to those seen at Samrong Sen. Those artifacts include polished stone adzes, bronze bells, pottery, bone points, clay anvils, and iron arrow-heads (Mansuy 1902). The pattern of site location and its associated natural features (river and landform) may suggest that the site might have been used as a semi-sedentary settlement dwelled in only during the dry season or during the annual recession of water for fishing, not for cultivating activity.

Kob Ches. It is also a very small shell mound, located about 5 km in the southwest of Anlong Phdao, in Sralao commune, Baray district, Kampong Thom province. Its geographical position shows an altitude of 13m, latitude 12°13'20.3"and longitude 104°52'09.1". The site is impenetrable during the water recession season because of swampy forests and anti-personnel landmines. The real dimension of the site is unknown and unpredictable due to the above conditions. Based on surface collections done at only one spot in the site and on interviewing local informants, we recognize that the deposit contains several kinds of artifacts, notably known as bronze objects (bangle, bell, adz, and rattle), polished adz-chisels, clay and stone bracelets, and other clay slotted earrings. The site has been abandoned to the forest. However, our local informants reported that big human skulls and long bones associated with bronze bangles and vessels were encountered during collections of river shells for lime; these may suggest that the site must had been used as a burial site or a necropolis.

Kok Trabaek. The site has been constantly inhabited. It is located about 11 km in the true south of Samrong Sen, and about 3 km from Anlong Phdao, its latitude and longitude positions are respectively at 12°15'06" and 104°53'17" with a rough altitude varying between 14 and 14.5 m. The surface survey reveals that the presence of freshwater shellfishes of univalve and bivalve specimens mixing with potsherds is confirmed only in some limited areas of the

mound. This pattern suggests that the site might have been partially used. The site is still inhabited at the present.

Por Prok. This site has been abandoned in recent times. It is located on both sides of the Chinit river, about 5 km from Samrong Sen, at 12°18'05.5"N and 104°51'23.1"E, in Samrong Sen commune, Kampong Leng district, Kompong Chhnang province. Every year from February until April, the site appears under swampy bushes and exhibits a cluster of small long and narrow bed of shellfish encrusted with potsherds and polished stone tools whose morphological characteristics are closely similar to those of Samrong Sen.

Toul Lies. The site is located approximately 5.31 km from the shell settlement site of Samrong Sen to the southwest and 1.3 km to the east of the village Lovea, Svay Rompear commune. Its geographical location is at 12°19'27.8"N, 104°48'25.9"E and its elevation, compared with the present sea level, is about 15.7 m. It extends on an axis true north south on a large flooded sandy bed partially covered with lower swampy forests. The site is free from landmines but there is no route or path for access to the site. During the site distribution survey, two villagers of Samrong Sen on a small engine boat guided us to the place. The site had also been partially damaged by villagers from Samrong Sen between the 1910s and the 1970s, when the site was trenched for shells.

The discoverers have collected from the site surface a number of potsherds; most of which are made from black clay paste, thick walls, undecorated and flaring lips. Judging from the comparison of pottery tempers with those of potsherds from Samrong Sen, we found that the pottery vessels from the shell matrix site of Toul Lies are dominant in black pottery but are rarely found at Samrong Sen.

The above fact suggests that the area may have been settled by many groups of potters who produced various vessels and exchanged them as trade goods among other local pottery-making villages in the area. And from such an implication, one may clearly predict that each settlement must not be isolated from others in terms of local interaction behaviors.

Kien Lies. This site is located approximately 3 km to the east of Samrong Sen, Kampong Leng district, Kampong Chhnang province and is geographically at 12°19'36. 8"N, 104°52'00. 4"E. It is the smallest shell mound among the shell mounds discovered in the area, about 5 m × 6 m, stretching just on the eastern edge of Beung Pralung lake, its elevation is about 13.5 m, compared with the present sea level. The site was covered with flood during my visit in July 2001. However, based on surface collection finds from this site and its associated natural features, one has the impression that the site may be not a permanent or sedentary location. This can be clarified by two simple reasons. The first reason is because the area where this site is located is covered with a deep annual flood and there are no other pre-historic settlement sites and artificial features linking to the site. The second reason is that all the potsherds collected from the site surface are all undecorated and not carefully manu-factured. This second reason clearly indicates that the vessels found in the site may not be produced on the site; if they were, then they would be made only for a short period of use during a short time span of occupation. This latter assumption may invite us to propose that the site may have been used as a transitional place for a semi-sedentary occupation in a limited period of time. For instance, the early inhabitants might have moved back and forth between Samrong Sen for fishing or hunting game during the water recession or dry season. Thus the lake with which this site is associated must be served as one of the catchment areas for procuring natural foods for those early people.

The pattern of distribution of prehistoric settlement sites in the central floodplains of Cambodia is for the first time recognized through the study of separation distance from one settlement to another. In this section, an attempt is made to find a particular focus on the patterning of prehistoric archaeological sites in a periphery of 280 square kilometers. This vast floodplain extends from the north at Phum Thnal (Thnal village) to the south at the immediate western bank of the Tonle Sap

River and reaches from the west to the east until the shell matrix site of Samrong Sen (Fig. 2). The area is dotted with different types of prehistoric sites ranging from settlement and burial sites to camp or catchment sites. Some sites have been uninterruptedly inhabited since prehistoric times (Samrong Sen and Kok Trabaek), some have been abandoned (Kob Ches, Toul Lies and Kien Lies), and others have been used as campsites for a temporary period of food procurement (Anlong Phdao).

By using a distance-recording GPS to relocate the site locations and to measure the distances from one site to other, we have observed that the nearest distance between two sites varies from 2 km to 4 km and the furthest distance falls between 5 and 6 km. Within this range of distance patterns, prehistoric people may have mutually communicated easily by a paddle-propelled boat, as done by the present fishing communities in the area, in order to exchange and trade in their local products with other settlement communities in the area. Along with this exchange and trade activity, ideas of cultural transmission or exchange from one settlement to other may be brought about. This latter assertion may be confirmed by the appearance of a cultural homogeneity or heterogeneity exhibited by the degree of similarity in cultural traits or attributes of a single artifact or a group of single specimens of artifacts. For example, the cultural traits of pottery vessels (mostly potsherds) from the settlement site of Toul Lies are different from those found at the settlement and burial site of Samrong Sen, in decoration and paste composition. Such cultural differences should not be understood as two different trends of cultural development but should be rather perceived as a local cultural variety developed and promoted by the people who have lived in such a single and homogeneous environment niche of the area since prehistoric times.

The pattern of the distance between one site and another and its associated geo-ecological features suggest that each settlement location may have been intentionally selected by prehistoric people as a permanent dwelling area or as a short-term camp site only for the period of food procurements. The site of Kien Lies can be one of several examples. The distance, on the other hand, can be extended or reduced according to the geo-physiographic behavior of the area and to the resource catchment distribution in the area. A natural constraint, such as flood, can modify or impact on some social and cultural activities (pottery making activity and death or burial ceremonies) but it certainly does not change a selected distance pattern between one settlement to other or between one settlement to an activity area in the region. This can be implied from the contemporary distance patterns adopted by the villagers of Samrong Sen between their settlement location and their activity areas. Therefore, the distance patterning between prehistoric settlement sites or food-procuring sites in the central floodplain of the Tonle Sap River can be generally explained as follows.

(1) Early village settlements distributing in the central floodplain of the Tonle Sap River are located near the natural sources of water, such as river, confluence, lake, and pond, or on the embankment of a river. All these natural features must play multiple essential roles in sustaining the socioeconomic system of the prehistoric and contemporary settlement communities of the area. The average distance from one settlement to another varies from 2 to 6 km.

(2) Two types of settlements – a semi-sedentary settlement and a full sedentary settlement are recognized in the area. The sedentary settlement might have been inhabited throughout the year, while the semi-sedentary settlement may have been occupied only in a certain period of time: water recession season.

(3) All prehistoric settlements consist of almost the same material culture in terms of material, typology, and function. The omnipresence of black phthanite stone adz-chisels, pottery made by hand and paddle-anvil techniques, bronze bangles and hafted axes, and other fishing and hunting tools in the area should be perceived in a broad sense as showing that those settlements have all adopted the same social and cultural ideology.

4. Socioeconomic subsistence

The mode of socioeconomic subsistence might have relied not only on hunting, fishing, cultivating rice and other edible plants, collecting forest products, but also on some activities of exchange and trade in local craft products among local communities within the area. Rice cultivation as attested by husk remains of the *Oryza sativa indica* sub-species used to temper the pottery clay, has been practiced since the first quarter of the third millennium B. C. in the area (Fig. 11). And the *Oryza sativa rufipogon* wild species, which are still dominantly surviving in the area, were also found in the pottery tempers from the earliest occupational layers (Fig. 11c). A part from rice remains, faunal remains, such as large size-mammals, fish bones, aquatic birds, crocodiles, carapaces, and mollusks, indicate that the prehistoric people of the area had selected a wide range of biological resources for their diet.

The morphological study of fish remains from Samrong Sen through comparison with modern fish samples from the Tonle Sap Lake, revealed that among several thousand pieces of fish bones excavated at the site, the most dominant species of fish are recognized as belonging to the families of *Siluridae, Bagridae, Pangasiidae,* and *Channidae* (Fig. 12a, b, c). Other edible species of aquatic faunas: freshwater turtles (*Trionyx cartilageneus* and *Callageur bomeoensis* species), shellfishes (*Corbicula* [ridged venus clam], *Paludina* [river/pond snail], *Unio* [pond mussel], *Pema viridis* [green mussel] and *Pila ampullacea* [apple snail]) were also known as the dominant shellfishes which have been consumed as food since prehistoric times in the freshwater streams of the area (Fig. 12d).

The prehistoric people of Samrong Sen could also have selectively hunted only the larger-size animals such as bovids, cervids, rhinoceros, wild boars, elephants, and wild buffaloes. This assumption is made clear by the well-preserved bones of large sized animals in the deposit. Those bones include tooth, fangs, mandibles, tibias, scapulas, vertebras, ribs, radius, ulnas, carpals, meta-carpals, and phalanges. By examining and recording those complex patterns of bone surfaces and cut marks, we come up with some taphonomic results as follows.

The bone must have decomposed through a process of chopping diagonally into splinters with a not too sharp blade. This has often occurred with deer, rhinoceros, and elephant bones. The bone had been received impact by a process of sawing, because the cutting marks were still visible on the surface of the cylinders of a tibia. The bone has been partially gnawed or chewed by carnivores or scavengers. All dorsal and pectoral fish spines present a breaking uniformity. All pointing ends of the spines were cut. The microscopic examination at a range of large magnifications: x (20–40) reveals that those fish spines may have been cut or chopped away with a stone tool, when fishes were caught from the water. The imbalance in the ratio of each species of fish found in the deposit may imply that an unequal consumption of fish as one of the diet patterns of the early inhabitants of this area must be considered.

In order to catch all these varieties of fish, it goes without saying that the fishers must employ some sophisticated fishing technologies, as for example creating fishing instruments to catch only the desired species. They also have to learn how to be aware of the ecological and biological behavior of each fish species. For example, in what season and when can many fish be captured, and when do the fish have poisonous flesh, and why. Even though there is no archaeological evidence to support the above issues, yet all this comprehensive knowledge must have been conceived of by the early inhabitants of Samrong Sen, if we are to rely on an ethnographical explanation.

Anther implication for the predictable density of population in each occupational phase can be made when examining the frequency of mammal bones from each excavated spit level of the deposit. The statistic list of faunal remain distribution in the deposit indicates that, from the middle portion of Layer 2 downward to Layers 3 and 4, the bone frequency decreases. This pattern is contrary if we compare with all upper portions of Layers 2 and 1. What can be inferred from such a fact? A more rigorous discussion can proceed as follows.

Fig. 11. Rice remains: (a) a rice husk imprint in a potsherd, (b) a modern Oryza japonica, (c) a wild rufipogon (?), (d) a living wild rufipogon in the area (Vanna 2002)

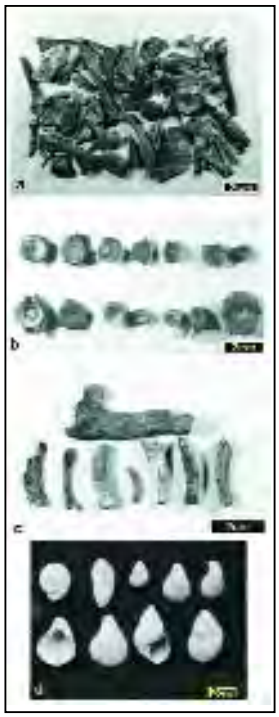

Fig. 12. Fish and shellfish remains from Samrong Sen

If we presume that the bone frequency, which also represents the animal frequency, in the deposit may have been impacted by climatic changes or environmental changes during the period when those deposits were humanly made, then there is need to examine all these natural phenomena. A recent study on the sedimentation of the Tonle Sap Lake and the Tonle Sap River has revealed that there were no major environmental changes in the Tonle Sap Lake of Cambodia during the last 6,500 years (Tsukawaki, 1998). Therefore, this clearly implies that there is no impact from environmental changes that can affect the density of animal population in the area during the first half of the third millennium BC in the central floodplain of the Tonle Sap River. Based on this fact, then one can proceed to an explanation that the bone frequency seen in the deposit of Samrong Sen could be related to the population density: as the number of people increases, more animals will be required.

5. Concluding remarks

Archaeological investigations at the prehistoric shell settlement site of Samrong Sen lead us to synthesize that the shell midden site of Samrong Sen has been occupied by several generations of fisher and agriculturist communities since the early third millennium BC. The site has been used either as a settlement area or a burial in part. There is no any interruption of human occupation in the site. The major geo-ecological features, such as lakes, ponds, streams, rivers, mountains, floodplains, natural hills, and other biological species intimately associating with those ecological features, are the main factors that drive human to make decision in dwelling the area. All prehistoric settlement sites are located near the streams, rivers, and the natural lakes. People have profited their living from natural resources, such as fishes, shellfishes, and other aquatic edible animals and plants. This assertion is tacitly reflected both from the archaeological record of the site and from the ethnographic data of the present subsistence pattern of the villagers of Samrong Sen. For example, the annual gathering of the wild floating *Oryza rufipogon* and the annual fishing and planting cash crops, including floating *Oryza indica*, done by the present villagers of Samrong Sen, might have implied a proto-form of living that has been closely associated with water. The annual floods, which transport every year several hundred tons of alluvial soils to fill the agriculture lands of this central plains of the country, effect the rhythm of daily life of the prehistoric people of the

area, as well. This assumption is ascertained by the fact that when the flood season comes the villagers of the area have to change their mode of living. For example, it can be valid to extrapolate that when the whole area of the site is filled with floods, people must live on the pile-dwelling huts or on the boats and are not able to carry on their pottery-making activity, and the burial ceremony cannot be either held during that period. Therefore, one should realize that water brings us several forms of impacts in the daily life of human. Human uses water as a crucial source for their life, but water can also modify the cultural diversity created by human.

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Dams and Cultural Heritage Management: a Strategy for Action

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Abstract

Today there are over 45,000 large dams. These dams are invariably constructed in river basins with rich cultural heritage. Unfortunately, these dams have caused incalculable loss, destruction, and damage of artifacts, shrines and sacred landscapes of local communities to world heritage monuments and sites. Large dams have also caused considerable loss or damage of cultural heritage resources through land reclamation and irrigation projects and the construction of power lines, roads, railways and workers' towns.

Given: 1) the colossal magnitude of the loss and damage of cultural heritage resources in every case where large dams are constructed; 2) the ongoing impact of dams on cultural heritage resources well beyond the immediate area of the dam and reservoirs; and 3) the woefully inadequate means to cope with the ongoing and impending loss of cultural heritage in developing countries, the situation in developing countries regarding the protection and conservation of cultural heritage represents a crisis of unprecedented dimensions.

We thus call on the world community to develop a strategy aimed at:

I. The development of new or the strengthening of existing legislation

There is an urgent need to: (1) call upon governments to abide by existing international conventions, charters, and recommendations; (2) develop internationally acceptable and feasible cultural heritage legislation; (3) convince international funding and construction agencies to develop and enforce internationally accepted protocols for conducting cultural heritage management projects; 4) develop a mechanism for private corporations and government agencies to be certified as meeting appropriate standards; (5) link Cultural Heritage Management (CHM) legislation to Environmental Impact Assessments (EIA); and (6) ensure the human right of tribal, indigenous, and marginalized groups to their own cultural tradition and their own visions of the past, present and future.

II. Technical, profession al and managerial capacity building

The demands of Cultural Heritage Management as a consequence of dam construction are beyond the capacity of most developing countries. Therefore, capacity building is of the utmost priority in mitigating the damage now underway as a result of the large dams built in previous decades, and coping with the potential loss and damage of cultural heritage resources at dams now under construction, or those that will be constructed in the near future.

III. Development and establishment of educational and public outreach programs

Educational programs on the importance of CHM in association with the construction of dams are needed for high level managers and professional and government officials involved in decision-making for dam projects, as well as for local communities and stakeholders.

IV. Establishment of Best Practice Guidelines

Best Practice Guidelines to ensure proper management of cultural heritage resources in conjunction with the construction of dams are urgently required. The Guidelines should be issued in UNESCO languages and widely disseminated along with information on specific successful CHM operations.

V. Guaranteeing of sustainable, adequate and timely funding

Guarantee a constant source of CHM funding. The most se cure way is through legislation and/or policies that require a certain percentage of total dam construction costs be allocated exclusively for CHM.

VI. Linking of Cultural Heritage Management to poverty alleviating development activities.

The management of cultural resources during and after the construction of dams provides an excellent opportunity to engage poor local communities, especially women, in various economically rewarding activities from participation in surveys to eco-tourism.

Zeugma: a Bridge from Past to Present

Kaya YASINOK

GAP RDA Former Vice President

Zeugma is an amazing well preserved city at one time hosting a roman frontier city of equal grandeur to Pompeii. In ancient times it was an important crossing point across the river Euphrates for many people who inhabited the Mesopotamian region. In modern times the extent of Zeugma's rich remains were not clearly understood except by a handful of archaeologists and researchers who were committed to finding Zeugma's past under the soil and ash that covered it. With the completion of the Birecik Dam, one of key projects being implemented by the Southeastern Anatolia Project (GAP), this dormant area was thrust into the limelight in the summer of 2000 with greater force than the rising waters of the Euphrates Rives that were about to cover it.

Keywords

Zeugma, GAP, Birecik Dam, protection, cultural assets, water -based development.

GAP: approach to cultural assets of the region

The upper Mesopotamian region known as the 'cradle of civilization' is now witnessing the birth of a new and modern civilization with the Southeastern Anatolia Project (GAP). GAP is a unique project which unites the contemporary values of development with a water resources based investment program and presents a full fledged regional socio-economic development model focusing on sustainable human development.

GAP is a human-centered regional development effort covering 9 administrative provinces in the region of southeastern Anatolia and aiming to eliminate socio-economic development disparities between this specific region and the other regions of the country. Beyond its physical investments in 22 dams, 19 hydraulic power plants and introduction of irrigation to 1.7 million hectares of land, the project has now turned into full-fledged human development effort comprising all sectors. The protection of cultural heritage and ensuring cultural continuity has been one of the targets of the GAP.

It is widely known that economic and technological developments may occasionally bring with them some adverse effects on the cultural and social structures of nations and communities. In this context, international conventions on the protection of cultural heritage are adopted and specific measures are introduced for the protection of cultural properties in areas affected by development projects. The protection of cultural heritage and ensuring its continuity has recently become an issue that is attached specific importance internationally.

Historically known as 'Upper Mesopotamia' and the 'cradle of civilizations', the region of southeastern Anatolia is one of the most important centers in the world in terms of culture and

creed tourism. Gradual disappearance of the cultural heritage will obviously create bottlenecks in tourism as an important driving force for economic development and employment generation. Protection of cultural heritage and promotion of tourism, on the other hand, boost the economy of the region through foreign exchange earnings and new areas of employment. The people of the region will enjoy an additional source of income through the re-vitalization of local handicrafts as an inherent component of cultural heritage.

Considering these and acting responsibly, the GAP Regional Development Administration (GAP RDA) is presently engaged in various initiatives to rescue and document for archaeological properties to remain under dam lakes, to protect immoveable cultural properties, create new income opportunities for local people through the tourism related promotion of cultural properties and to document the popular culture of the region for future generations. All these activities and initiatives are shaped by sustainable-integrated regional development approach and by observing the balance between protection and utilization.

GAP RDA continued its projects such as 'Participatory Urban Rehabilitation in Mardin', 'Excavation and Rescue Work in Hasankeyf Historical and Archaeological Site' to be affected by Il?su Dam, 'Inventory of Archaeological Settlements in Southeastern Anatolia' to assess the damage on the cultural properties of the region and 'Rehabilitation of Mardin-Ac?rl? Historical Site' with the participation of relevant organizations and agencies, universities, local governments and local communities. The 'Urgent Excavation and Rescue Work in the Ancient City of Zeugma' is one of these activities designed to protect the cultural properties of the region.

Zeugma in history

The ancient city of Zeugma (Belkis) is 10 km to the east of the Nizip district. The area has been continuously settled since pre-historic times. Along with Samsat, it is one of two points where the Euphrates offers relatively easy crossing.

The word Zeugma means 'bridgehead' or 'crossing point.' Indeed it has been a 'bridge' for different cultures with its spectacular mosaics made of colored stones from the Euphrates, and its frescoes, sculptures, and architecture.

The settlement was first established around 300 BC by Selevkos Nikator, one of the military commanders of Alexander the Great. The general named the settlement 'Selevkia Euphrates' by combining his name with that of the river. He established another settlement on the opposite bank of the river and named it 'Arsemia' after his wife. Once there was a bridge to connect these two settlements over the river, but it was destroyed by the unbounded waters of the Euphrates.

Zeugma flourished rapidly in trade thanks to its location on the silk route that extended from Antioch to China and where the ancient trade routes crossed. Since it was the easternmost point of the Roman Empire, the military camp of the 4th Legion was also posted there, adding a military dimension to the importance of the settlement. Commanders, traders, and men of wealth who settled in Zeugma built many villas on terraces overlooking the Euphrates and brought in master artists to decorate the floors and walls of their homes with figures from ancient mythology. These artists used colorful materials and stones from the Euphrates River to create exquisite mosaics and frescoes.

In the 1st century BC, Zeugma was one of the four big cities of the Kingdom of Kommagene. It became a part of the Roman Empire in 64 BC. In 256 AD, Apur I of the Sasanid Kingdom captured and destroyed the city. Then Zeugma was under the domination of the late Roman Empire during the 4th century and the early Byzantine in the 5th and 6th centuries. During the Byzantine rule, the city lost its importance as the main trade routes shifted to Birecik. The city was deserted in the 7th century after the raids of Islamic troops and remained as a modest settlement throughout 10–12th centuries. Starting from the mid-11th century, Zeugma no longer appeared in records,

hinting that it had largely been deserted. The present village of Belk?s in the same area was established in the 17th century.

Urgent excavation and rescue work in Zeugma: a true team effort

The first excavation in Zeugma took place in 1987 when a team from Gaziantep Museum unearthed a few graves in the Necropolis of the ancient city.

In 1992, when the Ministry of Energy and Natural Resources made plans to construct the Birecik Dam, the Ministry of Culture launched excavation and rescue work in the part of Zeugma that would be covered by the new dam lake. This work continued with the occasional participation of some teams from abroad. During excavations conducted by Gaziantep Museum, a floor mosaic reflecting the wedding of Dionysus was found in an unearthed villa. This was the first event leading to Zeugma's international reputation for its mosaics. This reputation was further bolstered with the discovery of a complex of villas in the rich part of the city, more floor mosaics, frescoes, and a statue of Mars.

Upon the completion of Birecik Dam, water level rose to its maximum code of 385 meters and the ancient city of Zeugma partly remained under the dam lake.

The Ministry of Culture had, since 1987, been conducting excavation and rescue work in the area. With the start of dam construction this work gained a rather different character and turned into a race against time to save the ancient city. Meanwhile there emerged the need for a rather large team and funding to conduct appropriate excavation and rescue works within a limited period of time.

With its magnificent mosaics, frescoes and statues found in the last years of excavation work conducted by the Ministry of Culture, Zeugma had already gained international recognition and reputation. An article by Stephen Kinzer appearing in New York Times on 7 May 2000, brought the world's attention to the site, and triggered demand for rescue work on a larger scale.

Cultural continuity is an inherent part of sustainable development approach of GAP. Specific importance is attached to the protection of cultural heritage and its promotion for tourism purposes. GAP RDA sought funds to support the work undertaken by the Ministry of Culture. On 8 June 2000, a protocol was signed with the US based Packard Humanities Institute whereby the Institute agreed to fund further excavation and rescue work in the ancient city of Zeugma.

After this protocol, an international excavation and rescue operation was launched at the Zeugma site in 2000. Under the overall coordination of the GAP RDA and Gaziantep Museum, the operation was conducted by the Oxford Archaeology Unit (OAU) under the permission of the Ministry of Culture, General Directorate of Monuments and Museums, and with the contributions of Gaziantep Governorship and Birecik A.?. As specified in the protocol, the project was financed by the Packard Humanities Institute (PHI).

GAP RDA coordinated this huge rescue operation known as ZAP 2000 (Zeugma Archeology Project). It managed the contributions of different parties, ensured the transfer of funds from PHI, and provided logistical support to the operation. In just six weeks, the GAP RDA found and refurbished a facility that could board 150 persons. It then supplied all necessary materials needed for a smooth and fast rescue operation. Further contributions of the GAP RDA include two labs that were built in two weeks on the back lot of the Gaziantep Museum. These labs are currently being used for the conservation and restoration of mosaics and frescoes. GAP RDA also provided a prefabricated gendarme building at a point overlooking the dam, which is functional in preventing any illicit operations and smuggling of properties from the Zeugma excavation site.

From June 5th to October 4th, 2000, one of the most ambitious excavation and rescue operations in history took place in Zeugma. A rescue team of about 100 specialists from Turkey, Great Britain, France and Italy employed about 250 workers to conduct excavation and rescue work at 19

different points in Zeugma. The site was divided in three parts and parts A and B were given priority since they were the first to be inundated by the dam lake. part C will remain above the surface of the water and will eventually be excavated as well.

An evaluation of the type of archaeology in different zones was carried out. The side was dived into three areas two of which (Areas A and B) required, immediate excavation as the formation of the dam lake was affect them.

Part A, covers the area where the Ministry of Culture had conducted its excavation work and which remained fully under water as of June 2000.

Part B, covers the area where urgent excavation work financed by the PHI and coordinated by the GAP RDA took place until October 2000 when the water level reached its maximum code of 385 meters.

Part C, covers the larger part (about 70 percent) of the ancient city that is not affected by the dam lake. The target is to carry out longer-term and broader scope work in this part in the light of earlier excavation and rescue work conducted in Part B.

Overall 19 excavation areas were opened across the 1 kilometer stretch of Area B. Among the many buildings found were houses, shops and workshops, 2 series of structures associated with different Christian ecclesiastical buildings and the remains of possible temples. In total, the excavation has produced vast amounts of archaeological records including hundreds of drawings and thousands of written record sheets. More than 500 rolls of film were shot and 2,376 digital images were produced.

Since there was only limited time available, an important problem was to select those points that were to be given priority in excavation. Thus, intensive geo-physical work was carried of to determine the points to be excavated and find out what could be beneath earth layers.

While observing rising water level in the dam, activities continued nighttime as well. During the transfer of mosaics, the GAP RDA provided generators for nighttime work, pumps for letting water out and vehicles to transport mosaics.

Meanwhile, the *Centro di Conservazione Archaeologica* (C.C.A.), an institute specialized in conservation work, was engaged in the in-situ conservation of frescoes, mosaics and other remains

that had been found but could not be moved elsewhere. The work conducted by the Center included the in-situ cleaning of frescoes and mosaics and their coverage with a special plaster so as to minimize the effect of water.

Since the mosaics known as the 'Flight of Europa', 'Eros and Psyche' and 'Three Women' were of great importance; they were dismantled from their original places and transferred to the labs in Gaziantep Museum.

All finds obtained from excavations were documented in line with the norms of the modern archaeology without missing any detail. This documentation work is based on three methods as written records, drawings and digital camera and conventional photography. From the smallest detail to the complex of structures and from the smallest find to soil samples, the whole documentation work was carried out in electronic environment. There is also a website available for access.

Many remains discovered during excavations also include houses, shops, workshops, various religious buildings belonging to the times of Christianity, two structures possibly belonging to a temple, a necropolis, remains from the infrastructure of the ancient city, streets and wastewater canals. There are many remains indicating that the city once had a rather elaborate water supply network. In sum, the excavation work provided a rather large body of archaeological recording comprising hundreds of drawings and thousands of written documents. Thousands of archaeological finds were obtained. These include such simple items as cooking pots as well as objects signifying high status such as bronze statutes, gold rings and fibulae.

Among other finds, there are more than 1,000 coins and innumerable bulla and the stele, which describes Antiochus, the King of Kommagene when shaking hands with Helios, the Good of Sun.

The urgent excavation and rescue work in Zeugma yielded important information and finds relating to the historical background, architecture and mode of life in the ancient city. After rather intensive and dedicated work starting early in morning and ending late at night urgent rescue work was completed on 4 October 2002 as the date on which the water in the dam reached its maximum level.

Post-excavation work

Post-excavation has continued since the dam was complete in October of 2000 and the water inundated the lower part of the excavation site at Zeugma. This work consists of evaluation, documentation and storage in computers of the results of the excavation work. Another line of activity in this period was related to preparation of materials for publication. Teams of specialists also have completed their work in the labs of the Gaziantep Museum.

Under a protocol acted between the GAP RDA and Ankara University, a team carried out conservation and restoration work on frescoes found in part A. A team composed of Italian and Turkish specialists led also completed conservation and restoration work on 700 m2 of mosaic. The same team is currently working on three new mosaics recently rescued (October of 2002) when the waters of the Birecik Dam temporarily dropped to lower levels. These new mosaics, including the largest and best preserved mosaic found at Zeugma, are now being restored at the museum.

All finds obtained as a result of this operation were documented in conformity with the norms of the modern science of archaeology. This scrupulous work is documented in three ways: with written documents, with illustrated drawings, and with digital and conventional photographs. From the smallest detail to the most complex of structures, and for everything from artifact fragments to soil samples, this documentation work was carried out in an electronic environment.

One of the most important objectives of the urgent rescue operation at Zeugma was to collect more information about the historical background of the ancient city, and to develop documents to

transfer this information to future generations. The sampling method developed for this operation made it possible to identify the characteristics, order, and domain of properties found in excavation area B.

Local and foreign archaeologists who excavated the treasures of Zeugma may well have uncovered the 8th wonder of the world. The quality and quantity of the mosaics are considered to be second only to the vast mosaic collection of Tunisia. The historical knowledge available from the extremely well preserved layers of civilization, frescoes, and statues of Zeugma has been compared to that of the city of Pompeii. The collection of more than 100,000 bullae (custom stamps) is the largest in the world.

Thanks to the diligent work of hundreds of scientists under the direction of GAP RDA and the generous financial support of the Packard Humanities Institute, the whole world and all future generations will someday be familiar with the treasures and historical significance of Zeugma.

A selection from Zeugma mosaics

River God

Several mosaics from a villa found in Area A were decorated with river gods and a water nymph. This mosaic shows a reclining river god. A river runs from a jar below his arm and at his feet a tree grows, symbolising the fertility brought by the water. The choice of river deities as decoration for floors at Zeugma is a natural one. The river Euphrates was itself worshiped as a god and propitiated with offerings, such as blood sacrifices of animals.

Eros Riding Dolphin

Eros Fishing

Beside to being a love god, the son of Eros like Aphrodite represents the giving life to the world, sprinkling joy and increasing. In Zeugma the mosaics which is founded by excavations, it was met the mythological scenes like 'Eros riding the dolphin' and 'Eros catching the fish'.

Poseidon Mosaic

Many of the mosaics from Zeugma have themes associated with the sea and with rivers. The god Poseidon is the central figure in this mosaic, carrying his trident and riding in a golden chariot pulled by two grey horses. Bellow him are Oceanus (a sea-god) and Tethys (a sea-goddess). Oceanus, who has lobster-claw horns, and Tethys, who has a pair of wings sprouting from her forehead, are linked together by a ketos (sea serpent) which coils around their shoulders. Numerous sea-creatures swim around them, including an octupus, shrimp and several kinds of fish, all very accurately depicted. Fish and seafood were luxury foods in ancient times and portrayal of them here may not simply have been to indicate the ocean but could also have been meant to convey the high-status of the house owner.

Conclusion

GAP RDA is fully aware that documentation is a critical element in post-excavation efforts for the protection and continuity of cultural heritage. As a part of overall documentation-publication work, the Administration published the booklet 'Zeugma: A bridge from past to present' in Turkish and English in 2001.

GAP RDA also transferred work at the site and its vicinity to GIS environment, which yielded three-dimensional images of the landscape.

Also in progress are efforts for the exhibition of some mosaics, frescoes and finds unearthed during excavations in a temporary museum. GAP RDA developed the 'Project for Zeugma Temporary Museum' in this context. The Administration conducted, in consultation with the Ministry of Culture, preliminary work for selecting a place for museum and after the reevaluation of previous excavations, surface surveys and geo-physical tests, a parcel that was least promising in terms of yielding further information on the ancient city and having no priority in future excavation projects was selected. Work related to basic mapping and proprietorship status of this parcel was also performed by the Administration.

GAP RDA commissioned the 'Zeugma Development Plan' to a private firm. The report to be prepared by the firm will be the basis of further investigations around the dam lake and the prospective 'sub-regional cultural development plan.'

Session 4: Indigenous World Views and Spirituality

The Spiritual World of Water
'The World View of the Ainu people, oral Traditions from the Ancestors and the Nibutani Dam Decision'

Masanori TOYOOKA
Ainu
Japan

Tan Kyoto sirikoro kamui wakkusi kamui ku onkami tourano
taan waekarapawa echi irankaraputei.

I have just greeted you in the Ainu language. There is no Ainu language translator here, so I will translate what I have said into Japanese. 'I offer a prayer of thanks to the Gods of this land Kyoto, to the Water God, and touch lightly the hearts of all those gathered here today.'

This greeting is used when meeting a person for the first time 'I touch your heart lightly'. This way of beginning a long relationship between two people is characteristic of the Ainu people.

I am most pleased to be able to meet and speak with the ladies and gentlemen who have gathered here from all over the world to discuss the theme of the importance of water, that which forms the basis of life itself, of all things living, both great and small. However, to look at things from the opposite side of the coin, we are here to look at the extent to which we human beings have polluted our waters in the name of our own convenience. I believe this is not only about water, but also seems to tell the story of the pollution of the culture of human spirituality on a worldwide scale. What do you think?

When we look back on the history of humankind since the industrial revolution, it is a terribly sad historical fact that, particularly the advanced nations who developed modern scientific and technical civilization, have, under the propaganda name of national interest, colonized the lands of indigenous people. These nations have forcibly relocated indigenous groups who had lived without abusing the gifts of nature, to regions lacking in nature's blessings, and indigenous people have walked the road of suffering.

But this is not all. Global warming, the reduction of the worlds rainforests, acid rain, changes to our ecosystem, the destruction of the ozone layer and the exhaustion of our forest, ocean and mineral resources through exploitation without planning are all, I believe, serious crimes committed against our children and grandchildren.

We the Ainu people have also become integrated in the social system created by Japanese people, we live as Japanese citizens, and I cannot deny that we too are playing a role in the destruction of nature.

I believe that this destruction happens because certain groups living within developed countries are dominated by a value system which flatters itself that man is the Lord of all creation, reigning at the pinnacle of our ecosystem, and can subjugate both indigenous people and nature to its will

I do not mean to negate all material civilization that is based upon modern scientific technologies. However I do feel some misgivings toward a value system which says that human beings will be made happy by material goods. It may seem meddlesome, but I can not help but think when I look

at the faces of those people in developed countries, not all people mind you, who indulge themselves by living surrounded by material possessions, that they look anything but happy. I have always found this quite odd.

The origin of my happiness is beautiful skies, clean, fresh water and the richness of fertile forests. That is, to be surrounded by the natural environment, wonders that could never be made by human hands. I also believe in the importance of human relationships where both people are so at ease that they can interact freely and without caution.

Now, I would like to look at coexistence with nature as seen from an Ainu cultural perspective, based upon our ancestor's oral traditions. That is, I would like to touch upon one aspect of our relationship with water. If stories like these were revived in today's society, I am sure that Ainu ancestors would rejoice from the world of the Gods.

The word Ainu means human being. The Ainu, who lived by fishing and hunting and gathering, called the natural world *kamui* (The Gods), and lived closely with nature, whilst also holding it in awe. Because it is a relationship of mutual reliance where 'Without the Gods there is no mankind, and without mankind, there are no Gods', there could be no abusing the gifts given by nature. Further, while it seems that Japanese believe that 'land is the property of individuals or the state', in Ainu thinking 'land is not owned by individuals or the state, but something borrowed from the Gods for ones daily existence'. And as a result of this way of thinking, we are told that instances of considerable environmental destruction and contamination were exceedingly rare.

When we look back on the history of humanity, wars over land and resources have continued ceaselessly. Such wars still continue to this day. Even though the Ainu are pacifists, trouble between individuals still occurs. Although it appears that on rare occasions this was solved by resort to force, it was thought by Ainu to be the most shameful action a human being could take. If you ask how then were matters resolved, I have heard that often matters were resolved by *uko charanke*, or meeting to discuss together. Ainu say that the highest artistic treasure created by humankind is 'words'. And they talk, placing the highest spirit of hope upon those words, discussing things thoroughly, whether it takes three days or a whole week.

The living things which grow from the sun's light in the mountains, the rivers and the sea are all thought of as important food bases which sustain life, and, particularly in respect of acts which pollute water, Ainu are lectured severely by adults from our childhood onwards. For example, if we pee into the river, we are scolded in the following way?'The river God is a very important God that raises fish that are able to eat humans you know'.

Also, when human wastewater from daily activities is thrown out, a hole is made in the earth, and a request made of *toikoro kamui* (the God in the earth). 'Please return this water I have dirtied to fresh water that we may drink', we pray.

When water must be drawn at night, a hand is passed across the surface of the water, and splashing sounds made before the water is drawn. This is because the Water God also sleeps at night, so it is necessary to wake him. In believing that water is also a living being, the relationship between water and humans is the same as that between Gods and human beings.

The reason these kind of ethics developed in Ainu culture is because the various Gods watch carefully over all human acts, and are all-seeing. It seems that in today's world, if no-one is watching, many people will lie or do evil. However, in Ainu society, even if other people are not watching, the Ainu had a faithful relationship with the Gods. This was because to cause trouble for the Gods or other people had negative repercussions on ones own survival.

Now, I would like to tell a unique story about a river. The Ainu people believe that a river is the same living being as a human, that it has a flesh body. For example, the source of the river is 'the rivers head', the middle of the river 'the river's chest', and an area where a river bed zigzags back and forth is called its intestines.

Also, a river has sexual relations, gives birth to children, sleeps and dies just like a human. Rivers whose water flow decreases and dries up in Summer are known as 'rivers that slim down in Summer', and where two rivers meet and form one, this is known as 'the embracing rivers'. Also the Ainu believed that rivers were living beings that rose from the ocean on to the shore, past the village and deep into the mountains. It is thought that this belief was born from the fact that originally the Ainu lived as fishermen near the sea, but later followed the riverbeds into the mountains. It is true that among the Ainu place names, there are such places as *Manppe* (the river that goes deep into the mountains) and *Rikomanppe* (the river that climbs up into high places). Therefore the mouth of a river was not seen as the place where it emptied into the sea, but rather the entrance to the river, where food such as trout and salmon could enter the body of the river from the ocean.

I would like to tell the unique story of negotiations with the God of Rivers. As previously explained, the Ainu lived in harmony with the Gods without polluting or destroying nature. One of the bases of Ainu philosophy was the thought that 'Nothing in this world exists without a role to play'. For example, trees and shrubs are called *sirikoro kamui* (God which supports the earth). Their role is to make fresh oxygen and store water. And when, once every few hundred years the strong earthquake comes, the roots which are intertwined under the earth support the land and protect many lives.

The role of the river God is to carry the nutrients of the green earth to the seas, and provide a place where the food of many living things can grow. It was also thought that rivers played a role in protecting and raising human beings.

So then what is the role of human beings? It of course includes having the humility not to destroy or pollute Mother Nature. However, devoting sacred alcohol, holy staffs and other offerings to the River God and the many other Gods, giving words of prayer expressing their feelings of gratitude was also thought an important role of humans which could not be neglected.

For example, in the unfortunate event that a young child drowns in a river and dies, Ainu elders who hear this sad news will hold a *kamuiko charanke* (negotiation with the Gods). They will appeal to the Gods with all their spirit 'Your role is to raise and protect human beings, so why have you stolen this young child's life?' The River God is bewildered and disturbed too, but we are told that as a matter of fact it listens with humility to the appeals of the Ainu. The reason is because it is honored by the holy staffs and other offerings the Ainu devote to it. The Ainu suggest that 'If you do not abide by your role as a God, we the Ainu will not give our words of prayer, our beautiful holy staffs and other offerings to you.'

Once the Ainu have said most of what they wish to say and composed themselves, the negotiations with the God are closed with the following words, which bring spiritual reconciliation 'We are sure there was also lack of care by the child, and the inattention of the parents and other adults. We are sure that the River God did not intend to snatch the life of a child, but was also merely unintentionally careless. We will take care not to be careless again, and ask that the River God please also no longer be inattentive in our relations hereafter'. I believe that it is precisely because the Ainu were careful in their daily lives not to defile or destroy nature and thus trouble the Gods that they were able to negotiate with the Gods in such a fair and open manner.

I would like to discuss the decision of the Sapporo district court in the Nibutani Dam decision, a case on the issue of water, and involving the Ainu people, which was concluded in March 1997. The Minister for Construction gave project authorization to a Fundamental Plan for the construction of the Nibutani Dam on the Saru river running through the Hidaka region of Hokkaido. When this occurred, the action was brought by 2 Ainu who owned the land that was to be used for this construction. The basin of this Saru river is also a region where many Ainu people live.

The text of this decision found that 'The state must (in the construction of the dam) give the utmost consideration to the distinct culture of the indigenous minority Ainu people … the state's project authorization is illegal'. In effective terms, the two plaintiff Ainu succeeded in having the following four assertions recognized: 1) The so-called *chashi*, archaelogical remains and buried cultural

assets of the Ainu people were destroyed 2) The *chipusanke* ceremony (the floating of newly built boats) could no longer be performed at its traditional location 3) fishing rights were lost because of the interception of salmon as they travel upstream, making it difficult to pass on the Ainu traditional way of life 4) Ainu culture was lost in the submersion of the spiritual grounds of the *chinomishir* (place of worship).

Despite the fact that this decision was the first judicial finding to recognize the Ainu as indigenous people, the Japanese government is still to recognize the Ainu as such. However, we intend to obtain this recognition in the near future by continuing to petition the Japanese government.

Participants in this World Water Forum, need, I believe, to work together, contributing their wisdom, to construct a philosophy that will allow us to live successfully in harmony with nature, including water, forever. I am sure there are those who give lectures on the issue 'What are the riches we will leave our children and grandchildren?' from a materialists perspective, that is from the scientific viewpoint. In my case, I am talking about things from the spiritualistic side, discussing the 'world view that cannot be measured'. But I think it may be necessary to consider both these ethical perspectives, and move the debate forward on both wheels.

The Ainu conception of nature is based upon the philosophy of recognizing the existence of a soul and spirit in each and every living creature on earth. In other words, when you hold the belief that 'Water lives and dies, and in that water there also lies a soul', I don't think you can ever feel that you are able to use or deal with water carelessly. The riches of these values in Ainu culture belong not only to the Ainu people, but are a wealth that should be shared by world humanity.

Finally, I would like to express my thanks the members of each of the bodies involved in this 'World Water Forum World Convention' for extending this invitation to the Ainu people, original occupants of the Japanese islands. I also express my thanks to those of you who have listened today to my rather clumsy speech. Thank you very much.

Water and Kooma People

Jim WHARTON
Kooma Traditional Owners,
Australia

Introduction

There are four main issues for us, the Kooma people regarding the management and allocation of water which reflect our concerns and interests. These four concerns are interrelated and interdependent upon one another. However to gain a greater understanding of these issues and their impact upon us and our lands, a separate analysis is of beneficial use. The four issues are:

1. Native Title issues;
2. Environmental issues;
3. Cultural issues;
4. Socio-economic issues.

Native Title issues

In 1984 a group of Murray Island Traditional Owners took the QLD Government to the High Court of Australia claiming, among other things, they has held Native Title rights and interests over their land.

In June 1992 the High Court of Australia handed down its decision in *Mabo v Queensland*. A majority of the High Court of Australia decided that the Murray Islanders were entitled as against the whole world to the possession, occupation, use an enjoyment of most of the land of the Murray Islands.

Importantly, in reaching this decision the High Court of Australia ruled that the common law of Australia recognises a form of Native Title to land. The High Court of Australia also rejected the concept that Australia was *terra nullius* or land belonging to no one at the time of European settlement (invasion). The Mabo decision was the first court case to recognise that indigenous Australians continue to hold Native Title rights and interests over land.

In 1993 and as a direct result of the Mabo case the Federal Labour Government introduces the Native Title Act. As stated by the Prime Minister, the reason for introducing the Native Title Act was to, among other things, 'to do justice to the Mabo decision in protecting Native Title rights and to ensure workable, certain, land management'.

The Kooma people have registered a Native Title claim over land and water under the Native Title Act. In this claim we are asserting our traditional right to exercise and enjoy our Native Title rights to land and water.

In 1998 the Federal Liberal Government introduced a number of major amendments to the native Title Act which, and as time has shown, these amendments have made it very difficult for Indigenous people to not only claim Native Title over land, but to continue to enjoy and exercise their traditional Native Title rights and interests over land and waters.

In 2002, the High Court of Australia handed down two cases that now make it very difficult for indigenous peoples to assert their Native Title rights over the land and water.

In the case off *Yorta Yorta v Victoria* a majority of the High Court of Australia rules, among other things, that for Native Title holders to claim Native Title to their land and waters they must provide evidence that there has been a continuing observation of laws and customs sine sovereignty. The majority of the court has placed a ridiculous and unjust high standard in proving Native Title claims. The High Court of Australia ruling waters down and almost diminishes the purpose of the Native Title Act, which is, in effect 'protecting Native Title rights'. Two judges who formed the minority judgement took a more sensible approach which is consistent with the purpose of the Native Title Act by ruling that continuing observance of traditional laws and customs, 'bears directly on question whether present day belief and practices can be said to constitute acknowledgement of traditional laws and observance of traditional customs'

In Ward v Western Australia the High Court of Australia again made rulings on, among other things, the principles of extinguishment of Native Title which places an unnecessarily high burden in proving Native Title cases. While the Mabo case gave Indigenous peoples some prospect of gaining legal recognition of their rights to land and waters, subsequent High Court cases have made rulings which are outside the spirit an purpose of the Native Title Act. While the Federal government has stated that it is important to protect Native Title the Courts in interpreting Native Title laws are diminishing what little legal rights we have.

What right remain will be further eaten away we believed by the introduction of these water allocation schemes. Up until now water allocations have been issued on a permit basis. These permits had certain rules and time frames attached to their usage. Effectively these allocations were generally a lease arrangement and as such depending on the conditions of the lease waters would be claimable under Native Title.

What is if major concern within the proposed water allocation schemes is that these 'lease arrangements' will be gifted to the lease holders as a free hold property right separate from the land tenure. This of course effectively extinguishes Native Title.

Environment issues

The Kooma have more than a vested interest in the protection and management of the environment as plants and animals both land and water are not only viewed by us as a source of food, but in many cases have 'totemic' significance. This significance encompasses internal social workings within and between groups, conservation and protection issues, cultural and religious issues and traditional law.

It is of importance to note that water plays a vital role in our well being. Surface waters have specific significance because of their strategic location on our traditional lands. Rain patterns that replenish our surface waters are used to mark our calendar as it also does with the animals and plants on out lands.

Under the proposed new management and water allocation process currently underway is the major underlining principle is to protect river health and aquatic habitats by identifying environmental flow needs.

Although we agree that environmental flows are critical in maintaining natural harmony. The main problem from our perspective is the differing definitions of what environment flow is, particularly from other stakeholders being consulted irrigators etc.

For us healthy environmental flows is not just the amount of water that passes through a water course but is linked to the surrounding health of land and how the land is used.

Some of our concerns we believe need to be seriously address included the following:

- Effects of altered flood flows and drainage patterns;
- Effects of regulation on river channels and on plants and animals;
- Barriers to fish movement and migration;
- Water transfers;
- Human impacts on river systems;
- Clearing of catchment and riparian vegetation;
- Loss of tree habitat around water ways and wildlife diversity;
- Changes in bank stability and siltation;
- Deterioration of water quality;
- Turbidity;
- Blue green algae;
- Toxic chemicals;
- Salinity.

Although the above concerns are acknowledged by various governmental agencies, what is becoming more apparent is that the water allocation consultation process advances is that water allocation plans are exactly that Water Allocations. Even if environmental flows are at a reasonably high percentage throughout river systems, the question still remains given that water becomes a private property right that technically makes the environment a consumer, so who pays?

Cultural issues

Kooma concerns focus on the identification of protection and access to places of significance to the Kooma peoples cultural heritage is of:

- Historical significance;
- Represents past and present activities;
- Are geographical aspects of the landscape which have spiritual or other forms of significance.

What we as a people have emphasised when considering the effects of proposals such as water allocation regimes that relate directly to cultural heritage issues, is that the social impacts are seriously considered.

- The Primary Impacts, which are the potential damage to artefacts or places or significance, or modifications to the cultural landscape;
- The Secondary Impacts, which are socio-cultural impacts of site damage and landscape modification, including effects on Kooma people's life styles and culture and the meaning that we as a people attach to these areas and places.

For the Kooma people it is critical that an improved consultation mechanism is put in place which allows for an informed decision making process which provides certainty to us as registered Native Title applicants to proposed activities in relation to water allocation regimes and the associated legislation.

The Kooma peoples are currently trying to liase with representatives from various governmental departments responsible for enforcing their respective legislation to allow for the establishment of

consultative mechanisms that fulfil registered Native Title applicants information requirement, and our need to make informed decisions in relation to water allocation regimes.

We believe this may necessitate the formation of a Kooma consultative committee. By using this approach of a serious consultative mechanism opposed to the hit and miss mechanism now in place. We believe this approach could lead towards Indigenous Land Use Agreements (ILUA's).

Primary Impacts

- Are activities under the water resource allocation plan likely to impact on places, sites or objects of cultural heritage significance.

Secondary Impacts

- As we claim the right to fish or take native flora and fauna as part of our traditional law and customs. The water allocation plans need to make provision for addressing the scope, nature and timing of these impacts in relation to the water allocation planning is timely.

From our perspective if any plan is likely to impact on our Native Title rights and Cultural Heritage interests there must be provision made within the water allocation plans for on going Kooma peoples involvement in the monitoring, management structures, regulations, reviews, in relation to both positive and negative impacts on our country.

We believe the adoption of meaningful, honest and transparent consultative mechanisms which will allow us to reintroduce, assert and carry out our cultural custodial rights and responsibilities of Thousands of years in relation to the care of the whole environment.

Socio-economic issues

Regarding social and economic interests and the effects of major policy/legislative developments on the Kooma people we are wanting to be more involved in the process of decision making that effect out socio-economic interests seeking to limit as mush as possible the negative impacts and enhancing the positive impacts that these water allocation plans may bring.

The Kooma people historically have either been excluded or marginalized form the economic benefits that such major policy/legislative bring to our traditional lands. And would prefer to be involved as active participants in the positive aspects of these changes, through employment, training opportunities and enterprise projects. These aspirations that we wish are very consistent with the recommendations 314 of the Royal Commission into Aboriginal Deaths in Custody.

Conclusion

The Kooma people believe that for water way systems on our lands to be manages effectively requires not only a catchment approach but for the relevant governmental agencies to be co-ordinated in their approach. It is readily apparent that there is a lack of clarity about the roles and responsibilities of agencies associated with the planning and development of water allocation reform and the processes that need to be followed.

It appears to us the main objective of water reform is the economic gain for a few being gifted free hold tenure of their existing water allocations in conjunction with a government wanting all the legislative control but none of the responsibility.

'Sanãmahi – Pãkhangba' A Living Relationship of the Meitei with Water

Debabrata Roy LAIFUNGBAM
Director of Health Development and Human Rights
Centre for Organization, Research and Education (CORE), India

'Nong-goubi! Nong-goubi!
Saari Kambong
Tuirel Leinaasé'

[Nong-goubi, Nong-goubi
Engrossed in house-keeping
Come let's form our water-way]

The ancient rhyme and folk-story reminds the Meitei of Manipur, India, of the 'rain-thirsty bird' (the crow-pheasant) – the totem bird of the Meitei Nation (Manipur) – who was too busy looking after her children to take part when all the animals, birds and people were working to maintain and clean the ancient waterways (*tuirel, khong, khongbaan*) and dykes (*torbaan*) system, that made human habitation and agriculture possible in the Manipur or Imphal valley – the ancestral lands of the Meitei, occupying a central water-shed in the Indo-Burma region. *Nong-Goubi*, as the story tells us, was punished and prohibited from using the water and she had to wait for the rains each year.

Water is not only an every day preoccupation of the Meitei-Water is a central element of the *Sanamahi Pakhangba* ancestral belief system that the Meitei have been practicing for millennia. The belief is based on ancestral worship with strong elements of animism.

Sanamahi and Pakhangba were brothers, ancestral deities of the Meitei. Together and individually, these two ancestors occupy the supreme positions in the Meitei pantheon along with *Ima Leimarel, Yumjao Lairembi*, *Panthoibi*, *Phouoibi*, *Emoinu* (*Chahong Ngahongbi*, the munificent and bountiful) and other female ancestors.

Pakhangba is revered by the Meitei because of his political and social significance, particularly to the development of the Meitei as a nation of several different tribes towards the end of the first millennium, according to the estimates made using the western calendar system. The first chiefs of the Meitei, called *Meidingu* were named Pakhangba (as a title).

The first Pakhangba, also known as *Nongda Lairen Pakhangba* (the Dragon or Serpent) is believed to take two forms, a divine and a human. The human form had significances in the political history of the Meitei nation, in the making of treaties and agreements, alliances between the many indigenous tribes of the region.

The divine form is significant to the spiritual life of the Meitei as an individual and as a society. Pakhangba in the divine form is a water serpent or a dragon. His element is water.

This is a very significant relationship – the core link between important ancestors who presided over political, social and religious matters, a spiritual leader and water. Let me make this a little clearer by giving a very brief overview of the contextual aspects of Meitei life, our lands and waters, our environment.

The Meitei nation was forged by alliances and treaties between more than nine different tribes, who still maintain their individual identity but in a subdued form - subsumed under the pan-Meitei nation.

The Meitei established its ancestral domain in the central region of what is Manipur today in a broad high valley that used to be entirely covered by lakes and wetlands (*paat*) and water channels or *tuirel*. The settlement of this valley involved a sophisticated hydraulic engineering that was informed by a deep understanding of the hydro-dynamics of the valley, which was extremely hostile to human habitation and cultivated food production.

This was achieved, largely, by the 7th and 8th centuries during the time of Taothingmang and Naothingkhong, the two brother chiefs, who together devised and engineered a large, infibrillating system of canals and dykes throughout the valley. Maintenance of this system required very careful and regular attention, which was achieved again through the spiritual and cultural institutions of the Meitei. These institutions are entrusted to the *Maibi,* the institution of Meitei shaman priestess that occupied a high political profile as well by advising the chiefs or temporal matters, development initiatives, domestic arrangements, and forecasting the fortunes of the collective and individuals.

The *Maibi Loisang*, institution of the Maibi, is the repository and vehicle through which the Meitei cultural, spiritual and social including traditional knowledge is transmitted from generation to generation. This is done through many ways but the most important way is through the prolonged annual ritual worship called the *Lai Haraoba* or the Happiness of the Ancestors.

During the *Lai Haraoba,* different clan and tribal ancestral called *Umang Lai* or forest deities are worshipped through complex and strictly ritualized ceremonies and devotional acts. The community participates as a whole but women, men, youths and children also participate as segregated groups. It is through those segregated groups that partake in the *Lai Haraoba* that the *Maibi* impart traditional cultural and technological knowledge.

The deities are always derived from and return to the waters, channels and wetlands at the beginning and end of each *Lai Haraoba*. The spirit of our ancestors is in communication through the vehicle of water and rivers. This is one of the core elements of the Sanamahi Pakhangba worship among the Meitei.

In every household, a place is kept sacrosanct and special for *Sanamahi*, the revered brother of *Pakhangba*. An earthen pot filled to the brim with water from the rivers or canals are always kept in these *Sanamahi kaa-chin* or corner of every home.

Another element is the maintenance of water biodiversity and prosperity through worship. The indigenous *ngamu,* a small fish, is held very significant to the Meitei. The *ngamu* is a fish that is very sensitive to unclean water and cannot survive in polluted waters. Every year, the Meitei perform a ritual called *Ngamu üssin sin-ba* – the replacement of the *Ngamu,* when fingerlings are released in every water body to bring prosperity to the people.

These are just a few illustrative examples of the Meitei's spiritual relationship with water, a relationship that is in essence a cultural system of water management, maintenance, purification and constant affirmation of water as a core element of Meitei life.

The growing distancing from, neglect and erosion of these daily and annual cyclical practices of the spiritual and cultural basis of Meitei and water relationship has threatened our society and environment, and led to critical crises we face today.

Indigenous worldview and spirituality

Tom GOLDTOOTH

Indigenous Environmental Network,
Dine', USA

(Greeting in Dakota)

My traditional tribal name is *Mato Awayankapi*, meaning, *'The Bears Look Over Me'*. I come from a land that we say is shaped like a turtle, lying in an island of water. This giant turtle is called Turtle Island. It is known by the colonialist of North America as the United States of America, Canada and Mexico. But, to our Indigenous peoples it is called Turtle Island. I come from an area of the Great Lakes in the U.S. where the lakes and the forest woodlands end, before entering the vast prairie lands. So, with our tribal people we understand what water is. In our identification of who we are in our tribe, we are called, *'Mdewakantonwan'*. Translated into English, *'bde'* means lake, *'wakan'* is hard to explain, but it means mysterious, sacred and holy and *'tonwan'* means the dwelling place or village.

We are the dwellers of the sacred lakes. We have always been in the place of the eastern doorway of the Turtle Island known as the *Mdewakanton Dakota* nation, sometimes known as 'Sioux' Nation. My mother is from a different tribal nation called 'Dineh', or the Navajo. So, I have tobacco of the Dakota tribe in my right hand and, the sacred corn pollen of the Dineh in my left hand.

The Dineh believe we are the five fingers clan people. Everyone of you are the five finger clan of the human race. We have something unique as human beings. We use these five fingers that separate us from all other forms of life. That is because we use the thumb. In addition to this use of thumb, we have been given creativity of thought, to be able to use our minds, to be able to use this mind to protect our families our children and elders, to be able to think about our future generations. God, the sacred spirit or Earth Maker, which is holy, has given us this use of the thumb and this use of mind which is balanced with the use of the heart.

We would not be standing here today if we did not have a global civil society pushing the policy makers of the world to balance the mind, the creativity, the heart and a use of the thumb to understand the spirituality of water. That water is sacred. This is what I would like to talk very briefly about.

The topic for my discussion is spirituality. I can talk about politics of water, water resource management, traditional knowledge about water and also modern sciences with different models of how we achieve water quality. But I am going to limit my talk about spirituality and water, from an Indigenous perspective. Talking about spirituality of water is very important because my elders have told me when you go out and talk, you have to talk to people to teach them about things they may have already known about somewhere in their genetic memory or it is new information that teaches them on what their relationship to the sacredness of our Mother Earth. Somewhere in the modern society, we have become industrialized, we have lost these original teachings that have allowed us to live in a harmonious sustainable relationship with the planet and also to live in a sustainable relationships to ourselves, with our family and our women.

When we say in our tribal language the word, *'Ina Maka*', we are talking about our Mother Earth, which defines our cosmic relationship to the female creative principle. As part of industrialized thinking and globalization we lost the respect we had for this female creative principle. Part of the element of this Mother Earth is water. The other three elements are the dirt or soil, the fire and the air. All these four items have to work together. When it is impacted, it affects all the other elements.

Many of you came from regions of the world where you have your own earth based spirituality and religions with your own teachings and prophecies. Many of our tribal prophesies have said, 'sometimes in the future, we will be in a situation where we may have no water, we may have no air and when that comes about, our fire may go out'. We are near that point in time. We are in a compounding environmental crisis. That is why we need to come back to rethinking what our relationship is to the sacredness of our mother earth – this planet. Part of this rethinking requires us to be more humanitarian to each other and to recognize the principles of human rights. World policy leaders to take into consideration many of the Indigenous peoples views that we are talking about today in these presentations within the Water and Cultural Diversity Theme of the World Water Forum. As Indigenous peoples, we represent 80% of the cultural diversity and we live in near 90% of the rich biodiversity regions of this planet. Our Indigenous peoples life styles and futures are threatened. But when I stand here, I am not just talking about the Indigenous peoples of my tribe or the Indigenous peoples in the world, but I am talking about all of you, all of us as humans. We are all in the same canoe in the river of life. But we are paddling differently with different paddles, trying to stay afloat, addressing these issues differently towards protecting our waters of the world.

Traditional knowledge of our Indigenous peoples teaches us about the sacredness of our land, which is our body; the values of our culture, which is the soul of our people; and the importance of water, which is the blood of our people. When I am talking about the creation and the creative principles, I am talking also about our genesis as Indigenous peoples, of where we come from. We have our own indigenous sciences and creation stories. We understand that over billions of years ago, this land was a rock, there was a mist before that in the universe, like a disk floating out there in the universe and how light come and later how fire came. We have our own Indigenous knowledge that guide us. This knowledge tells us that long ago, this rock with volcanic eruptions caused vapor and condensation and the formation of clouds and from that, rain, snow and ice to fill the land with water. Oceans and lakes were formed. This process created a delicate cycle that continues today. But human actions in how: unsustainable forms of development from industrialization, colonization and economic globalization is causing disruption in this delicate balance of nature.

That is why we support a global civil society to step forward to take responsibility to take action with the formation of international mechanisms to hold our governmental leaders and corporations accountable when it comes to better water management and access to water resources. We must not have a society where the bottom line is money. So somewhere in the direction we take, we must set ourselves aside from the predator society that preys upon the privatization or ownership of our water, animals and peoples that are sacred. We must somehow learn something from our Indigenous peoples. Our Indigenous peoples are very few in numbers but strong in spirit. We recently gathered in Johannesburg, South Africa at the World Summit on Sustainable Development, where water was discussed. Some of the peoples are here. At the WSSD, the Indigenous peoples developed our own implementation plan and political statement. There are three principles in our plan of implementation based upon the recognition of the importance of our cosmo vision and spirituality. One, we said we must direct our energy and organizational strength to consolidate our collective values and principles. It is from this strength, which springs from the interrelationship of different forms of life in nature.

Therein lies the origin, which secondly, we reaffirm by practicing our culture and spirituality. Thirdly, as Indigenous peoples, we must be allowed to practice our languages. It is through our language that we are connected to water, land and to the environment. If the environment, land and water are threatened, so is our language, so it is our right as Indigenous peoples to be able to practice our heritage and culture, which is a human right. Of course, land and water rights and access to our traditional territories is part of the issues that we, as Indigenous peoples are all dealing with.

Something is happening to the quality of water and the availability of water that threatens our

existence as Indigenous peoples. Natural resource development, technology and extraction industries have devastated watersheds and contaminated or depleted groundwater and surface water resources within Indigenous territories. Right now, many of our Indigenous peoples throughout the world do not have self-determination or collective rights as 'peoples' to have a voice in these governmental decisions that impact our access to and management of water. Many countries limit or completely deny the self-determination of Indigenous peoples to have a voice in these matters. In some countries, Indigenous men and women cannot stand up and say 'I have a right to say something' without suffering repercussions. As Indigenous peoples, very few of us are here, which was said yesterday. But, we are standing here in strength.

These are the few things I wanted to say to stimulate thinking and debate on this topic of water and spirituality. Indigenous peoples, globally, do have answers to share with governments and water managers concerning the protection of water. We do have traditional knowledge to share within true partnership arrangements based upon, consultation and respect. Lots of our knowledgeable people are out there yet they do not travel to these events like this. They stay connected to the land, taking care of the fire at home. I would like to recognize the Ainu people, who are the Indigenous peoples here in Japan. They have been struggling long to keep alive their language, culture and teachings that they have been given. In similar ways, in the U.S., we struggle to retain our language and knowledge, while residing in the belly of the beast of the U.S. In conclusion, I am going to sing a song that takes me back home – that connects the mind – the heart – the land and the father sky. Without the mother land and the father sky, we could not have creation.

Song

When we sing out like I just did, my elders told me its like a fishing person casting out the line thrown to that far away place that is holy and sacred. I am told that when that line is caught, they, the sacred spirits, will sing back to you. That is the meaning of the song. We must all have love and respect and to have compassion for each other and for the sacredness of our Earth and the water that is the giver of life. We have to do something. We have no choice. We are going to be in a situation of war soon, that will effect the water, the environment and the life of people everywhere.. These things are very important to think about. We have to do something together as people to come together.

Thank you very much.

Indigenous Worldview and Spirituality – A Zuni vision –

Jim ENOTE

Indigenous Communities Mapping Initiative
Zuni, USA

Keshi. My name is Jim Enote, 'Enote' is a word that means 'a long time ago'. I am of the Corn clan; my mother is of a corn clan, which makes me of a corn clan, too. I am from Zuni, New Mexico. It is a place of high plateaus, high desert country with big steep red sandstone cliffs and broad valleys. So it is a very womb-like kind of place. My people came from an underworld, from the underworld we came to the surface around the area many people call the Grand Canyon in the state of Arizona. We came out from there and we began to look for our middle place, our center of the universe. We journeyed for a long time, many years and we stopped here and there along the way. At this high altitude and dry environment the only way you could travel is to go from spring to spring. We could only go to one spring, rest and then go on to the next one. You cannot go across the land in our part of the world so easily. You have to go from one place of water to another place of water. So our history, our genesis story is a story of how we found the middle place and it is the place of good spring water and a place with good soil for farming – we are farming people; our place is a good place for life. For us, when we pass-on, when we die, we go to a place called '*kothluwala*', our Zuni heaven, a place of water. So for us, heaven is full of water.

Our songs, our prayers and our art: ceramics, tapestries, drawings, rock-art, all refer to water: dragon flies, frogs, water snakes… All these elements from water are in Zuni art. In addition to working on a project called the Indigenous Communities Mapping Initiative I am also an artist, an artist and a farmer. As high altitude desert farmers Zuni people must remember places of water and we must know places of water very well. We have always had ways to know where water is. Our maps describe where the water is. These maps are in our language and are included in our art and ceremonies. But in the last 500 years, our water and our territories have been remapped. New European style maps have reinforced the dispossession of Indigenous peoples' lands: our lands, our cultural properties, and especially in my area … our water.

Outside interests have made maps that limit information about our communities or create boundaries that tremendously limit our communities' access to water. Today however, many indigenous communities are exploring alternative ways of using new mapping technologies or older traditional technologies to make sophisticated maps for the management and protection of our water resources. These maps also serve to protect related sites such as springs, lakes, and rivers. The documentation and communication of this information is crucial to gain recognition of Indigenous communities rights to their traditional resource base. Developing maps that communicates this relationship effectively and persuasively requires creative ways of graphically representing water knowledge. We have vital natural and spiritual resources and often our elders keep this knowledge. By interviewing and working with our elders we can document this knowledge and work with them to make hand drawn maps that can later be included in protected water and cultural site databases. But mapping is the tip of iceberg. The process of gathering water information appropriately is of vital importance.

In recent years, the term 'community based' became a slogan for a wide variety of projects. Community involvement in these projects are sometimes limited and are sometimes about hiring local people to work on projects developed by non-indigenous governments or non-indigenous

NGOs. The other end of this is full community control over the initiation, design and implementation of the projects. Supporting the capabilities of Indigenous communities to map water and other resources under our own terms and within our own means is a powerful step towards creating enabling environments for Indigenous peoples.

It is one thing to think maps are useful for protecting water resources. It is another to consider who owns the maps. Who actually allows maps to be made and who may view the maps if sensitive cultural information is displayed on the maps? Communicating information about places and water, it can be told as a story, it can be told in many different ways.

I wrote something this morning. I would like to ask my friend, Jeannette Armstrong to read this for me. Jeannette is much better at reading poetry than I am. I like to read it and write it. I write many poems but I am not so good at reading them as spoken words...

After The Sandstorms

After the dry season bugs have eaten my ears
After the heat
After the sandstorms
and dry cracked lips
clouds slow down …. rain comes again

With the essence of all spirits
and earth smells
with cool wind
and mist
on dry stones
on my face

Bringing in wood
I wipe my feet before going in
In and out of grandma's house

Chopping wet wood
Kneel down to pick-up the pieces
then load the wheelbarrow ... perfectly

East
the new night
West
the last colors of day

After the rain
Sky is reflecting
in infinite pools … to the horizon

Jim Enote, Kyoto, 2003

Elahkwa … Thank you.

A story from Cook Islands – Water and Spirituality –

Te Tika Mataiapo – Dorice Reid **Ok???**
President, Koutu-Nui of the Cook Islands

Chant ...

This ancient Cook Islands chant is about the many different way water flows. Like the flow of many words that will be spoken at this forum, they are words of enlightenment. The chant acknowledges the Creator Io from whom life itself flows.

I honor our generous and gracious hosts, the people of this sacred land of Japan and the spirits of your ancestors. I honor all those present here at this 3rd World Water Forum and acknowledge the organization who made it possible for our High Priest Tangaora Kainuku and myself to be present.

I bring to this Forum the warm greetings of 'Kia Orana' which means 'may you have life' from our people of the Paradise Islands of the Cook Islands. We are probably one of the smallest nations at this forum and are deeply grateful to the organizers for this opportunity to be heard. I thank all previous speakers for their words of wisdom. As a small nation, our water resources are limited and precious. Our life depends on water.

On the other hand, we are surrounded by a vast expanse of sea space (just over two million square meter). Our entire EEZ (Exclusive economic zone) has been declared a whale sanctuary. This status by announced by our Prime Minister, the Honorable Dr. Robert Wontton at the World Summit on Sustainable Development in South Africa last year.

We are voyagers! We are people of the ocean. Te-Moana-Nui-A-Kiva, the Great Pacific Ocean. Our ancestors sailed the ocean guided by the galaxy, which they studies as science. They were also guided by the winds and the rhythm of the sea. They knew the many phases of the moon. They knew this earth was round ! We are told that early western explorers were afraid that their ships would fall of the edge of the earth, because they thought it was flat !

Our indigenous practices are based on three pillars: Sacredness, Respect and Spirituality. Each pillar is connected to the other. It is my firm belief that all of the world's indigenous practices are similarly connected, for we are all keepers of creation, which we regard as sacred.

I would like to share with you briefly my story o spiritually as a result of participating in traditional ocean voyaging. In March 1995 a crew of 24 sailed on the maiden voyage of 'Te Au O Tonga' which means 'te mist of the south.' We sailed this 72-foot traditional double-hull voyaging canoe using traditional navigation. We were invited by the Polynesian Voyaging Society of Hawaii to firstly meet at Taputapuatea, in Raiatea, Tahiti, then Nukuhiva in the Marquesas, and then on to Hawaii.

The High Priest of Taputauatea in Tahiti, told us that before we sighted land we would see the Taveke, the tropic bird with sacred red pin feathers. We would also see a whale. (This was March. Not the whale season!) When we would reach the entrance to the sacred harbour of Te-Ava-Moa, we would see dolphins, the guardians of the sacred harbour. The harbour entrance is directly in

front of the sacred marae, Taputapuattea (the sacred gathering place of early Polynesi Voyagers). If the dolphins were not there, it meant that we did not have permission to enter the sacred harbour.

Not only did we see the tropic birds which circled our canoe to welcome us, the whole showed isled, waved its tale, then disappeared. The dolphins were waiting for us at the harbour entrance! Sitting perfectly arched over the harbour was a rainbow. Mist gathered on the shore to greet us. Our canoe has been named'The Mist of the South!'

This was a spiritual voyage. I tell this brief story of personal experience to reinforce, to reaffirm and to validate traditional knowledge. Traditional Science. To validate the BRILLANCE of our ancestors.

We do not really know that still lies in the ocean bed following the nuclear testing in Mururoa, Tahiti. Our canoe, 'Te Au O Tonga' also sailed to Tahiti to protest nuclear testing in 1995 with others from around the world.

From the Sahara Desert, across the world, to the islands of the Pacific, the Indigenous Peoples are joining hands to restore the integrity of water.

Let us join hands in making a call for:

1. A halt to the pollution of our rivers and the sea,
2. The control of our waters to the Indigenous peoples,
3. Call attention to Climate Change, which could result in the flooding over and total disappearance of some of our Islands in the Pacific.

Our songs and dances are of the water and the sea. The lives of the people in the Pacific Islands are intricately woven and connected to the water and to the sea. The rhythm of our lives depends on the rhythm of the sea.

Finally, I quote and ancient Cook Islands Proverb:

'Aere Marie E Taku Potiki Kia Kite Koe I Nga Ina Potea'

'Go slowly my child, so that you will see the many phases of the moon'

Traditional water management among the Kankanaey of Besao, Mountain Province, Philippines

Eleanor P. DICTAAN-BANG-OA

Tebtebba Foundation, Inc.
Kankanaey-Igorot, Philippines

Good morning everyone. I am a Kankaney Igorot from the Cordillera region in northern Philippines. I am privileged to share with you this morning the water management practices in Besao, Mountain Province. It is a system deeply founded on the respect for life which has greatly contributed to the preservation and maintenance of the rich natural resources in the Cordillera region – one of the remaining watersheds and biodiversity areas in the Philippines.

Traditional regard and ownership regimes

Our local notions of water in Besao reflect a high regard for water as life itself that needs sustenance in order to perpetuate itself and man. Such notion is embodied in the belief on the '*nakinbaey*' or supernatural beings or spirits dwelling in water sources and other elements of nature. Water, among the Besao people is believed to be produced by the 'nakinbaey'. To ensure water supply, therefore, the 'nakinbaey' has to stay. Keeping the nakinbaey from leaving requires people to consciously respect the water by observing culturally prescribed behavior.

These culturally prescribed behavior are all part of our '*inayan*' and '*lawa*' concept that governs our day-to-day behavior and relations. The inayan and lawa are the embodiment of our custom law. As collective defined in the Besao Ancestral Domain Management Plan (2000):

> Our customary laws are embodied in the inayan or lawa which discourages any act that causes harm to anybody or anything and forbids the violation of norms.It appeals to one's conscience to judge the rightness or wrongness of what he/she does or plans to do and cautions the person through some form of 'punishment' to be carried out by Kabunian (god) for wrongdoings. It is a simple command of 'don't' that is replete with values like respect for other people and nature, justice, morality, harmony, sharing resources and helping one another among others…

Displeasing the nakinbaey results to its abandoning the area.

If it does not leave the area, the nakinbaey is believed to lessen its water production or cause stomach trouble among the users. Water from most sources have reportedly been decreasing. Old folk attribute these to the non-practice of the legleg for about 60 years now. Traditionally, the performance of the legleg is believed to ensure continuous production or generation of water. The legleg is a cleansing and propitiating ritual to appease and please the nakinbaey.

Ownership

'Maid kenkuas nan danum. Kuan am-in ay ipugaw nan danum…' (Galeled Anosan, Besao elder, 2003). Nobody owns water. Water belongs to all …

Water resources are considered as a shared resource that cannot be privatized through the contemporary water rights instruments. While ownership is communal, priority rights to water systems are vested on the community or farmers, who first tapped the said system for their use. Natural rights are also claimed by the community where the water naturally flows. No one is allowed to divert water from its natural course nor from existing irrigation systems without consent from the community/ies depending on it. With agriculture as the backbone of life in Besao and rice as a staple food, water is no less regarded as land.

In cases where water sources are found within traditionally held private lands, the landowner has all his rights to the land but not to the water. He can only have priority use of the water and cannot divert or stop the flow of the water at his own discretion

Rights to access and use of water for irrigation come with the right to land. The transfer of water rights follows the transfer of land ownership through sale, barter or inheritance.

Water management systems

'Nan ikak-an isnan danum, ay waay initdon di Kabunyan isnan ipugao id idi…' (Galeled Anosan, Besao elder, 2003.) What we do with water may have been taught by the Gods to the people of old…

Based on the Besao municipal data, there is a total of 51 potable water sources (MHO, 1992) in Besao and 88 irrigation systems. Most of these potable water sources are springs and creeks while rivers are the main source of irrigation water.

Domestic water supply

All barangays in Besao have their designated water sources for domestic purposes. Based on year 2000 municipal data, seventy three percent (73%) of the total population have access to domestic water through water works systems that are user-managed. Each community is obliged to maintain and manage its water sources by occasional cleaning and rehabilitation of the installed pipes or tanks when needed. Aside from these, each community should guard its water sources from pollution, forest fire and denudation. Most of the water sources are found in the mountains outside the settlement areas. Community initiatives to sustain water supply involves fencing of the water sources, supporting natural forest regeneration and voluntary reforestation.

Irrigation

To illustrate prevailing traditional water management system in the agricultural setting, let us take a look at Kapusean in Suquib. Kapusean is a traditional irrigation water source, which is presently serving 12 has of rice-fields belonging to 219 farm owners. It's downflow is divided into two irrigation systems called the Kapusean East and Kapusean West. Kapusean East serves some 5.50 hectares of rice-fields owned by 99 farmers. The latter serves 9.50 hectares of rice-fields owned by 120 farmers.

Based on use, Kapusean is 'owned' by all the farmer-irrigators along the downflow of the spring. These farmer-irrigators using a common water source are grouped as the 'dumapat'. These dumapats are informal organizations that are particularly concerned about the equitable access to and distribution of water. There is no designated head for each dumapat but leadership is usually attributed to the knowledgeable elders and or those who are articulate.

Membership and responsibilities

Membership is based on ownership of land that is originally included for irrigation during the establishment of the irrigation canals and along the down flow of the irrigation. Thus, present-day farmer-irrigators trace their families' membership to the dumapat from three to four generations back.

All matters about irrigation water are taken at the dumapat level from the establishment of irrigation canals, day to day maintenance to conflict resolution. A major obligation among the water users and irrigators is the annual performance of the '*legleg*.' This is a propitiating ritual meant to give thanks, and at the same time invoke the mercy of the nakinbaey for continuous supply of water.

The depletion of water supply during the summer season prompts the dumapat to watch over the equitable distribution of water to the fields through the 'banbanes (taking turns) system' where each dumapat has a scheduled time in which she/he can water his/her fields.

In taking turns, the dumapats have the right to stop the water flow in order to water their fields only within the specified time allotted to them. This is done by creating temporary mud walls that cut across the canal/s or temporarily removing installed troughs that supply water to other areas /dumapats. During these periods of watering, members of each dumapat are expected to wait and watch for their turn. These processes are locally referred to as 'mananum' literally meaning 'to water'. Once a turn is missed, one has to wait for the next cycle. Sleeping during the watch especially before one's turn and missing one's turn is usually regarded as being slow and irresponsible. Time allocation for watering fields is strictly observed. Whether or not fields are fully watered during one's turn the water has to be given to the next farmer in line when it is due.

To minimize risk or crop lose due to water scarcity, farmers plant less during the dry season based on the estimated capacity of available water.

Maintaining the watershed/forest

A big responsibility in water management is the maintenance of the forest cover and the manner by which we use and sustain our forestlands. We have a tradition of selective lumbering and practice conscious effort to regenerate forest resources through the preservation of the pagpag and the batangan. These are inculcated among our children in their day-to-day activities.

The Batangan

The batangan is the dominant pine forest in the municipality covering an approximate total of 8,484 hectares. This makes up 45.52% of the total municipal land area. Timber and fuel wood are primarily sourced from the batangan. Grazing areas maybe found in wooded lots and open grasslands.

The batangan are privately owned woodlots. All clan members have equal rights to the timber resources based on rules that may vary from clan to clan depending on the availability of resources. Ideally, a member is allowed to cut about 3–4 trees at a time for personal and immediate use only. After cutting, a member is expected to plant trees in place of those he cut. This same member can only be allowed to access timber from the batangan after about 25 years when the next generation of trees are expected to have matured.

Mossy Forest (Pagpag)

The mossy forest remains a public domain used primarily as hunting grounds. Food supplements like honey, medicinal herbs, and raw materials for basket weaving and wooden utensils/implements

may be gathered from the mossy forest. The mossy forest covers some 4,379 hectares mostly in the higher and steeper slopes of the distant mountains. Most of these remains free from agricultural expansion but the municipality reports decreasing biodiversity due to unregulated hunting activities. Scattered within the forests are cultural sites i.e ritual grounds, sacred sites and those places believed as the dwelling places of supernatural beings.

Thus, we have here a system of preservation, protection and maintenace of water , land, natural resources and environmental health that is a product of a traditional worldview that man is the steward of the land given by *'Kabunian'* (God). As stewards, one is obliged to nurture the land and resources in respect of the Kabunian who is the ultimate owner. This feeds into our deference for living things and those that support life like water. The morality engrained in the 'inayan' and 'lawa' provides a strong check and balance mechanism based on respect for one's self and others.

Emerging trends and issues

While these traditional management practices has prevailed, the community of Besao today is challenged by the following emerging issues and trends.

1. *Depletion of water supply*

   Based on municipal data, Besao has an average potable water deficit of 50,484 liters per day during the dry season and 3,000 liters per day during the wet season. The following have been identified as the contributory factors:

   a. The non-propitiation of the nakinbaey through the legleg – Old folks in Besao attribute the progressive depletion of water supply to peevish nakinbaey due to the non-propitiation of the water sources for about 60 years now. In recognition of positive traditional practices and values, however, there is an increasing community support in the revival of the legleg as may be reflected in the proposed ancestral domain management plan.

   b. Forest denudation due to forest fires and unregulated logging:
   Peoples initiative to arrest the issue include the banning the transport of timber outside the municipality, prohibition of burning mountain sides and imposing fines to violators. Interbarangay policies have also been crafted so that each barangay has its own area of responsibility in terms of fire prevention and indiscriminate logging. One barangay is accountable to the other if proven that the forest fire was started from its side or territory. This is a strengthening of the 'mendepdep' (putting off fires) or the traditional voluntary effort among community members to be vigilant about forest fires especially when properties a like granaries, timber, fruit trees and animal fences and houses where time, effort and resources have been expended are involved.

   c. Another emerging factor and issue in progressive water scarcity is the extension of commercial vegetable production as a promising source of cash income. Commercial vegetable production has extended the use of agricultural lands, therefore the intensifying the demand for water. Other high yielding crop varieties have also been introduced in the area as promising cash crops.

   d. Inadequate and inefficient infrastructure support refers to the lack of water reservoirs and comprehensive distribution system resulting to inequitable supply especially of domestic water.

2. *Overlapping claims*

   The people of Besao, like most indigenous peoples' in the whole country are denied their right to fully own and manage their ancestral lands under the Regalian. Aside from this, the whole Cordillera region has been declared as a forest reserve since 1975.

At the local levels, there are disparities in the territorial definitions of local governments and the traditionally defined and managed areas by the people. With the implementation of the Indigenous Peoples Rights Act (RA 8371) of 1997, these conflicts have become very pronounced. Besao's ownership of the Buasao and the Banao water sources which it claims to be within its traditional territory based on the traditionally managed areas and natural water flow is being contested by the Sagada municipality in the latter's effort to delineate its ancestral lands.

3. *Proposed Tourism, Logging and Mining Development*, which threatens our waters, our lands and our culture and our lives have been identified in the proposed municipal level as 'alternative development strategies'. This plan presents competition for water and other resources. Without peoples' conscious and vigilant participation in the development processes, their rights may be usurped. The community's free and prior informed consent should therefore be sought before any development initiatives are undertaken.

Recommendations

In order therefore to further protect and sustain our waters from which other people and other forms of life equally depend on, we recommend the following :

For indigenous peoples

Among us indigenous peoples, let us strengthen our organizations and networks from the local to the international levels to:

1. Defend our waters, lands and resources from encroachment and the usurpation of our rights to determine our own development;
2. Actively promote an indigenous perspective on water and water development;
3. Create or strengthen existing indigenous peoples' global networks to act as a watchdog to our water resources and concerns;
4. Build on our skills and capacities to document our territories, practices and values in aid of a more intensified educational campaign in pursuit of our rights to own, manage and control our water and land resources. In this regard, we should establish our data base of indigenous peoples status/situation in relation to the management, appropriate and traditional technologies, rights and access to our water resources;
5. Develop our traditional institutions and skills to negotiate and pursue our access rights to our water sources and its development based on our perspectives.

National level

In order therefore for the remaining watersheds and natural resource areas to be sustained in the light of securing food production, contributing to curbing the progressive climate change phenomenon and furthering its commitment to upholding human rights, the government of the Republic of the Philippines and its agencies should:

1. Fully recognize indigenous peoples right to self-determination and their inherent right to their ancestral lands by strengthening the IPRA and having the political will to fully implement it;

2. Institutionalize the recognition and strengthening of traditional water ownership/rights and management systems and the local initiatives for sustainable development of water and other resources;
3. Provide appropriate support services towards sustainable economic activities that do not contribute to water depletion, pollution and extraction;
4. Development interventions should build on the capacities of indigenous peoples towards participative planning and governance.

International level

At the international level, we call for governments, financial agencies, donor communities, the media, the academe and civil society organizations to:

1. Treat the water agenda not merely as a stakeholders' concern. Water as the basic element to life should be taken under the rubric of human rights. In this regard, the United Nations should adopt the Draft Universal Declaration on the Rights of Indigenous Peoples;
2. Recognize indigenous peoples' right to own and manage their ancestral/traditional lands/territories including all resources therein;
3. Support the strengthening of indigenous peoples' organizations and networks to define and promote an indigenous perspective on water and sustainable water development;
4. Promote indigenous peoples capacities to sustainably manage their own territories through research and documentation of effective practices and technologies;
5. Build capacities of indigenous peoples to do research and document their experiences and duplicate their good practices with regards water;
6. Develop economic programs, activities, alternative technologies that promotes water sustainability;
7. Stop trade and privatization of water. Instead develop equitable and efficient water supply and distribution system and services without prejudice to the prior rights of the landowners on which the resource is found;
8. States, banks, finance agencies and donor communities should institutionalize water sustainability by refraining from funding water extractive and polluting development initiatives. In line with this a participative review of existing development initiatives that is affecting water quality and quantity i.e mining, tourism and commercial agriculture should be undertaken towards the creation of a more sustainable development directions/reforms. Governments, private corporations and any other entity responsible for the destruction or pollution of water and its sources should be held accountable.

SALAMAT! GAWIS AY AGEW TAKO AM-IN!

(Thank you and good day to all of us!)

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Session 5: Community Life and Water Management

The 'Shikoku 88 Watersides' Blue Island Shikoku,

so as to Reveal the Attractiveness of Shikoku Island by the Hidden or Overlooked Watersides

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Japan

Logo of the Mizube in Shikoku 88

Summary

The initiative of the 'Shikoku 88 Watersides' has been challenging and unique to revitalize local societies and economies by focusing on rediscovery and revealing hidden attractiveness of Shikoku watersides. In the initiative in Shikoku, the general public's positive participation was remarkable. The 'Shikoku 88 Watersides' were selected from applications of the public, and the eyes of the people living there were so excellent that those places included not only already famous places but also hidden but greatly attractive places where is almost forgotten. And these are appointed to the 'Shikoku 88 Watersides' as the places where reminds us of tender and warm feelings. To make this initiative a great success further more, the collaboration of industry, government, academia, and the general public is indispensable also in future.

Keywords

The 'Shikoku 88 Watersides', collaboration, revitalizing, rediscovery, attractiveness.

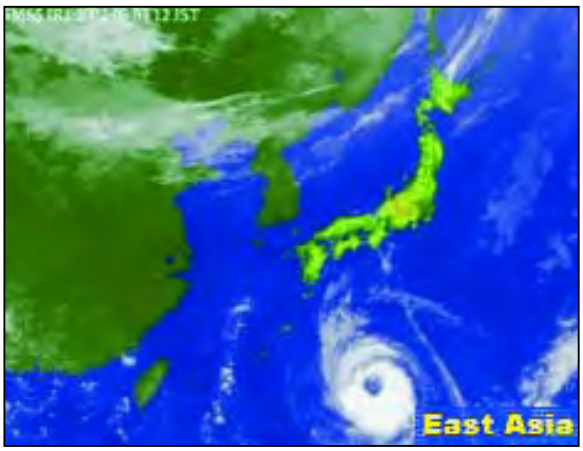
1. Introduction

Our globe is covered with blue water and the rate is more than 70 % of its surface area. Every body knows that it is the reason why we call our globe 'Aqua-Planet'. All of the creatures on the globe have their own history that their sources of lives had been bred in the sea, and they reached lands later on, and then they have survived until today as developing their life power individually. Indeed, 'water' can be described as a mother of all the creatures on the earth.

Human beings have been closely associated with water in many forms such as cultivation, fishery industry, water transportation, flood, and high tide through their living. Rivers and seas have been respected and revered as a source of life or a symbol of god, and rivers and seas have their each history, culture and climate specific to each region that collaboration of humans and water has created.

On the other hand, the same things can be said regarding Japan. Japanese have experienced concentration of population into urban areas, progress of social economic activities, and economic improvement of national living standard through period of high economic growth, while humans' spiritual richness such as cultures and climates specific to each region, human nature, modesty, kindness, thoughtfulness to others, and healings has been being lost. At the same time, various social problems have come to the fore, for example the decrease of the populations of local communicties, sluggish economy of local areas and so on.

2. Japan in the World



The Japanese archipelago is surrounded by the Pacific Ocean, the East China Sea, the Sea of Okhotsk, and the Sea of Japan, and consists of four islands, which widely stretch north and south. Its land area rate compared to the whole land area of the world is just 3%, while the number of people living on this archipelago is as much as 2% of the world population. Moreover, since the most of this country's land area is covered by mountains, its nation is forced to lead their daily lives on low level and small areas by the rivers or along the sea coasts. However, the history of the people's living has also been the history of battle with damages of floods or droughts, since it has built on the sharply inclined and brittle land. Thus, the Japanese is a nation which has always been associated with water.

3. The Shikoku Island in Japan

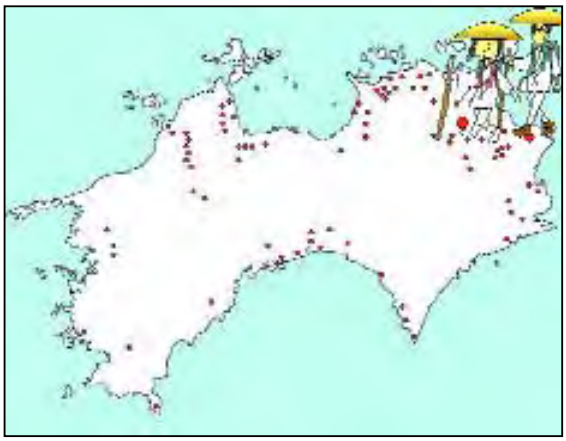
Shikoku Island can be described as an island that has all the features of the entire Japanese archipelago. The Shikoku Island has 5% of the whole Japanese land area, and its population living on the island is 3% of whole Japanese population. The size of population is relatively small, but as its landform has Shikoku Mountains stretching east and west along the center line of the island, and there are many sharply inclined terrains and lands composed of brittle soil, and high risk areas of sediment disaster are dispersed here and there on the island. So people forced to move on to small areas by rivers or along the sea coast, and they are leading their daily lives with close associations with water. As this island is on the regular track of typhoon, damages by floods have been reported almost every year. On the contrary, since the side of the Seto Inland Sea has the least precipitation in Japan, this region is threatened by chronic drought damage. As for the natural environment of Shikoku region, the island is surrounded by the Seto Inland Sea, which has genial climate and quietly embraces small beautiful islands, and the Pacific Ocean, which has dynamic and magnificent landscape and stretching out to rich fisheries. It also has the River Shimanto, which is famous as the last clear stream, and the River Yoshino, which has great and stunning scenery that can be proud widely in

Japan. The River Yoshino is counted as the one of the 'Japanese great three rivers' and known with its name of Shikoku Saburoh as well as the River Tone known as Bandoh Taroh and the River Chikugo known as Chikushi Jiroh. The Shikoku Island which environment exists in the strong relationship with water as above, can be said the Japan in Miniature.

In the meanwhile, 'Shikoku 88 Buddhist temples of pilgrimage' associated with saint Kohboh is known nationwide regarding its history and culture. People make a pilgrimage round these temples by walking to heal their fatigued souls and bodies. Japanese still hold their own culture, mercy, modesty, sympathy, healing as such in their spirits. Thus, in Shikoku, the traditions of good-old Japan such as spirit of hospitality and kindness to heal others are still alive and cherished by its inhabitants.

Shikoku 88 Buddhist temples of pilgrimage

'Shikoku 88 Buddhist temples of pilgrimage' are known as temples of 'Fudasho' around where Kuhkai (Saint Kohboh, 774–835) born in Sanuki region (Kagawa prefecture) walked as ascetic training. To make a pilgrimage to follow in the foot steps of the Kohboh-Daishi (i.e., the highest priest of Buddhism) is called Shikoku Pilgrimage. The Shikoku Pilgrimage is said to be originated in a trainee monk of the Heian Period (794–1191), and started to spread to the general public from the Muromachi Period (1338–1581) or the early Edo Period (1603–1867). It has continued until today constantly. The route starts with Ryohzanji Temple in Naruto City, Tokushima Prefecture, and end with the last Ohkuboji Temple in Nagao, Ohkawa district of Kagawa Prefecture



via Kochi Prefecture and Ehime Prefecture, making the total travel distance more than 1,000 km, and it usually requires more than a month when pilgrims walk it.

4. What is the 'Shikoku 88 Watersides'?

Shikoku region is rich in its unique natural environment, history, culture, climates and so on, as mentioned above. It was decided to address the initiative to select or create 'Shikoku 88 Watersides' from the following four view points and to preserve them, with the main theme of

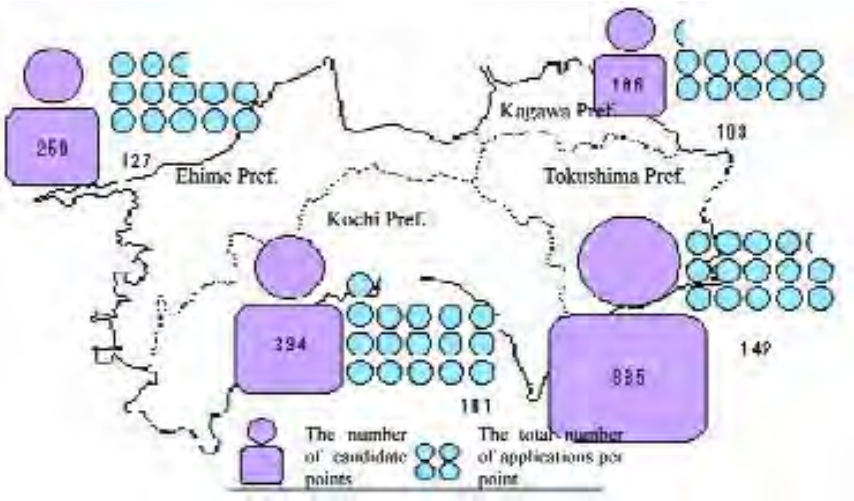
creation of the waterside spaces which local people can proudly hand down to posterity of the 21st century by industry-government-academia collaboration.

- Discovering the potential attractiveness in Shikoku in the field of history, culture, and climates,
- Recognizing the warm-hearted community of humanity,
- Vitalizing the regional economy by making use of regional resources,
- Inspiring the sense of the seasons by enjoying the beautiful watersides views.

4.1 The process and the result of selection

The Executive Committee of Shikoku 88 Watersides consisted of academic, cultural, and economic persons, journalists, representatives of NPOs and so on, and the four sub-committees set in each prefecture's government took this initiative to select the 'Shikoku 88 Watersides', focusing on the previously mentioned view points. As a result of inviting the candidate waterside mainly from Shikoku people for one year from Sep. 1st, 2001 to Sep. 30th, 2002, the total number of applicants was 1,653, and the total number of the candidate watersides was 553 points. Then the total number of the applications reached 1,674. After this process, the Committee as a whole made some recommendations based on the evaluations by on-the-spot visits to candidate watersides and examination for several times. Eventually, in the final review meeting on Feb. 21st, 2002, Shikoku 88 Watersides were determined with reflecting opinions from the local people.

The number of candidate points / The total number of applications per point (by prefecture)
(As of postmarks of Sep. 30th, 2002)



	Tokushima Pref.	*Kagawa Pref.*	*Ehime Pref.*	*Kochi Pref.*	*Total*
The number of candidate points	142	103	127	161	533
The total number of applications per point	835	186	259	394	1,674

Note: As there are some cases that one applicant posts more than one candidate, 'The total number of applicants (1,653)' and 'The aggregated total number of applications per point (1,674)' do not correspond. Namely, in case of that A posts 6 watersides candidates, 'The number of applicants' is 1, and 'The total number of applications per point' is 6. 'The aggregated total number of applications per point (1,674)' is the aggregation of these numbers.

4.2 The finalized 'Shikoku 88 Watersides' and its major points

1) The finalized points

The following picture shows the selected 'Shikoku 88 Watersides'.

2) The major selected points

This section introduces major selected points in the each prefecture.

The first point is the Naruto Sea Channel in Tokushima prefecture, which is located around the entrance of Shikoku from Kyoto and Osaka. The whirlpools in the channel are widely known.

The next is the scenery of the River Niyodo in Kochi prefecture. Although carps are said to be able to leap a waterfall, here the scenery of paper carps swimming elegantly in the stream can be seen.

And the excellent misty view of the River Hijikawa in Ehime prefecture is much more fascinating than the ones of London or San Francisco.

Lastly, the Pond Manno-ike is the largest pond for irrigation in Japan, which was made by the highest priest, 'Kohboh-Daishi' in the 9th century, and has sustained the local people's living ever since.

Unfortunately, it is difficult to introduce all the 'Shikoku 88 watersides' because of space, while there have more points of stream, waterfall, suspension bridge, dam, sea coast and so on. The people there are very proud of the various local resources blessed with natural piety. These watersides will surely entertain people who visit there by its blessings of nature. It should be noted that many people work together for further preservation and also advertising of the 'Shikoku 88 Watersides' which have been rediscovered as new Shikoku attractiveness.

4.3 The activities after the selection

1) The 'Shikoku 88 Watersides' advertising

Brochures introducing the 'Shikoku 88 Watersides' were made and distributed widely to the general public, through 4 prefectures' governments of Shikoku, local municipalities, and the Ministry of Land, Infrastructure and Transport Shikoku Regional Development Bureau. Moreover, the WEB sites of the Ministry of Land, Infrastructure and Transport Shikoku Regional Development Bureau and its each office have the outline of the 'Shikoku 88 Watersides' so as to be referred by many people. If you are interested please access to the URL below.

URL: http://www.skr.milt.go.jp/

2) Activities in future

In the selected areas to 'Shikoku 88 Watersides', local residents are going to be proactive in committing various creative activities by making the best of its features of each waterside, while executive committee is supposed to support their activities. Specifically, by means of advertising 'Shikoku 88 Watersides', continuous transmission of the information, planning and implementation of regional activities and events, the committee will support regional revitalization of Shikoku and increase the attractiveness of entire Shikoku Island. As a matter of fact, these are to be carried out in collaboration with each region's various institutions, local authorities, civilian organizations, NPOs and so on. The main aims for our activities in future can be summarized as follows:

- To provide places for exchange and environmental education by environmental consideration.
- To give support to NPOs and volunteer groups that help preserve and clean up the watersides.
- To assist events which utilize the watersides.
- To advertise at various places.

5. Conclusion

Many people have been engaged in this unique approach of selecting 'Shikoku 88 Watersides' focusing on waterside areas. What is important is to appeal the selected 'Shikoku 88 Watersides' nationwide and worldwide, and also link them to the regional revitalization and development from

such viewpoints as ‘rediscovery of potential attractiveness in history, culture, and climate’ and ‘recreation of humane exchange’ by way of associating with each waterside area as ‘Shikoku 88 Buddhist temples of pilgrimage’. In order to contribute this initiative, the executive committee and regional people are strongly wishing you to come and experience the ‘Shikoku 88 Watersides’.

Natural and Social Aspects of Vietnamese Water Puppetry

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Summary

As a cultural product of Vietnamese peasants who engaged with wet-rice cultivation, water puppetry has been seen as typical Vietnamese traditional theatre and the medium between Vietnamese people and nature characterised by particular natural condition. With the country's 3,260 km coastline, thousands of rivers and lakes, water elements greatly affect the economic, social and cultural life of Vietnamese people and can be seen in language, wet-rice cultivation, rituals, village festivals and water puppetry. Originated from the Red River Delta in Northern Vietnam during the 11th century, water puppetry derives from the struggles of Vietnamese farmers in dealing with flood. It has a close connection with the natural landscape and water environment, especially village ponds which are the most common stages for traditional water puppetry. Water puppet performances depict the agricultural life and the soul of the Vietnamese rural environment. Water puppetry also reflects the folk knowledge of Vietnamese farmers in making art present traditional cultural values. From folk art to a more established form and then to a professional art, water puppetry has been promoted as a typical cultural product which shapes Vietnamese cultural identity.

Keywords

Water puppetry, ponds, folk knowledge, village festivals, agricultural life.

Introduction

For the last few decades, along with the development of global tourism, Vietnamese water puppetry has been increasingly known and highly appreciated as an unique art. It attracts the interest of a large amount of tourists every year. Water puppetry has long been an icon for traditional Vietnamese stage art and in 2002, UNESCO has been asked to designate water puppetry as a part of the world's cultural heritage.

Water puppetry has a long history with its starting time remaining unclear. However, the earliest appearance of water puppetry can be dated back at least to the eleventh century during the time of the Ly dynasty (Huy Hong, 1987) or somehow to the 10th century (Hoang Kim Dung, 1997). On the Sung Thien Dien linh stele at Long Doi pagoda, Duy Tien district, Ha Nam province written by Nguyen Cong Bat in 1121, there is a description of 'Golden tortoise gushes water' in which, we can find a trace of water puppetry: 'The golden tortoise, swimming in a leisury way, carries three

mountains on its back above the rippling waves, its carapace, its feet visible in the clear slow-moving waters. Casting a glance at the bank, it opens its mouth to spurt water towards the jetty, turns its face up to admire the king's crown, then bows its head to examine the immense sky (the clouds mirrored in the water, and the steeply-rising escarpment. A Courtial musical prelude is played, the door to the grotto opens and fairies appear in a dance entitled The Wind Comes while singing in praise of Good Fortune; flocks of birds dance and twitter, herds of innocent deer jump for joy' (Tran Quoc Vuong, Phan Ke Hoanh, 1984). This reveals that water puppets had existed before 1121 and must be relatively popular so that it was used to entertain the King. Although the origin and beginnings of this unique art is contentious but the skillful conjunction between water and puppets in water puppetry leads to finding the intimate relationship between the Vietnamese and water, the dominent factor of Vietnam's natural environment.

1. The natural origin of Vietnamese water puppetry

1.1 Geographically, Vietnam's S shape is drawn by 3,260 kilometres of eastern coastline punctuated by a river mouth every 15 to 20 kilometres. In addition to this, thousands of large and small rivers criss-cross Vietnam, especially within the Red River Delta in the north and Mekong delta in the south. Thousands and thousands of dykes and embankmends are encompassed within sunken deltas, especially those of the Red River. The Red River Delta, according to Vietnamese historians, has always been a centre of economy, politics and culture of economy, politics and culture where Vietnamese tradition was manifested densely. As Vu Tu Lap describes, 'the Red River Delta took shape from the silts raised by the Red river and Thai Binh river. Even though it has been called 'delta', the terrain is not even and is divided by river's system. In the process of raising the delta, rivers were rewound and diverted...creating ponds and lakes which were scattered around valleys or rivers. This constructed the prominent characteristic of the delta which is sunken and waterlogged' (Vu Tu Lap, 1991).

These natural characteristics create a patchwork of fields divided by thousands of rivers, ditches, ponds and lakes which dramatically affect the material and spiritual life of Vietnamese. In order to both utilise and cope effectively with that natural condition, Vietnamese people in the northern delta have to choose an appropriate mode for production: wet-rice cultivation. As a consequence, the water environment has become an important factor governing the spiritual life at every level of the traditional social structure of Vietnamese people which are FAMILY-VILLAGE-COUNTRY. Water leads to specific cultivated habits, resident, behaviours and activities of Vietnamese people. Moreover, some scholars have seen water as an image which can generalise characteristic of national ideology: 'Vietnam triumphs over natural calamities and assimilation of invaders because our nation has soft, flexible, active and mobile characteristics as water'(Tran Ngoc Them, 2001).

Vietnamese call their country 'dat nuoc' (means land and water), or just 'nuoc' (water). The progenitor legend of Lac Long Quan – Au Co (Dragon father- Fairy mother) who gave birth to the Vietnamese people, reflects the perception of the Viet people about their ancestors: Dragon represents for water and fairy (bird) represents for mountain and forest areas. This reveals the important role of water in Vietnamese consciousness. Water Gods (Thuy than) has been worshipped throughout the country in many different forms, directly as Sea God, River God, Well's God or indirectly as fish genii, crocodile, snake, dragon and drowned god. People ask them for help when they need rain. They have tradition of water-procession in village festivals, traditional religions and beliefs relate to their Water God. Even during the Ly dynasty in the 11th century, there were water festivals held by agricultural inhabitants in the autumn. In those festivals, apart from worsipping and spirit-processions, there were always activities linked with water such as boat racing, swimming and water puppetry.

1.2 Living with water since childhood, Vietnamese are both happy with water and sad with water, rich because of water, but also poor because of water. Their sentiment for water, therefore, is ambivalent as they embrace it whilst they are also scared of it.

Out of the four important elements which are 'nuoc, phan, can, giong' (water, manure, labor and seed) of the wet-rice agriculture, water is seen the most important one determined wet-rice production. The natural condition of the sunken area, on the one hand, has created a good condition for wet-rice cultivation, one the other hand, brought about natural disasters for people's life. 'Thuy, hoa, dao, tac' (Water, fire, thief, invader) are considered the most perils for people in which, 'thuy' (water) is the first thing they are most scared of. The saying 'Lut thi lut ca lang'(flood makes village sink) has been used in every village of the Red River delta. Flood, apparently, has been constant obsession of Vietnamese people whose life is linked with wet-rice cultivation. From the founding of agricutural and social existance, confronting the flood was the first task of the nation which could determine the existence of the country. With the legend of Son Tinh-Thuy Tinh (Mountain God – Water God), Vietnamese mythicise the hard work through many centuries of creating dykes and trying to utilise every inch of ground for cultivation, and in this story, the Water God is portrayed as cruel and harmful one who creates the floods. Son Tinh-Thuy Tinh is an immortal epic of the Vietnamese nation's ongoing relationship with water.

1.3 The ambivalent perception of Vietnamese people toward water stresses the fact that water is the vital factor affecting their life. The history of wet-rice civilization is the history of possessing and improving the Vietnamese ability of understanding water, and thus, leading to 'tu duy song nuoc' (waterway thought) of Vietnamese people (Tran Ngoc Them, 2001). Living with water, Vietnamese farmers have become accustomed to using it to their advantage, combining cultivation with fishing, raising animals, growing crops, and even as a strategic advantage in warfare. They also have habit of building house in accordance with geomancy in which, river is a centripetal place. From big and common structures such as communal houses, temples and pagodas, to small structures like people's houses, they all conform to a close rule concerning water.

Vietnamese also have found their own way to cope with natural disasters such as floods, i.e: building dykes, digging canals, arroyo, ponds and lakes and changing river's directions. Obviously, in their attempt to bring the Red River's flood season under control, they have worked out a whole system of methods dealing with dykes, irrigation and drainage. Especially, in this system, the ponds play an important role.

The delta of northern part is sunken area, therefore, in order to cope with flood cycle, almost every family had to dig ponds to drain and obtain earth to raise the house's floor. Family ponds, therefore, help rural people to save themselves from heavy rain and flooding. Above this, ponds have many other functions: places to breed fishes and float vegetable for eating, grow water-fern for pig husbandry, soak wood and bamboo for setting up houses and the most common stages for traditional water puppetry. Ponds are also water sources for everyday use of the whole family. Ponds are usually dug in front of houses with the purpose of making the climate equable, fresh in hot days and warm in cold days. Vietnamese popular saying: 'I am going back to bathe in my pond. Whatever it is pure or muddy, I still prefer my pond' expresses the place of ponds in Vietnamese lives and psychology (Huy Hong, 1987). Like family ponds, communal ponds and lakes of village communities are also dug up in front of communal houses, temples and pagodas – a crucial thing in Vietnamese ideas of geomancy.

1.4 The sunken terrain checkered with lakes, ponds, rivers and full waters of rice fields is an ecosystem of the Red River delta, and it also is the ecosystem of traditional water puppetry. Natural conditions and agricultural life encompass the innermost feelings of Vietnamese peasants to the environment of ponds and lakes around them. There were few arts that could exploit actively and successfully the essence and power of water like water puppetry. This is an creation of the Vietnamese ancients. People in Nguyen village (Thai Binh province), one of the most famous cradles of water puppetry, explained their water puppetry's origin like this: long time ago, in the rain and storm seasons, Nguyen village was always inundated. Temples and pagodas were flooded and Buddha statues were floated in the village. From witnessing that view, Nguyen village's farmers created simple puppets like duck, fish, buffalo and a farmer with plough to play on water just like a game. At the beginning, they directly manipulated puppets by hands, and later on, they

found the way to operate them by poles and strings under the surface of the water. As techniques improved, they began to incorporate legends and myths to make plays (Pham Trong Toan, 1997). Therefore, from the case of Nguyen village, water puppetry might derive its origin from Vietnamese farmer's attempt to bringing under control one of the foremost natural calamities related to water.

2. Water puppetry mirrors the agricultural life of the Vietnamese

2.1 The beginning of water puppet art has been seen unprompted, but it virtually reflects the peasant's attitude toward the real life happening around them. The close sentiment with living environment, rural sceneries of bamboo edges, rice fields, ponds, the communication among farmers in working, the farmer's perception about agricultural life are revealed in the water puppetry in a simple, not showy and humorous manner, like natural essence of peasants. Watching a water puppet show, we can see many agricultural activities in the ordinary Vietnamese rural life. The daily life of farmers associated with the rural scenery is represented through all the topics of the items in water puppet shows. The items are short and precise pieces of writing, skits reflecting in a truthful manner the productive labour and the struggle of the people against calamities and foreign invaders (Huy Hong 1987).

The topic of water puppet shows could be picked up from ancient legends, myths or the national history against invaders such as the victory of Tran Hung Dao over Mong-Nguyen invaders on the Bach Dang river, or the fact that Le Loi, the King who founded Le dynasty, returned a sword to a margical turtle. However, the ordinary life with all normal activities related to agricultural cultivation such as farming land, tending ducks, catching fish, rowing a boat as well as all the healthy games of peasants like wrestling, horse-racing, dragon dancing are the main topics and depicted vividly in puppet shows.

In a similar way, the characters of water puppet theatre could be heroes and heroines (historical figures with both truthful and ideal images like generals and kings), legendary figures (fairies) or holy animals the four supernatural creatures related to religious and spiritual life of Vietnamese people such as dragon, unicorn, tortoise, phoenix, but most are ordinary peasant characters living in an old village protected by clusters of bamboo and the animals close to peasant's life in the rural landscape: ducks, fishes, frogs, buffalous, and storks. The most prominent character of puppet theatre is the buffoon Teu (chu Teu), a virtual emcee and indispensable character of water puppet show, with a plump body and an arch smile. His belly is usually exposed and he wears either an unbuttoned red vest or just a loincloth. He represents farmers, who make up the majority in the Vietnamese traditional society.

Other characters of water puppet shows are also presentative images of different farmers, man or woman, whom can be seen in every rice-fields of the rural area. The puppeteers, who always hide themselves behind the bamboo screen to manipulate puppets are also farmers. They are ordinary peasants who get used to work on water for wet-rice cultivation. They play or perform with puppets to satisfy their's and other peasants enjoyment in the villages, therefore, puppeteers traditionally gather into a troupe to perform for villagers for free.

Traditional puppet theatre is also a miniature space of the village. It is an open-air structure that comprises a pavilion, stage and auditorium based on a pond or a lake. The pavilion is designed to look like a communal house that is popular in every village including two layer curved roofs with 8 drip-mouldings, and made of either bamboo or brick. Mobile theatres for temporary use set up by bamboo for easy transportation with wires are strung between stakes. This area is seperated away from spectators who sit on the edge of the pond or lake. The inside of this structure is divided into two parts: one is the stage on where puppeteers make all preparation for the show, playing music, resting and storing instruments. The other part is a water space where the puppeteers stand waist-deep to manipulate puppets. The stage for water puppets is a water area in front of the pavilion

approximately five to six metres long, four metres in breadth and three to four metres deep, separated with the pavilion by a bamboo screen. The auditorium for spectators is set up in surrounding land of the pond or lake which is in the shade of trees, without seats therefore, spectators can move around to watch the show (Huy Hong, 1987).

With simple and rustic puppets, in the natural environment of the village, a water puppet show is true to life and very expressive in presenting the Vietnamese rural soul.

3. Water puppetry reflects the folk knowledge of Vietnamese farmers

3.1 Water puppetry filled with a farmer's knowledge of nature. By their understanding of nature, ordinary farmers creatively utilise available materials to make art. From behind the bamboo screen where puppeteers stand waist-deep in the water, they manipulate the wooden puppets with a pole-and-string apparatus (water puppets are operated by means of two kinds of mechanics, namely string mechanics and pole mechanics))(Huy Hong, 1987). The designs of poles, levers and strings are hidden under the water and are secrets passed down within a family. Each troupe has its own traditions and keeps their methods a secret. That is why tradition follows the paternal line, passed from father to son. Daughters might marry outside the village and give away the secrets, women in early time therefore were never accepted into a troupe. In order to become a member of a troupe, one must dress decently and bring betel and areca as well as rice wine to pray troupe's founder in front of the altar. If accepted to the troupe, he must drink a vermilion concoction that symbolises human blood and take a sacred oath to keep the secrets of the troupe. Failure to do so is at the cost of the life of the father and that of three successive offspring.

3.2 Water puppetry takes its shape from two component elements: puppets and water. Wooden puppets – performers of this special art carved by talented artisans, showing the farmer's ability of collecting materials. The most popular kind of wood for puppet's carving used by many water puppet troupes is fig tree ('sung') (some troupes prefer wood taken from jackfruit tree) which are available in the country. This kind of wood is cheap and easy for artisan to carve, light when fresh and tough when dry. With the relatively simple technique, from sections of tree trunks, puppet-makers put all their inmost feelings into different kinds of puppets. Puppets range in height from 30 to 100 centimetres and in weight from one to five kilograms. The puppets usually have two parts, the body seen above the surface of water, and the base under the water. The head and arms are usually movable. Apart from wood, artisans use many other materials like iron, steel, rope, bamboo and spongy to make puppets, cloth, electric wire and hair to decorate, rubber to make resilient for movable articulations. Paint is the main material used to avoid water absorption, thus despite the water stage, the puppets never get wet, unless they really go diving under the water and pop back up again for certain scenes. The puppets may take on a lacquered look after being painted.

3.3 Even though puppets have different characters, the ability to express feeling through facial features or speech of these rigid wooden puppets is finite (traditionally water puppet show was performed without vivid description of speech). Unlike land puppets (hand-puppets or marionette), water puppets are not close to puppeteer's hands but linked by rod and string, therefore, the emotion transmitted from puppeteers who stand in deep water inside the pavilion, to the puppets on the outside stage is also limited. The main thing keeps the puppet show lively is water, a fascinating component element of the water puppetry. Water hides in its depth all the secret of the puppet show. The water is the mystery constituting both an encumbrance and help for the puppets. Although the water impedes puppet's movability, it also helps the rigid featured puppets to move creatively. Using it effectively for performances is the secret of puppeteers. Under the manipulation of puppeteers, thanks to water, the puppet's jerky movement seems to be more smoothly and soulful. The water surface allows rapid and clumsy movements of characters. Moreover, water surface is not only the place for stage action but also play a role of one character of the show: the big waves

of the ocean battle between Tran Hung Dao's army and Mong-Nguyen enemy or the tranquil ripples of a duck pond in a peaceful setting of a village. Water with its liquid and reflecting character creates the illusive appearance for the show. The water is bubbling over as the puppets move in and out, to and from, it turns on to waves raising puppets up and down making them much greater in number. Water makes the natural augmentation for the show.

4. Water puppetry maintains traditional cultural values

4.1 Water puppetry, as a production of rural life, plays an important role in the cultural activities of the village community. Water puppetry is a miniature village festival in which, all activities of the festival are reflected in different scenes of the show. The village festival is an important opportunity for every special things of the village to be performed, to entertain villagers and stimulate the proudness of their tradition. Therefore, the cultural environment of village festival is the environment in which many traditional artistic and cultural values are preserved.

Village festivals are usually held to mark either the beginning or the end of the agricultural cycle. Festival is a means by which the peasants express their hopes for abundant crops through which they derive enjoyment and diversion. Village festival is a combination of many components and aspects, which are religious and entertaining, sacred and mundane, unreal and real, desirous and realistic. It is a high point of time when people share a collective feeling, pray for local spirits, play and enjoy themselves together. In the festivals, apart from rituals aimed to serve tutelary god or local spirits, many healthy games and custom such as wrestling, boat racing, swinging, kite-flying, bird racing, dragon and unicorn dancing are organised. Although water puppetry does not appear in every village, this extraordinary art attracts every farmer. Especially in the villages of the water puppet troupes, villagers respect and keep it as a precious thing of their own villages. In some villages, water puppetry is not only for entertainment but an crucial ritual to serve the deities, such as in Thay pagoda festival, organised to worship Tu Dao Hanh, a monk, who was considered the founder of water puppetry of Phu Da troupe in Thach That, Ha Tay province (Hoang Kim Dung, 1997, Huy Hong, 1987). Water puppet shows allowed farmers to entertain themselves while paying homage to local spirits and praying for a bounteous harvest.

In the environment of village festival, water puppetry has an opportunity to express fully its nature and artistic characteristics. All relationships are set up: relationship between handing down jobs between generations within the troupes, the relationship between creation and self-enjoyment, the relationship between puppeteers and audience, and many dimensional feelings within the environment of community. Apart from these relations, the central symbol of dimensional feelings is puppets, with ponds and lakes, trees and village sceneries as backgrounds, and the support from spectators, appeared falling in line with lights, flags, firecrackers and a joyful atmosphere. Without the village atmosphere and participation of people in the village, the beauty of traditional water puppetry is vanishing. No doubt that the best place to watch water puppetry is during a traditional festival in a northern Vietnamese community with a puppet troupe.

4.2 A water puppet show is a result of a collective work with the contribution of many people: artisan (puppet makers), puppeteers, musicians, singers, and audience. Therefore, on the one hand, water puppetry is an art of the village community, on the other hand, it contributes in reinforcing the village community. In puppet shows, there is an exchange between performers with spectators. Teu is a typical one, who invites audience to eat betel, to quiet crowd and put everything in order.

The music in a water puppet show is a combinative sound of instruments such as drum, cymbals, flutes, gongs, one-stringed monochords and ancient-style guitar. The music and songs often introduce the themes of the scenes and help to animate the stories. No performance is complete without firecrackers adding to the excitement. The spectators sitting on the shore, seeing the puppets moving, appearing and disappearing, listening to the music, the resounding beats of drums, the cracking noise of firecrackers and character's voices have special feeling and sense of

harmonization between man and nature. Watching water puppet shows in the open-air theatre is ideal to feel and to perceive all senses of the soul of rural life and the beauty of this art.

Performing water puppets is actually very hard work. In order to have good scenes in the shows, puppeteers-farmers have to sweat and work with all their might. They must deeply love playing with puppets because standing in mud and water to perform is not easy. In early times, puppeteers had to suffer from bone diseases and rheumatism. Water puppets, traditionally, were presented in not very clean lakes and ponds (even now when professional puppet troupes use running water but they still have to use chemical substance to make water turbid (very muddy) to keep the secret of technique under water). Even when the weather was freezing, the puppeteers still sweat because they have to spend a lot of energy to control and manipulate heavy puppets. Many other times they have to drink a lot of ginger tea and fermented fish sauce to keep them warm during performances. Only their love to this art has kept the water puppetry, as a traditional cultural product, alive through many difficulties.

4.4 From the creation of individuals at the beginning, water puppetry had attached with groups, troupes have become a village festival art form, and finally, has developed to a theatrical one as it is today. It has passed through a long history of the ups and downs. It nearly disappeared during the decades of wars against France and the United States, poverty and communist revolution. However, the year of 1956 marked an important milestone for the development of water puppetry with the Government's policy of professionalised puppetry. The central puppet theatre was established. In the 1960s, the North Vietnamese government began promoting water puppetry as a national art form and the new troupes trained both men and women. When the country was re-unified after the Vietnam War in 1975, the tradition spread into the South Vietnam. A professional water puppet unit officially came into being in 1984 at the Central Puppet theatre, and in this year, the first time water puppetry was invited to perform in Western Europe. In the year of 1994 there was a national festival for water puppetry for both professional and amateur. Among many professional and amateur puppet troupes, the Vietnam national puppet theatre has made considerable contributions to preserving and developing this art.

Along with professional water puppetry, there is still existence of traditional water puppet troupes concentrated mostly in the deltas of the north. Because one of the most important rules of a water puppet troupe is the secret, many plays and items were lost with times, obstructing the development of this art. In some places, they are experimenting with new plays and modern themes, moving away from the classical repertoire of stories. However, the 17 water puppet troupes existing today are living museums for this unique art of Vietnam.

Conclusion

Watching a water puppet show, we can get general picture of the daily activities typical to Vietnam's rural areas and get some understandings of Vietnamese life, history, and the building and defending of the country against the forces of man and nature. Water puppetry shows Vietnamese creative ability to change a natural element into an art production reflecting the soul of rice-fields and of rural life. The reality of the rural life comes straight forward into art from simplest things such as rod, stick, pole, string, wire, from wood, bamboo, from water, wind, smoke, but the art enciphered that reality in closed-opened symbols of things that we can see, imagine and feel. Water puppetry is real and unreal, theatrical and life-like. Water puppetry is a system of symbols, which are a symbol for agricultural life, a symbol for folk knowledge of the Vietnamese farmers in artistic creation and a symbol for traditional values existing and transforming in contemporary society. Preserving and developing water puppetry, thus, is not only the way to attract the interest of the world, but also to maintain Vietnamese cultural identity.

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Restoration Project of the Chikusa River in Cooperation with Local Inhabitants, Government and Scientists

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Summary

A river restoration project in the Chikusa River Basin has been started in cooperation with local inhabitants, government and scientists. So far, river works have been carried out with a focus mainly on flood disaster prevention, but little attention has been paid to the natural and social environment. In addition to flood control, water use and the hydrospheric environment are very important aspects to the river restoration that should be taken into account. In order to lead the project in the right direction, we need more information on the nature in the basin, and need to understand the historical background of the culture, industries, agriculture, forestry and lives of the people. Through the investigation of these subjects, we can learn what people expect from the river, how people are involved in the river system, and how people live within the natural environment of the basin. In this report, the author intends to show the natural environment, human activity and engineering problems with respect to flood protection and water use, historical views of industries and cultures, recent river restoration programs conducted by the local government and inhabitants, etc. Based on various data, the way the restoration program should be worked out is discussed, as is what we can learn from past experiences so that we can apply them to the river works.

Keywords

River restoration, flood protection, catchment, history, society, industry, natural environment, water use.

1. Nature of the Chikusa River

The Chikusa River is a second-class river located in the western area of Hyogo Prefecture, Japan (see Fig. 1). The river is 68 km long with a catchment area of 750 km^2. As shown in Fig. 2, about 80% of the catchment is covered by forest, and the rest of the basin consists of paddy fields and urbanized area. There are municipalities consisting of two cities and eight towns. Population in the catchment has remained almost unchanged in the

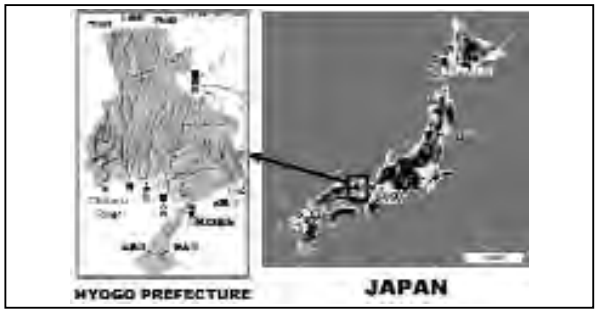

Figure 1. Location of the Chikusa River

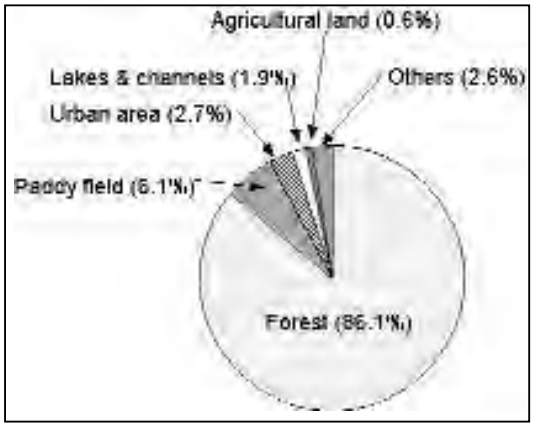

Figure 2. Land use in the catchment

last fifty years. The biggest city is Ako City, inhabited by fifty thousand people and located at the river mouth. The natural forest area has decreased slightly, while the artificial forest area has increased. As a result, the total area of the forest has not changed very much in the last fifty years. This data shows that the catchment's nature is fairly well preserved.

Photo 1 is a typical view of the river upstream. Even in the downstream area only ten kilometers up from the river mouth, we can still find beautiful river scenery as seen in Photo 2. People can enjoy a view of this scenic zone, Takao (see Fig. 3), from the super express train, Shinkansen. Its railway bridge can be seen in the photo.

Photo 1. View of upstream area

Photo 2. Beautiful scenery of Takao, about ten kilometers upstream from the river mouth

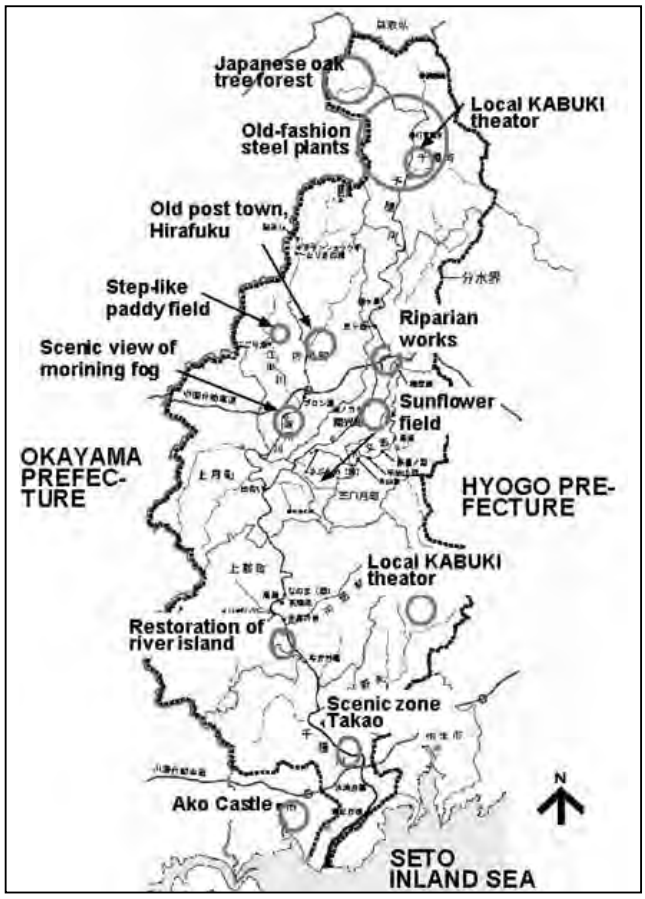

Figure 3. Chikusa River Basin

In the middle- and upstream areas, there is plenty of variation in the river morphology, such as channel meandering and series of riffles and pools. The river morphology generates flow turbulence and thus promotes oxygen exchange across the air-water interface. The active aeration accelerates the decomposition of organic matter and keeps water quality quite excellent. This is an important environmental factor that provides well-conditioned habitats for various species of aquatic life such as Coreoperca kawamebari, Char, Great salamander, Sculpin, etc. (Photo 3).

(a) Coreoperca kawamebari (Oyanirami)

(b) Char

(c) Great salamander

(d) Sculpin

Photo 3. Aquatic animals inhabiting the Chikusa River

2. Culture, history and society

2.1 Old-fashioned steel production and forestry

Until the Meiji Period, old-fashioned steel plants were in operation in the mountain area (see Fig. 3). The steel produced from this area was highly appreciated for its quality, and was well-known as a brand name 'Chikusa Steel'. The steel was typically used as a material in Japanese swords (Photo 4). The steel production technique was originally imported from the Korean Peninsula around the 5th century AD. At the same time, many businessmen and engineers immigrated to Japan to transfer their culture and techniques. Among those people, the Hata family from the Chinese continent had strong political and economical power, and ruled many areas throughout the country.

Steel was produced in the following way. Soil collected from the catchment was fed into an artificial water channel as shown in Photo 5. In the course of running down the channel, iron particles and sediments were sorted by their specific weight

Photo 4. Japanese sword 'Bizento'

Photo 5. Water channel for sorting sand iron

Photo 6. Fireplace used in an old-fashioned steel plant

differences. The collected sand iron was thrown into the fireplace as shown in Photo 6. This style of steel plant yielded a high amount of sediment downstream and to the coastal zone, which nourished sand beaches. As a result, the shoreline was protected against coastal disasters. It is reported that in other river systems, coastal erosion has recently become significant because steel plants are no longer active and sediment yield is not as predominant as it used to be.

The fuel used in the steel plants was coal made from Japanese oak trees in the catchment. This is one reason why people took good care of the forests in the old days. But this is no longer a factor because broad-leaved forests were replaced by artificial forests of cedar and cypress, and because the forest industry has been sluggish in recent years. The forest, however, should be maintained more from the viewpoints of flood control and nature preservation. For this reason, cooperation between river and forestry administrations is desperately needed.

2.2 Agriculture

Because most of the catchment consists of mountains, people had to work very hard to develop farmlands on the steep slopes. Step-like paddy fields shown in Photo 7 are the results of many years of labor. They can still be found in suburbs of Sayo Town, whose location is indicated in Fig. 3. The paddy fields create a beautiful landscape as well. The rice product in the area has a high reputation for its taste. From the viewpoint of landslide disaster prevention, the step-like paddy fields serve to reinforce and stabilize the slopes. They also control rainfall runoff much like a series of dam reservoirs that minimize flood disasters.

A rough estimation of water balance in a paddy field is schematically shown in Fig. 4. A high amount of water is impounded and infiltrated into the ground. Although some proportion of water is consumed for rice cultivation and lost due to evaporation, most is returned to the water cycle system. In this way, a paddy field has an efficient mechanism of water storage. The paddy fields also provide good habitats for many species of aquatic animals. Considering these various functions of the step-like paddy fields, it is necessary to preserve them not only for agriculture, but also for disaster prevention, water resources, ecological environment and landscape.

The agriculture, however, suffers from a serious problem of labor shortage. In addition, most of the farmers are getting older. People of the younger generation tend to find their jobs in urban areas instead of in the countryside. In recent years, there have been fewer and fewer successors for farming. This is a problem not only in this area, but also in most farming areas throughout Japan. A

Photo 7. Beautiful scenery of step-like paddy field (Sayo Town)

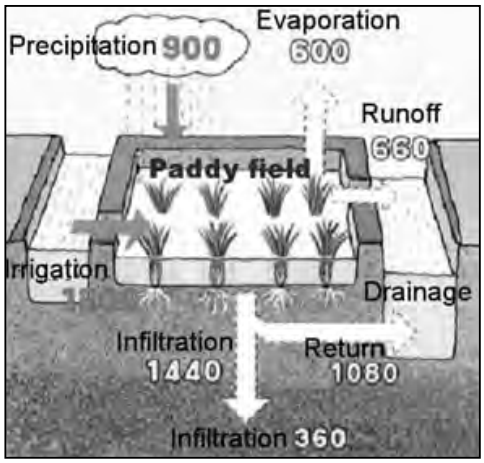

Figure 4. Water balance in a paddy field

program named 'paddy field's foster parent' or 'a paddy field rental owner system' is expected to be an effective solution to the labor shortage problem. People who are interested in agriculture and nature are invited to the farmlands from urban areas, and they voluntarily help the farmer perform his jobs. They can rent the paddy fields free of charge and, in return, learn agricultural techniques from the farmers. In this sense, people take good care of the farmland, just like they would their stepchildren, thus the program is called 'paddy field's foster parent'. In the harvest season, they receive a portion of the rice products free of charge, which is an additional advantage for the 'foster parents'. Some of the programs are already up and running in many areas throughout Japan, but not yet in the Chikusa River basin. For the program to run successfully, close cooperation between farmers and the local government is necessary.

More than fifty weirs have been constructed for irrigation along the river. A traditional type of weir was a rubble mound structure as shown in Photo 8. Local people used to work together to repair the weirs after they were damaged by flood. The act of repairing worked as a mechanism to tighten the local community and society. After the flood disaster of 1976, however, most of the weirs were reinforced by steel and concrete. A typical example of a restored weir is shown in Photo 9. Because the weirs became maintenance-free structures, cooperation for the repair work became no longer necessary. This is an unexpected side effect on the cooperative structure of the local society.

In addition to the negative social impact, an impermeable weir has a negative impact on the natural environment because it blocks the movement of aquatic animals in the streamwise directions. In contrast, the rubble mound weir allows the streamwise migration of aquatic life, because the body is porous and the slope on the downstream side is very mild. In addition, physical and chemical substances can pass downstream, minimizing the negative impact of the structure on the river environment. It is also expected that turbulent fluid motions inside the weir may promote aeration through the air-water interface. From these aspects, the rubble mound weir is considered to be more environmentally-friendly than most of the recently constructed impermeable weirs.

The major functions of the rubble mound weir are summarized in Fig. 5. The author is now performing a physical model study to investigate the hydraulic properties of the weir as shown in Photo 10 (Kohji Michioku et al. 2002, Shiro Maeno et al. 2002). A theoretical analysis is also being carried out to find solutions of discharge, water storage capacity and dynamic stability against the river flow. The author believes that the study will help river engineers make a suitable structural design based on hydrodynamics.

Photo 8. A traditional rubble mound weir

Photo 9. A modern weir in the Chikusa River (Johbaru River, Saga Pref.)

In the years to come, we have to take this experience into consideration for the creation of an environmentally-friendly river system.

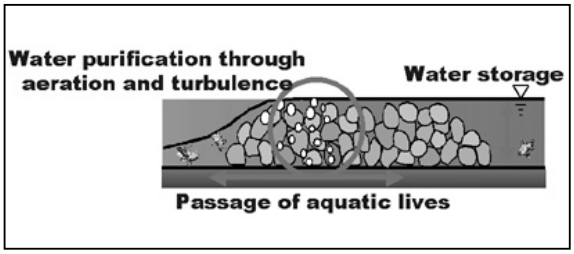

Figure 5. Functions of a rubble mound weir

Photo 10. Laboratory experiment of rubble mound weir, Chikusa River

2.3 Fishery

Sweetfish, or Ayu, is a famous product from the Chikusa River (Photo 11). The fishing season begins in May. Clean river water is a necessary condition for good-tasting sweetfish, because the quality of sweetfish meat depends on their food or waterweeds growing in riverbed gravel.

The sweetfish industry is suffering from the problem of the weirs interrupting fish migration along the river. Artificial release of young fish into the river is one of the solutions to this problem. In addition, fish ladders are constructed on several weirs as shown in Photo 12. Most of them, however, do not function well, because most of the ladders were not designed so that fish can easily pass through. It is our urgent task to perform extensive research on fishways to come up with designs for high-performance structures. The Japanese Mitten Crab is another important product from the Chikusa River. Fishery nets are set in the river to catch the crabs when they start to migrate downstream in November. We should pay attention to the fishery, too, in working out a river restoration project.

Photo 11. Sweetfish fishing in the Chikusa River

Photo 12. Fish ladder

2.4 History of transportation

For many years, a lot of industrial and agricultural products were transported on the river and a long the main roads in this area. The products were steel, agricultural crops, seafood, salt, timber, etc. A traditional Japanese cruiser, ‘Takase-bune’, shown in Photo 13, was widely used for river navigation. This ship was specially designed so that it could cruise even in shallow waters. On the Chikusa River, the ships went up to Nanko Town, located about 40 km from the river mouth. So that people could pray for navigation safety, many shrines were constructed along the river and traditional festivals and religious ceremonies used to take place. Some of the cultural events are still held, and they inspire the community’s spiritual identity through the participation of many local

inhabitants. Nowadays, river transportation is non-existent because many weirs became barriers for shipping.

Many inns, stations, markets and business centers were active in post towns along the old main roads. Hirafuku (Fig. 3) is one of them, where old-fashioned streets, landing places, a travel agent's main office, etc. are still preserved (Photo 14). In order to maintain such traditional treasures, a town rejuvenation project was started under the leadership of the local government. The project aims to restore streets, old houses and buildings, etc. Even private houses are repaired with financial aid from the government. Fig. 6 is an image sketch of downtown in the restoration project.

Photo 13. A traditional Japanese cruiser, 'Takase-bune'

(a) A town view from upstream

(b) A town view from downstream

(c) Water front in the backyard of a home

(d) Main office of travel agent 'Honjin'

Photo 14. Scenes of the old post town, Hirafuku

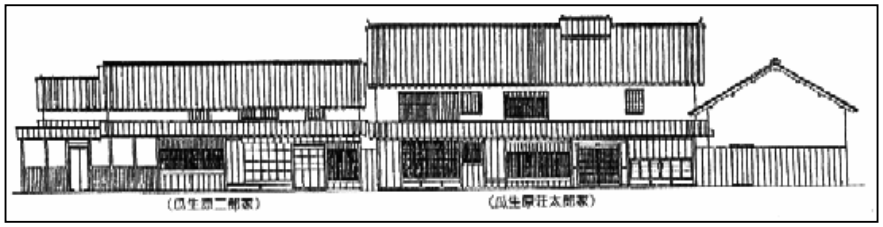

Figure 6. An image sketch of restoration project in Hirafuku

2.5 Cultural events

In addition to religious ceremonies at shrines and temples, people enjoy traditional entertainment, such as Kabuki performance in the local theaters as shown in Photos 15 and 16. Their locations are indicated in Fig. 3. In the harvest season, for example in autumn, local inhabitants come together and enjoy Kabuki performed by children. This is a very important historical event in the sense that it passes on cultural information from the distant past.

Photo 15. Local Kabuki theater

Photo 16. Kabuki performance by children (Both photos are from Nanko Town)

3. River restoration projects

3.1 Problems in the Chikusa River

The Chikusa River does not have enough capacity for conveying high water discharge. The channel cross-section must be widened for flood disaster prevention. In the river construction projects so far, focus has always been placed on increasing the channel capacity, and little attention has been paid to the natural environment and people's demands. In order to convey water most efficiently, the channels were constructed as monotonic trapezoidal cross-sections composed of a flat riverbed and a steep riverbank slope. Photo 17 is an example of a channel constructed in a branch of the Chikusa River system. The channel course was straightened and the river morphology became very monotonic. The steep riverbank interrupts people's access to the shore. There are no more riffles and pools where aquatic animals can live as they did in the past. Since the riverside landscape is no longer attractive to people, they began to lose interest in the river. People of loose morals are unlawfully dumping garbage as shown in Photo 18. In addition, some species were lost due to the negative impacts of the river works and human activities on the ecological environment.

Photo 17. Cross section of the Yasumuro River, a branch of the Chikusa River system

Photo 18. Unlawful dumping of garbage in the flood plain

3.2 Basic idea of river restoration (Hyogo Prefectural Government 2003)

We learned from experience that when working out a restoration program, it is necessary to take into consideration not only the hydrological aspects of the river, but also the nature, culture and history cultivated in the catchment. It should always be kept in mind that a river system is composed of natural, social, historical, economic and industrial aspects that are closely related to each other.

It is necessary for local inhabitants to learn about the history of human activity, because past experience can help them to correctly understand what the river should be. For the successful construction of a river system, the river restoration project needs the participation of local people who know the river well.

3.3 Examples of restoration projects

Project in Kamigori *(Photo 19)*

Photo 19. Restored island in Kamigori Town

A river island was restored in Kamigori Town located about 15 km upstream from the river mouth (Fig. 3). The project was to cut off a part of the island in order to increase channel capacity. Meetings were organized by the local government and community, and supported by engineers and scientists. The basic idea of the project was to harmonize the river work for flood protection and water use with the island landscape and ecological environment. Attention was also paid to the creation of a friendly atmosphere around the site and to the formation of a human network connecting the river and the local community. In the riparian work, various environmental aspects such as the impact on aquatic plants and animals, accessibility to the shore, etc. were carefully investigated.

Project in Nanko Town *(Photos 20, 21, 22)*

Photo 20. Riparian work in cooperation with local people (Nanko Town)

The project was carried out in order to create a natural environment harmonized with a public camping site. Extensive discussions were conducted among local people, scientists from various fields, river engineers and the local government. A questionnarie was sent out to ask how the river channel should be constructed, what people expect from the river, what kind of activities they will do in the river, etc. A riparian work was done in consideration of those discussions and opinions. It is expected that people can learn about ecology, natural disasters, flow dynamics, river morphology, etc. through outdoor activities in this area.

Photo 21. Aerial view of riparian work (Nanko Town)

Photo 22. Discussion between local people and river engineers over a physical river model (Nanko Town)

3.4 Committee for Creation of Clean Chikusa River (Hyogo Prefectural Government, and Committee for Creation of Clean Chikusa River 2003)

The 'Committee for the Creation of a Clean Chikusa River', a collaboration between local inhabitants, governments and scientists, was founded in April 2002. The mission of the committee is to create a river that fascinates people. The committee's slogans are 'to know', 'to love' and 'to protect' the Chikusa River and 'to cooperate with related organizations'. The committee organizes various events such as workshops on topics like river nature, aquatic animals, historical and cultural background of the area and river structures, as well as conducting technical excursions to forest catchment, publication of newsletters, investigation of water quality, etc. Small children are also invited to these events because the next generation will play a very important role in the creation of a nicer river environment. Several members of the committee also take part in the Chikusa River Committee mentioned below, where a river restoration program will be conducted from the viewpoints of disaster prevention, water use and the natural environment.

3.5 Committee of Chikusa River (Hyogo Prefectural Government 2003)

In September 2002, the 'Chikusa River Committee' started its activity. The committee's task is to make a one hundred year long restoration program. The committee members are from the local government, local inhabitants, scientists, and fishery and agricultural unions. The author himself is in charge of the committee. The committee intends to propose a river restoration project considering the river's hydrological properties, natural environment, and the local society's activities and historical background. Discussions are being held with a focus not only on the river channel but also on the nature and society throughout the catchment. Because the committee's mission is so important, each member needs to have a broad vision and various ways of thinking.

4. Concluding remarks

It is a matter of course that the participants in the river restoration project, especially the local inhabitants and organizations, should keep a neutral stance without focusing on profit for individuals or organizations. The idea that the project is for public benefit, and not for individual profit, should always be kept in mind.

(a) Outdoor class on river nature

(b) Sampling of aquatic animals

(c) Excursion to the Japanese Oak tree

(d) Workshop on aquatic life forest in the upstream basin

Photo 23. Activities organized by the Committee for Creation of Clean Chikusa River

There is a program to collect historical information from the river basin in order to investigate the role that the river has played in the society in the past. The study will provide useful findings for the river restoration project.

Similar activities have been started in other river basins in Japan. Experience and information should be extensively exchanged so that the river can be restored most efficiently for flood control, water use and the natural environment.

Acknowledgement

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I Bottini, the Medieval Acqueduct of Siena: the Ancient Water Supplying System Related to the Urban, Social and Economic Development of Siena

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'La citta di ieri per l'Homo di domani'

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One of the most beautiful cities in Tuscany, Siena is still characterized by the same architectonic and urban features as in medieval times. As a result Siena city center has been granted UNESCO World Heritage status. The hill on which Siena stands is one of the worst irrigated uplands in Tuscany. Thus, ever since the days of Roman civilization, Siena has had to depend on an aqueduct for its water supply.

However, unlike the typical over ground Roman aqueducts with which we are all familiar, the aqueduct which feeds Siena is made up of a series of underground ducts supplied by subsurface water and local streams. The city of Siena grew so quickly during the 12th and 13th centuries that the water supplied by the aqueduct soon failed to satisfy the needs of the rapidly expanding population. The problem was further aggravated by the city's determination to free itself from an exclusively agricultural economy. Thus, the ancient network of underground channels – known locally as 'bottini' as a result of their barrel vaulted (botte) ceilings – was developed and expanded to supply the thriving city which Siena had become by the beginning of the 14th century.

The water from this network of channels, wells, tunnels, ducts and settling pools reached surface level by means of an ingenious distribution system – dozens of fonts, fountains, wells and tanks – which guaranteed supplies throughout the urban fabric of the city. Not a drop was wasted. Any water which was not consumed at a drinking water plug went to large pools in which it was collected for use in the case of fire (fires were frequent and extremely serious in Medieval times).

Once these pools were full, the precious liquid flowed into animal drinking troughs. Any excess water was then sent to the washhouse for use in washing dirty clothes. Having served every possible use in the city, the water was then transported to tanners, mills and vegetable gardens outside the city walls. The rigor with which water distribution was managed reflects the strategic importance of this vital element in the development of both the economic and the social activities of the city. Indeed, water played a leading role in the demographic growth of Siena, being an essential factor in the improvement of the hygienic and sanitary conditions of the whole community and the development of many thirsty craft and cottage industries. Over the centuries many city governors and administrators have worried over how to proceed with the ongoing job of maintaining a structure which is as precious as it is delicate. Fonte Gaia, a fountain head sculpted by Jacopo della Quercia, is emblematic of the 14th century ability to combine artistic and functional perfection: an ability which is difficult to match even in today's technological era. Composed of approximately 25 kilometers of tunnels, the medieval aqueduct is a masterpiece of 14th-15th century engineering and it is still used to pipe water to the city of Siena. However, the water carried by the ancient aqueduct is not been used for drinking since the construction of a modern aqueduct at the beginning of the last century.

Roles and Functions of Water in African Community Life

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Summary

As man gradually spread across Africa, water was a determining factor in choosing a location for the community, for strategic life support and military reasons. As time passed, man began to domesticate water, endowing it with a socio-cultural function. In Africa, water is a rare resource coveted by both men and animals alike. When available, it enables man to eat, drink and grow crops. In terms of customs, water is an element to be found in all religious rituals throughout African communities. It is used to commune with the spirits present in the afterlife. Convinced as he is that he owes his life to water, man has invented a myriad of myths to surround this life-giving, benevolent element. Modernisation of water management techniques has been particularly beneficial to women, as they have to spend less time fetching and carrying water, leading to a degree of liberation enabling them to claim their place in the community and engage in revenue-earning activities. The health, diet and buying power of the populations have improved accordingly.

Introduction

Water, which is the lifeblood of our planet and its inhabitants, is a rare resource in Africa. When available, it is managed rationally to ensure that there is water for consumption and for production.

As he has done with nature's other elements, man has domesticated water, endowing it with a socio-cultural function, on which our presentation is based.

1. Control of water and atmospheric phenomena

In most traditional societies, the noble classes surrounded themselves with a number of corporations or castes responsible for feeding and looking after them and protecting the population as a whole. In this way, certain families had responsibility for the water supply and atmospheric phenomena. The families of fishermen called the Bozo in Mali and Tôfinou in the lake village of Ganvié in Benin handle the fishing side while others specialise in looking after meteorological phenomena.

Among the Bozo, the parents have the task of handing down their knowledge to their children, who are generally initiated very young. Through these initiation rites, they receive the secrets of the craft from the water spirits. After a period of one week spent in the water, they acquired the knowledge and power elevating them to the rank of Bozo. Henceforth they are capable of:

- communing and communicating with water,
- predicting disasters related to water,
- saving any life in danger in water,
- extracting a fishbone from the throat, simply by caressing the neck.

A good Bozo can never be 'eaten' by the water.

In the field of agriculture, it is up to the designated family to signal the beginning of the farming season. Knowledge and empirical mastery of meteorology gives it the role of announcing the effective beginning of the rainy season by sowing a few symbolic seeds.

In Africa, lightning can be created and directed against an individual. It is often used to identify those guilty of theft. Failure to confess inevitably leads to the guilty party being struck by lightning. Mastery of lightning is reserved for a very few families of initiates.

2. 'The water of welcome'

African tradition requires that the visitor's thirst be slaked before he can be asked any questions. The art of welcome led certain communities to develop the 'water of welcome', which is in fact water with a millet flour and sugar base. Apart from this welcoming ceremonial function, the 'water of welcome' is used as a drink in festivities or funeral rites.

3. The water cult

Water is an element to be found in all religious rituals in African communities.

3.1 The role of water in contacts with the afterlife

When poured on the ground or the fetish, water enables man to commune with God or the Spirits inhabiting the afterlife. This is a practice which considers that the deceased is still alive up there. The closeness of the deceased to God and his special ties with those still on Earth enable those left behind to ask him to find solutions to their problems.

3.2 The aquatic environment cult

Ponds, lakes, rivers and/or aquatic animals may be linked to the community by a pact endowing them with a sacred status. Some aquatic animals represent the deceased ancestors and are thus venerated and protected, creating a bridge between the community and the afterlife.

Examples of sacred aquatic animals can be found in all countries in Sub-Saharan Africa. However, we will mention two examples in Burkina Faso. These are the sacred catfish of the Dafra[1] in Bobo-Dioulasso (town in western Burkina Faso) and the sacred crocodiles of Sabou lake (village in central-west Burkina Faso). Regularly fed with meat or cereals, these protected animals become huge as they grow older. It would seem that some sacred catfish wear ear-rings or necklaces.

Through these close ties with water, the entire community or each individual in the community submits problems for which a solution is sought. The problems concern not only health, happiness, peace, safety, protection, fertility, work and marriage, but also the fight against natural disasters such as flooding, drought and so on. Women who, for example, is having trouble conceiving, may go to the sacred pond or river to ask to become fertile. The request is always followed by a promise, which is to offer an animal if the request is granted. Failure to keep a promise can call down a host of misfortunes ranging from death, to drowning, flooding, drought, etc.

3.3 The struggle against drought

Water is the element that determines the success or failure of a harvest, especially in sub-Saharan Africa. Occult methods can be used to make rain in isolated areas of drought. In certain societies, incest (sexual relations between castes) can cause drought. Occult methods are used to identify those guilty of incest, who then undergo purification consisting in bathing in the village's sacred pond or lake. There are three steps in the process from identification of those guilty of incest to the purification ceremony. The first is to identify all the concessions affected by the incest. Then the guilty parties in the concession are identified. The ceremonies in these two phases involve sacrificing chickens. When the chicken keels over backwards stone dead, the fault is confirmed. Once all the incestuous parties are known, the third step takes place, involving purification or banishment. Unlike the extreme sanction of banishing the incestuous person from his community, the solution of purification chosen by certain social groups rehabilitates him within his original community.

In other societies, dancing by naked women or sacrificing domestic animals in sacred places or on altars creates contact with the Sky God, master of rainfall, from whom help is requested.

All these practices are inevitably punctuated by storms that can lead to flooding. This is how communities that have preserved their culture manage to save their crops and pasture lands and fill their reservoirs.

1. Name of a river.

3.4 A few water-related myths and legends

All water-related myths are based on enigmatic representations which always involve deities in a form which can be summarised as human, animal, or a combination of the two. These deities are endowed with the power to bring either happiness, or misfortune.

3.4.1 The legend of the siren

The myth of the siren, a female deity whose lower limbs take the form of a fishtail, can be found in all the coastal countries. From Côte d'Ivoire to Benin, the legend says that the sirens commonly called 'Mami Watta' open the gates of happiness and wealth to whoever meets one.

3.4.2 The myth of the river that saved an entire people

The Akan people currently occupy the central part of the Côte d'Ivoire and owe their existence to a river. Fleeing from the enemy, their ancestor, Queen Abla Pokou and her retinue escaped from Ghana and settled in the Côte d'Ivoire. Along the way, they found their path blocked by a river. The fortune-tellers predicted that only the offering of a child to the river would enable them to cross.

To save her people, the Queen promised to throw into the water the child she was holding. In so doing, she declaimed in patois 'Bâ Ouli'[2] which she gave to her people as their name. When the river took the child, a bridge of crocodiles formed to enable them all to cross. Once they had all made the crossing the bridge dispersed leaving the enemy stranded on the other side.

3.4.3 The myth of imaginary creatures haunting the waters

In Africa, when a river or body of water 'eats' a human, this is attributed to a spirit. Many communities believe this spirit takes the form of a large water snake, with the legend handed down from generation to generation. The serpent may be invisible but its destructive powers are great. When it is angry, it creates flooding by blocking the water course. People found dead by the water's edge are believed to have been killed by this mysterious and imaginary creature, which only brings an end to its devastation if sacrifices are made. These sacrifices involve throwing sacrificed or living domestic animals into the water.

3.4.4 The water myth and the Dogons

Among the Dogons inhabiting Bandiagara cliffs in Mali, the myth of Nommo, a celestial divinity who is the source of all water has been handed down through the generations. Believing Nommo to be the force behind everything, the Dogons venerate him every year, as the rainy season approaches, in order to guarantee good harvests. Nommo is both man and serpent and is present in all manifestations of water from the lake to the smallest droplet.

4. The impact of change on the socio-cultural functions of water

Traditional water management practices and the water cult have had to change in the face of modernisation. Water management is now the responsibility of specialists, who often have little

2. The transcription error made by the colonising power led to 'Baoulé' instead of 'Bâ Ouli', meaning 'the child is dead'. The Baoulé are the ethnic group occupying the central part of the Côte d'Ivoire.

time for local culture. Certain introduced cultural habits have obliged many communities to abandon their own culture.

4.1 Liberation of women

Modernisation of water management techniques has benefited women greatly. Improved pumping techniques (lined wells, wells equipped with hand pumps, etc.) have considerably reduced the time taken by the women to fetch water.


Source: Association Eau-vive

As they are no longer obliged to travel several kilometres every day to provide their homes with water, the women now have time to giver more attention to their children, claim their rightful place in the community and take part in activities generating income. There is now a growth in the number of women's groups and associations, where they get together to discuss their living conditions, their place in the community, their future and their activities … Many ponds and lined wells allowing market gardening have been put to good use by these organised community structures.

4.2 Changing mentalities

In Africa, any community development which ignores local culture is doomed to failure. This is why it is vital to take account of what the people are, know and need, from conception to implementation of a project. Many hydraulic development projects planned in the laboratory and transferred to the field, have failed through ignorance of the local realities. Water pumps have remained eternally broken through poor management. Dams have been incorrectly used, lined wells have been blocked with rubbish.

Actions in the field are increasingly using awareness programs to change mentalities which are highly influenced by the existing culture. With regard to wells with pumps, these programs have led to the creation of community structures responsible for managing the installations. Water is now sold on a barter or cash basis, whereas traditionally this would have been taboo. In the event of a breakdown, the money generated can be used to pay the local repairman or one from a nearby village to repair the system.

Despite the efforts of governments and Non-Governmental Organisations (NGOs) to provide rural communities with high-quality water, one is forced to admit that most people still do not have access to drinking water. To survive, they have to drink river or pond water without the slightest check on whether or not it is potable. They thus expose themselves to numerous water-borne diseases such as Guinea worm, dysentery, diarrhoea, and various stomach ailments. Until such time as all villages have access to hydraulic equipment to produce drinking water, campaigns to make people aware of water hygiene and the various methods of purification are being conducted in the field.

4.3 Adaptation of the water cult to change

When the hydraulic development specialists work hand in hand with the local population, steps are always taken to spare the holy sites. The need to develop a sacred lake or to occupy a sacred site to build a dam, means that steps must be taken to prevent angering the ancestors. The Elders simply need to make offerings to the ancestors to ask for their permission. Development of the sacred

crocodile lake at Ouahigouya (northern Burkina Faso) required the involvement of the Elders, who took steps to ensure that the crocodiles disappeared before the work began. They only reappeared once the work was completed.

Certain communities have been able to reconcile the water cult with integrated tourism activities in which the culture is preserved. Tourist activities organised around the sacred crocodile lake of Sabou and the sacred catfish of Dafra in Bobo-Dioulasso are examples worth mentioning. The tourists who wish to take a close look at the crocodiles offer them chickens from the community authorised to conduct the ceremonies. After being fed to the point of harmlessness, the crocodiles come out of the water to be fondled by the visitors.

However, the adoption of introduced religions such as Christianity and Islam dealt a fatal blow to traditional African culture. The communities which converted were obliged to give up all their idolatrous practices.

Conclusion

The deterioration of the natural environment in Africa can chiefly be explained by ignorance or the gradual abandoning of the cult of the natural environment and the demographic explosion with its concurrent growth in the needs of the populations. The co-existence of the two factors has meant that 'modern Africans' looking for living space have infringed the rules that protected the sacred areas at a time when the ancestors lived in harmony with the world around them. The attack on the environment has served to entrench a situation of chronic drought causing widespread famine, drying up of surface waters and falling underground water levels.

Today's African is unable to exert any influence on the climate, as his ancestors were capable of doing when the need arose, and is powerless in the face of these water-related problems. The need to develop modern distribution techniques is vital but the cost of modern installations means the only solution is governments and NGOs, whose financial efforts in favour of hydraulic projects are limited, because outside funding is becoming increasingly scarce, at a time when control of water is one of the conditions sine qua non for Africa to break free of the shackles of poverty.

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Reconciling Modern Water Management with the Political Culture of Traditional Societies

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In every country, even in the modern developed societies, the cultural differences influence the way to organize and manage services and technical operations. Difficulties always appear when trying to introduce new management manners, coming from another cultural area. This difficulty is reinforced when the issue is to modernize or to organize new services in developing countries, generally with models coming from northern countries.

Everywhere in the world, management is based on universal values that are efficiency, respect of populations and individuals, social justice and participative approaches. But the problem when trying to organize a community is that the social and cultural aspects and the concern for a better efficiency are completely mixed in a strange form of combination. In developing countries, we have to bring efforts in the rationalization of management. A modern and efficient form of management needs to be achieved and developed. This issue of management and culture, is closely linked with the issue of water because managing water means charring resources and services and making sure that things work together. We know that water is essential. It involves technical and financial issues, but also social and public issues. Of course it gives raise to conflicts and has very strong symbolism attached to it. So we need more rationality and we need to base ourselves on cultural aspects of groups.

Before moving on to management concerns, the idea of culture needs firstly to be discussed in order to avoid any sort of misunderstanding. When we talk about culture in the sociological sense of the word, we usually think that culture is a system of values that determines the behavior of the actors. This definition comes from Dürkheim and is frequently used by social scientists. But this definition is not sufficient. It does not address our problem because in fact, a certain number of values are universal. In the same time, many values change with generations and technical progress.

Therefore it is preferable to refer to the definition anthropologists give: culture is a context for interpretation. The same social situation is not interpreted in the same way by different people, it does not have the same meaning, according to the cultural context of each community. The values are universal, but the way to express these values changes from one country to another. From one country to another we can find different ways of giving a meaning on the proper way or the bad way to live together, to share resources or tasks, to work together, to control people or to exercise a pressure on our colleagues.

The notion of culture is thus a key aspect in the implementation of projects in developing countries. When trying to implement user-associations for example, we are often faced with projects that are not sustainable or inefficiently managed.

Several user-associations find it hard to identify the original funds. In several systems these deficiencies have led to the fact that the community can no longer handle these issues. At the basis of all this, the community is weary, the village communities distrust the approaches. What was the problem originally?

The first explanation is that the management procedures, in the practical sense of the word, are often imported from developed economies. They are not consistent with the local way of living and working together. For example, the decision making process is not well suited to the context. It has

just been determined by the project. How to control or drive the operation? How to implement the content of the maintenance procedures? How to share the price of water or even to monitor the management of money? All these aspects need to be adapted.

There are a couple of key issues to be highlighted on the culture of the sub-Saharan area.

Often in the relationship between individuals and the group there is a basic opposition between friendship and nastiness which gives a meaning to social understanding. How to interpret social interactions? This interpretation is actually based on the intentions, personal interest, friendship or secret envy the stakeholders have. All these intentions need to be regulated in the relationship. Based on this brief overlook, we can begin to understand what went wrong. Regarding friendship, we often note that the general management principles are affected by the loyalty that is due to your neighbor, to your friend, to anybody who requires help. What experts call the African solidarity is a positive value, but it is also a considerable difficulty in refusing assistance to the person who requires this assistance. Refusing financial assistance, one has to proof that this help can not be brought forth. It is difficult for example for the person responsible to recover water tariff to forth the payment. But it is also a problem for the people who distrust the person responsible to recover the money. There is this saying that 'the person ate the money'.

In this context we are lacking practical approaches to properly manage the associations.

Nevertheless a successful example in Mali can be mentioned to show how an efficient management in the cultural context was addressed. In this case of Mali, we can find small decentralized water systems in villages of a population of 2,000 to 10,000 people. The association with communities, small user associations and local users was essential.

But before implementing this project, we called on the services of a social scientist to organize awareness campaigns, not only on hygiene issues, but also on management issues. Pictures of painters from Burkina Faso were used by social scientists to talk with populations about what needs to be done to better manage the water resource, to manage the money, the technical maintenance and so on.

Two very practical aspects insured that this management approach lead to the fact that 20,000 users now pay for the water services. First of all the association has written detailed procedures that determined very specifically and practically, who does what, who is responsible for what, who reports to whom. Another surprising point is the importance of an auditor who visits the user-associations twice a year. He is paid by a levy on the water tariffs and he assesses the work of the water associations. In some cases the visit of the auditor leads to a meeting in the village to talk about the water tariffs that were considered insufficient and it was decided to raise the tariffs. Another village used the report of the auditor, who comes from the outside and who is not influenced by friendship aspects, as an independent observation. In this village it was decided to change the offices of the organization following this auditor report.

This is very comparable to what we find in terms of procedures in the African tontine. They are associations of voluntary subscriptions where specific control systems are implemented.

There are best practices to seek in the project management approaches, but there is one universal learning which says that best practices should be sort at the regional level, according to a same culture area. Best practices need to be studied in detail in terms of management practices and consistency with the cultural context. Success stories of consistency with the local way of living and thinking as a community should be widespread, not explaining the procedure, but the reason why it worked.

Session 6: Indigenous Water Vision and Rights – a New Perspective for Better Water Management

Derechos indígenas y acceso al agua: EL AGUA ES DE TODOS Y ES DE NADIE La visión andina del agua

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1. Los Andes

La Cordillera de los Andes es mudo testigo del origen y desarrollo de uno de los procesos históricos más sobresalientes del mundo antiguo que condujo al surgimiento de variadas civilizaciones. Ello fue posible gracias a la manera como a lo largo de miles de años las sociedades originarias aprendieron a utilizar, transformar y conservar los recursos naturales, a organizar su territorio y a generar mecanismos sociales y económicos particulares para el ecosistema andino.

La Cordillera de los Andes

A diferencia de otras cordilleras del mundo, la Cordillera de los Andes corre en dirección norte a sur, paralela al Océano Pacífico, abarcando 70 grados de latitud a lo largo del margen occidental de América del Sur. Comprenden una sección de 15.000 km de cordilleras del Nuevo Mundo y tiene una longitud de 7.250 km, ocupando un área continua de más de dos millones de km^2.

Los Andes constituyen una de las regiones de mayor diversidad ambiental y geomorfológica en el mundo. Dada su enorme longitud norte-sur que se extiende a través de todas las zonas climáticas con diversa vegetación entre la línea ecuatorial y la Antártica, así como las grandes alturas desde el nivel del mar hasta las cumbres de nieves perpetuas, no es sorprendente que los Andes contengan los rangos más extremos de tipos de paisajes, climas y comunidades vegetales del mundo.

El día de hoy la complejidad geomorfológica y climática de los Andes parece ser un factor limitativo para el desarrollo, y el mundo moderno aún no sabe utilizar a plenitud las riquezas que ofrece su diversidad. En la antigua América andina, las limitaciones geográficas y medioambientales fueron convertidas en oportunidades, con la domesticación de plantas, animales, la tierra y el agua.

Transformando limitaciones en oportunidades

Además de las empinadas laderas y los cambios climáticos impredecibles que caracterizan a los Andes, la escasez de agua es uno de los retos más grande para la sobre vivencia. Para mitigar esta situación, las poblaciones indígenas andinas desarrollaron tecnologías asombrosas e incluso movieron cantidades verdaderamente prodigiosas de tierra y agua para crear nichos agrícolas sostenibles.

Muchas técnicas fueron usadas por los hombres y mujeres andinas para manejar el agua y crear tierras de cultivo: entre otras los sistemas hidráulicos particulares a las diversas condiciones naturales; los ‘waru waru’, ‘camellones’ o ‘sucaqollus’ para las planicies inundables del entorno del lago Titicaca; las ‘qochas’ para capturar las aguas de las lluvias; y las más conocidas terrazas de cultivo o ‘andenes’ para aprovechas las empinadas laderas andinas.

El día de hoy, mucho de los conocimientos indígenas que permitieron la convivencia armónica con los Andes no son utilizados, las tecnologías están relegadas y las poblaciones que las hicieron posibles se encuentran marginadas.

La población andina

En los Andes, por más de 20.000 años, la población estableció un modelo de vida basado en una agricultura y ganadería sustentables. Esta población constituyó una sociedad en armonía con el medio ambiente y con altos valores de complementariedad y reciprocidad.

El día de hoy, casi la totalidad de las poblaciones indígenas en los Andes comparten un conjunto similar de problemas con relación a su situación social, política y económica como poblaciones colonizadas y marginadas.

2. El agua en la cosmovisión andina

Si bien la visión del agua en la región andina tiene particularidades de acuerdo a las distintas culturas indígenas existentes, a la diversidad de áreas ecológicas, a las diferentes ubicaciones de las cuencas, y a los niveles de organización social (comunidades, caseríos, parcialidades, ayllus, etc.), existen comunes denominadores que deben de ser mantenidos y respetados.

Para los pueblos andinos, el agua es mucho más que un recurso hídrico.

El agua como ser vivo

El agua es un ser vivo, proveedor de vida y de animación del universo. Con el agua se dialoga, se le trata con cariño, se le cría. Esta visión ha sido factor fundamental para la adecuada cosecha, conservación y reproducción de los recursos hídricos.

El agua como ser divino

El agua proviene de *Wirakocha*, dios creador del universo, que fecunda la *Pachamama* (madre tierra) y permite la reproducción de la vida. Es, por tanto, una divinidad que está presente en los lagos, las lagunas, el mar, los ríos y todas las fuentes de agua.

El agua como base de la reciprocidad y complementariedad

El agua permite la integración de los seres vivos, la articulación de la naturaleza y de la sociedad humana. Es la sangre de la tierra y del universo andino. Permite practicar la reciprocidad en la familia, los grupos de familias y comunidades andinas. Ordena la vida de los individuos, presenta la diferencia no como oposición sino como complementaridad, y facilita la solución de los conflictos sobre la base de acuerdos comunitarios.

El agua como derecho universal y comunitario

El agua ‘es de todos y es de nadie’. Pertenece a la tierra y a los seres vivos, incluyendo al ser humano. Se distribuye equitativamente de acuerdo a necesidades, costumbres y normas comunitarias, y según su disponibilidad cíclica.

El agua como expresión de flexibilidad y adaptabilidad

El agua se comporta de acuerdo a los ecosistemas, circunstancias y coyunturas, sin seguir normas rígidas. Depende del tiempo, clima, y topografía. La sociedad andina, como el agua, está en continua apertura frente a todo lo que enfrenta, incorporando selectivamente elementos de otras culturas y grupos humanos complementarios a su cultura.

El agua como ser creador y transformador

El agua sigue leyes naturales, de acuerdo a los ciclos estacionales y a las condiciones del territorio. Su uso sustentable implica la generación y aplicación de conocimientos y habilidades obtenidos durantes siglos, así como la construcción de una infraestructura hidráulica que permita cosechar y distribuir el agua, sobre la base de una gestión mancomunada y eficiente.

El agua como recreación social

El agua es la recreación de la diversidad en el espacio y el tiempo, en las organizaciones comunitarias, en la participación de la población, permitiendo la autodeterminación de las comunidades, en discusión y dialogo permanente con la naturaleza.

3. La realidad de los Andes en el contexto de la visión mundial del agua

La Visión Mundial del Agua aprobada en el Segundo Foro Mundial en La Haya, en marzo del año 2000, además de haber marginado la perspectiva de las poblaciones campesinas e indígenas de los Andes y el mundo, pone en gravísimo riesgo la supervivencia de éstas. La Visión emanada de la Haya, a ser convertida en un Plan de Acción Internacional en Kyoto, en marzo de 2003, constituye una amenaza para la conservación y uso sustentable de los recursos hídricos a escala internacional y para los países con poblaciones indígenas campesinas altamente significativas, como en los Andes.

En estos países las legislaciones con relación a los recursos naturales y en especial con relación al agua no consideran la visión, cultura y propuestas indígenas y campesinas en referencia a uno de los recursos más estratégicos del milenio, y por lo tanto no respetan sus derechos y prácticas consuetudinarias. Esta realidad se torna aún más ingrata al analizar que la gestión hídrica de poblaciones indígenas y campesinas sostiene la seguridad alimentaria nacionales.

Nos preocupan principalmente cuatro propuestas presentes en la Visión Mundial del Agua de La Haya:

a) Reducir el uso del agua en el sector agrícola generalizando el uso de cultivos transgénicos
Esta propuesta, como vía para el uso eficiente del agua, atenta directamente a la inmensa biodiversidad de cultivos nativos de los Andes, provocaría dependencia de las poblaciones hacia empresas biotecnológicas y la pérdida de su seguridad y soberanía alimentaria y viola el principio de precaución sobre estos cultivos.

b) Reasignar el agua de los usos de menor valor (agricultura familiar) a los usos de mayor valor (agricultura en gran escala, industria y consumo humano)
Esta propuesta conduciría a la destrucción de la pequeña producción campesina y familiar, base de su subsistencia y cultura, profundizando la migración hacia las ciudades y generando nuevos bolsones de pobreza.

c) Hacer de la inversión privada la palanca para la resolución de los problemas del agua
Esta propuesta conduce a la privatización del agua, desligando al Estado de las responsabilidades que tiene con todos los usuarios y generando artificialmente una demanda para promover grandes negocios en desmedro de la mayoría de la población mundial, y especialmente de las poblaciones indígenas y campesinas.

d) Cobrar el costo total del agua
Cobrar el costo total del agua en un contexto de privatización del recurso, para atraer a los inversionistas privados, pone en peligro la disponibilidad del agua para la mantención de los ecosistemas, restringe el acceso de la población a este recurso, y transforma el acceso al agua en una mercancía, dejando de ser un bien nacional de uso público, y derecho consuetudinario.

4. Propuesta para la acción desde la visión andina

¿Cómo respetar la visión de las comunidades indígenas y campesinas de los Andes, fortalecer su identidad, asegurar sus derechos y conservar los recursos hídricos?

El agua como patrimonio común

Desde la visión y experiencia del mundo andino, cualquier plan de acción con relación al agua debe estar orientado a protegerla y conservarla, garantizando su disponibilidad con equidad para asegurar la existencia de todos los seres vivos del planeta. Para ello se debe asegurar y proteger los sistemas hídricos, tanto en su entorno geográfico como en su ciclo natural, consensuando acciones y mecanismos que mantengan la integralidad de los ecosistemas, especies animales, vegetales y la vida de las comunidades con dignidad, y recreando su identidad cultural.

El agua es patrimonio de la tierra y de toda forma de vida animal, vegetal y humana. Por ello, cualquier marco jurídico con relación a los recursos hídricos debe estar basado en este principio.

El agua como dominio público

Este principio implica la definición del agua, en las Constituciones, como bien público bajo el control de la sociedad en su conjunto.

Al mismo tiempo, se deben formular mecanismos equitativos de uso que respondan a las necesidades de la naturaleza y de las comunidades humanas, priorizando los derechos de subsistencia, soberanía alimentaria y desarrollo local.

El agua es un bien común no una mercancía

El acaparamiento del agua por los sectores más dinámicos de la economía como el sector minero, industrial, agrícola empresarial, exportador, y otros, va en desmedro de la gran mayoría de usuarios y de la propia naturaleza. Por tanto, ninguna empresa, nacional o transnacional, o persona particular, tiene el derecho de apropiarse del dominio del agua o acaparar su uso para fines de lucro privado en perjuicio del resto de la colectividad.

Por ser el agua un bien de dominio público, es un recurso vital que no puede ser tratado como mercancía, ser reducido a un valor comercial y estar sometido a las leyes del mercado. Por ello, el agua no puede ser materia de tratados de libre comercio internacional como los de la OMC y el ALCA, o los tratados bilaterales.

Revalorización de saberes, tecnologías y organización andina

Los saberes del mundo andino, sus sistemas tecnológicos y sociales de gestión del agua parten del principio de la convivencia armónica con la madre tierra y se sustentan en la propiedad colectiva del agua basados en un sistema legal y social propio. Estos lograron garantizar la sustentabilidad de los ecosistemas desde tiempos inmemoriales y por lo tanto deben ser preservados, respetados y reconocidos.

Los sistemas tradicionales de manejo del agua, desarrollados y validados a lo largo de cientos de años, hoy en día marginados, son probadas alternativas para la sostenibilidad de los recursos hídricos. Por ello deben de ser mejor comprendidos, valorados, recuperados y difundidos como tecnologías para la sustentabilidad del desarrollo.

Sistemas de gestión integrales y participativos

Los sistemas de gestión del agua deben basarse en un concepto de integralidad, a partir de una concepción territorial de cuenca, de usos compatibles y sustentabilidad del recurso. La priorización de los usos del agua debe basarse en mecanismos participativos que permitan garantizar su conservación y el acceso equitativo.

Los proyectos de gestión sustentable requieren de información pública sobre el estado actual y disponibilidad de las aguas superficiales y subterráneas, información hoy en día casi inexistente, poco sistematizada y de difícil o costoso acceso.

Institucionalidad participativa y control social

Las normas legislativas y formas de gestión del agua deben garantizar la disponibilidad del agua en términos de volumen y de calidad, para asegurar la sustentabilidad y necesidades de los ecosistemas y de las comunidades humanas. Para ello, los sistemas de gobernabilidad, tanto a nivel de cuenca como nacionales, deben basarse en las autoridades hídricas locales ya existentes, tales como comunidades indígenas, campesinas, asociaciones de regantes, y demás usuarios del agua.

Los gobiernos de los países andinos deben respetar y valorar la gestión y el derecho originario comunal e integral de las comunidades indígenas y campesinas, debiendo éstos ser reconocidos como patrimonio de la humanidad.

Políticas económicas adecuadas

Toda política de inversión pública debe considerar prioritariamente la conservación del recurso, la gestión sustentable y el desarrollo local y regional sobre la base de los usos y costumbres indígenas y campesinos. Cualquier inversión privada en el sector agua debe someterse a estos criterios.

En las cuencas andinas, el recurso agua se genera en las partes altas pero por lo general se beneficia a las partes bajas. Las políticas hídricas deben priorizar mecanismos adecuados para el beneficio equitativo, que garantice una mejor calidad de vida de los pobladores de las cuencas altas que son los menos favorecidos.

De Porto Alegre a Japón
La defensa del agua tiene rostro indígena

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Los indígenas somos el sector de la población que más respeta y protege el agua en la tierra. Sin embargo, uno de los sectores mas olvidados y atacados en sus derechos entorno al agua es el sector indígena. Somos tan olvidados que, en el borrador de declaración ministerial que este Foro Mundial del Agua está discutiendo, no existe ni siquiera la palabra INDÍGENA.

Pero mientras aquí a los indígenas hay quienes nos quieren convertir en parte del folklore del Foro Mundial del Agua, en el Foro Social Mundial de Porto Alegre que se realizó hace apenas dos meses en Brasil éramos el corazón y el centro de atención cuando de agua se hablaba. ¿Por qué el mundo oficial nos desconoce mientras los movimientos sociales cada vez se hermanan con nosotros los indígenas?

Permítanme responder a esta pregunta con este resumen de planteamientos que venimos haciendo en diferentes eventos.

Primero, los indígenas no queremos ser solamente una palabra en una declaración, un adorno folklórico que no compromete a nada. Reconocer la existencia de los pueblos indígenas es reconocer que no se deben otorgar concesiones o derechos de agua para minería, electricidad, pesca, plantaciones forestales y otros que afecten el uso y acceso al agua de los pueblos indígenas en el mundo.

Segundo, queremos que nos consulten y que respeten nuestras decisiones. No queremos informarnos por el periódico de las leyes y contratos que aprueban sobre el agua en nuestros territorios. La gestión del agua para ser participativa, democrática y "eficiente", esa palabra que tanto le gusta al Banco Mundial, debe incluirnos a nosotros con poder de decisión y no solo a nosotros sino a todas las poblaciones de campesinos, trabajadores y habitantes de las ciudades. Porque para los indígenas todos somos seres humanos.

Tercero, las leyes sobre medio ambiente y derechos indígenas deben estar por encima de las leyes sobre comercio y protección al inversionista. Primero está la naturaleza y los seres humanos antes que los negocios.

Cuarto, queremos que se reitere el llamado para que todos los países firmen la convención de Kyoto sobre cambio climático. Y cuando digo "todos" los países ustedes saben a que país me refiero.

Quinto, queremos instancias de control y sanción real sobre las empresas que contaminan y destruyen las aguas. No estamos de acuerdo, como lo plantea el borrador de declaración ministerial de este foro, con generalizar el principio de que el que contamina paga, y listo asunto arreglado. Eso es criminal. Yo mato un animal, destruyó un pueblo indígena y lo único que tengo que hacer es pagar una indemnización. La contaminación es un delito que no puede ser remediado con dinero. No desconocemos la importación de las compensaciones económicas, pero ese no puede ser el principio.

Sexto, consideramos que generalizar el consumo de semillas y alimentos transgénicos que consumen menos agua, como lo propone la Visión Mundial del Agua aprobada en la Haya, constituye un crimen contra la humanidad y el planeta. Valoramos el desarrollo de la tecnología pero advertimos que la ciencia no debe romper las leyes de la naturaleza sino quiere destruir el mundo.

Séptimo, no queremos la privatización y mercantilización del agua. Nadie tiene el derecho de apropiarse de un bien que es de todos, y cuando digo todos no nos referimos solo a los humanos sino también a las plantas, a los animales y a la tierra. El agua es un bien común que debe ser protegido, cuidado por los hombres y mujeres para el presente y futuro de la vida.

Octavo, los créditos y préstamos del Banco Mundial, el FMI y los Bancos de Desarrollo regional no pueden estar condicionados a la privatización del agua. La propuesta de Public, Private Partnership en los hechos promueve mas el private que el public.

Noveno, estamos muy preocupados porque en la Organización Mundial del Comercio y en los tratados regionales y bilaterales de comercio se esta incluyendo el agua como una mercancía. Si esto continúa no habrá más diversidad cultural, pueblos indígenas ni autodeterminación de los pueblos en el mundo.

Décimo, la vida esta delante de la muerte. Este foro mundial del agua tiene que hacer un llamado a que los miles de millones de dólares que se están gastando en la guerra sean destinados a inversiones en el agua y la vida.

Water laws, water policy and indigenous water rights: the WALIR Programme

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Summary

In many regions of the world, peasant and indigenous water management systems constitute the basis for sustaining local livelihoods and national food security. In most Andean countries, for example, indigenous and peasant communities are the main providers of food for the national populations. Therefore, security of access to water and the means to manage their water systems is of crucial importance. Nevertheless, on top of the historically grown, extremely unequal distribution of access to water, indigenous and customary water rights in Latin American countries and in other continents are increasingly under pressure. Consequently, the millions of indigenous water users find themselves structurally among the poorest groups of society. Moreover, they are usually not represented in national and international decision-making water organs. This contributes to a situation of increasing inequality, poverty, conflict and ecological destruction. Even when indigenous rights and water management practices are not simply obstructed by national legislation and intervention policies, attention to the subject is negligible. Governments have paid it mere lip service.

In the presentation, the challenges of the international action-research, capacity-building, exchange and advocacy programme WALIR are outlined – 'Water Law and Indigenous Rights. Towards recognition of local and indigenous rights and management rules in national legislation'. WALIR is a collaborative program coordinated by Wageningen University and the United Nations Economic Commission for Latin America and the Caribbean (UN/ECLAC) and is implemented in co-operation with a great variety of counterpart institutions in Bolivia, Chile, Ecuador, Peru, Mexico, France, The Netherlands and the United States of America. The program attempts to be a kind of think-tank to critically inform debates on indigenous and customary rights in water legislation and water policy, both to facilitate local action platforms and to influence the circles of law- and policy-makers. Equitable rights distribution and democratic decision-making and therefore, support for empowerment of discriminated and oppressed sectors, are major concerns.

In co-ordination and collaboration with existing networks and counterpart-initiatives, WALIR sets out to analyze water rights and customary management modes of indigenous and peasant communities, comparing them with the contents of current national legislation and policy. Thereby, it sheds light on how the first are legally and materially discriminated against and undermined. The aim is to contribute to a process of change that structurally recognizes indigenous and customary water management rules and rights in national legislation. It also aims to make a concrete contribution to the implementation of more equitable and sustainable water management policies and participatory action-strategies.

Introduction

In the Andean countries as in many regions of the world, local and indigenous water management systems are the basic fundament of the people's livelihoods and national food security.

Therefore security of access to water (quantity, quality, timing, place) and the means to manage their systems in the context of broader institutional and agro-ecological settings and developments is of crucial importance.

However, indigenous and customary water rights in the Andean countries and in other regions and continents are increasingly under pressure. Besides they have to face the discrimination of their hydraulic cultures and rationales (e.g. by national legislation and policies) the threatening and encroachment of their water rights by outsiders (commercial enterprises, mining companies, power generation, etc.), the neglect and obstruction of their local water management systems, and the lack of their representation in national and international decision-making institutions.

Policies and legislation do not take into account the day-to-day realities and specific contexts of indigenous groups

'…there is a recurrent problem for indigenous peoples, who are often constrained to deal with vital issues on terms dictated by others.'

The lack of recognition of indigenous and customary water rights has affected indigenous agricultural uses, causing their elimination, and the exodus of population.

Deterioration of water, has also affected indigenous uses. Indigenous and campesino populations dispossessed of water, and therefore of sustainable livelihood agriculture, migrate to the cities enlarging the misery belts of urban centres.

In other cases, neglect of indian and campesino rights has resulted in social revolt as in Cochabamba, Bolivia (2000) and massive protests in Ecuador.

The WALIR Programme

The Water Laws and Indigenous Rights Programme *'Towards recognition of local and indigenous rights and management rules in national legislation'*, is a collaborative program that started to work in the year 2001 as a 'think thank' that critically inform debates on indigenous and customary rights in water legislation and water policy, both to facilitate local action platforms and to influence the circles of law and policy makers.

The WALIR group

Coordination

- Wageningen University;
- UN/ CEPAL (Economic Commission for Latin America and the Caribbean).

Counterparts institutions and networks

Bolivia (Centro AGUA, CGIAB), Peru (Universidad Católica, IPROGA), Ecuador (ECUARUNARI), Chile, Mexico, France, United States of America and The Netherlands.

WALIR aims

- To support the many thousands of customary and indigenous water management systems and platforms at local and higher levels,
- Secure their water access and control rights, and
- To contribute to local water users' economies, livelihood security and poverty alleviation.

WALIR objectives

- To contribute to a process of change that structurally recognizes indigenous and customary water management rules and rights in national legislation.
- To make a concrete contribution to the implementation of more equitable and sustainable water management policies and participatory action strategies.

The WALIR Program main concerns

- Equitable rights distribution
- Democratic decision – making, support for empowerment of discriminated and oppressed sectors.

Pueblos indígenas, diversidad y regulación social

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Summary

The denial of contemporary forms of indigenous water management is often combined with a glorification of the past: 'Incas yes, Indians no!'. We find a folkloristic, romanticized, paternalistic or racist attitude towards contemporary indigenous communities. Policies are oriented towards a non-existing image of 'Indianity'; or towards the assimilation and destruction of indigenous water rights systems. As a reaction, we see a shift to a class- and ethnicity-based struggle for water access and control rights: collective claims for more equal water distribution, the legitimization of local authorities and indigenous normative frameworks.

Placed in this context, the presentation will focus on the problem of inclusion-oriented water law and policy strategies: the *tyranny of modern equality and participation discourses*, which deny local and indigenous livelihoods, water rights and management rules. In former days, indigenous water property rights were taken away through violence, conquest, colonization and oppression, and they were excluded from the benefits of society. Although violent take-overs have not disappeared, the keywords in modern society are not anymore exclusion and outright oppression, but so-called 'inclusion', 'integration' and 'participation', in the name of 'equality'. Fundamental questions come up: First, if Equality is strived for, the question is: equal to *what,* equal to *whom,* equal to *which model?* The basic assumption in current Latin American water policies is, that 'progress' means: equality to the occidental, technocentric and male-biased water management model. Second, if Inclusion and Participation is the objective, the obvious question is: inclusion in *what?* Participation in *whose objectives, visions, and terms?* Third, there seems to be a general consensus regarding 'integrated' water management and 'integrated' policies, but: who does the integration ? Contemporary nation-states employ a new and different symbology of power – espoused in modernization and development discourses as well as in neoliberal economic policies – which aims to 'include', not to 'exclude'; it pretends to provide universal benefits, while in fact extending state control and the cultural orientations of national and international power holders. Recognition of indigenous rules and rights is denied because any legitimization of these local norms calls into question the state's and market ideology's monopoly on rationality and legitimate culture.

Paradoxically, precisely the indigenous producers of local livelihood and national food security, who developed a variety of water rights and management systems in order to adapt them to the multiple local constraints and opportunities, are the same ones that most suffer from inclusive policies and uniform legislation. But, if current cultural politics and policies of *inclusion* constitute the problem, the solution can never be to go back to *exclusion*. Participation, yes, but with a different rights approach. Taking into account that indigenous communities want to take part on their own terms.

Therefore, indigenous communities today, water users claim *both* the right to equality and the right to be different. On the one hand, there is a general demand for greater justice and equality regarding the unequal distribution of water, funds and decision-making power. On the other, there are the demands for internal distribution to be based on autonomous decisions, locally established rights and principles, and local organizational forms for water control which reflect the diverse strategies and identities found in indigenous communities today.

Los pueblos indígenas son actores políticos que han emergido en las últimas décadas con demandas diversas en los contextos nacionales, como fuerzas que cuestionan la unicidad de la perspectiva del estado nacional, la juridicidad y las propuestas económicas. Son sujetos colectivos con una diversidad de propuestas y perspectivas de manejo, gestión, administración y usos del agua. Si bien de manera general los pueblos indígenas mantienen una relación compleja, que incluye aspectos de su cosmovisión, valores éticos, formas simbólicas y saberes ancestrales, la pertinencia de sus propuestas de inclusión diferenciada enriquecen la perspectiva misma de estado, marcos normativos y relaciones sociales.

En muchos espacios territoriales de sud y centro América los pueblos indígenas fueron marginados a hábitats alejados de las tierras consideradas mas valiosas por los conquistadores. En las últimas décadas, el modelo económico esclarece la importancia de áreas naturales entrañadas en zonas alejadas, descubriendo además que las identidades indígenas, que nunca antes miro se manifiestan en aquellas. La selva amazónica se encuentra preñada de nacionalidades y pueblos indígenas que han conservado sus formas de vida, en inmensa armonía con el entorno natural, frágil y origen de una mega diversidad fabulosa. En el río Bío Bío, los mapuches pehuenches se encuentran asentados por muchas generaciones, constituyendo culturas que han conservado para los chilenos este interesante ecosistema. La implementación reciente del proyecto de represas de la empresa Endesa, ha minado la vida y supervivencia de decenas de pehuenches, llegando al cometimiento de un auténtico etnocidio a este pueblo. Es imprescindible la aplicación y la justiciabilidad de los derechos que los pueblos indígenas tienen en los territorios que fueron históricamente de su posesión, el riesgo es simplemente la desaparición objetiva de esas culturas e identidades.

Elementos fundamentales en la vida de las culturas indígenas se encuentran en la naturaleza, son parte de la cotidianidad productiva, de formas solidarias de economías, del simbolismo y religiosidad que son muestras de sus identidades. El agua en las civilizaciones indígenas es fuente y origen, dadora de vida, de allí que en muchas sociedades comunitarias se convierta, también en eje de orden y regulaciones internas. Partiendo de generaciones anteriores mantienen en el acceso al recurso del agua un enfoque complejo, que incluye representaciones culturales, formas de reciprocidad con los recursos naturales.

La gestión del agua es el fundamento, en muchos casos, del complejo tejido social, constituye en gran parte el origen del conflicto y también el núcleo de un orden social. En los Andes las comunidades indígenas han sostenido ordenamientos y regulaciones que simultáneamente a establecer un orden social y una noción de equidad propia, en la mayoría de casos también conciben una distribución equitativa, en el respectivo espacio territorial y ecológico.

A nivel de los estados nacionales, el ordenamiento que mantiene autorreguladas a las comunidades y la gestión del agua, es un soporte de estabilidad social, equidad en el acceso al recurso agua, y fundamento de la producción agropecuaria que en el caso de Ecuador (por ejemplo) alcanza a cubrir un 60% de la seguridad y soberanía alimentaria interna.

Los pueblos indígenas deben ser reconocidos dentro de la dinámica de sus derechos humanos colectivos, como sujetos con prácticas normativas, ecológicas y productivas diversas. Desde su propia especificidad se concibe el aporte al conjunto nacional y andino.

Las normas que regulan la gestión, distribución y mantenimiento de los derechos de agua en el ámbito comunitario deben ser respetadas como parte de la pluralidad jurídica que existe en los países pluriétnicos. Este reconocimiento permitirá la existencia de la interculturalidad, de una parte, y del respeto a las dinámicas, regulaciones y formas socio – productivas que dichas sociedades requieren para mantener su existencia diversa, y por tanto, su aporte significativo como patrimonio cultural de la humanidad.

En el caso ecuatoriano el movimiento indígena propone el Estado Plurinacional. Es en esencia el reconocimiento a la diversidad de nacionalidades que viven en su interior y la necesidad de realizar una reforma política y jurídica que garantice una convivencia armónica de la pluralidad de sujetos nacionales, colectivos y sociales. En el caso de las nacionalidades indígenas y los recursos naturales, es fundamental la relación histórica, simbólica y estructural que hay entre ambas. Cada territorio es un hábitat complejo en el cual se han desarrollado pueblos con culturas diversas. La demanda de plurinacionalidad pone en cuestión la forma de acceso al recurso agua, propone el manejo comunitario, así como, regula las relaciones de los comuneros o miembros de cada entidad colectiva indígena. La plurinacionalidad implica una noción de equidad, justicia, orden distintas para cada nacionalidad y pueblo.

Paulina Palacios / Enero 2003

Touareg semi-nomade dans l'Air massif du nord du Niger

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Introduction

Historiens et chercheurs ne se sont pas accordés sur l'origine exacte des Touaregs, ce peuple qui vit principalement dans l'espace Sahélo-Saharien formé par : la partie Nord du Niger et du Mali et la partie Sud de l'Algérie et de la Libye.

Toutefois, l'on s'accorde à reconnaître des origines Berbères à ces communautés nomades venues du FEZZAN, et qui demeurent très attachées, des siècles durant, à leur culture, à leurs terroirs et à leur mode de vie spécifique.

La zone de peuplement des Touaregs est constituée essentiellement autour des trois massifs du grand ensemble Saharien : l'Ahaggar (ou Hogar), l'Adrar des trois massifs du grand ensemble Saharien : l'Ahaggar (ou Hogar), l'Adrar des Ifoghas et l'Aïr. Selon une belle expression de Théodore Monod (1958 : 284), ces trois massifs sont dans un même fuseau et forment comme les piliers d'un pont Touareg qui franchit le Sahara et relie le Maghreb au Soudan, l'Afrique du pont Touareg qui franchit le Sahara et relie le Maghreb au Soudan, l'Afrique du Nord à l'Afrique Noire. Ainsi, dans ce fuseau, l'Ahaggar algérien constitue le massif central, alors que l'Aïr au Niger et l'Adrar des Ifoghas au Mali, forment les deux apophyses sahéliennes.

Le présent exposé s'intéresse plus particulièrement aux communautés Touaregs vivant dans les massifs montagneux du Nord Niger communément appelés « Aïr », à la porte du grand désert du TENERE. Ces populations vivent depuis la nuit des temps dans un écosystème fragile, marqué par la grande variabilité des pluies dans le temps et dans l'espace, un climat aride avec des écarts de température à peine supportables, le tout impliquant aune recharge aléatoire des réserves d'eau. Si en l'occurrence, des règles et comportements drastiques de gestion de la ressource « eau » ont pour une large part contribué à maintenir un certain équilibre de cet écosystème, l'on s'interroge aujourd'hui plus qu'hier sur les capacités de cet environnement exceptionnel à faire face aux besoins de plus en plus croissants de ces populations et à résister à la généralisation de la désertification qu'impliquent des sécheresses de plus en plus rapprochées et les activités économiques des hommes.

Nous tenterons de présenter dans les développements qui suivent, un aperçu du contexte physique et les modes de vie des communautés Touaregs des massifs de l'Aïr afin d'appréhender la problématique et les enjeux de la mobilisation de l'eau, facteur déterminant ici plus que partout ailleurs, pensions-nous, pour la survie es hommes et de leur environnement.

1. Contexte du milieu physique et spatial

Demande le lait à ta chamelle, un fils à ta femme, mais demande l'eau à Dieu seul.
(Proverbe Touareg)

Ce dicton populaire présage d'un cadre de vie où l'eau, au même titre que la vie, est un don de Dieu : elle est un bien sacré, rare mais elle peut être abondante selon les années et les espaces. Il traduit un cadre physique marqué par les sécheresses et un milieu humain qui « a soif » de l'eau.

1.1 Cadre physique

Relief

Il présente les éléments suivants :

- Les massifs montagneux du Nord Niger ou Aïr, constituent un vaste plateau compris ente 500 m et 900 m d'altitude, avec cependant des pics dépassant les 2000 m. Ils sont pour la plupart, de formation granitique d'âge récent et occupent d'énormes espaces.
- Les vallées (ou koris ou oueds) constituent des voies de drainage, caractérisées par l'importance de leurs bassins versants. Ils s'étendent sur plusieurs centaines de kilomètres à partir des versants Ouest et Sud Ouest des massifs montagneux ;
- Les plaines représentent les principales zones d'épandage des eaux d'écoulement que délimitent les collines ;
- Les ergs, formations sableuses avec dunes de sables constamment mobilisés à partir du TENERE par les vents sur la marge Est des massifs montagneux et dans une moindre mesure dans les vallées.

Climat

Le climat est de type tropical, subdésertique, avec des pluviométries inférieures à 100 mm / an. Les températures moyennes annuelles tournent autour de 28°C. L'amplitude thermique nocturne annuelle est de 17°C tandis que l'amplitude thermique diurne atteint fréquemment les 28°C (42°C le jour contre 14°C la nuit).

L'été est très chaud avec des températures dépassant les 45°C, quelquefois les 50°C. En revanche en saison froide, les minima sont compris entre 0 et 5°C avec parfois des valeurs négatives (–5°C).

Les saisons sont caractérisées par l'alternance de deux grandes périodes : une période sèche très longue (de novembre à mai-juin), et une saison humide (hivernage) courte (de juillet à septembre-octobre).

Ainsi on distingue localement trois saisons très marquées :

- la saison sèche et froide allant de novembre à février ;
- la saison sèche et chaude, de mars à juin ;
- a saison humide et chaude de juillet à octobre.

Les vents de type dominants sont : l'harmattan, chaud et sec et qui souffle durant une grande partie de l'année à fortes vitesses (sous forme de vents de sables) et la mousson, humide qui souffle pendant la saison chaude et humide.

L'évaporation est ici très importante car déterminée par les vents, les hautes températures et le faible degré hygrométrique qui sont une caractéristique majeure de la zone.

Végétation – sols faune

Les formations végétales sont assez caractéristiques des climats désertiques avec une prédominance de la steppe herbacée. On rencontre aussi et souvent des espaces ou subsiste une steppe arbustive (constituée essentiellement d'épineux) et herbacée.

Les sols sont très pauvres à l'exception des fonds des vallées dans lesquelles on troue des dépôts argilo-limoneux. Dans les plaines ils sont constitués de sables grossiers issus de l'altération des roches granitiques.

La faune (sauvage) existe par endroit mais certaines espèces sont menacées d'extermination : c'est le cas de l'autruche à cou rouge et l'addax.

Actuellement on y rencontre essentiellement la gazelle (dorcas), le mouflon à manchette, quelques espèces de singes et des carnivores (fennec, guépard, chacal doré, renard famélique, etc. ...) et des oiseaux d'espèces diverses résidents et migrateurs (dont les plus gros sont l'autruche à cou rouge et l'outarde de Nubie).

1.2 L'eau dans l'Aïr : une ressource précaire

Les mécanismes des précipitations dans les massifs de l'Aïr

La saison des pluies est, sans aucun doute, l'évènement le plus attendu des populations car, durant plus de huit mois de l'année il ne pleut pas. L'installation de cette saison relève selon les spécialistes, de mécanismes que nous tentons de résumer ci-après.

Les massifs de l'Aïr sont soumis, comme la région du Sahel, aux phénomènes atmosphériques généraux de l'Afrique de l'Ouest.

L'arrivée du FIT (Front Inter Tropical) annonce le début de la saison des pluies. Ce front qui représente le contact ente les masses d'air chaud stabilisées sur le Sahara et les masses d'air humides instables d'origine maritime.

Durant l'été, la dépression thermique centrée sur le Sahara produit un appel d'air et provoque le déplacement vers le Nord du FIT, suivi de la mousson guinéenne (masses d'air humide en provenance du Golf de Guinée). Simultanément des courants d'air violents venus de l'Est provoquent, au contact de la mousson, des tornades. Mais les pluies précédant le plu souvent de forts vents de sables n'arrivent pas toujours au sol.

Ave de tels mécanismes, l'on comprend bien le caractère aléatoire de l'arrivée et de la chute des pluies dans cette zone et le fait que la probabilité des années de sécheresses est du même ordre que celle des années à pluviométrie normale.

Le phénomène des sécheresses et ses conséquences

La sécheresse, comme diraient les pasteurs, est la « maladie la plus meurtrière » de cette zone. C'est la conséquence de l'absence ou d'un déficit prononcé des précipitations.

Selon les spécialistes du domaine, les précipitations dans l'Aïr s'inscrivent dans une tendance à la baisse et le phénomène des sécheresses de plus en plus fréquent depuis la fin des années 60.

Ainsi observent-ils les 40 dernières années ont été marquées par des années de sécheresses particulières sévères notamment celle de : 1963, 1968, 1973, 1984, etc. ...) et qui en font la période la plus sèche du siècle dernier.

L'alternance irrégulière des années de sécheresse et des années moins sèches, caractérisée cette région : en général une année sur 2 à 3 est sèche. Mais dans certaines zones il arrive que plusieurs années sèches se succèdent.

Les conséquences sont désastreuses sur les hommes et sur l'économie de la zone où la vie reste un éternel recommencement.

Les causes sont nombreuses, on peut entre autres citer :

- *La famine :* le manque de pâturage et la rareté des points d'eau entraîne la perte du cheptel, unique source de revenus pour les éleveurs nomades. La baisse du niveau des nappes entraîne le déficit de la production des céréales et le manque de vivres sur les marchés. Dans un cas comme dans l'autre malnutrition, maladies;
- *L'exode rural :* les populations, notamment les bras valides se retrouvent dans les villes du Sud du pays ou limitrophes du Nord (Algérie/Libye) à la recherche d'hypothétiques emplois);
- *La pauvreté :* l'instabilité des conditions climatiques et environnementales a un lien direct sur le niveau de vie des populations dont les revenus sont tributaires des activités économiques ainsi perturbées.
- *La déstabilisation et la désorganisation du mode de vie des populations :* après chaque année de sécheresse des éleveurs nomades se trouvent contraints d'abandonner leurs terroirs et pour se retrouver dans les centres urbains pour survivre. IL en est de même mais dans une moindre mesure pour les agriculteurs sédentaires lorsque suite à plusieurs années de sécheresse ils ne peuvent plus produire par manque d'eau dans les puits maraîchers.

Quand les précipitations redeviennent « normales », une partie de ces « nouveaux sédentaires » repart pour essayer de reconstituer leur mode de vie auquel ils sont tout attachés.

Les principales ressources en eau dans l'Aïr

Dans l'Aïr, il n'existe point de cours d'eau permanent. Les principales ressources en eau de cette zone sont dans le sous-sol, sous deux formes : l'eau du socle et celle des aquifères alluviaux. Quant à l'eau de surface, elle se présente sous forme de petites mares et gueltas.

L'eau du socle

Ces eaux sont liées à l'existence des vallées qui sont des voies de drainage des eaux de pluies, mais aussi à la nature du socle qui comporte des fractures (ou failles) cernées par des roches très dures.

Il semble bien que de réserves importantes sont stockées dans de nombreuses failles à travers tous les massifs. Malheureusement il se trouve qu'actuellement, très peu d'études ont été menées pour connaître le réseau des failles existantes, leur capacité de stockage de l'eau et les réserves constituées.

En plus, ces réserves sont d'accès difficile par les populations et donc peu exploitées, à travers quelques rares sources d'eau minérales (Tafadek, Igloulaf, cascade de Timia notamment).

Les aquifères alluviaux (ou nappes phréatiques)

Il s'agit de nappes phréatiques existant le long des koris (ou vallées) situées pour la majeure partie sur le versant occidental et Sud-Ouest des massifs de l'Aïr. Ces koris s'étendent sur des centaines de kilomètres et renferment des potentialités importantes en eau. L'alimentation de ces nappes se fait essentiellement par les écoulements de surface dans le lit des koris à la suite des pluies annuelles (en 10 ou 15 jours à peine)) et qui entraînent l'infiltration des eaux. Mais les réserves d'eau souterraines ainsi constituées ne sont pas statiques ; elles se déplacent de l'amont vers l'aval des koris durant toute l'année. IL faut ajouter que ces écoulements souterrains sont par endroit ralentis ou freinés par des barrages rocheux souterrains, ce qui augmente le débit des nappes.

Ces aquifères constituent, à n'en point douter, les principales ressources en eau des populations qui y ont accès par fonçage de puits (traditionnels ou en matériaux définitifs).

Les eaux de surface

Il s'agit des retenues naturelles d'eau à l'air libre. On distingue dans les massifs de l'Aïr deux types : les gueltas (ou agelman en langue tamacheq) et les mares.

Les gueltas sont des poches d'eau dans la roche alimentées par les pluies et les écoulements. Ils constituent une ressource d'eau précieuse pour les éleveurs, en raison de leur grand nombre ; mais les quantités d'eau qui peuvent y être stockées sont dérisoires (quelques centaines de mètres cubes au maximum) et leur alimentation aléatoire car liée au régime des pluies.

Quant aux mares, elles sont quasi inexistantes en raison du caractère montagneux de la zone. On en rencontre quelques unes, très éphémères sur certaines plaines alimentées par les écoulements des koris.

2. La population et son mode de vie

2.1 Peuplement des massifs de l'Aïr

Les massifs montagneux de l'Aïr sont peuplés exclusivement de Touaregs. Ce peuplement est consécutif aux agitations politiques dont l'Afrique du Nord a été le théâtre. Ces conflits d'ordre interne (inter-confédérations Touaregs) ou externe (notamment avec l'arrivée des Arabes au FEZZAN d'une part, et, la recherche de pâturages d'autre part, ont poussé les Touaregs plus au Sud. Leu mouvement s'est effectué par vagues successives à partir du XIe siècle et s'est poursuivi jusqu'à la fin du XIXe tout en refoulant vers le Sud l'ancien peuple (Haoussa) qui occupait ces terres.

Mais seulement une partie de ces tribus est restée dans l'Aïr, les autres ayant continuer plus au Sud, toujours à la recherche de conditions plus favorables pour leurs activités pastorales. Le peuplement de cette zone s'est stabilisé à partir de 1900 en dépit des soubresauts consécutifs à la pénétration coloniale (française) et les mouvements de résistance Touareg (Kaocen, 1916). Les effectifs de cette population ne sont pas connus avec exactitude en raison de l'insuffisance des opérations de recensement administratif organisées par l'Etat. Sur la base de quelques études et monographies menées dans la zone (I. Bayard) on estime à plus de 200.000 le nombre des habitants de cette zone.

La population organisée en tribus est répartie, pour sa grande majorité dans les principales vallées, dans des centres de peuplement constitués à la faveur des activités agricoles (Iférouane, Timia, Tabelot, Teloua, etc. ...). Autour de ces centres de peuplement, gravitent les campements des éleveurs nomades vivant des activités pastorales.

Il faut cependant préciser que d'une manière générale la population se compose d'agro-pasteurs car ici, des liens intimes existent ente les activités agricoles (pures) et le pastoralisme : au sein d'une même tribu il y a des familles qui pratiquent l'agriculture, d'autres l'élevage. Mais aussi, dans une même famille des membres peuvent être agriculteurs et d'autres pasteurs. Nombreux aussi sont ceux qui en saison sèche s'adonnent à l'agriculture et, en saison des pluies (hivernage) vont exercer le pastoralisme « saisonnier ».

2.2 Activités socio-économiques des populations

Les communautés Touaregs des massifs de l'Aïr pratiquent dans leur grande majorité l'agriculture et l'élevage, activités intimement intégrées l'une à l'autre (agro-pastoralisme). Mais cette zone est

aussi par tradition (carrefour d'échanges Nord-Sud/Est). Un espace économique ouvert aux échanges commerciaux avec les autres régions de l'intérieur du Niger, comme de l'extérieur.

Enfin, une faible fraction de cette population pratique l'artisanat, une activité non moins génératrice de revenus.

L'agriculture

Cette activité occupe aujourd'hui le premier rang des activités socio-économiques des populations des massifs de l'Aïr. Mais l'ancienneté des cultures dans cette région est difficile à établir. On sait seulement qu'avant l'arrivée des Touareg elles étaient pratiquées par les Haoussa qui y vivaient.

Elle est exercée sous forme de cultures irriguées (la seule forme possible en raison de l'insuffisance et de l'irrégularité des pluies) dans les vallées. Ces différentes vallées dont nous avons fait cas plus haut, présentent par endroit des conditions favorables : une nappe phréatique peu profonde et des terres arables en quantité et en qualité suffisantes. Un mode de gestion de l'eau particulièrement ingénieux permet l'irrigation et la mise en valeur intensive de superficies réduites : 2 à 3 hectares par exploitation (ou jardin).

Le périmètre exploité est organisé en planches de cultures desservies par un réseau de canaux d'irrigation. A partir d'un puits (8 à 20 m) creusé généralement au milieu de la parcelle et dans la partie surélevée, un système d'exhaure traditionnel par traction animale (le dalou) permet de remonter l'eau dans un bassin de régulation distribuant l'eau aux canaux d'irrigation.

Le calendrier cultural est réglé en fonction des saisons : la saison sèche, qui suit l'hivernage (octobre à décembre) correspond à une période d'intenses activités culturales. Cela s'explique par le fait qu'à l'issue de la saison des pluies le niveau des nappes remonte et permet de cultiver les spéculations, grandes consommatrices d'eau, essentiellement blé et légumes (oignons, tomates, choux, etc. ...). Par contre, en saison des pluies, l'activité agricole est au ralenti et on cultive de faibles superficies de mil, de maïs ou de pomme de terre. La raison est que les puits sont profonds, le débit d'eau est faible et c'est la période de recharge progressive des nappes avec les écoulements de surface et l'infiltration des eaux.

Il faut souligner que l'agriculture irriguée demande beaucoup de travail car il faut quotidiennement ou tous les deux jours amener de l'eau aux cultures. Selon les spécialistes, plus de 2000 litres par mètre carré sont nécessaires pour amener les cultures à maturité.

Il faut ajouter enfin que dans les jardins de l'Aïr, on pratique (à titre accessoire) la culture des dattes (phoeniciicicultue). Les dattiers n'étant pas très demandeurs en quantité d'eau, cette culture est associée aux autres cultures qui sont pratiquées autour des pieds de dattiers.

Le pastoralisme

A l'origine sans doute, les communautés Touaregs vivaient du pastoralisme. Mais les sécheresses qui se sont succédées dans l'Aïr ont durement marqué l'économie pastorale, en réduisant le nombre de bons espaces pastoraux (eau et pâturage) et les effectifs des troupeaux. Néanmoins, l'élevage reste, du point de vue de son poids économique, le secteur dominant dans l'Aïr.

Face à ces sécheresses, les éleveurs ont modifié leurs comportements :

- Ils ont compris la nécessité de diminuer la taille de leurs troupeaux, devant la diminution des ressources en eau de surface et l'appauvrissement des pâturages ;
- Ils ont aussi adapté au contexte physique de l'Aïr, la composition de leurs troupeaux, en privilégiant les espèces plus rustiques : les camelins et caprins.

On note en effet une raréfaction des espèces exigeantes et délicates telles que les bovins et, dans une moindre mesure des ovins. Le mode de pastoralisme pratiqué est la transhumance, limitée aux terrains de parcours inter et intra-montagneux.

Le mode de vie des pasteurs est donc marqué par la mobilité (nomadisme) qui est la réponse à l'irrégularité des précipitation déterminant la disponibilité des ressources en eau et du pâturage. En règle générale chaque tribu ou groupe de tribus a son aire de pâturage faite de terrains de parcours et de points d'eau.

L'eau est considérée comme aussi déterminante que la terre dans l'esprit des Touaregs. Aussi, l'on relègue comme règles traditionnelles de son utilisation :

- l'eau de surface naturelle (gueltas, mares, sources), pérenne ou non ne peut être objet de propriété, ni individuelle, ni d'un groupe. Ainsi nul n'a le droit d'en interdire l'accès à qui que ce soit. Toutefois, ces points d'eau ne sont pas laissés sans maître. Les groupes ou tribus ont tacitement approprié les terrains de parcours et les points d'eau font généralement l'objet de règles d'accès acceptées par tous, qui compris par les éleveurs de passage. Il se forme d'ailleurs généralement autour de ces points d'eau, des alliances ou de nouveaux liens de parenté (suite aux mariages) qui permettent de renforcer le consensus sur l'utilisation des ressources en eau, de les entretenir et de les protéger. A la différence d'autres régions, ici les conflits autour de ce type de point d'eau sont très rares, ce qui n'est pas le cas pour les puits pastoraux ;
- l'eau souterraine est exploitée par le moyen de puits pastoraux, généralement assez profonds : 20 à 40 m. Le puits est la propriété de celui qui l'a creusé, individu ou groupe de personnes. Toutefois, le propriétaire n'a qu'un droit **d'usage prioritaire** sur son ouvrage et l'eau est **un bien commun** que l'on ne refuse pas.

Cette règle est malheureusement source de conflits autour de certains puits où elle est diversement interprétée. Mais en raison des liens de parentés et d'alliances multiformes entre les différentes communautés en présence ces conflits trouvent toujours une issue heureuse. Quant aux puits construits par la puissance publique (l'État ou les collectivités territoriales) ou les projets financés par l'extérieur, ils sont confiés aux groupes qui en ont fait la demande, sans que ceux-ci en aient la propriété. L'accès est libre à tous les éleveurs.

En tout état de cause, les moyens d'exhaure (cordes, puisettes, poulies, animal d'exhaure) sont des propriétés individuelles incontestables, quelque soit le statut du point d'eau.

Le commerce et l'artisanat

Le commerce

La zone de l'Aïr a été pendant longtemps une zone de transit pour le commerce trans-Saharien. Aussi, les caravanes de chameaux assuraient les échanges de marchandises diverses entre l'Aïr et les autres régions du Niger et des pays voisins. Ainsi, en direction du Sud de l'Algérie et de la Libye, les populations de l'Aïr exportent essentiellement des animaux sur pied et de la viande séchée et elles en importent des produits de consommation courante : sucre, thé, tissus, etc. ...

En direction des autres villes du Sud du Niger et du Nord Nigeria, elles exportent le bétail sur pied et des produits agricoles (légumes notamment) pour importer des céréales (mil) et des produits manufacturés divers. En direction du Kawar c'est aussi du bétail et de la viande séchée qui sont « exportés » pour rapporter le sel, produit indispensable pour les animaux. Aujourd'hui encore le commerce caravanier reste une activité importante de ces populations en dépit de l'apparition du transport par camion. Ceci s'explique en partie par l'enclavement de la zone et les coûts prohibitifs du mode de transport automobile inaccessibles pour la grande majorité.

L'artisanat

Cette activité occupe une faible frange de la population de l'Aïr, constituée des « inadanes » ou artisans traditionnels qui forment une caste bien organisée. L'artisanat de l'Aïr, inspiré de la culture Touareg est bien apprécié, notamment dans sa branche de bijouterie (exemple de la croix d'Agadez) ou de la maroquinerie.

La création artisanale est très variée et pleine d'originalité et couvre aussi bien le domaine utilitaire (selles de chameaux, mortiers, sandales, cuillères, couteaux, sabres etc...) que décoratif (broderies, croix, bagues, colliers, etc. ...). Il faut cependant noter que cette activité est confrontée à divers problèmes, notamment la rareté de la matière première végétale, fortement entraînée par la désertification et les difficultés d'approvisionnement pour les métaux et autres matériaux utilisés dans l'artisanat.

3. Problématique de l'eau dans l'Aïr

La charge sociale de l'eau souligne que « l'eau est un élément primordial et vital du développement économique et humain... son **accès à tous doit être un droit imprescriptible** ».

Cette même charte ajoute que « l'eau est un bien social et économique car, si chacun doit en supporter le coût, **la solidarité entre riches et pauvres doit s'y substituer pour les plus démunies ».**

Or, nous sommes en présence justement de populations démunies, peut-être les plus démunies de la planète, vivant dans un milieu où l'eau est une ressource rare et précaire. Pour survivre, elles ont adopté des comportements et des techniques drastiques d'économies d'eau dictées par les conditions climatiques décrites plus haut.

3.1 Les économies et techniques locales de gestion de l'eau

- Pour les besoins en consommation humaine : les rations quotidiennes de la famille sont généralement stockées dans des récipients modestes (outres = sacs en peau de chèvre) ce qui permet de contrôler l'utilisation et de lutter contre tout gaspillage ;
- S'agissant des besoins d'hygiène et autres nettoyages ou lessives, ils sont satisfaits en fonction de la disponibilité de l'eau ;
- Quant aux animaux, la consommation de l'eau est aussi réglementée :

  - Les petits ruminants (caprins et ovins) sont abreuvés tous les 2 à 3 jours selon les saisons ;

  - Le dromadaire n'est abreuvé que tous les 5 à 7 jours. Il peut aussi, faire plus d'un mois sans être abreuvé lorsqu'il dispose d'un pâturage vert ;

- Au niveau de l'agriculture irriguée, les économies d'eau sont guidées par le souci d'assurer aux cultures les quantités d'eau nécessaires jusqu'à maturité.

  Ainsi, en fonction du niveau de la remontée de la nappe phréatique dans les puits maraîchers, les agriculteurs déterminent le type de spéculations à semer et la superficie à remblayer.

3.2. Les limites des techniques traditionnelles

Ces techniques et comportements montrent cependant de plus en plus leurs limites face :

- à l'augmentation d'une population à très faibles revenus et donc des besoins en eau ;
- au déficit chronique des précipitations rendant aléatoire la recharge des nappes ;
- à la réduction des eaux de surface assurant en partie la couverture des besoins des pasteurs,

ce qui accélère la dégradation de l'environnement autour de quelques points d'eau permanents.

3.3 *Appel à la solidarité internationale*

Il s'avère donc aujourd'hui plus que jamais, que l'avenir de l'écosystème dans cette région en général et la survie es communautés qui y vivent en particulier, pose le problème de mobilisation et d'utilisation rationnelle des ressources en eau. En cela, la communauté internationale est interpellée afin que dans un élan de solidarité, elle appuie les efforts des communautés vivant dans ces espaces où, l'eau représente un bien vital rare et précieux, pendant qu'elle est source d'ennuis et de gaspillages dans bien d'autres contrées de la planète.

Nos recommandations aussi dans ce sens sont :

- la réalisation d'actions visant une meilleure alimentation des nappes : micro-barrages, retenues collinaires, seuils d'infiltration et épandages etc. ... ;
- la promotion d'activités socio-économiques autres que l'agriculture et l'élevage, grosses consommatrices d'eau : commerce, transport, exploitation de ressources minières, etc. ...

'WE ALL CARE'
The Water for Food Movement in Rural South Africa

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1. Introduction

This paper aims to raise worrying issues and concerns around the problem of food insecurity for many rural people living in the arid rural communal areas. Although South Africa has a large sector of commercial farmers and food processors, producing an abundance of food, many marginalised rural communities live in poverty situations with very little money. Food is therefore inaccessible because of the cost. The black emerging farmers have yet to emerge – the bulk of these farmers are still locked in subsistence food production and facing lots of problems.

It is a great pity that we have lost the history of food security at household level that existed in all rural communities carried within the basket of social systems that mobilised individuals and families to take responsibility for their own survival.

In good years, many produced in abundance for storage to secure food for the future years, and many bartered to increase their stock assets and to supply in others' individual needs.

I grew up during the times when those systems still existed. I remember well how we produced food, processed and preserved some through drying, particularly the vegetables and fruits, grain storages and seed preservation ensuring self-sufficiency even for dry years. Food also played a critical role to enhance social systems for mobilisation and mutual support. At household level, there was co-operation through collective work responsibilities for all members in the family, ensuring that all grow up with dignity and respect. I am not trying to say all was fine at all times.

During times of drought, others would assist those families with less food in storage. Individuals or families who were faced with disasters because of unforeseen circumstances, community social safety nets would automatically move in to help. Chiefs were the guardians of these values.

Socialisation of youth was not only the responsibility of the households but the whole community took responsibility to transfer the philosophy of the values they deeply cherished through norms transferred in the form of story telling, songs and dances.

Things changed, policies of the country brought in a new civilisation that was characterised by forced removals, change of local administration, traditional systems collapsed giving way to frustration, disorganisation of communities. Families and individuals faced new challenges. Surviving from the land was no longer possible.

I am not an academic person to be in a position to give statistics, but I have stayed and worked in villages as a development activist in Limpopo Province and elsewhere. I have done village scoping investigations in areas where I lived. I also worked as a social worker and have seen and heard stories of painful experiences as a result of poverty. I have seen women and men losing the hope and retreating into a deep pit of apathy. This category of people survives barely on mercy from others or the government. The self-images and dignity have disappeared. They are scared to face problems and have no courage to stand up and try ideas that can change their lives.

Water for Food Movement through its vision aims to change the individual's mindset in order to change the environments, at household level, the natural physical environment around them and the social-economic systems that will benefit all instead of only a few empowered individuals. The movement is a new born baby that came into existence legally in 2002 as a non-profit organization focusing on mobilization of households, particularly the poorest, to stand up and fight the hunger and malnutrition.

Every single person in both peri-urban and rural areas has to be encouraged to change the mindset and to look at him / herself with a different mind and eye: **Believe in Yourself.** For this to happen – Water for Food has packaged a training.

2. Indigenous traditions and rituals for food security

South Africa used to have many rural communities who survived on the land through farming. They had developed social systems and rituals in support of food production and food security for all. These systems acted as the guardians of land use management systems, and ensured commitment to the communal farming activities through seasonal work schedules to keep food production as a first priority.

2.1 Land use management systems

The land was regarded as a communal asset to be cared for and its value had to be maintained to carry and sustain the communities living on it. Land allocations concerned: homestead plots, fields for crop production, and grazing land, which was communally owned. Main water sources were rivers, wells, and rainwater that was harvested.

Homestead plots

The homestead plot was the heartbeat of the rural home economy. Every family had its own homestead plot where they erected their own styles of housing. They could harvest rainwater and run-off through terracing and dug wells where the natural conditions were conducive. Housing did not only mean structures for providing shelter for the inhabitants, but also meant building of animal sheds and kraals, granaries for grain storage, grain threshing, mud paved lapa's, sheds for ploughing implements and carts and wagons. There were also waste management heaps and pits.

As there was no electricity, wood was collected for fuel and cow dung dried where wood was scarce. Food processing had special attention – and a special *rondavel* was built for the grinding stones, stamping blocks and seed storage. Clay pots were also stored here. Where families produced handicrafts there was a special *rondavel* for making clay pots, grasswork, beadwork and for many other handicraft activities. Many of these activities did not rely on money: people were harvesting natural resources like clay, grass, reeds, shrub, twigs, tree branches, stones, etc. Many of the sheds were built of stone.

The children grew up in such families. They had a wide range of skills for survival at household level. Every single person in the family had a role and a contribution to make to the holistic survival for all.

Fields for crop production

Crop production was the major activity for all. There were social systems developed and driven from the chief's *kraal* (compound) to ensure that all are committed to food production. In every village there was a *Kgoro* venue either built from stones or tree branches or a special big tree prepared for *Kgoro* meetings.

Issues discussed in the *Kgoro* meetings were:

- Field activities, land planning and maintenance;
- Water – caring for the rivers and wells;
- Construction of swails and gabions to stop erosion;
- There was a conscious effort given to planning and implementation of land use strategies;
- Decisions were taken about when cattle and other livestock would be allowed to graze in the fields after harvest, ensuring that all crops should have been removed from the fields by then. 'Deadline date given to all farmers – *Dirue di ya lahlewa*'. If cattle destroyed the crops of a person who failed to comply with the deadline, the *Kgoro* would not attend to his/her claim;
- The only setback was that women did not sit in *Kgoro* meetings.

Communal grazing land and forest areas

Shared animal care and use

Another Communal Activity was caring for pastoral land and forests. Even though not everyone in the community had cattle, donkeys, goats or sheep, the maintenance of pastoral land was a community activity, because almost all the people relied on crop production for survival. Therefore there was a commitment to ensure that the animals were healthy and would be available to work the land for them.

People grouped themselves into small groups. Those who had cattle or donkeys clubbed together with those that had none, to milk together and plough together. Systems of benefits were negotiated amongst the members involved. Small boys or elderly men would take turns in herding the cattle. Those who had no cattle would benefit by getting a calf for every year of herding. Sometimes there would be one kraal so that people who owned fewer cattle did not need to build a kraal for only one or two cattle, goats or sheep. They would share kraal manure, milk and ploughing.

Pastures and trees

Caring for pastures meant clearing it of poisonous plants like *mokgu*. A date would be announced and all would take hoes and clean out the pastures before it rained.

The rule was that none of the big trees should be cut and destroyed – instead the elders taught us how to prune the trees if we wanted to cut some branches for handicrafts. There were certain trees we were not allowed to collect for firewood because they said it was a bad omen. Burning of those types of trees would cause hail and other weather disasters.

Wild fruit trees were a preserve for community food security. We were not allowed to destroy those trees. We could only harvest dry branches or trees for firewood. Shrubs like *dithokole* (black berries), *mehlwetlwa* for weaving of baskets, we were allowed to cut tags, but not dig out the shrub. Other fruit trees are – *mabilo, matshidi*, *marula*, *ditloro*, and *mehlatse*.

Insects and communal harvesting of swarms of locusts and problem birds

Most of the insects like *ditisic* (locusts) *makeke* (ants), *dikglegaripne masontja* (beatles), *dimenemene*, *dinhlwa*, *ndmabitsi*, were food for us. As young kids every morning we would go into the veld and pick some for food. Herd boys always brought lots of insects home.

The forest was also useful to harbour locusts and swarms of birds that would make it easier for the community to catch during the night. Families would have enough dried locusts preserved in bags for food security. This would be a whole community activity. There would be those that monitor the swarm during the day and follow up to locate were they were going

to rest for the night. Old ladies would be preparing big pots to cook. Bags and blankets filled with birds or locusts were brought home by all that had gone to harvest from the forest.

However, recently in Mogalakwena, bird swarms became contaminated from poisonous sprays used by farmers in the area. People from the village did not know about the spraying and they collected the birds for food and many got sick.

Wild vegetables

There were climbers on trees in the forest, which we picked as *morogo* e.g. *monyaku*. There were also certain herbs growing under trees or in grass veld like – *mosehlo*, which we used as shampoo for dandruff. Other wild vegetables or *morogo* were the following: *leroto*, *mositsim*, *mopshe*, *serowe*, *mmantla*, *lekgeru*, *lehlange*, *letlele*, etc.

There were also other climbers with other uses like *bolepu* – which acts like glue. Boys used it for catching birds.

2.2 Rivers and wells

Soil erosion and siltation of the rivers

The system of land cultivation was simple and caused very limited soil erosion, so rivers still had banks an there was no silting to the level we see it today.

Food from the river

On the riverbanks there were reeds, grass, water vegetables (*morogo*). We used to get lots of different *morogo* from the riverbanks. We also had fish from the river. There was plenty of food for the poor people.

Water sources and uses

The water was for all. The sand in the river filtered the pollution, which was minimal. We got our drinking water directly from the river. The rivers would flow throughout the year and when they were full for long periods, like in 1952, the water table was very high. We dug wells at household plots and everyone had their own well. When the water table dropped the community dug many wells next to the riverbanks and protected the wells so that we had lots of water.

In one of our fields in Mashabane we had dug wells and also small dams for cattle to drink when we were ploughing.

Rules for sanitation

To prevent us from relieving ourselves just anywhere, the elders told us a story that there once was a man who bridged the community norm against squatting next to the drinking well. He developed *motila* (a tail) that grew so long that he could not even wear a pair of trousers. He became a joke in the village, because he could only wear skin aprons.

2.3 Celebrations and rituals in support of food security: the annual farming calendar

The chief's kraal had a responsibility to mobilise the community/communities within his/her jurisdiction for keeping the food security awareness pulsating in people's minds. There were rituals performed and traditionalised to mark the events of the Farming Calendar as yearly celebrations.

Environmental cleansing ritual

Every year, before the rains would start, and to mark the beginning of the New Year farming calendar, an environmental cleansing ritual was performed. The chief, counselors and traditional doctors were responsible to ensure that the environment was purified, so that when the rains started and the dirt was removed from the forest and veld, the water did not carry carcasses into wells and rivers. This activity only happened at the chief's kraal. The role players were traditional doctors, chief's counselors, old men, old women and also young girls before puberty carrying water calabashes or clay pots to the veld. It was also a ritual for rain and insect distraction.

The traditional doctors performed the ritual, burning certain types of tree roots to entice the birds to come and pick insects' larvae before hatching. They knew when to do this.

Preparations for the events on the Farming Calendar

People would get the implements ready, renew the kraals and get kraal manure to the fields. They would cut little shrubs in the fields and reinforce the shrub fences around the homestead plots. At the first rains, everything would be ready so that planting could start at the household plots.

Big trees were never removed from the fields, but were pruned. The trees provided shade for resting when working in the fields. This was also the time to make sure that enough wood or cow dung for fuel had been collected and packed tightly to prevent soaking when it rains, because there would be no time for daily collection of fuel during the cultivation season.

All these pre-season preparations also helped to raise awareness of the need for food storage, so that people would not suffer hunger when the hard manual work in the fields would start. Food storage was not meant for the one year up to the next harvest only. People were very conscious of the danger of droughts and would aim to store two to three years' food supply.

People were now ready for the new agricultural year – and for all activities of the 'Farming Calendar of Activities'.

The Harvest Festival

The Harvest Festival marked the end of the farming year calendar. The chief's council announced the celebration and date to all headmen. A date would be declared and a ritual performed at the chief's kraal. Families and communities would prepare traditional dishes like:

- stamp mealies for samp added with peanuts, jugo beans, cowpeas, green lentils, beans etc.,
- pumpkin porridge,
- *mageu*,
- sorghum beer or millet beer,
- *setlopothi* – watermelon juice or beer etc.,
- slaughtered sheep or goat or chicken.

Each headman and councillors would take beer to the chief's kraal for performance of a ritual. Each community would organise its own style of celebration with traditional dishes, games, etc. It was a time for the farming community to rejoice and feel good about their farming production. It was also a time for communities to interact.

During the time of this celebration, everyone exchanged seeds, bartered their handicrafts and sold whatever they wanted to sell. Every year people were looking forward to this event. It inspired them to get committed to doing their best every year. The lazy ones were also motivated, because this was the time for sharing produce, experience and moral support. The children also had a role here, they created dance groups and played sports, etc.

Seed blessing ritual

Sometimes the seed blessing ritual was built into the harvest celebrations. The purpose of this ritual was to bless the seed and raise the community's awareness of the need to prepare for the new planting season. People would be ready with the seed, check what they have and get from others what they didn't have. Seed was stored and preserved in ash to prevent insect infestation.

The children's 'Mantlwantlwane'

In my village at Tshikudung, there was also a celebration for children to rejoice and become not only handmaids or handymen at household level, but to be recognised as part of the community through a celebration. During the period for *mantlwantlwane*, the children would be freed from household activities to do their own activities. The Kgoro would allocate a site for a 'children's village'. Just after harvest, the children of the village would start building their own village to play mommies and daddies, under the supervision of their parents or community elders. They would build miniature mud houses, grass thatched, and then make lapa's and kitchens, ready for the festival. The parents would assist them to perfect their building skills. Each child would be given the same food grains and legumes to prepare food for the celebration. Food processing was done in groupwork and a date would be decided by them and announced by the Kgoro to all community people. Unlike at the main Harvest Festival, the elders were now spectators, the main roleplayers were children themselves. They would cook and took pride in serving all. The adults would dance, eat and drink. This was a yearly activity during the June/July school holidays. This was an important platform for the resocialisation of the youth and the transfer of skills for survival.

3. What is the situation now?

3.1 The erosion of indigenous food security practices, livelihoods and social cohesion

Things have changed so much that one hardly knows where to start when looking at issues of food security. Despite the fact that our large commercial farmers are producing food in abundance for the country and for export, South Africa is faced with the problem of serious food insecurity for many households without the money to buy it.

South Africa's poor majority nowadays depend on social grants for survival, which creates a syndrome of apathy and helplessness. Our present youth have no idea of how to produce food at household level – all they know about is buying it daily from food markets. Those who live in urban areas or in areas where there is more economic activity are somewhat better off – they can hike a living from various sources, even if it is through committing crimes.

Betterment?

I am not going into detail on the apartheid government legislated apathy. There are mountains of documentation throughout the country, but much more has not been documented: how removals from their original settlements displaced people physiologically changing their attitudes, creating behaviors, which ragged their moral fiber and their social systems; how removals disposed them of their livelihoods – the loss of their land and accessible water resources, grazing land, their woodlots, their wildlife they so dearly depended on.

How their meagre assets were affected to force them to dispose off their cattle, goats and donkeys, which they depended on for milk, meat and transport and power to work their lands.

Migratory labour system strategically imposed to break up the primary institution of the family

leaving communities with no basis for the socialisation of the children. Gender roles at household changed, values changed, no system to capture the norms and shape the integrity of individuals, obviously the community social systems got fragmented greed for power and material gains emerged.

Our little village at Tshukudung was dismantled in 1957, when all satellite villages were destroyed and people moved to the big settlement next to Chief's kraal. This scheme was packaged in the government policy for the day, named the 'Betterment Scheme' in preparation for the new bill, which became the Territorial Authority Act of 1960 – leading to separate development.

'Betterment' in our area meant the following:

- The land allocated as homesteads were ± 50 m x 50 m or smaller.
- The fields were left in the hands of a few and were far away (± 5–6 km from the residential area) and were small holdings of 0.5–2 ha. Fields were only allocated to people who had cattle.
- The cattle were reduced to six per person.
- The donkeys were scrapped.
- The people lost their housing and any other possessions they could not carry with them and received no compensation.
- River water and wells were far away.

Inevitably, people's lifestyles changed as migratory labour became the order of the day and social systems collapsed. Crime moved in and households sank into poverty. People who used to co-operate now became helpless. Human values degenerated. Mistrust and conflict set in. People who used to produce food for themselves and who had no other skills, had to take up seasonal labour contracts on neighbouring commercial farms for wages as low as R50 a week, with transport and food as an extra cost. We used to be proudly self-sufficient and never used to know malnutrition, but at home nowadays ±40% households live below the breadline.

Those in power misused their positions. The powerless got heavily repressed and lost their self-image leading them into the deep pit of apathy. Conflict became the orders of the day and changed the previously self-sufficient families and communities into beggars, thieves, liars, and murderers. Bringing up children became a crisis for the families that failed to cope. Single headed families became the order of the day with women carry the total load for child raising with no means of support.

The apartheid government realising that they had created a human catastrophe, introduced a social benefit scheme 'We will take care of you through pensions and food rations – **don't worry** you can eat but you will have avail yourself for forced slave labour.' They introduced a system of monitoring through a pass-law system that closely watched over your movements. You work for someone, or you are in prison. The effects of these legislations will be felt in South Africa for many more decades unless the country takes a very cautious decision to create a process that will unravel these complexities.

For the present grassroots rural persons, work is interpreted as being and employed for a salary. Livelihoods can only be possible when someone is employed for a salary. This mindset is very different from the time when I grew up. What do you do now when the level of unemployment is so high?

People have lost the power to value themselves, value the God given assets they have e.g. land and water the environment natural systems around them. They have lost the passion to take arms and face the struggle for their own survival. The silent messages that were pumped into their heads by all devious laws of Apartheid are still a reality even now. The country is free but people are not yet free.

Environmental impacts

Nowadays not even one of the rivers flow throughout the year. The big Mononong River is dry and silted. Hlaafele River has no water, the riverbanks are untraceable. People are buying water from those who have boreholes in their homesteads. The communal water supply is inadequate or non-existent in certain sections of the village. It is a nightmare to live in that area.

Trees are gone, grass and shrubs are scarce. The chief in office is a young man with no history of where he comes from. He needs a resocialisation intervention.

3.2 Challenges for the future: Can we select our best roots to graft our future on?

In March 2003, thousands of people of the world gather in Kyoto, Japan, for the Third World Water Forum to look at issues of 'water for all'. Around the world, countries are faced with huge disparities and issues around natural resource allocation. Privileged people consume large quantities, while the poor live in conditions of severe water scarcity and therefore, living conditions symbolised by poverty and apathy.

The United Nations Charter for development says that by the year 2025 there should be:

- no person in the world without food;
- no person in the world without safe water to drink; and
- no person without proper sanitation; etc.

South Africa's new local government has been born into a period of great challenges to deliver better living standards for all. The big question is: where do we start? The South African Government has transformed greatly. Our constitution holds great hope for the majority of people who, through legislated apartheid, have for decades been denied the dignity of living their lives to the full. To me the great challenge we face during the era of new civilisation is whether we have suitable strategies to deliver on the promise of 'a better life for all'. Everyone is looking forward to the promised dream…

However, we should also recognise that the strategy of 'self-targeting' works well for those who are already up on their feet and can rise to the challenge. But what about the many that are still trapped in apathy? While we all recognise the necessity to share the water of rivers and boreholes in the country and in the Southern African region, we have failed to provide the poorer people of our country with adequate water even for household use, let alone for food production.

Many citizens in our rural areas still remember the indigenous Communal Food Security programme I have described above. However, the gap is huge – many of our elders have the memory, but our youth have no idea of where we came from. I am also aware that this traditional history of food security practices cannot be a blueprint for these modern times.

However, what can we do to heal the physical environment alongside with the healing of the majority of the South African population? I think that 'food first' should be our strategy to redress the chronic physical and social ill health caused by the food insecurity of the rural poor.

What support is needed? Rural development is a stated goal of the government to deliver better living conditions to all. Many empowered individuals and groups are already on their way to self-upliftment, but on the other hand the gap is increasing between those that have targeted themselves and those still trapped in apathy. *NGOs* have thinned down. The *private sector* is getting involved in development, but in many cases the recipients of development are getting confused, and expectations are not coming closer to fulfilment. At another level I am also hopeful that the *government* has adopted a separate food security programme as a special area of focus, but what that means I am not sure.

4. The way forward: Water for Food Movement

My own opinion is that we need a vigorous programme for food security for the rural poor, particularly focusing on youth and women, especially female- and child-headed households and families living with HIV/AIDS. Through a mobilisation strategy we need to draw people who are trapped in apathy in rural areas to take up issues and to save the degrading environment they live in, turning it around and developing it to be a resource that can carry their livelihoods. This will need a strong mobilisation strategy supported by government, NGOs and private sector. It will also need revival of certain social systems that can reflect the African patterns of living and survival. For this to happen, both local government and the house of chiefs should be mobilised to take up this challenge seriously. To realize this we created the Water for Food Movement.

The Vision of the Water for Food Movement is:

- Active households in communities taking responsibility for their own livelihoods, starting with food as a priority to liberate the minds and rebuild the family as the primary institution for the re-socialisation of the youth.
- Water for Food Movement aims to break the cycle of apathy particular to insecure families, take them through the stage of helplessness into the stage of self-confidence and creativity to enable them to face the challenges of rebuilding their lives through their own initiatives. This process enables them to see opportunities open to them to change their situations and not sit back to wait for someone to do it for them. Water for Food Movement stimulates co-operation and inter-personal support within communities so that community values and norms can regenerate. The process helps eliminate self-pity, idleness and negative perceptions in the powerless section of communities.
- Children need to be raised in villages where people care. Rebuilt families can influence crime reduction through directly becoming conscious of their own power by slowly building small assets from very little means. Focussing on food security, the challenges will flow beyond household into community environmental awareness issues so that even local government and chiefs can start tackling the problems of environmental degradation as a priority for the reconstruction programme, not dictating terms but communities taking the process into their own hands because everyone will be feeling the need to take action.
- For this to happen Water for Food Movement has packaged a training program.

4.1 Training Modules

1. To ensure food security, the targeted households become conscious of **water** capturing, storage, manual pumping and utilization of rainfall run-off, roof water and recycled grey water on homesteads. Conservation of potable domestic water will become a priority through wastewater recycling.
2. Through a **land and water management design** for the homestead, the families become conscious of run-off water catchment-creative initiatives within the homestead and low-cost methods for intensive sustainable homestead land use for vegetables, fruit trees, cereals, etc.
3. To rebuild arid soils, **waste management** at household level and surrounding areas is a priority. Environmental health is not theorised through legislation and by-laws only. It is a people driven programme making Local Government effective in its approach to the reconstruction programme.
4. **Fruit tree** planting at household level ensures **reforestation** initiatives – build long-term food assets at household level with an impact to influence the nature conservation ultimately generate social forestry. This helps to raise awareness for environmental care based on social

values and norms at village level which local government can support by by-laws, rather than legislate policy from top down.

5. Marketing at local level and beyond can become a community issue and people can cooperate to promote market cooperatives and contribute to **marketing policies** at local level and even beyond. A start-up pack skill development for a small business can help selling surplus.

6. **Food storage**, processing and preservation will stimulate the consciousness for improved nutrition at all times. It will also stimulate the small business initiatives, striving for quality production.

7. **Seed distribution** comes in as means to share seed through festivals and will bring in some cash to those that have enough to sell.

8. Food processing also stimulates **arts and crafts** as some indigenous skills can be revived to produce stamping blocks, grinding stones, grain baskets and calabashes for storage and household utensils, clay pots for seed preservation and cooking utensils etc. Some manufacturers can start on small business because there will be demand for tools for working the land. These tools can range from hoes, bucket irrigation equipment, treadle pumps, picks, spades etc. People can also be creative to use waste plastic bottles, build roof-water harvesting infrastructure and recycle plastics presently in the waste dumps to make ropes, mats, hats, bags etc.

9. Festivals will help to create broad base conscious raising for **community awareness and mutual support**, skills and information sharing where government people can be invited to share information and also become exposed to the people's power to create a positive working partnership.

10. **Youth re-socialisation** process. Youth engaged at household level are not passive participants at festivals, but are part and parcel of the process because they also have something to bring onto the table at such functions. This opens up to a Youth Day celebration where they can create an opportunity to test the skills gained at home. They also see a range of skills during the fun-filled festival, which help them to think positively about their lives. Especially children from disadvantaged homes, where apathy still dominates, will be motivated to help their parents change the situation with no money or little money. This will take them off the streets and keep them out of mischief, while instead they will enjoy creativity and fun; recycle waste material to produce useful articles; playing with work to create a future working nation. The seed collection from the few trees in the veld can become home social nurseries for donga reclamation as a play and fund raising awareness for environmental protection and rehabilitation. Some can start developing crafts skills to make baskets, carving wood for little cash.

11. **Time management** at household level will stimulate time consciousness as a ladder to value own time utilisation as an asset to **self-empowerment**. Children growing up in disadvantaged homes with parents who can not read and write will start helping their parents to learn to write and read. Adult Basic Education and Training as fun at household level will stimulate cooperation and smoothen relationships at home.

    Street play will be fun as children can play with the skill for land designs to prepare for a children's village where they can be creative to sharpen their creative urges. Develop the skills for measurement, square, levels etc. This will help them to sharpen their maths studies.

    Cleaning campaigns do not have to be stimulated by legislation only, but can become daily practice as they pick up plastics and useable waste from dongas and streets to play with productively.

12. **Recording**

Planting and harvesting recording helps to raise the economic awareness linked to production: how much does the family consume daily and what does it take to produce the food? It helps them to understand how to use money and save. It also helps them to diversify planting for nutritional needs.

Weather charting helps them to understand the relationship between plants and the climate, i.e.:

- Seasons as they change, what crops can be grown in relation to the season, how long the crops take to ripen.
- Pests and what to do, i.e. when do pests start, what to plant and when to evade pest infestation.
- Rain – what to do to maximise rainwater harvesting. What it does to your plants when there is a storm, rain, hail etc. Gaining awareness to inform your plot/land designs and soil preparations.
- Irrigation – hot summers or days; when to irrigate, understanding evaporation and plant fatigue from the heat, when to mulch etc.
- What to do to maximise run-off water when it rains. This impacts on your land design to stop soil corrosion.
- Seed beds – what to do when making seed beds in summer when too hot – make shade for seedlings.
- Inter-planting – Trees, the benefit of the shade in summer, choice of trees and crops in multi-cropping areas. Which crops need a bit of shade, which crops do not do well in shade.

All these need a conscious learning for self-discovery.

Daily activities charting. Developing a calendar of activities helps you to manage implementation of your land design and put time frames to boost your achievement – you develop a time conscious mind, which helps you to cut off your routine unproductive activities to balance your mind. Vision building helps to discipline your mind because you need to think through how you are going to achieve your vision. Children need to develop this at household level to be able to become successful business people or productive employees of the future. This is to redress the apathy.

4.2 Water for Food Movement methodology

The training program starts with participants' own empowerment within their homesteads. There, they are in control of their lives. From the homestead, it moves into the village community with continued support of the Water for Food Movement. The sequence of the programme is as follows.

a. Self-reflection, motivation, and design workshops

An analysis of the present situation helps individuals to reflect on their situations and share the pain and frustrations they face. The sharing helps those that thought their situation is permanent to think otherwise. Apathy is being turned into hope – changing the mindset. Then, vision building how to change their own environment, the homestead, helps them to set achievable targets to change present situations. You start valuing your own self and power to change – 'Don't sit back, do it yourself. Nobody will do it for you.'

You have discovered yourself, your weaknesses and strengths. Pick up your pruning shears and prune your entrenched attitudes to life. Come out of your cocoon and believe in yourself. At the end of the self-reflection workshops, you have your draft design for land and water management in your homestead, seeds through seeds sharing, and a candle for firing your spirit.

b. Implementation of the design at home

Go back home and start changing and implementing your land and water management design in your homestead. It is threatening, but a process to keep your hopes also rests on the creation of an enabling environment – do it and mobilise your neighbours; alone you can not win. You need the support of your neighbourhood to respect your initiative even if they see you as a Nobody. If you do not mobilise your neighbours, goats and chickens will destroy your initiative and you will fall back to apathy. Your own effort cannot defeat the powerful in the community, so mobilisation helps to create an enabling environment for you to achieve your vision.

c. Community mobilisation

In informal group work you share your hopes with your neighbours or those like you. Make fun of what you are doing to keep up your spirit.

Water for Food Movement is to help you to influence the change of mindset of the rest of the community to shape new values for cooperation and caring.

Local government and chiefs or chiefs' wives are to buy into the strategy. Develop norms – do's and don'ts. Festivals sell the hopes of success, sharing of skills and demonstrate what you have achieved. Apathy will be out of the window seeing the Nobodies leading the way to self-discovery with pride and confidence. Community meetings decide on bulk buying of fruit trees, installation of treadle pumps etc.

d. Follow-up training and inputs by resource persons

The Water for Food Movement keeps the spirit up of the initial target families to keep on doing what they do. The skills sharing is expanded to improve skills for land designs, soil preparation, crop plantings, harvesting, storage, preservation and processing, nutrition education, irrigation, composting, mulching etc.

They are helped to develop seed banks for seed needs.

Other stakeholders are brought in for sharing other options of skills and techniques, but we make sure they do not disempower them by prescribing.

If production is more than consumption at household level, informal selling skills need to be encouraged, for example exchange or bartering for things they don't have or need.

Once the food security has been fulfilled the family is ready:

- Confidence has been rebuilt;
- Relationships are harmonised;
- The neighbourhood respects their initiatives and bought into the strategy;
- The family works as a unit – has developed business skills;
- The family is ready to go forward; the choice is theirs. They can start a small business, find jobs and sell their skills for land designs to the middle class, learn irrigation technologies and water harvesting – they do it for others for small cash.

e. Community programs

If a buy-in strategy is positive, the local government and other stakeholders can start planning with communities on village programmes for environmental and land use reconstruction programmes on a wider scale.

- User-friendly and inclusive policies can be developed with all. There will be a sense of ownership by all.

- People will be encouraged through inclusive participation to take responsibilities for the service charges on e.g. water, because there is an economic value attached to it.
- People will take responsibility for reforestation of wider environment. Norms will be developed by the village that will ensure sustainability.
- Health education for improved nutrition and hygiene at the household level will be through popular education strategy.
- Government departments will be coordinating well. All will be feeling cared for.

f. Replication and up-scaling

Last but not least, successful and highly motivated participants will be trained to start training others. Their homes will be new 'training homes' that will spread further.

Thus, the feeling of 'We all care' should spread as slogan for South Africa's code of conduct.

THE GUARDIANS OF TREES AND WATER
LOS GUARDIANES DEL ARBOL Y EL AGUA
E CHAJINEL RECH LE CHE´ RUK LE JA´

Santos Augusto NORATO

Alcalde Indígena y Presidente Junta Directiva de los 48 Cantones
Maya Kiché, Totonicapán, Guatemala

Summary

The fact that the forests of Totonicapán are still in a good natural state is because of the intimate relationship of the collective control and resistance that the Maya-Quiché culture has exercised. It is safe to say that it would not be possible to deal with this natural resource without alluding to the community organization. Moreover, in some communities, forest and water issues determine the forms of local organization, based on specific collective relationships. For example, the indigenous council is the most important community political organization.

In addition, the Totonicapán forests are not only natural ecosystems, but also constitute a cultural benefit, to such a degree that they strengthen the collective identity of the Maya-Quiché communities. These forests fulfill a transcendental hydrological function for the local and regional areas of Guatemala. The communities understand the importance of the water-forest relationship, and the seriousness of the consequences that they could face if they place at risk an element so vital to the survival of their people.

In each of the communities there is a water source committee, whose fundamental function is the conservation of the water resources. To accomplish this, the people contribute a large number of work hours, called *faenas,* which represent sacrifices, hardships and economic expense, given that the work is done *ad honorem.* This process is not understood or supported by state agencies, which create obstacles and politicize the actions taken to protect water sources and the sustainable forest use (for example, to prevent deforestation).

There is a committee for each water source and the beneficiaries constitute the general assembly. The board of directors is composed of nine people (women and youth should participate) who serve for two years. The board conducts activities that include the maintenance of the entire distribution system, the organization and distribution of work crews *(faenas)* to cleanup the area around the water sources and the water containment tanks, reforestation, keep a watchful eye on those who cut down trees, identify new water sources and evaluate their capacity. In communities where the committees are well organized, there are regulations for the use of this vital liquid. The board of directors establishes, subject to previous consultation and consensus, monetary quotas, which are their responsibility to manage transparently. In addition, a beneficiary who does not fulfill his or her responsibility with the *faena* must pay a monetary fine, and if the person fails to attend a

committee meeting he or she will suffer the same penalty. Some visionary committees exist that have opened bank accounts or have deposited their funds in a local cooperative.

Periodically, the community celebrates a Mass, a worship service or a Mayan religious ceremony to show their appreciation to God for the benefits received through this natural water source.

As one can infer from the previous discussion, it is the communities that who have fulfilled the role of guardians of the forest and the water sources. And, in keeping with this fascinating reality, the people connect practices with community values, such as mutual assistance (TOBANIK); communal autonomy; common law; community organization, consultation and consensus; community service, among others.

A majority of the committees have joined an organization called ULEU, CHE', JA', which means "Land, Tree, Water" respectively, and they have achieved the development of a very important management capacity.

Finally, we cannot fail to mention the problems that these communities face, the advance of the agricultural frontier due to uncontrolled logging, and the pressure of population growth. Totonicapán has a population density of 315 inhabitants per square kilometer, while the national average is approximately 115 inhabitants per square kilometer. The politicization of the community organizations by the governing political party, and the process called modernization, which translates into the Plan Puebla-Panamá, are some of these problems. Faced with these problems, we are strengthened by our culture and its values and social identity.

CHABE´XIK:

'TATAIP, NANAIP, E KAMALBE´ RECH RI U ROX FORO MUNDIAL RECH RI JA´, XIN KAM LOQ JUN RUTZIL Y WECH PA U BI´ NU TINAMIT IXIM ULEU, XU KU JE´ RECH NU CHWIMIQ´INA´, XAQ XU KIEB´, OXIB NOJ XIN KAM LOQ.

MALTIOX CHE LE QACHALAL RECH JAPON KUYÁ NU KULIBAJ KIEB OXIB Q´IJ, RI TINAMIT ALAQ SIBILAJ JELIK.

ARE LE AJAU KA TE WE CHIN A LAQ´.

MALTIOX CHE NU TATABEXIK.

KUYU NU MAK KIN VAN OKEM CHE NU TAQ´KIL XIN PE JE WA'.

TRADUCCION AL CASTELLANO:

' SEÑORES, SEÑORAS, ORGANIZADORES DEL TERCER FORO MUNDIAL DEL AGUA, TRAIGO UN SALUDO DE MI PAIS GUATEMALA Y TAMBIEN DE MI PUEBLO TOTONICAPAN, SOLAMENTE TRAIDO UNAS DOS OTRES IDEAS Y EXPERIENCIAS QUE COMPARTIR CON USTEDES.

MUCHAS GRACIAS A LOS HERMANOS JAPONESES POR PERMITIRME ESTAR UNOS DIAS AQUÍ, TIENEN UN LINDO PAIS.

QUE EL AJAU LES BENDIGA.

MUCHAS GRACIAS POR ESCUCHARME.

COMPERMISO VOY A TRATAR DE CUMPLIR CON LA MISION PARA LA CUAL HE VENIDO HASTA ACA'

Palabras introductorias

Les reitero el saludo fraternal a nombre de mi pueblo **CHWIMIQ´NA´** (traducido al idioma castellano significa: sobre el agua caliente), conocido hoy como Totonicapán, que al mundo 'ofrece dos riquezas extraordinarias, su pueblo Quiché, que a lo largo de **500** años de etnocracia, colonialismo interno y marginación social, ha podido subsistir, gracias a la defensa de sus pilares étnicos, idioma y cosmovisión en donde juega un papel importante su organización social comunitaria y sus prácticas jurídicas' y 'su otra riqueza es la forestal, pues posee una de las mas grandes extensiones de bosque coníferos de Centro América y demuestra la capacidad comunitaria en conservar y manejar sus recursos y constituye un bastión importante en sus reinvindicaciones'.

Hoy mi pueblo se siente muy honrado al darle este importante foro, la oportunidad de compartir su experiencia comunitaria ya que 'la verdad es que toda la historia de América puede leerse como una larga guerra entre las fuerzas de la dignidad y las que nos niegan la posibilidad de ser voces, nos condenan a ser ecos, nos niegan la posibilidad de tener cuerpos propios y nos obligan a ser sombra de otros'.

Muy a pesar que en mi país los indígenas seamos mayoría en términos demográficos; pero minoría políticamente, aún así, hoy estamos vivos y fortalecidos para aportar al movimiento indígena del mundo, a la sostenibilidad de los recursos naturales y fortaleciendo nuestra identidad de pueblo para enfrentar los efectos de la globalización, entre ellos la ola de privatización de los recursos naturales, principalmente el agua.

I. Presentación

La presente ponencia es un intento encaminado a compartir con los hermanos de Cultura Indígena y de otras Culturas del mundo que se encuentran presentes en este importante foro, el conocimiento y las prácticas que se realizan en mi pueblo para el manejo del recurso natural **AGUA (JA´** en mi idioma materno).

Para poder entender cómo las comunidades rurales han logrado conservar de manera tradicional los recursos naturales, es necesario primeramente referirse a la trilogía **TIERRA, ARBOL y AGUA, (ULEU, CHE´, JA´** en idioma **Kiche´)** y que este trío de elementos forma parte de la cotidianidad comunitaria y unidos a la diversidad biológica y el clima, constituyen la base material sobre la cual se construye la sobrevivencia de las comunidades. Seguidamente, que el marco que rigen las distintas prácticas del manejo de los recursos naturales es la Cultura Maya Kiche´ con sus distintos valores que en desarrollo de la presente exposición se ampliarán.

Por lo anteriormente anotado, se explica por qué los bosques de Totonicapán han sido tan celosamente cuidados y que los comunitarios bien se les puede llamar guardianes de la naturaleza, por lo que se puede afirmar que 'el bosque ha sido un resultado cultural que ha permitido establecer una relación por medio del pensamiento Maya y de la sacralidad de la naturaleza'.

La tendencia natural de las comunidades por organizarse ha sido el factor fundamental para la administración, uso y manejo de los recursos naturales; es importante indicar que en las comunidades que poseen bosque, la organización gira en torno a este recurso y es la Junta Directiva la que puede avalar cualquier decisión comunitaria, incluso las decisiones políticas. De esto se puede inferir el grado de incidencia que tiene tan importante recurso. En las comunidades que no poseen bosque, la máxima autoridad está constituida por los Alcaldes Comunales.

Otro elemento importante que no puede dejar de ser mencionado cuando nos referimos a los recursos naturales de Totonicapán lo constituyen los mecanismos de consulta para el consenso de las decisiones de manera participativa, las asambleas sectoriales para tratar asuntos relacionados con problemas específicos de la escuela, mantenimientos de los caminos, por ejemplo. pero también la celebración de las grandes asambleas generales para buscarle solución a problemas que

afectan a todos y todas, como es el caso del agua. A esta forma de participación, algunos teóricos han dado en llamar democracia participativa y yo atrevidamente nombro como democracia comunitaria y asumo que lo de participativo está implícito.

II. Totonicapán

La república de Guatemala se encuentra ubicada en Centro América, políticamente se divide en 22 departamentos, según el censo practicado el año 2002 nos informa que somos aproximadamente 11 millones, un 60% indígenas y un 40% no indígenas. Cuenta con 4 grandes pueblos: **XINCA, GARIFONA, LADINO Y EL PUEBLO MAYA,** es un país multilingue hablándose 24 idiomas de origen Maya, siendo los mayoritarios el Kaqchikel 343 mil hablantes, el Mam con 347 mil, el Q´eqchi´ con 474 mil y el K´iche´ 648 mil hablantes.

El departamento de Totonicapán se encuentra localizado en la región occidental de la República de Guatemala, con una extensión de 1.061 km^2 y se divide en los siguientes municipios: Santa María Chiquimula, Momostenango, Santa Lucía la Reforma, San Bartolo Aguas Calientes, San Francisco El alto, San Cristóbal Totonicapán, San Andrés Xecul y Totonicapán como cabecera departamental.

El municipio de Totonicapán tiene una extensión territorial de 328 kilómetros cuadrados y una población aproximada de 110.000 habitantes, siendo en un 95% indígenas. La densidad de población es de 330 habitantes por kilómetro cuadrado, lo que ocasiona una fuerte presión sobre la tierra, agravándose con el proceso acelerado de atomización del recurso tierra, dado que la tasa de crecimiento poblacional es de aproximadamente 2.9%. Este hecho explica y preocupa la presión que el crecimiento demográfico ejerce sobre el terreno boscoso.

En su mayoría, el territorio departamental se caracteriza por la presencia de las montañas con alturas que van los 1.800 a 2.600 m.s.n.m. En todo el departamento la temperatura media anual es baja, lo que provoca heladas y granizadas frecuentes.

Un inventario realizado por la Asociación CDRO y el Plan de Acción Forestal en el año 1993 nos indica que en ese entonces, el departamento contaba con una cobertura forestal de los tipos de coníferas 489.61 km^2, latifoliadas 90.31 km^2 y mixto 26.57 km^2, equivalente al 57.2% del territorio departamental.

Una estimación permitió ‘tener una idea del potencial económico – financiero que para el departamento de Totonicapán representa la existencia volumétrica de madera, al estimar su precio en pié; el cual representa para las coníferas aproximadamente 2.139,3 millones de quetzales y para las latifoliadas y mixto, aproximadamente 54,7 millones de quetzales. (Junio 1993)’.

Para una mejor apreciación de los montos, asumiendo los mismos datos y al tipo de cambio de 8 x 1, serian 274 millones de dólares.

Con los datos anteriormente anotados podemos inferir realidades tales como: el suelo de Totonicapán tiene una alta vocación forestal y es susceptible a la erosión, existe un considerable volumen comercial de especies forestales, alta concentración poblacional en pobreza y en pobreza extrema, los habitantes tienen una total dependencia de la energía vegetal y materia prima para la construcción – lo que hace imperativo que el bosque sea incorporado a un proyecto de desarrollo sostenible con el fin de protegerlo, perpetuarlo y que participe directamente en proporcionar satisfactores económicos que contribuyan a elevar el nivel de calidad de vida de las comunidades.

III. La cultura maya como marco del manejo sostenible de los recursos naturales

La Cultura Maya está compuesta por una serie de valores, normas, autoridades, instituciones,

prácticas, trajes, idiomas, toda una cosmovisión propia hacia la naturaleza y por ello me atrevo a afirmar que los bosques comunales constituyen un referente importante para la identidad colectiva de las diversas comunidades Kiche´s de Totonicapán. Es más, en el proceso organizativo comunitario, la relación con la gestión de los bosques cumple un rol fundamental.

La Cultura Comunitaria ha tenido un papel muy importante en la preservación de las tradiciones, costumbres y formas de vida, por ello comparto que 'los bosques de Totonicapán, no son simplemente un ecosistema natural, si no que, a nuestro entender, constituyen un producto cultural. Su estado actual de conservación es el resultado de intervenciones humanas reguladas por una racionalidad y unas pautas culturales muy específicas. Los problemas que hoy presentan deben ser contemplados también a la luz de la evolución e esa racionalidad y de esas pautas culturales'.

El reto es entonces cómo y qué estrategias utilizar para asimilar los cambios y la tecnología de punta sin erosionar los valores culturales comunitarios, pienso que debe partirse desde el fortalecimiento de la identidad individual y colectiva, esto por medio de la práctica en la cotidianidad de 'los valores comunitarios en los procesos de cambios'.

Don Benjamín Son, Asesor de una importante Organización Comunitaria ubicada en las comunidades de Totonicapán y con trabajo extensivo hacia la región, me refiero a la Asociación CDRO, agrupa los valores comunitarios como sigue.

1. Los Valores de carácter general

a) La vida en ciclos

Los Mayas siempre vieron el funcionamiento del universo en ciclos y no como una sucesión de etapas. Por ejemplo: el ciclo del agua, el clima, los cultivos, el ciclo del sistema solar en la vía láctea, el ciclo de la gestión de un nuevo ser. Existen los Ciclos grandes y los pequeños.

Los ciclos son repeticiones de lo mismo, pero en forma ampliada o mejorada. Aparecen las mismas condiciones pero mientras dan la vuelta, se modifican.

b) La unidad en la diversidad

Se admite que existen diferencias entre las personas, los animales y las plantas, pero también la existencia de similitudes.

c) El enfoque integral

La contemplación de la naturaleza, llevó a los antepasados a encontrar la vinculación entre los fenómenos, cuyas consecuencias podían aparecer espontáneamente en otro lado, que posteriormente en términos dialécticos se identificó como la acción recíproca de los fenómenos.

d) La visión de largo plazo

Derivado de las observaciones durante muchos años, el pueblo maya se acostumbró a no impresionarse solamente por los acontecimientos inmediatos.

2. Los Valores con respecto a la conducta humana

a) El potencial natural de la persona

En el calendario maya los días tienen su significado, los individuos nacen en ciertas condiciones marcadas por la fecha en el calendario, que constituye su potencial. Este potencial debe desarrollarse lo más posible, pero esto solo se logra cuando se le conoce.

b) El apoyo mutuo y las relaciones de cooperación

Este valor se puede observar en las distintas formas colaborativas que se dan en las comunidades, cuando una persona enferma, fallece, cuando ocurre una desgracia, en el servicio comunitario hacia

la seguridad de los demás, en las faenas para el mantenimiento de los caminos y las fuentes de agua.

c) La complementariedad

Se refiere al otro yo, el reflejo en la otra persona, se aplica fundamentalmente a las personas más cercanas, la esposa, por ejemplo.

d) La relación armoniosa entre las generaciones

Este valor trata de poner en un lugar especial la preocupación por las generaciones futuras, no es discurso solamente; existen prácticas, por ejemplo, la construcción de la casa de una nueva pareja, es decir, de jóvenes recién casados.

e) La relación armoniosa entre el hombre y la naturaleza

Este valor es muy mencionado, al punto de afirmar que es uno de los mejores aportes de la Cultura Maya al concepto del desarrollo sostenible. Personalmente creo que no tiene mucho sentido decirlo, pues con ello no se consigue nada más que un reconocimiento a un concepto desarrollado por las principales instituciones mundiales, poniendo a nuestra cultura como tributaria solamente.

De todos modos las mismas instituciones mencionadas no tienen la capacidad para hacer que el mundo recobre ese respeto por la naturaleza. Efectivamente se siguen realizando acciones que destruyen la naturaleza, mientras la población aumenta y el futuro cada vez más aparece incierto. En Guatemala se puede citar la destrucción agresiva de la selva de Peten donde fue un asiento importante de la cultura maya, la ciudad de Tikal.

3. Valores con respecto a la comunidad

a) La propiedad comunal de los recursos

La propiedad individual y la colectiva son semejantes y ambas aparecieron en la época de la colonización española. Pero la propiedad comunal se distingue por el hecho de hacer que un bien conserva su independencia de la persona individual. El individuo puede considerarse perfectamente como un propietario de un bien comunal siempre y cuando tenga necesidad de él. Entonces lo que debe hacer es pedir permiso a la comunidad y utilizar lo que necesita. Esto hace a la propiedad comunal una propiedad funcional. Es decir, el uso del bien depende de la necesidad, pero el bien mismo está sujeto a las disposiciones individuales como si ocurre en las acciones, aportaciones, como formas de constituir capitales sociales o propiedades colectivas.

b) El servicio a la comunidad

Dentro de los principios relacionados con las relaciones de colaboración aparece la obligación de prestar servicio a la comunidad. A esto servicio se le denomina **KAXKOL** (sufrimiento), debido a que es un año que el comunitario debe servir *ad honorem*, en un puesto que le sea asignado, por ejemplo como Alcalde de su comunidad.

c) La horizontalidad

Es lo contrario de verticalidad, pero no significa ausencia de dirigentes. Sucede que en las comunidades es relativamente fácil que se distribuyan las funciones y el poder, siempre que las comunidades actúen dentro de su propio marco cultural.

d) El sistema de la resolución de conflictos

Existen normas internas de la comunidad y que se fundamentan en la moral, en consecuencia, cuando las familias tienen problemas, lo que hacen es acudir a sus autoridades (por ejemplo Alcalde de la comunidad) para plantearles su dificultad y ponerse de acuerdo ante ellas.

IV. La organización comunitaria para el manejo sostenible de los recursos: agua y árbol

Para poder comprender la organización comunitaria en torno al bosque y el agua se deben considerar los siguientes elementos.

1. Los Valores comunitarios

El principio de la relación armoniosa entre el hombre y la naturaleza, ha cultivado en las comunidades una profunda identificación para con los recursos naturales, principalmente el binomio bosque - agua, en estos tiempos donde se avecina una crisis sin precedentes del agua a nivel mundial, también las comunidades indígenas han tomado conciencia de la gravedad de las consecuencias que pueda entrañar el poner en riesgo un elemento tan vital para la sobrevivencia del pueblo y del mundo. Las generaciones de los abuelos nos enseñaron y hoy practicamos el agradecimiento a la naturaleza, porque nos brinda su fruto. Los distintos comités de agua y particulares estiman conveniente pedir permiso a la naturaleza cuando van a tocarla, cuando van a tomar algo de ella; el agradecimiento es a través de la celebración de una **CEREMONIA MAYA,** dirigida por el **AJ IJ** o Guía espiritual.

Esta sacralización de la naturaleza también se puede observar cuando llega la época de la siembra; hay que bendecir previamente la semilla y pedir al **AJAU** que la nueva cosecha sea abundante y que haya suficiente agua.

2. El tipo de propiedad sobre el bosque

El bosque en Totonicapán tiene 3 tipos de propiedad:

a) La propiedad privada

Lo constituyen extensiones de bosques en propiedad de particulares, que hacen uso de los recursos sin mayores restricciones, ni legales ni comunales.

b) La propiedad comunal

Es una extensión de bosque propiedad de los 48 cantones de Totonicapán y que hoy su administración es motivo de constantes litigios entre la autoridad municipal y las autoridades comunitarias, a tal punto de que existe un **CONSEJO CONSULTIVO DEL BOSQUE** integrado por representantes de la municipalidad, Alcaldes Comunales y miembros de la comunidad.

c) La parcialidad

De manera muy sucinta, anoto que al arribar los antepasados a las tierras que hoy se conocen como la región occidental del país, se organizaron en grupos que más los conquistadores identificaron como clanes y linajes con unidades territoriales bien delimitadas. A ellos les llamaron parcialidades.

Estos grupos contaban con organización interna propia así como normas sociales específicas, entre ellas la descendencia patrilineal específica. Debido a que la parcialidad no fue reconocida como unidad administrativa por las autoridades españolas de la colonia, ésta no fue objeto de intervención directa. Según la antropóloga Carol Smith, fue por medio de la parcialidad que los indígenas lograron conservar muchas de sus tierras y sus instituciones comunitarias.

Actualmente existen alrededor de 13 parcialidades y sus características principales son:

1. El bosque se trabaja por derecho de uso colectivo y no en propiedad como se conoce en el derecho jurídico de las sociedades ‘occidentales’.
2. Este derecho de uso se fundamenta en el sentido de patrimonio comunitario y por tanto

igualitario, con respecto al bosque, que constituye la base de la parcialidad, en este sentido, la parcialidad encierra un potencial único para impulsar el desarrollo comunitario.

3. En una parcialidad se puede hablar de propiedad, siempre que se refiere al uso de los recursos que provee el bosque a todos los asociados, o sea colectivamente.
4. Las decisiones en una parcialidad son generalmente colectivas, el poder es horizontal, osea de todos. Sin embargo, cabe señalar que cada parcialidad tiene su propia Junta Directiva, con un orden jerárquico.
5. En casos especiales, cuando la parcialidad convoca a sus miembros y vecinos que se benefician del agua, son un gran potencial de fuerza de trabajo.
6. **TODOS LOS MIEMBROS** de la parcialidad tienen la tarea de cuidar y preservar el bosque, al entender que los recursos forestales son patrimonio colectivo comunal, prueba de ello es el hecho de que los bosques de Totonicapán son mejor conservados del altiplano occidental.

3. La tendencia a la organización

El otro elemento que debe considerarse es la tendencia natural de las comunidades a organizarse, es mi opinión, una estrategia muy inteligente para la sostenibilidad del agua. Los mayas kiches tienen una larga historia en lo que respecta a organización, sin embargo, actualmente hoy los comuneros han asumido un impresionante rol de conservación participativa que atraviesa toda la actual organización social.

La organización comunitaria denominada por el antropólogo noruego Stener Ekern como 'gobierno indígena o maya', es conformada por aproximadamente **2.000** hombres que año con año prestan su servicio comunitario ad honoren por un espacio de un año, dicho servicio es llamado **K´AXK´OL** (sacrificio) y es realizado 'por el bien común de la comunidad y es obligatorio para todos los hijos de la comunidad'. El Gobierno indígena se rige de alguna manera por el llamado Derecho Consuetudinario, nombre que personalmente no comparto, prefiero llamarlo Derecho comunitario ya que constituye un conjunto de normas y principios que rigen la vida política comunitaria principalmente en cuanto a la solución de problemas se refiere y que se concreta en lo que hoy se llaman las Consignas, éstas son revisadas año con año y se hacen las actualizaciones necesarias.

En cada comunidad existe lo que se denomina la Corporación Comunal y está compuesta por los siguientes elementos:

- Los Alcaldes Comunales: es la autoridad política de la comunidad, la máxima en aquellas comunidades que no poseen bosque; en donde existen parcialidades es la Junta directiva de éstas la autoridad superior, este hecho se explica por el valor estratégico del bosque.
- Los Alguaciles: son los encargados de salvaguardar los documentos históricos y donde se registran las propiedades del Pueblo Indígena de Totonicapán.
- Los delegados y promotores de baños, son los responsables del cuidado de los baños de Agua Caliente que utilizado por las personas de las comunidades, en su mayoría.
- Los fontaneros, son los responsables del mantenimiento de la red de distribución comunitaria del agua.
- Los guarda bosques: son los encargados de velar por los linderos de los bosques y cuidado del mismo contra los depredadores o deforestadores que constituyen un atentado contra tan apreciado recurso natural, asimismo, velan por los nacimientos y su mantenimiento, además de sembrar árboles en los espacios en los que sean necesarios.
- Los distintos comités de mantenimiento de caminos, pro mejoramiento de la comunidad, de la escuela y comités de introducción de agua.

4. Los comités de agua

En los bosques de Totonicapán existen alrededor de **400** nacimientos de agua captados y **85** comités, conformados por **50** a **100** familias, la cantidad exacta de familias lo determina el caudal o la capacidad del nacimiento. Por lo tanto en todas las comunidades existen comités de agua cuya función principal lo constituye la conservación de nacimientos.

La asamblea de cada comité lo conforman los beneficiarios del proyecto de donde surge una junta directiva compuesta generalmente por 9 miembros, ésta es la encargada de coordinar las actividades tendientes al cuidado del bosque y de los nacimientos, y son las que a continuación se anotan:

- Aporte de jornales también llamadas faenas para el mantenimiento de los nacimientos, con una frecuencia según lo demande el estado del nacimiento, asimismo, el mantenimiento de la red de distribución.
- Limpia de los alrededores de los nacimientos y de la red de distribución, las cajas de captación.
- Reforestación del área del caudal.
- Vigilar a los taladores.
- Identificar nuevos nacimientos y evaluarlos.

Además, un avance importante es la existencia en cada comité de un instrumento importante como lo constituye el **REGLAMENTO DE USO DEL AGUA,** donde está consignado todo lo referente a los derechos y obligaciones de los asociados e incluso, las sanciones y o multas.

Por ejemplo, es multado aquel vecino que no asista a las reuniones de información como también aquel que no brinda sus faenas, la pena mayor es el corte temporal o en los casos extremos el corte definitivo del agua domiciliar. Todo esto ha sido el resultado de la consulta y consenso, y validado por la asamblea respectiva

Todos los miembros de los comités trabajan adhonoren y por 2 años obligatoriamente, los comités más visionarios han abierto una cuenta bancaria o depositado sus fondos en la cooperativa local.

Periódicamente se celebra una Ceremonia Maya para agradecer al **AJAU** por los beneficios recibidos, principalmente: el agua.

Como puede inferirse, son las comunidades y sus habitantes los que han hecho el papel de **GUADIANES DEL ARBOL Y EL AGUA** y en torno a esta fascinante realidad se entrelazan prácticas y valores comunales como el apoyo mutuo (T**OBANIK**), autonomía comunal, derecho comunitario, organización comunitaria, consenso y consulta, servicio comunitario, entre otros.

65 comités de agua se han aglutinado en la organización comunitaria llamada **ULEU, CHE´, JA´** que traducido al castellano significa **TIERRA, ARBOL Y AGUA** respectivamente, habiendo desarrollado una capacidad de gestión muy importante.

Finalmente, no se puede dejar de mencionar los distintos problemas que se afrontan y que van desde el avance de la frontera agrícola por la tala inmoderada, la presión que ejerce el crecimiento poblacional, los problemas de límites y titulación legal de los bosques y últimamente se agrava con la politización partidista del gobierno en turno hacia las comunidades profundizando la fragmentación en el tejido social, de por sí ya dividido como efecto directo del conflicto armado que duró mas de treinta años, habiéndose firmado Acuerdos de Paz que por la falta de voluntad política no avanzan y mas recientemente la llamada 'modernidad' se traduce en un Plan Puebla Panamá, que seguramente obviará el contenido del Convenio 169 y el Acuerdo de Identidad y Derechos de los Pueblos Indígenas, al no tomar en cuenta la opinión de los pueblos indígenas que habitan el área de influencia directa de dicho proyecto.

5. *Organización comunitaria y las instituciones*

Existen esfuerzos institucionales que coordinan actividades con los comités de agua, con las parcialidades y con la organización comunitaria en general, se presenta en anexo 2 experiencias, una de la Pastoral de la Tierra de la Iglesia Católica de Totonicapán y la otra de la Asociación CDRO, que promueve la participación total de la comunidad en la construcción de un modelo de desarrollo que tenga como marco la cultura kiche´. Ver anexo.

V. Conclusiones

Los bosques de Totonicapán, no son simplemente un ecosistema natural, sino que constituyen un producto natural, cuya conservación ha sido el resultado del uso de la racionalidad y de los principios culturales del pueblo kiche´.

La organización natural de las comunidades ha jugado un papel muy importante en la conservación de los recursos naturales, esta organización compuesta por los Alcaldes Comunales que han actualmente han asumido un papel de incidencia a nivel local y se preparan para la construcción de un modelo de desarrollo en términos del etnodesarrollo.

Los bosques y la sacralización del agua, son pilares fundamentales que fortalecen la identidad del pueblo indígena de Totonicapán, su conservación es actualmente la mayor preocupación y la herencia que se dejará a los hijos de esta generación.

Existe una profunda preocupación en la dirigencia comunitaria por los efectos de la llamada transnacionalización de las economías y que en el caso específico de Guatemala, los efectos se verán con la implementación del Plan Puebla Panamá, principalmente en los recursos naturales como es el caso del agua y los bosques.

VI. Recomendaciones

Que el presente foro emita un pronunciamiento al mundo y principalmente a los gobiernos para que construyan políticas públicas con tendencia a la conservación de los recursos naturales y las transnacionales que respeten los convenios y leyes internas de los países.

Fortalecer las distintas coordinaciones, redes y organizaciones que han manifestado su preocupación por el manejo sostenible del agua, dado que no hacerlo significa profundizar y acelerar la crisis mundial sin precedentes.

Que los cooperantes evalúen la posibilidad de apoyar directamente actividades con impacto en el uso sostenible y la construcción de una conciencia ecológica de los recursos naturales.

A los Pueblos Indígenas del mundo mantener la comunicación que permita fortalecer la unión para la lucha por hacer valer sus propiedad histórica sobre su territorio y sus recursos naturales.

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The Long Road of Safeguarding Water: Critical Issues of Indigenous Governance, Institution Building, and Leadership in the United States of America

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A society must freely access and consciously determine its interactions with water in order to maintain a sovereign, cultural identity. The ways in which a community generally takes care of, uses, and otherwise relates with water reflects fundamental values of that community. Many American Indian societies identify water as a central element of their spiritual and cultural practices. Successful economic development for Native nations – meaning self-determined, culturally appropriate development – requires that Native nations unrestrictedly administer adequate supplies of water on their lands.

It was almost a century ago, in the 1908 *US v. Winters* case that Justice Mckenna of the United States Supreme Court pronounced the legal decision that American Indian nations did not give up their rights to water when signing the treaties establishing their reservations, but rather they *implicitly reserved* a sufficient amount of water to fulfill the purposes of their reservations. Since then, Native nations have had difficulties in asserting their reserved water, or *Winters*, rights. Without the ability to secure loans, and with meager if any assistance from the federal government in developing indigenous water delivery systems, Native nations have been severely restricted in their water resource development.

With the expectation that water rights dialogue between Native nations and non-Native entities will be a perpetual process, what must Native governments and their leaders do to protect and enhance their water interests? What types of institutions must be developed to safeguard these interests?

Session 7: Wrap-up Plenary

Water Saving and Cultural Diversity in Environmental Education System of Kids' ISO 14000 Programme

Takaya KAWABE and Miyuki KOYAMA

ArTech (NGO) and United Nations University

Cultural diversity and global environmental issues

There are two major trends visible as clear world, (1) appreciation of cultural diversity, and (2) globalization. Two seem to contradict each other, however, we have to optimize these two trends to solve environmental problems, particularly, water pollution, global warming and climate chance.

The one, and possibly the typical example of the issues mentioned above appears in 'environmental education' of the children, today. We have to start the environmental education of the children from children's 'awareness' or 'sensibility' to the nature, and not from the knowledge of the disorder of the nature.

This comes from the fact that the knowledge of the children on the global environmental problem is limited. The awareness to the nature for the children in the region is based on the locality of the nature, which leads to importance of the local cultures, which are characterized from place to place.

On the other hand, the final goal of the solution of the environmental issues is the global activities to stop water pollution or global warming. This means that the world children have to work for the same target to live on the earth, together.

To attack this issue, we started an environmental education programme system, called *Kids' ISO 14000 Programme* in the summer of 2000. We deduce the awareness of the children from their workbooks when they accomplish the programme. By using typical methodology to solve their awareness and issues in many aspects through the programme, children obtain confidence to solve the environmental problems in their households, in their region, and in their countries or internationally, by working together with other children.

In this presentation, we would like to show an example of the solution for the contradiction between the cultural locality and globalization in the environmental education system.

Kids' ISO 14000 Programme

The aim of this Programme is to educate children to have their confidence to live. This Programme has two characteristics, i.e., vertical and horizontal structures.

In the vertical structure, children start from the 'Introductory Level', which is to experience what is environmental management. Next step is 'Primary Level', in which children learn and make practice on the management of household with their family. In the 'Secondary Level', the children who pass the primary level form groups, and the group challenge to improve the environment of

The International Certificate for the Primary Level of Kids' ISO 14000 Programme

their regions. In the 'Highest Level', children work together by partnership, nationally and internationally. When the children accomplish the programme, then, they receive international certificates, issued by the international committee of ArTech.

The horizontal structure gives networking among the children, or as the group. The children who participate this Programme start to think about what they should do by themselves for environment in their household. Through this process, children gain their awareness toward environment.

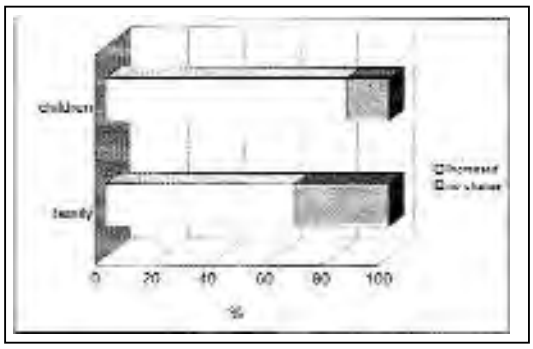
Then, they take their actions scientifically, through the process of P (plan) - D (do) - C (check) - A (action), which has been used in ISO 14001 (global standard for environmental management) by taking data of their household, including consumption of electricity, gases, water as well as solid municipal waste.

Children get confidence in their action to reduce their consumptions of water and energy in their household from the data by their action. This leads to their confidence in many aspects of their everyday life.

Change of Environmental Awareness

Kids' ISO l4000 Program gives leadership of the environmental management in the home in the introductory level to the children.

This changes the awareness of the children on the environment by 80% or more. Then, this will lead to the change of the awareness of their family members. At least, 60% of the family member changed their awareness. This data indicates the effectiveness of Kids' ISO 14000 Programme as the environmental education system.



Change of environmental awareness of children and family

Saving of water and reduction of emission of carbon dioxide from the household

From the analysis of the data from the children on the consumption of the electricity, gases, and water, it is possible to deduce the emission of carbon dioxide from their home during the course of Kids' ISO 14000 Program. It is found that children with their family reduced the emission of carbon dioxide from the household by about 10% to 15%. This data indicates that Kids' ISO 14000 Programme could be used even as the environmental programme to slowdown the global warming.

Kids' ISO 14000 Programme is being tested in Thailand, where the cultural difference exists

between Thai and Japan. Through comparison of the data on the average consumption of the water and electricity in Japan and in Thai, we found that consumption of the electricity per person in Japan is twice of that of Thai, while the consumption of the water is opposite. This comes from the cultural difference in the household. This indicates that we have to take into account the difference of the culture in the global activities toward the environmental issues, particularly, in environmental education.

Notes:

1. The United Nations University (UNU), The United Nations Environmental Programme (UNEP) supports Kids' ISO 14000 Programme.
2. ISO, International Organization for Standardization supports the aim of Kids' ISO 14000 Programme.
3. Tomigaya 1-39-2, Suite 104, Shibuyaku, Tokyo, 151-0063 Japan, Tel:++8l-3-3467-6250, Fax: ++81-3-3467-6277, E-mail: info@artech.or.jp URL:http://www.artech.or.jp
4. Jingu-mae 5-53-70, Shibuya-ku, Tokyo, 150-, Japan. URL:http://www.unu.edu.

Closing remarks

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We have listened to a whole score of presentations. This makes us aware of the very complex relationship that exists between mankind and water all over the world. We could measure the importance of culture on the individual or collective behavior of citizens when faced with water. Water and the use of water depend on the cultural context as much as on the source itself. And the cultural aspects are fundamental. They design our attitude, our daily behavior, our most banal behavior. The fact that citizens participate in water related issues clearly underscores the very strong factor which water links to mankind. We should try to manage water depending on the needs and wishes so that we can better use water in the light of the cultural roots linked to geographical conditions and religious believes. Cultural diversity must be respected. It is a wealth for all of us, and it is a guaranty for a water management which meets the requirements and wishes of all those interested. Anything which tries to drive at making water management more uniform is not going to succeed. Every single culture corresponds to a geography, to a history, to certain conditions. And therefore it is impossible for all of this to be unified. Water management for it to be efficient has to adapt to culture, and not the other way round. In all countries, either industrialized or developing countries, the individual behavior even on a very small scale can have consequences immediate and very long term consequences. Satisfactory water policies which have been put into practice efficiently, accepted by all with the parties participating in a diverse fashion can be the only way to succeed. We have seen over the last three days that this is not a simple task. It is important for citizens to be aware of their interests and of the solidarity they need to show to start this type of approach. So we need to be open in our spirit. We need to be tolerant, we need to have trust as well. We need to look at water management at our common interest and we should try to exploit the resource to the benefit of all, creating mutual understanding. We must do this patiently and tenaciously because often long term policies need to be put into practice which need to cover several centuries. We need to come up with original solutions, adjusted to the economic, social and environmental context, and of course, the cultural context, since water is closely linked to the local conditions. You can not have ready made solutions in space and time. We have all seen that theory and experience show that there are series of general principles. They are universal. And you also get a series of tools, complementary tools which can be adjusted on a case by case basis. Of course a lot of this scientific and technological means can be used and we have very modern capacity. Legal and administrative solutions can be found. We have seen that creativeness and imagination in this area is very broad. If we have efficient economic and financial investments, very large sums of money have to be invested in water infrastructures. This has to be taken into account as well. So if we want to really manage water properly, we need to put all of these actions into practice in a pragmatic and complementary way. But it seems to me that after the three days we have seen that the human aspects are very important and have often been underestimated. We have looked much more at the economic and technical aspects and brought to them priority. Water is vital. The social and cultural dimension, the human dimension with the involvement of the local communities is indispensable for harmonious and sustainable development. We need to listen and to keep our ear

close to the ground and this will help us to develop the policies. The right to access, solidarity between the rich and the less rich. In order to make sure that we fight against floods, against droughts, the spreading of information will make it possible for us to have proper consultation in the light of the different cultures. We need to train, teach and educate people about water within their own cultures. Water is something that touches mankind very close to his heart. So we need to proceed to very basic education which affects the intellectual and moral aspects of human beings. So the economic, social and health conditions of citizens are closely related to water. So we need to proceed to information campaigns to awareness campaigns among adults and especially women. We talked a lot about women. Women play a very important role in managing water. Whatever the social and cultural context is. Especially the cultural context where women do play this very important role: giving live and passing on live with all the values that go hand in hand with it. But local communities closed to the field, closed to the citizen need to play an important role. There is a major movement of decentralization at this moment. Those responsible for local authority need to train and inform those who manage water. The public and private water companies, the donors, the NGOs the civilian society need to be constructive and imaginative. Every one of them has an important an constructive role to play.

In the framework of a partnership which could be innovative as well. We want the private and the society and the local communities, the regional, national and international communities all groups are capable of contributing in a very positive way to improve the situation at the level of those who have less. So it is not impossible to take account of all the interest if there are solutions that satisfy one side and the other that is good. But sometimes it goes on to a higher level. You need to take into account the long term interest of future generations because they are not there to defend themselves. We must understand the commitments we need to shoulder. We need to share a common vision, a new water culture which needs to be taken on board by all parties involved. If we have communication across our globe, if we want to have true communication between man and women, we need to have mutual respect, knowledge and dialogue. As was said by Saint Exubéry, ‘give them a common goal and they will unite’.

By way of conclusion, this first international meeting dealing with water and culture clearly indicates that this initiative taken by the French Water Academy two years ago, in close cooperation with UNESCO and the National Museum of Ethnology Osaka, has been a very a good initiative.

Water was at the origin of the exhibition organized in the botanical garden of Kyoto within the framework of a French Japanese bilateral cooperation. I would like to encourage you to visit this exhibition. We also took a further initiative in this city full of symbols. And we need to pursue these initiatives over the long term. Of course we should draft the minuets together with our partners, but we would like to go even further. We would like to publish a reference book which would include all the contribution which you have been kind enough to give us over the last three days, and hopefully you will be in a position to handle over documents and papers for this particular work over the coming years. We would also like to prepare a film on this subject, which I think is very attractive for the media. Hopefully this will help us to establish some progress and to pass on our ideas on water management during the 21st century. I would like to thank you very much for your contributions once again. Thank you for your patience and your attention.

Pre-Forum Colloquium

Two World Views; Two Relationships to Water: the Bozo of West Africa

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Professor, National Museum of Ethnology

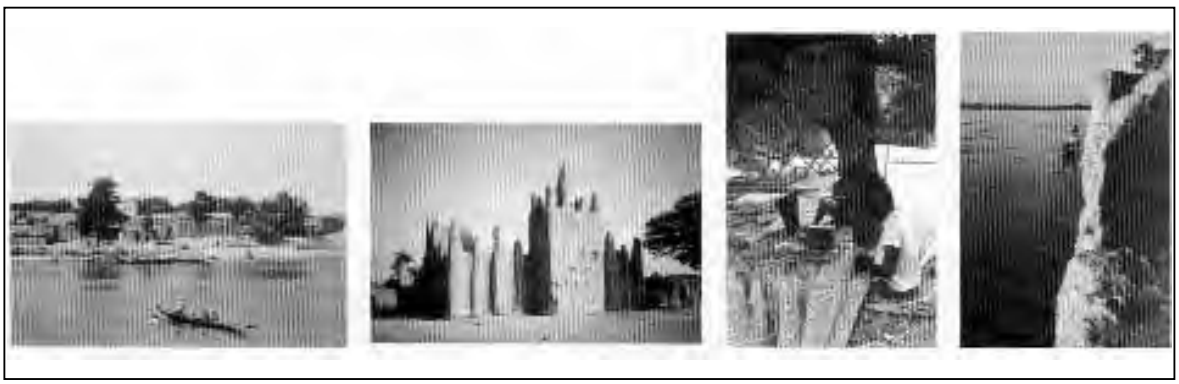
The Bozo people are one of twelve ethnic groups that constitute the Republic of Mali in West Africa. Their homeland is in the dry savannah, but they live through fishing on the Niger River. Rainfall in the upper reaches of the Niger flows east to form a vast flood plain rich with fish: The Niger Inner Delta. Fish enter the Inner Delta to eat the young grasses and to spawn roe among them. Thus, a broad and extended inundation in the area is a precondition for the success of Bozo fishing activities.

Just as their living depends on the river, so is Bozo religious life centred on the river spirit who controls, so it is said, rain and flood. Master of all creatures of the water, this spirit grants fishermen a good catch if they obey the rules. Violation of these rules warrants punishment – drowning or attack by crocodiles. In each fishing village there is a priest dedicated to the water spirit. The priest's main task, besides offering annual sacrifices, is to maintain a balance between fishing activities and the water world. To accomplish this task, the priest decides when the fishing season begins and ends, and forbids the use of tools that might upset this balance.

The modernization process has struck a discord in the harmonious relationship between Bozo people and their water environment. To catch as many fish as possible, they have begun to buy big and expensive fishing tools, and to extend their annual movements in search of rich fisheries. Conflicts have intensified everywhere between indigenous fishermen and ambitious strangers. Unprotected by the village water spirit, the strangers have embraced Islam, and the conflict between fishermen takes on a religious dimension.

Nowadays, Islam is by far the dominant creed among the Bozo people, as it is among other peoples in the West African Savannah. Dedicated to a single God, Muslims are hostile to the local water spirit that personifies the relationship between human beings and their water environment. Without a doubt, Islam has won knowledge and an international perspective for the Bozo people. But it has severed them from their ancient harmonious relationship to water.

Living in a global society, we have lost our sense of being embedded in a local setting, where the outer world is also the inner world. How can we recover this ?



Water and Cultural Diversity in Nepal

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Abstract

The Himalaya is the reservoir of precious water in Asia. Nepal, the Himalayan Kingdom covers important parts of the Himalaya. The altitude geography has created Nepal, the country of geo, eco, bio, ethno diversities with vast contrasts in nature and culture. The height variations from 60 m above sea level to world's highest peak 8,848 m within less than 200 km caused this part to become a laboratory of water cycle. The monsoon mechanism between the Hindukush Himalaya and Hinda Mahasagar has created Nepal a country of meteorological playground. As such the Himalayan Rivers are more powerful and potential. Nepal as such has immense sources of water. All sorts of water bodies including antecedent rivers, glacial lakes, springs, wetland and ground water have enriched the water geography of Nepal. The Himalayan heritage of water presents an example of water cycle and climatic contrasts. The people of the Himalaya are harvesting water to fulfill multipurpose activities since long time. Though there are still remote villages, which need couple of hours to walk up to the sources to fetch water, people have developed their own culture in water use. Different documents on water and observation of water spots have supplied data to analyze the Himalayan water heritage. Nepal is known as second largest country of water resource. The Vedic and Buddhist tradition made Nepal a country of cultural diversities. Age-old culture of 102 ethnic groups distributed in different height zones provide rich heritage of cultural practices of water wisdom. The god of water has been worshipped since ancient time. The river has been taken as goddesses. The cultural practices of water have been observed throughout the country. Cultural heritage of water can be seen in every steps of social life. The river confluence, banks, lakes, ponds all is holly. The ghat (river bank spot made for holy purposes), kunda (pond), mool (springs), kuwa (small well), tribeni (confluence) culture have influenced much to the Nepalese society. There are many water related values and beliefs. There are folk stories, proverbs and religious myths on water. Traditional technology of water is still in work. Dhungedhara (stone tap), inar (deep well), kulo (canal) and kuwa (small well) etc are inseparable parts of Nepalese society. Water conservation also has its traditional practices. There are many traditional practices of water use, conservation and cultural consciousness. The culture change raised the issues in protecting age-old practices and values of water as nectar. With the explanation of population, cultural encroachment and environmental deterioration, traditional practices have been disturbed. There are also developing dangerous situation in the preservation of clean and safe water. Water bodies can be preserved as Water Park, natural reserves and cultural heritage.

Traditional technology and knowledge should be preserved. Old practices of water related fair, festival and folklore could be preserved. Water studies should be promoted. Water tourism has high prospect. Museum of water culture and research of these renewable resources should be launched by the international organizations and individual countries. The community culture can supply lot of water wisdom, which gives golden guidelines for this wonderful water heritage of human life.

Keywords

Altitude geography, alticulture, altipotentialities, water culture, Himalayan hydrology and antecedent rivers.

Introduction

Most clean water of the Himalaya and pure water of the mountain spring flowing within Nepal are drinkable.

Water is symbolized into Ganga, a goddesses in the Himalayan culture. The origin of Ganga (from the *Kamandalu* of Brahma, or from the foot of Bishnu, or from the head of Siva) is in the heaven. Water as such is the precious matter related to three prominent Gods Brahma (Creator), Bishnu (Protector) and Maheswora (Destructor). In fact, Ganga has been brought from the heaven to the earth. The God of rain Indra, Mahadev, Parbati (Ganga), Barun, Lokeswora, Machindranath) all are popular in Hindu and Buddhist religion. Protectors of water such as Naga (serpent), fish, frog all is traditional symbols honored since long time.

Rivers have been taken as mother in Nepalese culture. Life of the Nepalese people is intensively depended on the water. Early in the morning people go to the *'pandheraa'* the water spot like wells, tap, stream, river and deep wells. People of Nepal perform religious rituals (bath etc) early in the morning mostly in the water sites. Such as *dovan, sangam, tribeni* etc.

Kathmandu, the capital of Nepal is located in the confluence of Bagmati and Bishnumati. Both rivers have been taken as holiest in Nepal. Both rivers as mentioned in Pashupati Puran and Nepal Mahatme has several religious spots in the bank of their courses within the Kathmandu valley.

The stone tap culture is found up to 570 AD (Gangahiti, Patan) but some remnants also found earlier to 749 AD (Satyanarayan temple, Handigaun excavation)

The architecture of stone tap is rich in Kathmandu. Stone tap is popular in the major settlements including Illam, Baglung etc. Most of the stone taps (more than 90%) are found within Kathmandu valley. Most of them are constructed in the period of 500 years – 13th to 18th centuries. Still they are working. Kathmandu has 118, Lalitpur has 40, Bhaktapur has 103 and Thimi has 48 stone taps. People use stone taps for religious rituals, bathing and drinking water. So the architecture has integrated Hindu and Buddhist god and goddesses. People provide water homage, annual rituals of ancestor- *Shraddha*. The sources of stone tap have its own technology. They are spring and deep well. People bath each day (9 days in *Bada Dashain*) and each *Sankranti*, the first day of the month). Before the birth to after the death, water is essential to form all sorts of Nepalese rituals and cultural activities.

In Nepal, there is a tradition of caring and repairing such water spots. In *Kumaar Sasti-sithi nakkha* people clean, reconstruct and repair water spots. People at present are not caring such tradition.

In Rana time there was a tradition of blasting ammunition from the top of the hill to make rainfall. People pray and perform *yanjya* to get rain in the drought time. Machindra fair, a chariot pulling festival is popular for the rain.

Nepalese culture is very rich in worshiping *daha, kunda,* spring and many such water sources.

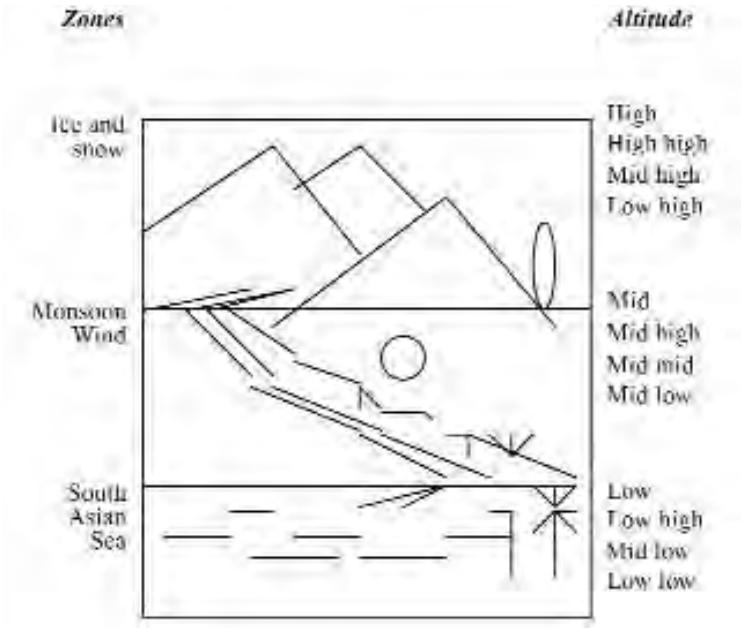
Sources of water in Nepal

The monsoon mechanism of South Asia is under the system of earth's rotation and change of seasons. In Asia due to the rotation of the earth the temperature is more in the sea during winter. So there occurs air blow from land to sea. In summer it becomes opposite. The temperature in sea

decreases than the land and the wind blows from sea to land. The change of wind is the next name of monsoon. The summer monsoon comes from the Bay of Bengal, which evaporates and enters moist laden air from eastern Nepal and in winter it comes from Arabian Sea and enters from western Nepal, which is weak, and of shorter duration to cause occasional rain falls. All the monsoon activities help Nepal to enrich both ground and Runoff.

The altitude and climate has interplayed within the distance between Sea and Sagarmatha. This has created a water cycle, which has given birth to all three state (gas, liquid and solid) of water and also stages of the flow as well as different kinds of water bodies.

Himalasian heritage of hydrology



Altitude Geography of water presents a typical hydrological system, cycle state and stages in the heights around Bay of Bengal to the Himalaya.

Nepal is the finest place to observe all sorts of seasons found in this earth. And also there has a specialty of temperature in height realm, which has its own qualities. John Hopkins says that the life span is also differs in high and lowland region because the clock is slow in the low? In fact, the temperature budget in the height region in one side and seasonal inclination of the earth provided ample opportunity of water flow in different parts of the Himalaya. The high and low pressure system shifting in different seasons causes torrential rain in the southern part of the Himalaya and also cause snow fall in the winter season on the higher regions. The orographic rain is rich. The Himalayan region as such became the laboratory of water. The water cycle of this region is clearly reflected in the change of seasons and differences of the volume of water in the river and under ground level of water table.

In the broad context the evaporation of the Indian Ocean and Arabian Sea (the author feels better to say the South Asian Ocean combining both) forms rain-bearing clouds full of moisture. During the summer rainy season they condense into precipitation. This feeds ground water and running river water. Many tributaries get together to flow back in the sea. The Himalayan hydrology thus presents all sorts of water cycle and river life from the Himalaya to the Hindamasagar.

Nepal as a mountainous country possesses most important part of the Himalaya. There are 8 famous peaks among 14 popular peaks above 8,000 meters in Nepal. Out of 144 peaks above

7,000 m, Nepal has 127. The Nepal Himalaya counts more than 1300 peaks above 6,000 m. Nepal comprises the central part of the Third Pole region of the earth.

The lowest limit of permanent snow on the Himalaya is 5,000 m. The permafrost possesses permanent amount of icy water.

Rivers of Nepal are very powerful. It falls down a height of 6,000 m. It has made deepest gorges. Some of them are flowing before the birth of the Himalaya.

Nepal has about 6,000 rivers. It has total length of 45,000 km. The rivers of Nepal saturated even the remotest parts of the mountain. About 100 rivers are more than 160 km long and 1,000 rivers about 11 km long. There are more rivers of 50–500 km long. All belongs to Gangetic drainage system. Nepal contributes about 75% water to the Ganga River (in the dry season through the melting of snow).

There are three major drainage basins (each having about 36,000 sq. km). Koshi (45,000 kw per km power), Gandaki (Budhi and Trisuli together 54,500 kw per km) and Karnali (10,800 megawatts), Mugu and Tamakoshi can produce 20,000. Chisapani of Karnali is the highest power, which can generate 10,800 megawatts. All are powerful rivers of Nepal. Each has their seven subsequent rivers in the Himalayan hydrographic patterns. And there is other border and rivers of national importance. Mechi in the eastern border and river Bagmati in the middle capital valley and Mahakali in the west border are other three popular rivers.

Nepal is located in potential watershed region of Asian continent. There flows about 170,000 million cubic meter of water per year. Nepal as such is the country of white gold and blue diamond.

There are three grades of rivers in Nepal. They are originated in the three major hypsographic regions viz. Himalaya, Hill and plain. The first grade is of snowmelts and glaciers or snowfield fed perennial rivers contribute 80% of the total Himalayan Rivers. Rivers like Karnali, Kaligandaki, Trishuli, Sunkoshi and Arun are antecedent rivers, which originated before the birth of the Himalaya, which caused deepest gorges. The Himalayan emergence thus has separate story of wind and water.

The Second Grade Rivers are originated in the mountain region. They are monsoon's spring rose rivers. And Third Grade Rivers rise from low hill region. Then rain fed rivers and streams are small but helpful in local irrigation.

Nepal as such has two types or rivers. They are snow-fed and monsoon fed. Till the system of the earth remains balanced, there will be no lacking of water in the Himalaya region. But due to climate change, deforestation and unwise use of land are threatening the supply of quality water lack of timely plan and irregularity of rain.

The global climate change has affected to the Himalaya too. It is reflected in the glacial lakes. The area of glacial lakes is increasing due to melt water volume. In Nepal the glacial lakes have occupied about 5,000 sq. km areas. The new glacial lakes are emerging. And some of them are threatening the flood. Glacial Lakes Outburst Flood (GLOF) is creating danger to the downward settlements. There are more than 3,000 glacial lakes. About 25 of such lakes are more dangerous. There are about 70 glacial lakes above 4,000 m, which are big and born in the later part of 20th century. The most risky lake was born in later part of 20th century. Tsho Rolpa (One and half km area) located in the Rolwaling Himalaya of Dolakha is creating danger. They may burst due to swelling of lake water caused by rise of temperature.

The lakes of Nepal Himalaya like Tilicho, a lake of 4 sq. km of Manang is in the 4,919 m altitude. Ringmo or Phoksundo (3,612 m), Rara (167 m deep), Gosaikunda (4,267 m) Gokyo (4,877 m) are famous not only for clean water but for the panoramic beauty and biodiversity. In Ramechhap there are more than 50 lakes and ponds. Jatapokhari, Panchpokhari, Kalpokhari, Bhalupokhari like ponds are famous.

In Kathmandu valley there are both natural and man made ponds, Taudaha, Indradaha,

Katuwaldaha, Mathatirthadaha, like natural pond and Ranipokhari, Kamal Pokhari, Nag Pokhari, Gahana Pokhari and Siddha Pokhari are making beautification in the city centers.

The hill region has several lakes. Pokhara is known as the valley of 7 lakes. Shyarpu of Rukum (3,372 m), Kuvinde (1,159 m) in Salyan, Gidi Dha of Jumla are beautiful and important lakes. Most of them have not been used for electricity, Fishing and recreational activities.

Waterfall in the other side is important water resource. Suligaad of Dolpa falls 167 m down from 3,711 m lake of Phoksundo. Hyatung fall of Terhathum is 365 m long and Rupse of Mustang is beautiful waterfall of high altitude. There are many falls in the mountain area, which have own importance aesthetic values.

Water flowing in different altitude zones has medicinal values. But Nepal lacks research on such realm. There is high perspective of Nepalese water use. The day is coming to sell water like petroleum. The water flowing from the Himalayan heights passes from different mineral and herbs zone. This has brought water qualities of different nature. Water treatment of hot spring and also drinking of water of definite spring has helped to improve health. Nepal can export water of different height for the human health. The Himalayan herbal water is not only clean and nice but also healthy due to medicinal value.

In the lowland Tarai the marsh and wetland is important area for biodiversity.

The Himalayan heritage of holy water

The Himalaya is the world's highest refining tank of drinking water. The Himalaya has occupied about 2,400 km long chain expanded in Asia. The snow covered heights of the mountain in the mid of Central and South Asia is known as the Third Pole occupying the whole snow covered and young fold mountain system ranges of the Himalayan origin. The area of the Himalayan snowfield is 2,400,000 sq. meters. The water budget differs in seasons. The snow in the Third Pole part is not extended over latitude like in other two poles but it is on the height dimension. The temperature decreases 6.5°C. per 1,000 m.

The geographic specialties of Nepal i.e. altitude geography has created diverse environment offering geo, eco, bio, and ethno diversities. The altitude geography of Nepal has created relief of 60 m above sea level to world's highest peak Mount Sagarmatha 8,848 m within the shortest latitudinal distance of less than 200 km. The ecological diversities are immense with sub-tropical to alpine and humid to dry climate. The biodiversities of flora and fauna is rich having various species and native habitat. In the ethnic section the 2001 census has recorded more than 102 ethnic groups and 92 languages. The Vedic and Buddhist tradition as well as Aryan and Mongol practices made Nepal a country of diversities. In this rich heritage of nature and culture, the tradition of water use is diverse and it became a subject of research studies.

Traditional technology of water use in agriculture, industry, religious and life activities, environmental perception of water and folk legends related to water in different cast/ethnic groups have preserved the water wisdom of age old civilization.

The Himalaya is known as the holy place since ancient time. The Himalaya has been taken as the home of Ganga, the source of water.

There are many types of mentions of water in the epic books. Krishna holds the mountain Govardhana to save the earth. Govardhana Parbat gives the hints to save living being just holding and /or protecting a mountain to protect life. Even an ancient sculptor of the God Baraha found holding the earth. It means preservation of the earth is necessary. Preserve the wild (animal like boar) to save the earth. Since the Vedic period five elements have been focused as the life giving elements (earth, water, light, air and sky). Preservation of the earth means preservations of natural elements to make the earth habitable. Still there are lakes, which has been taken as a settlement spot

while telling story of its origin. This has indicated the different stages of the Himalayan Origin. In this context the Himalaya is most important to the people of Asia in particular and all people living in this earth in general.

So, the Himalaya has been appreciated in one of the epic books of oriental literature. The following verse has considered the Himalaya as the source of sacred rivers. This has created consciousness and awareness of water in the Himalasia.

All the rivers are sacred,
All flow towards the sea.
All are like mothers to the world,
All purge away sins.

(Kalidasa in Kumarsambhavam, an old literature)

The Hindukush Himalaya (covering the countries like Afghanistan, Bangladesh, Bhutan, Burma, China, India, Nepal and Pakistan) altogether forms the Himalasia with more than 1,000 million populations. They are distributed in 8 countries.

Nepal, geologically, is located in between Eurasian and Indian sub-continental plates, which was the part of former Tethys Sea. Nepal covers about one third area with important and highest peaks of the Himalaya. About 22,077 sq. km (15%) land of Nepal is occupied by the Himalaya. Nepal Himalaya covers 12,000 sq. km of land area. It has been extended from 200–300 km with east west extension of 2,400 kms on which Nepal occupies central part about 1,112 kms. But the Great Snowy Himalaya extends 25–90 kms in width. The snow has covered above 3,700 m in general and permanent snowline lies from 4,500 to 5,000 m. Glaciers and glacial lakes are rich in the Himalaya. Glaciers gave rise to the perennial big rivers and beautiful lakes in the Himalaya region. There are antecedent rivers such as Kali, Koshi and some others. Hydropower of Nepal is estimated at about 83,000 megawatts. Nepal till the last of 20th century used only about 1% of the water resources in the hydro electricity. This is increasing slowly. Nepal has surplus power potentiality but still could not harness. It is less than one million kilowatts.

Still there are rivers and streams, which can drink directly. The upper part of the mountain water is more clean and healthy in Nepal. The rivers in the settlement area have been disturbed with increase of population and degradation of cultural values.

People of the village use water for different purposes. The rural powerhouse use water at night to generate electricity and use it in water mill, irrigation etc in the daytime. Micro-hydro turbine has been developed in Nepal. This became useful to generate small-scale hydropower and use in the villages for household purposes in the area where the construction of big project located, the village found in such area at the source region of water has been disturbed. They became unable to use water for irrigation. Modern development and age-old cultural base of water use became a challenge to the people of modern civilization.

Due to the destruction of forest, the water sources are getting down. They are drying and dying.

The perennial rivers are flowing from the high gradient with high velocity and volume. Nepal has utilized water since long time. In 14th century, the king Jaysthiti Malla has reformed the rules on fetching water. Rana Prime Minister Maharaja Bir Shumsher has introduced piped water from Kathmandu. Modern pipe water became popular only in late 19th century 1894 (1952 B.S.). The water brought from Sivapuri was known as ‘Birdhara’ In the case of hydro electricity Chandra Shumsher started since 1911 by the construction of reservoir in Pharping. The plant, first of its kind in south Asia, inaugurated in 1911 (by King Tribhuvan and Prime Minister Chandra SJB Rana jointly) It was used in the Royal Palace, Rana Castles, Kathmandu-Hetauda ropeway etc). British government has assisted to establish this ‘Chandra Jyoti’ plant producing 500 KW capacity of electricity. The reservoir pond is 18 feet deep and 300 feet width located at Setidevi village. It was

stopped in 1981. The water then connected with the drinking water supply network from the water penstock pipes by the Nepal Water Supply Corporation.

Due to rapid growth of urban population, the supply of water in the city is scarce and modernization in the village is demanding much more fresh water to drink. In Kathmandu valley there is a need of about 200,000,000 liters water to drink. Demand of water is 194 million liters per day. By 2011 it will rise to 224.7 million liters. Still there is shortage of one-fourth water to the capital city.

In the case of rural areas still people has to walk long distance everyday to fetch water. Some of the Japanese citizen has contributed in some of the villages to supply drinking water from the polythene pipe, which brought new life to the villagers by saving time and energy along with the supply of healthy water to improve community health.

Inar, tube well and pumping sets are means to tap ground water in Nepal. Kathmandu valley consumes more than one croreliter of water. There are about 500 inar and deep wells. Kathmandu can tap 5 to 6 crore liters per day from underground. In valley about 17 crore liters drinking water is the contemporary demand. The waterpower of Nepal is 83,000 to 1,26,000 megawatts. If one counts below 300 sq. km it may be more. There are 5,922 such small streams in Nepal. The Himalayan River has more potentialities of generating hydropower per each kilometer. It decreases down with altitude. Kathmandu needs 18 crore liters water per day.

About 22 crore and 20 lakhs cubic meter of water flow per second from Nepal. Nepal has not utilized water even to meet basic drinking and irrigation needs.

Kathmandu is rich in underground water. Less than one meter to 10 meter down the surface one can find water in Kathmandu valley. Kathmandu needs about 20 crores liters water but less than 10 crore liters is available. Less than 70% people are receiving water till 9th plan. Irrigation is also receiving water only in 45% of arable land.

Nepal has not so much water pollution problem but it is in increasing trend. Industrialization is causing some problems. In Tarai Arsenic problem is more. Sedimentation is high (Koshi 1,131, Gandaki 1.34, Karnali 0.988 sediment weight per liter of water). Tamor has 5 crore 76 lakh tons sediment deposit per year.

The water in Kathmandu also has problems. Colform bacteria, iron and ammonia are causing pollution. Chloride is high. Potassium and sodium is low.

Sedimentation is causing problem in irrigation, canal system and reservoirs. It is affecting electric appliance in power generating center. Water strategic plan became essential.

Nepal has rich heritage of culture related to river, stream, lake, pond, spring and stone tap. The folklore of water is rich. There is Asare Geet (song singing during rice plantation in rainy season) popular in the summer season of rice plantation. There are bathing festival like Makar and Matatirtha, Swopna tirtha (Tokha) to Baaisdhara and Gosaikunda mela. During the eclipse too people bath. There are various songs related to river and importance of water. Even people sang song to beg Water. O lord Mahadev give us water, little is not sufficient give more (hara hara Mahadev pani deu alikata pugena ali dheri deu). In Janakpur and some other parts people have tradition to sing song to beg water. Draught is directly related to farmers. So they pray Indra, Mahadev like powerful god for the water. So there are enumerable water related folk songs and festivals in Nepal. Each ethnic group has been found aware of the importance of water.

Rivers of Nepal are colorful. Seti nadi (white river), Kali nadi (black river), Sunkoshi (golden river), Dudhkoshi (milky river), Tamakoshi (copper river) etc. are examples of watercolor and quality. Hindu culture is full of water. Samundra manthan is popular myth. Churning of the ocean gives everything. Still there are temples where people worship and get bless of good harvest and fulfill wishes. People have belief that if some one bath in Swopna tirtha, his dream comes true. There are several folk tradition and beliefs. Jalbinayak, Jaleswor Mahadev, Kumbheswor, Jalasayan Vishnu, Godawari, Gosaikunda, Rani Pokhari types of many temples and shrines are center of

water where people worship. People in Nepal by tradition have to bath daily and before eating they have tradition to take little water as a religious process of honoring god. People use fresh water. 'Basi pani cannot be used in holy purpose. Chokopani is fresh and clean water to use for holy purposes. People take water as a purifier. From sunpani (gold water) people purify. Panipatiya is a process to purify cast. Water is the demarcation in certain ethnic group. People who go out feel good luck with full of water pot. So people use kalash in the gate while going out of the house. While performing pitrikarya people give homage from the water. Japan also has such tradition of ancestor worship.

Machindranath, Indra, Ganga, Jamuna to Barun like god and goddesses are worshipped as water gods even water related creatures such as serpent (Karkotak), fish (Matsyaavatar), crocodile (Makar), frog and tortoise are all worshipping creatures.

Nepal posses Boundary River like Mechi and Mahakali. Regional River like Gandaki and Karnali and International River like Koshi flow from China via Nepal to India.

Water use in navigation is not so developed in Nepal. Upstream non-benefit must be balanced with downstream benefits.

Hydrography is popular to prevent and cure diseases. Tatopani (hot water) treatment in Nepal is popular. Even Veda praised water use. Water heals all diseases as mentioned in Veda. Hydrotherapy is growing. Hydro-hygiene has been neglected. Hydropathical treatment is cheap and easy as well as harmless.

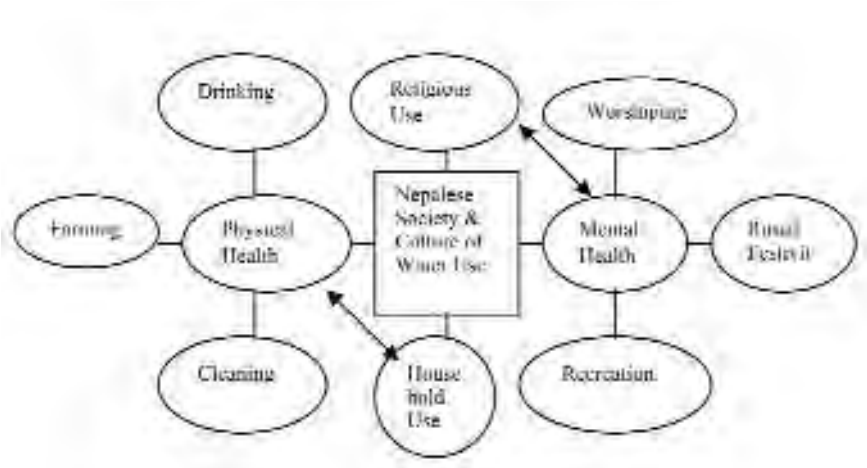
Nepal, India and Bangladesh use water of Brahmaputra and Ganga river system. Nepal is a water potential country but utilizing about 400 megawatt (till Kaligandaki A Project) out of 83,000 mega-watts.

Cultural practices of water harvest

Nepalese practices of water harvest are of multiple natures. The culture of Nepalese society is rich. It has taken water as a holy liquid and also household matter. They are related to both physical and mental health.

Nepalese practices of water harvest

Narayanhiti (the Royal Palace of Nepal has a famous historic stone tap related to very popular story of its origin. Sundhara, the golden stone tap is two in Kathmandu and Lalitpur. In side the medieval



palace court of Patan, there is a Sundarichowk where one can see finest stone tap made for the private royal bath. There is Naudhara in Godawari, Baishdhara in Balaju and 101 Dhara in Muktinath, a famous Himalayan shrine all are important places for the water spot.

People of Asia know the importance of water use. Water has been depicted in their epic books. Our water also has hierarchy. *Amrit, 'Jala'* and *pa*ni, are all gradation of water quality. *Choko Pani* is the name of non-contaminated water used for worshipping purposes. There is different terminology indicating various aspects of water in different ethnic languages.

The religion has given highest place to the water. The Ganga, a Goddess of water (river) is taken place at the head of Mahadev. As such most of the cultural activities of the people are found concentrated around aqua culture. Even the Puraan has sang a song on the water

All the rivers are sacred
All flow towards the sea
All are like mothers to the world
All purge away sins

(Markandya Puran)

Ganga is the popular name of the major sacred rivers of the Himalaya. The water of sacred streams has been taken as powerful Goddesses to clean fairest of the fair all sins.

Ramayan has depicted the story of the birth of Ganga. Sagar was the king who went to heaven.

In Vedic Gods there are Gods of nature power like Agni (fire), Vayu (air) or Indra, Surya (seven-rayed God of heat representing lithosphere, atmosphere and troposphere and galaxy. The given Vedic Triad has been worshipped since pre-historic time.

Indra is the most popular deity of power having thunder and the lightening and rain. Agni and Indra have been taken as the twin brothers.

Indra has been shown with four arms and heads. Two hands hold a lance, third a thunderbolt and fourth hand empty. And known as Sahastaksha (body of thousand eyes). His vehicle is elephant (Airavata). He is found of 'soma' intoxicants. His enemy is drought (Vritra). The description of battle is the scenery of the seasons. Such bless of Indra makes all happy and people gives thanks. Indra becomes the King and later part superseded by another God or by a man.

Indra lives on Mount Meru (Sumeru, the center of the earth, the Himalaya) and heaven is situated there where Nepal existed. Indo-Aryans thought that in the accessibility of mountain tops a heaven. Still there are shrines. The home of God is located in the high altitude.

There are many names of Indra indicating his power Bajra (thunderbolt), Meghavahana (clouds carrier) etc. Indra in Nepal is worshipped as the God of rain. There are two famous festivals related to rain and water in Nepal.

The Machindra chariot festival is related to the rain God and festival occurs just before the monsoon. This God has been brought from the area of world's highest rainfall i.e. Assam.

Indra Jatra is another famous festival of the city center.

People adopted various means to fulfill water use. There are water mills to grind grains. There is *Rajkulo* (Royal canal) for the irrigation and multipurpose works (popular in Patan since a thousand years). Kuwa (wells) and *Mool* (spring) both have immense and enumerable utilities for the man.

Ghats in Nepal are found popular because last rites have been carried out in the stone paved or pebbles shrine. There is even *'tirtha'*, a holy shrine like Chankhu tirtha/Bankhu tirtha inside the Chobar gorge of Kathmandu valley. Even the water sprout has been decorated as Sundhara (golden tap) and to the pond of lotus people depicted the name Kamalpokhari in the city region.

The serpent has been taken as a symbol of water and rainfall. There are several stories related to water. In the coronation of the King sprinkle of holy water is most. About 1,000 pot full of holy

water prepared for the coronation bath. There are golden pot full of butter, silver pot full of milk, copper pot full of yogurt and earthen pot full of water for the holy sprinkle to the king. There is a tradition of using herbs, saint, mango leaf, flower water, cows urine, gold water, honey water, kush grass water and river water etc. used to sprinkle in the coronation.

Even the water pot and pitchers are of various kinds used in different occasions and purposes. Ghada (pitcher) is the holy pot of water to worship. For the fetching of water people use different vessels made of different materials. The earthen pitcher of big size gagro, the metallic pitcher like pitchers made of copper, brass and silver (aluminum) is popular. For the religious purposes there are different vessels of special shape and size. Similarly, for the household purposes there are vessels like ghada, kalash, panchapatro, jhari, gagro, karuwa, amkhora, lota and metal glass. The diversities of such vessels related water still available in Nepal. But due to westernized culture and encroachment of technology some of the traditional vessels are out of use and they are becoming museum peace.

Religious importance

The water has been taken as important religious objects in the epic book of religion. The Ocean churning (Samundra Manthan) a famous story of Puran indirectly presented some hint of the importance of Ocean resources. Sea supplied not only jewels but also many kinds of things including poison to nectar.

River has been taken as sacred mother Goddesses 'Devi' in the epic literature of the South Asia.

In Kathmandu valley there are dozens of holy places related to rivers and also places of other types of water bodies such as spring, lake and ponds.

Bagmati River of the Kathmandu was popular as early as 500 AD. Another tributary of Katmandu is Bishnumati, which was known as Keshavati. All rivers in the Kathmandu are related to pilgrimage and/or holy places. Tributaries of Bishnumati alone have several 'Tirtha'. They are Tokha-Sapnatirtha (Bimalawati), Sovabhagawati – Nirmal tirtha (Bhadramati), Tankeswor – Gyantirtha (Papnashini), Lukhu Nidan tirtha (Swarnawati), Gokarna –Sodhantirtha, and Guheswori Shantatirtha. Within the Kathmandu valley most of the rivers and rivulets got Sanskrit name related to Goddesses. Pravawatti (Na-khu), Iksumati (Tu-khu-cha), Manimati (Sa-khu), Rudramati (Dhobi khola), Ratnavati (Bal-khu) all are popular river names found in the Bagmati drainage basin. Kathmandu valley is most holy place to honor water from the religious point of view. All places are holy where the river Bagmati flows. It may be due to the location of Pashupati and Guheswori in the bank of Bagmati. In the Bagmati bank of Pashupati area there are Bhakari for the Royal death rites and also for general people. There are Pashupati Aryaghat and Bhasmeswor Ghat for such last rites.

In the case of riverbank there are important places of religious activities. In the Bagmati river of Kathmandu there are many such holy banks with famous shrines for religious activities.

In Bagmati of Kathmandu valley there are several shrines in the bank. Like Pashupati, Shankhamul, Kalmochan Ghat and Teku Dovan etc are popular. Arya Ghat and Kalmochan are popular for the last rites.

Shankhamool, the Bagmati bank of Lalitpur city is equally holy for the Hindu and Buddhist.

People perform religious activities to welcome spring and change of season in major river sites of Nepal. There are some holy places in the bank of Bishnumati River. Tankeswor ghat and Sovabhagawati area are famous in this area.

Teku is another such area. It is the confluence of Bagmati and Bishnumati, which is known as Chintamani Tirtha or Teku Dovan. There is Panchanari Ghat in Teku area where Pachali Bhairab fair occurs. There is Rajtirtha Kunda in Rajghat of Teku. The Royal rites of purification perform in

this area. The Ghat culture is well established in Kathmandu. Pachalighat, and Hanuman ghat (Confluence of Tukucha) are famous.

Buddhist script Dhampad has given different examples for the enlighten on which comparison of Ocean and enlightenment is interesting and valuable. Ocean does not save death body. It is same in the case of enlightenment, which never retains bad or evil things. Ocean accommodates numerous rivers. Enlighten also help to adjust all sorts of living being. In ocean there are big creatures. In enlightenment there are great souls. In enlightenment there is clean knowledge like flowers decorated to salvation like the great waves of ocean.

Water is the main center of Nepalese culture. River is the center of religious activities of Nepali people. While bathing people enchanted *Harahara Mahadev* or Ganga. While demanding water also people shout *Harihara Mahadev Pani deu* and even Nepali people were using water watch to find the right time to decide any ceremonial activities like marriage.

Major rivers of Nepal have such holly names like Kausiki (Saptakoshi), Salagrami (Sapta Gandaki). There are well known Sanskrit name of the major rivers of Nepal. Mahaprava is the name of Shivaduti (Arun). Dukhagni Barahi is the next name of Tamor.

Suvaasrawa Durga is the Sunkoshi and Swetbahini is the Indrayani. Papghani Narayani is known as Dudhkoshi. Barada Chamunda is the Barun and Dharmawati Maheswari is Trishuli. Yeshodhara Bramayani and Biswodhara Narsimha are known as Budhi Gandaki and Marsyangdi. Sitprava Ganga is known as Seti and Ratnaprava Kaumari is the Kali and Krishnaprava is known as Mahakali.

Rivers also are popular in the name of Goddesses like Kali and Mahakali. Ganga is the popular name of the Himalayan Rivers because Siva lives in the Himalaya. River confluences (*Tribeni or Dovan*) are religious centers in Nepal. Devighat (Tanahun) is the confluence of Kali and Trisuli, which is famous all over the country. There are many such river confluences honored as pilgrims to perform religious activities.

The confluence of Koshi and Koka is Tirtha (shrines) well known as Barahachhetra. Even Rai community has tradition to complete their purification in this place in the Kartik Purnima. Near the confluence of Kamala river and Tawas, another river Karakul joins with Tawa. It is the place of a biggest fair of Maine Mela. This fair of Maghe Sankranti in the eastern Nepal is the major area of Mongoloid population. They also have tradition of different kids in the river confluence. Kamalamai has been mentioned in Mithila Mahatme. People have tradition of sacrifice during the fair. In mixing place of two rivers there appear new triangular land, which is known as Tribeni (i.e. the center of three rivers). With Tawa is the place of a biggest of India.

There are many Tribeni throughout the country. All most all of them are hot place for the people of Nepal.

Roshi (Bihebar khola) and Punyamati confluence of Panauti is famous for a month long Maghe Mela.

The confluence (*dova*n) of Trishuli and Tadi is known as Devighat in Nuwakot. Joljibi is another holy place of Mahakali River, which is located in the confluence of Mahakali and Gauri River. This area is performing the biggest fair in western Nepal.

River has been taken as mother. The water is like mother's milk. River saturates land and makes green like mother to feed children. Mother accepts all our bad habits. No partiality, all are equal to mother. So Bagmati is the main shrines and of shrine of all shrines in the Kathmandu, the capital of Nepal. The Jalpa Devi temple in the confluence is the center of attraction. This Devighat fair of Chaitra Shukla Purnima is well known. The unifier king Prithivi's last rite had been completed in this place.

Devighat confluence (located in Chitwon) of Trishuli and Kaligandaki (two big Himalayan rivers) is most holy for all Hindu inside and outside Nepal. Maghe Sankranti mela is famous.

Modi-Beni confluence of Kali and Modi (Kusma of Parbat) rivers also is the place of many types of religious activities. The festival occurs during the important days of the year.

Setibeni of Seti and Kaligandaki in Parbat are also famous for fair. Rudrabeni, a confluence of Krishna Gandaki of Arghakhanchi is a complex of river confluences of Bagi Khola, Ghocha Khola and Bhadre Khola. This place is also known as Tribenipur.

Ruru of Kaligandaki (Palpa) is well known for various religious and life activities throughout the important days of the year.

Ghat is the well-known riverbank spot where people perform their life activities with water. In Banganga river of Kapilvastu there are *ghats* known as Ramghat, Laxmanghat etc. 'Brahmanaal' is a practice to keep death body's leg in the river water before burning in the *ghat*.

River bank (*ghat)* and confluence (*Tribeni*) have been taken holy to take holy bath, religious ceremonies and last rites. People believe that last rites in such place give salvation and purification.

Kotila temple is located in the east bank of Chamgad Khola. People beg water with this God during drought time. They have belief that the Mahadev gives water.

Tapoban located in the bank of Mahakali River is well known holy place. A hot water tap also is available in this area.

Riverbank has also been taken as a holy place known as *Ghat*. In Kathmandu there is Aryaghat in Pashupati area, Devghat of Narayani, Ramghat, Narayanghat, Ridi Ghat are found in many river sites of Nepal. In *Ghat* there are some idols and temples of Gods and Goddesses. People performs religious activities.

In India also, the meeting place of Ganges and Ocean has been taken as place of pilgrimage. Rivers are regarded as sacred. Rivers are taken as female except few like Brahmaputra is belonging to Male River. River of Nepal is the next name of Devi.

In fact, rivers, lakes and springs are holly in the Himalaya. All most all lakes have some stories of miracles and myths. So people observe many types of festival around the water bodies in Nepal.

There are many lakes known as *Kunda*. They are known in the name of God and Goddesses. Bhairab Kunda (Sindhupalchok), Narayan Pokhari (Sindhupalchok), Sarswoti and Parvati Kunda (Rasuwa), Maipokhari (2,438 m) in Illam etc are important shrines related to famous ponds. Lake and spring (known as *Taal and Kunda*) are all holly in Nepal. The spring like Kumbheswor and Godawari Kunda in Lalitpur and Baghdwar and Guheswori of Kathmandu all are holly springs well known to general people. Savapokhari (4,240 m) in Sankhuwasava, Jatapokhari of Dolakha, Gosaikunda (4,360 m) of Rasuwa all, is famous pilgrimages. Dharma and Papkunda to confess sins are located in Mugu.

The Himalaya has been taken as God and also the home of the God. People of Pokhara worship Machhapuchre (fish tail) and Annapurna (full of grain) before harvesting crops in winter. The Himalaya opens their full beauty in this season. The farmers of Pokhara recognize the Himalaya as the God of grains.

Water bodies are holy in the Himalayan country Nepal. There are many festivals, which are concentrated in the pond, lakes and rivers. Handigaonko Jatra, Gosaikundako Jatra, Baghdwar Jatra, Baisdharako Jatra to Rishitarpani-Tij Mathatirthe Ounci and Chath all have honored the water. Barabarse Mela of Godawari kunda (pond) and some other occasional/periodical time bound fair are important to honor water and find benefit of all sorts from water. And water culture as such has strengthened mental, physical and behavioral realm of human being living in Nepal. Chath of Tarai region is related to worship of water bodies (pond, lake and river) those who are fasting go to water site and bath and wear new cloth and enter in the water to pray the sun God. Even people of Nepal and India visit in the holy water sites such as Ganga of Baranasi, Mansarowar of Tibetan China and many river confluences of Nepal. Honor of water helped people to conserve water. In a lime cave of Chobar, Kathmandu there is a pilgrimage known as Chankhu Tirtha- Bankhu Tirtha.

Tirtha is the pilgrim shrines in the religious terms. Till the 1950s people were bathing in the Pashupati area and any holy sites of Bagmati in Kathmandu valley. Children were swimming. It was really clean even one could observe sand particles moving inside water. But it has lost original flavor after the rapid population growth in the valley.

For the rituals of ancestor too people use sand and riverbank to perform ceremonies. River water has been taken as holy water. There are several festivals on which people visit river area and bath to worship Gods. This way people of older time were enjoying mass bath, which is like seashore bath. *Kumbha mela* of India is famous. There are some river confluences, lakes and ponds where people have tradition to bath as a part of cultural activities.

There are 12 Buddhist shrines. Rivers were holly in the past but due to lack of cultural awareness selfish people and lack of proper plan people mixed their sewerage in the river. The most holly river thus became drain of the city dwellers. The water contaminated. No creature could survive in this type of water except bacteria, which is hazardous to the human health.

Values and beliefs

There are many folk legends of the water. From the water treatment (pani mantarera khanadine) to the holy water as nectar, there are many water related beliefs. There are several words on water.

Etymology of the water words gives some glimpses of water dimensions. *Jagadwal* represents mangrove. It is derived from Bengali word *Jagadal*. *Daldal* is the Nepali word for the marshy land.

Bachita came from *bango-ch*ita or it may be from *Barsa-chita* to the rain of few weak drops from the sky.

*Dyan*g is derived from *Dihi*, which means *khet* or orchard.

Gangata the creature of Ganga is the name of crab. Makara, the crocodile has been symbolized as a water animal and used in traditional stone tap design. Panipanday is the word to signify man distributing water and also man with full energy using manliness. Water in Nepali represents not only water but also (1) river, well etc, (2) form: liquid, (3) The liquid flowing from tongue, eyes and nose, wound etc. (4) rainfall, (5) brightness, (6) fame, honor (7) brevity, energy, proudness (8) time – the tree taken water two times, (9) climate.

There are fruits (*pani amala, panifal/pani singada*), birds (*pani kag*), paper (*pani kagaj-polithin*), horse, insects, (lichen, *pani juko*), moss (*pani Jhyau, pani simali*), gradient/partision- *pani dhalo*), grass, stomach, ghost, *poushala* (place to drink water), vegetables (*pani latte, pani lunde, pani sirish, panisaro*), snake, vegetation (*pani sag*), birds (*pani hans*), crops (*pani makai*)

The water has measured even cast system. *Pani chalne /na chalne* (group division of touchables and untouchables), *panipatiya*, a process of cast purification, *pani barne*- discard, *pani cahaln*e – women leaving husbands' house for one month, etc.

The example of water has been used much in the proverb and also in several stories of social and religious subject matter. *Pani maruwa* indicates the man without energy, *pani an*dre on the other hand is a popular saying to give the example of the lean and thin and weak person who cannot digest even the water. The water has been taken quite opposite in the case of dysentery.

There are many proverbs depicting the water knowledge, consciousness and its nature. There are so many water related folk beliefs and practices. *Pandhere Kura* is popular as a kind of chatting or baseless talk when the women gather to fetch water they talk everything while waiting and it becomes an informal source of communication in the village. *Pani maruwa* (dead water), *pani aandre* like words are the expression to indicate man who has no energy to do something. *Paniko foka* is the expression for the short life. All such words, sayings and proverbs are very powerful. The proverbs capturing the nature of water are very interesting:

Nepalese Proverbs on water

Nepali proverbs in English	*Corresponding Proverbs in English (Nepali)*
1. The water has not any color; human being has not any caste.	All men are equal. (*Paniko kunai rang hundaina, mancheko kunai jaat hundaina*)
2. Money earned by selling water is washed away by water.	Ill-gotten money seldom prospers. (*Paniko paisa panile lancha*)
3. How long does a bubble of water last?	Man is a bubble. (Paniko foka kati ber?)
4. Provide water to drink but do not show him the source.	The remedy may be worse than the disease. (*Pani khuwaune mool na dekhaunu*)
5. Water cannot be thick by boiling; a fool cannot be nearer by persuading.	He is mad that trusts in the lameness of wolf. (*Pani tatera baklo hos na rijhayera aafno hos*)
6. Holding a leaf-umbrella before rainfall/Taking a shelter before rainfall.	Better never trouble until trouble. (*Pani parnu kahancha, aghibatai ghum odhbe*)
7. Words are more diluted than water.	Truth is always strange, stranger than fiction. (*Pani bhanda kuro panyalo*)
8. Dry on the water.	As good as ever water wet. (*Panimathiko ovano*)
9. One cannot learn swimming without playing in water.	Practice makes a man perfect. (*Panima nakheli poudina sakinna*)

You are prince; I am a prince who fetches the well water. Fish enjoys in the water. Drink water from its source; marry a girl from a family of higher status. And so on. There are more than 50 proverbs related to water. Water as a most essential lifeblood of man, people of Nepal has studied its nature, qualities and characteristics since long time, which are reflected in the cultural tradition like proverbs and practices. 'Sunpani' (gold water has been used for the purification. There is still tradition that low cast cannot touch the water of the higher cast group. It may be due to danger of contamination. Because low cast group do work in the dirty areas. There are stories popular with water cases to reflect human conspiracy and corruption. The story of Petition Against River, Counting waves of the ocean, sheep cub's fault of water contamination etc are well known to the people of Nepal.

There are religious stories too. Indra is the God of water. There is the Story of Machindra. This God has been taken from Assam where the highest amount of rainfall occurs. The Machindra brought from Assam is known as the God of rain the chariot festival of Machindra performs before the beginning of monsoon rain.

Ganga is another Goddesses, which is living on the head of Siva. This has indicated that the perennial source of water is the Himalaya where Siva lives. All needs water. Water has power to create life from the inanimate matters. It is life-giving element.

The Aryan and Mongoloid living in the lapse of the Himalaya realized the importance of the Himalayan water and symbolized it in various Hindu myths, literature, philosophy, practices and knowledge.

The Nariskhola located near the Aginchok-5 village of northern Dhading has its own values. The water of this river has been prohibited to drink. The villagers have belief that it is the blood of the demon Hiranya Kashyap of Dwapar yug. They have drinking water problem but they do not drink. The villagers believe that the birth of 4th incarnation Nrisingha was taken place in the north of Dhading.

There are mythical and mysterious stories of the origin of the Ganges. The freezing of the water in the Himalaya has been symbolized in the story of how Bhagirath brought water from the heaven. Rig Veda has described it. It also has indicated the origin of the life. After the creation of the earth there lacked water to settle life. It was stopped by enemy (Bhritasur) of Indra in the heaven. So Indra struggled to send Ganga in the earth. This story has indicated the origin of the earth and its process of the evolution. It also mentioned that the Ganga came down in the Sumeru, the highest peak of the earth. There is another version of Brahmaji (creator) who gave water to the Bishnu in his leg from the vessel Kamandalu. Bhagirath flown the remnants of his ancestor and gave salvation from the main river Ganga. So thousands of years old literature has recorded importance of water and imagined its origin to what we call cycle of water or hydrological cycle. The power of water in giving life and clear all physical and mental garbage.

Even Agni Puran depicted its importance as a holy nature. Bathing in the river gives some feeling of the heaven. The Himalayan Rivers as such are most holy in the earth.

Jaleswor is the famous water god in Nepal. This temple has named the Mahottari district head-quarters. Siva is living under water. There is a belief that if the water dries around the phallus of Siva, there comes Draught. But still today nobody knows drying up of the water around this idol of the Siva lingam.

There are several religious sites related to water culture. There are lakes, springs, river confluences and banks. Tradition honored water as God and saved from the pollution.

Traditional technology in water use

Canal construction (*Kulo nirwan*) in the village is simple. They put some leaves and tree branches to divert water from the stream and carry to the field. Tharu is skill full in making *kulo.* They can make smooth and leveled canal to flow water easily.

Due to the availability of water in different heights, Nepal does not need energy to flow water. Gravity and velocity of water helps to take water down and up to the certain height. This helps to generate hydro-electricity and also lift irrigation.

The 8.9 cu m/sec. drop of water generates 1,500 kws. Due to the altitudinal variation, several rapids and high gradient within short span of space, it gives immense potentiality of hydroelectric generation. About 83,000-mega watt has been estimated as total hydropower potentiality in Nepal.

The decrease of boiling point with altitude and permanent water reserves above ice area has not been utilized from the point of view of water resources. Relative humidity also differs with height. Precipitation increases up to 3,000–5,000 m. It rises up to 3,000 m. On the windward side rainfall increases with increase in altitude up to 3,000 m. Orographic or relief rain occurs.

The mist water has also introduced in Pathivara (3,794 m) of Taplejung. Still Nepal has deep-frozen region which has not been utilized as water source. The Himalaya as such can be known as a greatest refrigerator, which can supply fine and fresh ice and melt water regularly in the earth.

In the broad context, the earth's water system is related to three zones of height and its layers. The

ice-snow, melt water and run-off are the state of water in the Himalayan region. In the Asian altitude geographic system the state of water is clearly visible in the monsoon time. The snow above 5,000 m, the gaseous moisture laden winds down to the Gangetic plain and liquid state of ocean water in the south Asian Sea is the water module in the altitude realm.

The Nepal Himalaya (Api-Nampa range to Singhalila-Kanchanjunga) has magnificent criss-cross system of the highest, youngest and steepest mountains. This exhibits a breath taking view. This presents totality of the earth's mountain dimensions. In the Bagmati bank there are *Bhakari* (circular spur) to control the velocity of floodwater. Circular spur is different than strait spur and angular spur. This is Nepalese technology. Still this stone spur '*Bhakari*' and steps down the riverbank has been found very useful and people using for (bath, water homage to the sun, religious works and last rite etc) cultural activities.

Bagmati River was also the source of sand. Due to overuse of sand, the River started cutting base and became deep. In the contemporary Nepal, it is difficult to observe sand. Instead, the original scenario and water landscape has been changed and became ugly with mud and deep cutting and dark water. The white sand bed and sallow clean water beauty of flow has finished in the Bagmati. Bathing during festival time and washing vegetables also gone. The river culture as such has diminished. River polluted much and bacteria contaminated river water. The river environment degraded.

People know the use of water. Highly educated people discuss the big project of water and big river. But no initiation has been found to improve river culture. People of rural Nepal have age-old experiences of water use. The use of small stream has been forgotten or neglected by the water workers. But people have used them to fulfill their day-to-day needs. Their labor and cooperation reduces government investment and they construct thousands of water mill and well. They have water tap of different kinds. The big plan is problematic. They need big capital. They are complex. They can destroy environment and cultural practices. They may be risky not only to the human kind but also all creatures. Seriousness is necessary in planning water projects.

How people of the rural Nepal use water is important. The traditional use of water has been forgotten and neglected by the educated people. In fact, people are using water in their own style to fulfill human needs.

There are deep well (*Inar*), well (*Kuwa*). Small mud canal (*Kulo*), water mill (panighatta), pond (pokhari) and stream (khola) to river (nadi), which have been used by the people since long time.

Due to so-called modernization the river culture and stone tap (*Dhunge dhara*) have been destroyed. Deep well and well have been under utilized and all of them emerged from age-old experiences changed by so-called development activist.

Nepal had tradition to construct pond around and inside the settlement sites and enjoy its beauty everyday and also use them for different purposes. If the fire occurs they use it. People gather and line up from pond to the fired house to carry water to sprinkle in the fire. It was general practices in the village settlements where there are no other facilities.

To supply perennial water even they have tradition to dig out deep well inside the pond. Some time they carry water from the source area. Just constructing small canal. Rajkulo, the canal of the King was the term to honor it. This type of work was the concern of whole community of the settlement (village) sites in construction, repair and supervision.

The Rajkulo had multiple uses. They supply water to the pond, they use for irrigation and drink for livestock. There were Royal canal (rajkulo) in Patan and Kirtipur like cities. But no traces have been found in the contemporary Kathmandu.

People have forgotten the use of such canal and pond. For the emergency use people lack water in the modern society. Individualistic out look over-shadowed such community culture. Common interest of the common people was organized through 'guthi' system, which is not working in the modern generation. There were different guthi to care and share common interest. There was

tradition of cleaning and repairing deep well and ponds in the driest day of the year. People are not caring community deep well. These days pond has neglected. In fact, traditional means and types of water utilization have been neglected and many of such culture are extinct and some are in endangered condition. Although fire brigade some time uses such pond some conscious and capable people are making park by integrating old pond. Some are utilizing them for fish farm. But the condition of pond is not satisfactory.

People had tradition to clean up pond by remaining mud and use in farm field. It was a kind of manure. It is very fertile. Each village had tradition to construct 2 to 6 ponds and 10-20 deep wells are for the community use. Construction, preservation and promotion of such water bodies were thought to be a part of religious discipline. So some of them have been constructed in the name of God and some of them they keep God in the periphery of the pond.

Religion in this sense is service oriented. People had tradition to construct small well nearby farm field and hill trails to fulfill their immediate needs.

The traditional water use in Nepal was like a living heritage up to the middle of 20th century. The modern education, encroachment of outer culture and lack of proper communication destroyed such water use tradition.

People of urban and market centers in the Kathmandu had tradition to use deep well for the drinking water. There are many such wells in the dense settlement sites of Kathmandu and surrounding settlements. Kirtipur, a hill town has deepest well on the up hill. There is big well like pond too to fulfill drinking water in this fort like town during the war.

Well was one of the popular means of community culture. Kirtipur in Kathmandui has deepest and widest wells to fetch ground water. In Kathmandu, the capital city has well known historic wells which was constructed in the tantric tradition which took 12 years to dig-out and known as *Barabarse inar* (12 year's well). In Patan, there are artistic wells. Wells have been honored keeping idols and artistic construction. Well supply clean, fresh and tasty water. It is cold in summer. Well water has multiple uses. It is for drinking water, wash dish and cloth both and use for kitchen garden.

Kathmandu has culture to clean such wells at least once a year. It was fixed in the day of Sithi (known as Kumar Khasti/ Sithi Nakha of Newar worship to the earth and clean, repair water bodies like wells, pond etc), which lies in the driest month in May. This festival lies in the driest day of the year. After 4th day of cleaning the owner or donor of well took water to worship God and only then they can use for other purposes. Some of the community still is keeping such tradition alive. Some of the well water is famous in their medicinal values.

People honor to other who comes to fetch water and also still people believe that to give water to the thirsty person is a kind of religion.Well of the settlement site is an example of finest community culture of Nepal. They construct together. To save from the contamination of outer water, people use Gathu soil (which is water and fire proof).Women and priest fetch stone tap for the *jal* (holy water) to the God.In Patan there are hundreds of stone tap constructed in different time. It has been said that there were constructed 32 such stone taps in the period of Lichhavi and Malla each. Now some have little water, some dried up and some already perished under the ground.

In Nepal there are several settlements having their own traditional water management system. Modern development models could not integrate that system.

The case of Kirtipur

Kirtipur (1,400 m asl) is a small hillock town of 40,835 population (2001) located in the southwestern part of Kathmandu valley. As a medieval town it has built own system in water use. In the northern lower slope there are more than half dozen spring wells known as *kuwa* of different kinds. Some are serving still and some are uncared. One biggest *kuw*a is like a small pond, which has been supposed the well where Kalu Panday's blood has been washed.

So people do not drink the water of this *kuwa*. But there are several wells of perennial source of water.

Deep well also found interesting in this hillock town. A deepest well *'Tun* (*Inar*) *Jho* (*tol*)' is the deepest well constructed on the hillock. It has about 2.5 m circumference and more than 50 feet. This has not been at use. Similarly, there is widest deep well too. This has circumference of 9.5 m and depth also same. This is the biggest deep well in Nepal, which is located in Palifal, Dopacha of Kirtipur. This deep well known as Bag Bhairab Inar is also related to the tiger-gods bath well. It has stone base and look like community well in the medieval time. Another deep well is known as *Jor inar* made in 803 sambat located in Sagal. Both are located very near. People are still using these wells. The brick of the biggest well also biggest triangular brick. It was east to make round. But renovation has taken out that medieval construction on the upper parts and used modern rectangular bricks. Upper part has been constructed with brick and cement. But the house lord has pipe water and no use at present.

In Kirtipur there were many ponds surrounded in the base of the hillock. But most of them already dried up and turned into land. Remaining few also has not been cared. One can visualize two-three such big ponds in the southern base of the hillock. Few are located on the top in the middle of the town.

In Kirtipur, stone tap also available. Some are small but beautiful.

There architectural design is based on Nepalese culture. Temple or god around such stone tap has raised the honor of water. People give homage of water to the god. Terraces surrounding in such stone tap is useful to change and dry cloth as well as rest.

There are other types of architectural design of water use. People could drink water from the breast like tap. This is filling reserve tank for the general people who want to drink. There is few such taps, which has not been used, in contemporary time. So they are standing as a show peace and also deteriorating day by day. There is a tap in the middle of the town (near Bagh Bhairab temple) where one can find an idle water pipe standing empty. It was installed in the Rana period. It has facility to link big pipe (for firing and other needs).

In Kirtipur there is a *ghat* in Balkhu in the west and Sundarighat of Bagmati in the east. Both are using for last rites.

Kirtipur, a small hillock town gives a good example of different models of traditional water taps.

Water conservation cases

People in the villages are constructing, repairing and caring canal for the farm field. They are irrigating together since long time. They have their own common community system to manage proper use under community collaboration. They were using simple materials such as green leaf and tree trunk and grass cuttings to divert water with the encroachment of modern civilization slowly age old technology has been changed and started using stone and wire. They have good representation of village people to manage water. This type of people does not believe in project. They stress self-reliance. They have developed certain system, which was working generation to generation. In this age-old system. People donate labor and complete the work by themselves.

In Patan there are several stone tap of historic values. There is a tradition of caring water bodies. If tap stops, people go to care source area. The stone covered in the source had prohibited opening. If people want to see it, one person cannot open and there must be some people together. It may be due to sand and dust; the water doses not flow and there needs to clean. And the water divided to different taps should be balanced. The water could flow one side. So the group could balance it to supply equally. One person may use his selfish nature. So there were religious restrictions to open by an individual.

The supply of water from the source to tap has been constructed from traditional technology of filtering water. *Mangaal* is a small whole construction to filter and supply water to the tap. For the canal people use brick, *Gathu* mud, clay pipe and even wood. Some tap in the spring near by, some far away. In the source of the water a sign of hand (sign of danger to stop opening) in the stone is visible. It prohibited opening.

Nepalese in the recent years are facing water management problems. Due to growth of population and use of marginal land water management became a difficult task.

Problems of preservation

The disaster of Nepal is born mostly from the change of nature environment. In the case of man made disaster, encroachment of nature system caused explosion of problems. Nepal is facing more disaster caused by disturbances of nature system.

There are many water related problems. The human health hazard from the water contamination is the main problem in the community health sector.

Soil erosion in Nepal is also an increasing problem. The Himalayan River carries millions of cubic meters of soil. The denudation rate is more in higher region. In the low land area flash flood causes damages.

The Glacial Lake Outburst Flooding (GLOF) is emerging as a new risk due to shifting of temperature line. The rise of temperature in Nepal is 0.06 °C per year while in the Himalaya the rate is two times more (0.12 °C). About 23,000 glacial lakes are swelling and threatening outburst due to rising rate of temperature and melt water. The snowline is retreating. The local environment has been changed due to the shifting of settlement down to the river valley. It became risky to save the lowland settlement from the GLOF. There is no land-use restriction and settlement plan.

Poverty and lack of proper education is pushing people to destroy environment. Alternate source of energy is lacking. Hydropower generation for the rural people has been neglected.

The population pressure and pressure of poverty is intense in the remote western parts of Nepal which is bringing risk in the water storage of the Great Himalaya. The huge amount of clean water is drying up. The temperature line is shifting and destruction of forest is causing water level low. Nepal lacks household energy. And also lacks education on the use of regenerating resources like water and forest.

The huge water of the Himalaya must be the concern of countries around the world and it is the property of all human being. The risk on this water storage is increasing. It has been threatened. The changing ecological context and climate of the country brought risk to the huge amount of water of the Himalaya.

The cultural change is not going in to the right direction.

The water-mill culture also overshadowed by the modern mill, which needs electricity and comparatively it is not friendly in the environment. Still there are water mill to grind corn and other grains in the interior villages. This made them self sustained.

Villagers are masters of technology to solve their local problems. There are examples of landslide control. Some add greenery. Some construct pond to control velocity of water and some put stone to save from the erosion and landslides. The pond made to control velocity of mountain water help to livestock and irrigate kitchen garden.

Simple technological improvement like important in terrace construction help to retain moisture and also grow production. The flash flood and soil erosion control also help to improve and save the land. The pond in such village has responded to control flash flood and its velocity, which is supporting to control landslide in the mountain slopes.

The human power of winning water has been reflected in the construction of bridges, dam, canal, pond, hydropower and so on. The sea has been crossed first time after construction of bridge from India to Sri Lanka. Recently, it has been traced out in the spot images. The epic stories have been reflected importance of water in *samudra manthan* (churning of the ocean) and birth of different incarnations.

Due to lack of human culture different problems are rising. Even common sense is lacking.

The construction of dam in the border side of India has created inundation problem even in Lumbini, the birthplace of Buddha. Even international law has been crushed for the personal interest. Problem as such on water is multi faces. The buying of electricity in low price, imbalance benefit in bilateral treaty of dame, conflicts in water use and possibility of struggle within community and war between countries (in dividing water for irrigation and hydro power distribution) has gave birth to water diplomacy. Nepal has long history (14th century) of water conflicts and reformation of social rules. In the contemporary Nepal wise use of the Himalayan Rivers became a challenge in both local and regional level.

There is a debate on big project vs. small project. The geologic structure, the environment and investment, economic viability are major concerning points in water issue. Nepal geographically is prone to earthquake, erosion, and flood. The nature of settlement distribution and poverty level all have disturbed to take risk on construction of big dam and mega hydropower projects.

Nepal, in future can construct canal from east to west (as suggested by this author in 1980s) to connect rivers in Tarai. This can help for the irrigation, inland water transport and fish farming. There are great potentialities of using water-capital in Nepal.

This needs careful planning and diplomatic awareness for the benefit of the Himalasian region.

The Asian water heritage is rich. But due to lack of proper awareness we are forgetting our inventions of water utilization, water preservation and water promotion.

Conclusion and recommendations

The myth, legend, the folk tales and tradition have been neglected. There are so many philosophical base of water. There are rules, rituals and regulations related to water use and advantages.

The water is the lifeblood for the biotic world. Nepal like the Himalayan countries that have sufficient drinkable water can sale the Himalayan herbal water as the expensive petrol of the Arabian countries in future days.

Kathmandu valley is facing water shortage. The need and demand of water in Kathmandu is about 200 million liters but hardly 50% supply and its cost is adding havoc. Japan like countries is cooperating to improve water supply in Kathmandu.

Nepal lacks even general knowledge of water treatment. Distillation, decantation, boiling, filtering, solar water disinfections like water treatment can save many people living in the remote and poor villages of Nepal. In Tarai arsenic content is causing problems. In Kathmandu there are more complication in water. Traditional taps have not been cared. There are more than 100 stone taps in Kathmandu, which are beautiful in its architect design and art works. Still people of Patan are using many such stone taps. There are many such taps constructed before 1,000 years. Such taps are also helping to utilize ground water and also helping to control land slips and slides. Due to expansion of city old holy rivers have been contaminated. Bagmati river of Kathmandu is an example, which later purified with the construction of sewerage treatment plant. Carpet industry and paper mill are polluting water. Encroaching, dumping and discharging of wastes and sewerage in the water bodies have negative impact on aesthetic as well as ecological and health values. Inadequate supply of drinking water and deteriorating quality are causing serious problem in Nepal. Destruction of nature environment is causing drying up of spring, lakes and wetland and ground water sources.

Catching up of the fog water and ground water needs higher technology. Nepal has all sorts of sources of water.

Water is a potential biggest natural resource of Nepal. Nepal has more than 600 lakes and 6,000 rivers. Mean annual rainfall of Nepal is about 1,700 mm. Monsoon (Jun-Sept.) occupies 75% contribution.

The water consciousness is the focal subject of human society. Cultural practices, as such, become most important aspect to study for the up gradation of water qualities and regularities. Stress as such needed to raise conscience than science. Science supports the practices but culture diversities demand to share experiences, which can improve the perception and values of water culture based knowledge in application is valuable. Too much stressing on science is loosing the human conscience. Science and society are two sides of a coin. The culture of human society as such is the field of all human explorations and experiences. Viewing water from the cultural microscope can invent age-old scientific inventions and innovative ideas, which can be a great contribution to support wise use of water for the maintenance of civilization of mankind.

Recommendations

1. Poverty alleviation from the water is possible. Still there are dry land and river flows below. They lack technological input. Still a simple canal not only increases growth but also can add new crops in the new field in Nepal. Most of the farmers stay waiting monsoon. The Cloud culture (looking sky to receive rain) is still powerful. The Himalayan water has not been utilized even in the irrigating, drinking and running modern mill. Irrigation help not only to rise yield but also grow multiple and double crops. Instead the working in such development activities, the corrupted politicians neglected to cooperate and bring developmental projects. This reacted to work poor to anti government activities. The price of a pajero in Nepal can run ten sawmills in the village and give employment to more than 100 people. The Nepalese so called democratic politicians failed to do so and they are also killing poor people with increasing poverty. People die lacking simple medicine of first aid like fever. So corrupted politicians are real terrorist who are disturbing the development for the people in the country where poor villagers live. Good governance. Good planning and careful programming are essential parts for the development of Nepal. Cultural components of water must be cared in water related works.
2. Education can create awareness of water culture. UNESCO should find traditional water technology and communicate to different nations of the world for the welfare of man. Some of the good examples of water use can be disseminate through education and reading materials. ACCU Water book under ecology series of Japan is an example of the importance of water in human life. Such publication should be promoted to create awareness on water.
3. Water wisdom can be shared to improve human welfare. Water as a most precious heritage of living being the time has came to care for the life of mankind. There are so many beautiful lakes, river confluences and waterfalls, which can be conserved not only to protect the natural beauty but also to preserve the drinkable water. There are man made means of water such as tank and pond, riverside religious centers and rituals of water use as well as water related wisdom all could be shared between the countries around the world. *Ghat* technology of Nepal can be promoted in the riverside along with the construction of *Bhakari* (round spur) to control flood and also promote riverside environment. The construction of pond in the settlement and in the mountain slope side helps to control landslide and also fire in the rural area. These types of traditional culture should be protected and promoted. UNESCO has to pin point such heritage and honor as the micro national heritage. This can honor the human invention as well as promote cultural base of the country.
4. The big rivers and water bodies should be the property of the mankind. The United Nations

like organization should take care of such property to protect its environment and share water in the regional and global levels. There should be developed master plan for such global heritage to protect water. UNESCO like organization can include important water spot in the list of world heritage.

5. Water studies should be promoted. The knowledge, research studies and publications related to water and its promotional activities, technologies should be shared between countries. UNESCO like organization can lead to incorporate water studies and knowledge in the education around the world.

6. Water Knowledge should be disseminated. An encyclopedia should be developed to record all sorts of water use and cultural practices covering the continent. There are good thoughts, techniques and practices hidden in Nepalese water culture, which needs a careful exploration, explanation and exposition. This can create water awareness and help to get benefit proper use and restrict misuse and also conserve the water to promote human civilization.

7. Water is an important topic for teaching. Water as an inevitable elements like fire, air, it should be included intensively in the educational curricula.

8. Water tourism should be treated separately. The concept of water tourism can be promoted a visit in the site of glacial lake; wetland, waterfall, river confluence and gorge etc can create good feeling in human heart and awareness on water. An educational excursion in water spots help to promote water consciousness. Geography education can be made a compulsory in the secondary schools to survey local prospects and problems as well as give task to record rainfall and temperature in the villages. School can be a center of recording, watching and creating awareness of water-born disasters.

9. Research on ethno water use can be a good source for the cultural development. Nepal still lacks research on water and livelihood. Different ethnic groups living in different ridge and valleys have their own age-old tradition of water uses.

10. A museum of water culture can be built to disseminate water wisdom. UNESCO like organization and Japan like country can take initiation to establish such museum. A water laboratory can be opened in Nepal for the scientific experiment.

11. Research on cultural aspect of water can help to promote water qualities. Research on water cultural diversities in Nepal can be a module to find best use, protect and promote water in the world.

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Water Harvesting: The Tanka in the Zoroastrian Homes of Bharuch, India

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Abstract

The climate of India has nurtured a variety of traditional systems of water harvesting and supply. Some of the most striking examples of step wells are to be found in the aired hot regions of Gujrat and Rajasthan. The architecture of water storage, referred to in different places by different terms, is a lesson in the architecture of necessity. Strategically sited and created with imagination, love and precision, these systems and structures are fast becoming the victims of a changed life style, due to the available alternatives. Most of these alternatives are expensive, impersonal and ecologically irrational. The insatiable thirst of the metropolis, meanwhile, must continue be met from all available sources at any cost.

This paper examines the case of Bharuch, a small town in Gujrat where the practice of using the 'tanka' an indigenous system of rain water harvesting from roof tops, and storage is still practiced by a handful of the Parsee Zoroastrian households. Even though so useful and self sustaining, these systems are fast disappearing. The neglect of these fine systems and monuments needs attention. It is hoped that the move of rejuvenating some of the water harvesting systems, will not only help save some of the heritage structures but also augment, in a very humble way, the water supply during the long hot summer.

This is also the need of the hour in several other small towns of the country.

Keywords

Climatic regions, water harvesting, traditional systems, 'Tankas', rejuviniation of systems.

Overview

Cities are living organisms. In order for the cities to remain sustainable it is necessary for them to remain within their capacity to regenerate their natural sub systems. Once the carrying capacity is exceeded, these sub systems give way. The rapid physical expansion of our cities has encroached upon the vast resource of air, water, flora and fauna of the hinterland, which is an essential requirement for maintaining the environment in a holistic and organic manner

Many of our traditional life support systems are fading away or are gone. Growths in our cities exemplify the unavailability of basic services, specially water, and the lack of foresight in tapping sources which tend to get further and fewer every year. The deteriorating condition of available services affects the quality of life of the residents.

The ever increasing demand

Cities in the Asian region are growing at an alarming rate. It is estimated that by the year 2015 there will be 27 mega cities of population of 10 million plus in the world and 16 of these will be in the Asia Pacific region and at least three, Mumbai, Kolkatta and Delhi in India. An attempt is made here to look at the gradually failing traditional systems leading to an alarming status of water supply scenario in the Indian cities. While the large metros exemplify the problem dramatically the smaller cities have not escaped the trauma of inadequate services. The vanishing systems of traditional water collection, storage and supply assume significance and it is important to consider the potentials/limitations of rejuvenating some of the traditional systems.

Climatic range

India has a wide range of ecological regions. The Himalayas have dry cold deserts and the sub-temperate region. The dry hot deserts stretch in the western Gujrat and Rajasthan, the tropical high mountains of the Nilgiris, the alluvial monotones planes extend along the Gangetic valley, the plateau of Malwa, and the dry slopes of the Aravalis. The mountains and valleys of Meghalaya, Nagaland and Mizoram display abundant humid slopes.

Except the cool greens of the mountains, a large part of the country gets hot and dusty during a long hard summer, which is broken by a brief monsoon. Each one of these regions have, over the years evolved a suitable means to collect, store and use the restricted quantity of water available. The more hostile the terrain, the more care was taken to conserve scarce resources. Excavations in Harrapa, Mohanjadaro and recently in Dholavira have confirmed the utmost priority and importance given to water storage and use. Social controls ensured the collection, storage and distribution, as also checking of wasteful use/misuse of water to all residents at all time. In many small towns of India, as indeed also in Afghanistan and Iran, the persons associated with the indigenous water works (digging canals *Qunats* of Iran, constructing tanks and dams including the '*Gabarbands*' – the system of check dams – of Afghanistan) were regarded as the true heroes of the community. In India there is a strong belief that building or dredging of a temple tank is one of the most noble acts a man could perform in his life.

Harvesting water for survival

As long as the Indian towns were small, they were quite sustainable in nature. Ecological sustainability was much more than the question of quality of life. It was life itself. Food, water, firewood and other natural exhaustible resources were wisely and optimally used. Rainfall in India is seasonal, spread over roughly three months all over the country. The runoff is swift and heavy. For this reason rainwater harvesting was as common a practice as the harvesting of the fields for food. The principle of rainwater harvesting is to collect/store water where it falls. A central lake, or a series of lakes, wells, tanks and dams collected the water of an extended watershed to be supplied to the residents the year around – especially if the rains failed to arrive in time. Many towns in the aired region of Rajesthan and parts of Gujrat optimised this system of water catchment of a large watershed for the city needs.

In all the different states and different languages, the water related terms signifying the different storage systems clearly expressed the importance attached to water. Design of the human settlement was truly an ecological statement, between man and the elements of nature in the most harmonious way. Rajasthan had it's *khandins* and *nadis,* Gujrat had it's *talaos, vavs* and *baolis,* Maharashtra the *bandaras* and *tals,* Madhya Pradesh and Uttar Pradesh had *bundhis* Bihar had *ahars* and *pynes* Himachal Pradesh and Jammu and Kashmir had *kuhls* and the Southern Indian states of Tamil Nadu

had *eris*, *surangams* in Kerala and *kattas* in Karnataka. All references were to different storage devices such as wells, ponds, reservoirs, dams and streams.

Dozens of towns in practically every state of the country had tanks, wells and/or lakes for water collection, often as their central feature. The 'temple towns' of South India (Tiruchanpur, Madurai, Kanchipuram) had huge tanks in the heart of the town. Managed by a temple trust the water was kept unpolluted and used judiciously. Fully grown cities of today (Nainital, Udaipur, Mandu, Nagaur) had their beginning as habitations clustered around lakes. Towns located on the rivers such as Delhi, Mathura and Brindavan on the Yamuna, Allahabad, Varanasi, Patna, Calcutta on the Ganges and Ujjain on the Kshipra had well defined and developed '*ghats*' (terraced riverfront) for social and religious activities. Forts wherever constructed as in Rajasthan (Chittorgarh, Jodhpur, Bikaner, Pushkar, Ajmer…) and Gujarat (Ahmedabad, Rajkot, Junagarh, Jamnagar, Bhuj, Mehsana…) contained a combination of tanks, step wells and lakes as the major features of the towns. In many of these towns and cities today these systems have been rendered redundant due to mindless development thereby causing flooding and health problems.

The cultural dimension of water in India

Water bodies dictated the location of temples. Rivers and lakes were named after gods and goddesses, who are depicted to be residing in or close to water bodies. The water, or the deity residing in water must be venerated with rituals and offerings. A typical step well is a series of steps (the long flight broken by landings) leading to a deep well lavishly decorated by arches and lintels. Light work is made of heavy stone retaining walls by elaborate decorations and projections. Step wells like the helical '*vav*' in Pavagarh, or the *Rani ki bawli* in Ahemdabad, Gujrat reflect a very creative approach, where the stair itself gets sculpturally transformed in to a well as one reaches the bottom.

Step wells have been constructed in India both by Hindu as well as Muslim rulers and though essentially the same in nature, they vary in the level of decoration and ornamentation. The Muslim structures being simpler and less ornate.

The Zoroastrians, a micro minority better known as the Parsees, arrived on the shores of India in the 8th century AD to escape religious prosecution in Iran. The Zoroastrian tenets of 'Asha' proclaims and celebrates the sacred nature of elements i.e. fire, water, earth and air. Their now vanishing, predawn practice of 'yashna' is a daily prayer ritual that honors all creation by drawing a sample of water from the well and returning it back to the source after the religious act of consecrating the same. The Zoroastrians treat water not only as a life giving entity but also a living element. It is considered improper to 'disturb' water at night. Water bodies are to be respected by not crossing them but to find land route around the same for fear of polluting the same. Silmiar to the beliefs elsewhere in the world and in India,offerings of flowers and food is made to water specially on it's 'birthday', the celebration of the 'Ava parab'.

Many festivals and social rituals coincide with the arrival of the monsoons. Water related rituals dominate religious celebrations, death rituals and special social occasions.

One can see a level of devotion and care in the construction of water related elements as was bestowed on temples, palaces and *havelis* (rich man's mensions) Be it an embankment of a '*ghat*', a step well or a tank. The architecture is extremely rich and meaningful. 'This, for someone not from the desert, might seem extravagant and excessive but once the value of water is realized one can appreciate the manifestations in construction to hold and access it.' The tankas, since totally underground, were not ornate but built to last.

Womenfolk met at the well or step wells to collect water. Though this daily ritual offered a limited mobility and the resulting social contact to the women folk who would otherwise be confined within the four walls of the house due to social constrains, fetching water became a drudgery in

women's lives. The tanka owners had already found a way to reduce the woes of water collection With changing times, women were no longer required to be home bound and also with the arrival of water right inside the kitchen/courtyard, the traditional system had very little reason to continue to exist. As it become easier to get water straight to the house these systems lost importance.Some households in Gujrat as well as the Thar desert area of Rajesthan, however continued the tradition of the tanks-(explained later) a traditional system of rainwater collection right inside the house.

The decline of indigenous systems

The break in the use of these traditional systems of water supply came gradually and naturally. Many factors contributed. The inability of the British administration to understand the socio cultural context of water, the fear of exposed water bodies as a source of malaria and an obsession with the supply of water through pipes as a controlled commodity as also the haphazard development with no consideration of natural flow path contributed to the gradual disfunctioning of these systems – except the 'tankas' Indiscriminate overexploitation of the natural water resources, not necessarily located in the immediate vicinity of the settlement, for providing water to a growing population was resorted to by the British. In time, the growing population and physical growth slowly but surely cut off the recharge channels and paths of the traditional sources. Also the idea of a system of centralized control, specially for the supply of basic services, as introduced by the British, now lies in the hands of inadequate and unskilled operators. The present day administration of many small and medium towns renders this system not answerable to anyone. Inadequate water at the source, falling groundwater and inefficient distribution system of water supply, even in the small towns, has become one of the most curial problems in India today.

Per capita availability of fresh water is getting reduced. 'The annual availability of water in India is around 4,000 B CUM during the monsoons out of which nearly (17.5%) 700 B CUM is lost to the atmosphere, (3.75%) 150 B CUM soaks into the ground and (28.75%) 1150 B CUM flows as surface runoff. In recent years it has been understood that the component of the rain water that soaks into the earth, needs to be maximized as potential source of water to meet the off season demand'.

The tanka of Bharuch

In the aired state of Gujrat, water has always played a very dominant role in the social-cultural life of people. Perpetual shortage of water has inspired people to appreciate the value of conserving and storing this resource in all conceivable ways. The city of Bharuch, a small town (population 150,000 as/2001 census of India) located at a distance of 320 Km North of Mumbai, though situated on the river Narmada, shows dependence on ground water for it's survival. Like many other rivers in India the flow in the Narmada in summers is minimal and pollution levels high. Bharuch today exemplifies the small Indian town in many ways. The municipal water supply, at best is just enough to cover basic needs of the people. Long queues at the public distribution stand posts indicates shortage. Over dependence on the well water has rendered many a well brackish while the water table continues to fall deeper.

The step well (vaus) of Ahemdabad and Jodhas of Rajesthan are very well know examples of water storage system. However the tanka is a much simpler and very personalised system of water collection and storage, which is fast getting lost. This system, is still practiced by a handful of persons, mainly the Parsees, the Zoroastrians who brought the consciousness of water related rituals and the concept of harvesting water from ancient Iran. In cities other than Bharuch i.e. Ahemdabad, Barmer etc also a very small minority of users are still taking advantage of the system.

All the tankas are very old structures – nearly (or more than) 100 years old.

The 'Tanka' is an underground tank, accommodated inside the house, preferably under the kitchen or dining room, made of chiseled blocks of stone, in lime mortar, unlined but made waterproof by a indigenous herbal mix. The ingredients of this mix is not recorded but the quality of this mix was not only to render the inside surface waterproof and seal minor cracks but mainly to prevent the bacteriological growth inside the tanka. The size of the tanka is large enough to store sufficient drinking water for a family for six to eight months. An average storing capacity of the tanka is around 25,000 litres. Some tankas are virtually like independent cellers with 8 to 10 feet of filling over them. With sizes reaching nearly 20 feet by 60 feet and height of 12 feet, arches and vaults were needed to support the earthwork and the superstructure on top of the tanka.

Since the bottom of the tanka was well below the lowest level of the house, there is no outlet of water provided, when required to be cleaned it must be emptied manually. Almost all tanka inlets are large enough for people to enter and walk/work inside. The tanka floor slopes into a sump right under the point from where the water is drawn out.

The tanka feeds on the rainwater collected through roof runoff. A simple system of collection, via a 3" to 4" pipe, depends on successive sumps whose water is collected and overflows on it's way to the tanka, and settled impurities are flushed out thru an overflow pipe. In fact the total water runoff of the first couple of days of rainy seasons, is just made to run down the overflow pipe, ensuring a maximum cleaning of all surfaces in contact with water. When the owner is certain of the cleanliness (this is done by constant visual testing and actual tasting of water) the overflow is plugged and the tanka inlet opened. That starts the flow of the water into the tanka. The tanka has a hatch cover which is kept closed except for the time when water is needed to be pulled out as out of a well, by a bucket on a pulley. The water retention capacity of these tanks which is seen in the form of a particular 'danger level' indicated inside the tank by the depiction of a sculptured 'fish' form along the inlet neck of the Tanka. Filling the tank above this mark was considered dangerous as the hydraulic pressure inside may well exceed the retaining capacity of the tank wall.

The tanka is filled gradually till the 'fish' mark and stored away to be used long after the rains have stopped. The clean conditions of collection, storage and once in a while ventilation by opening the hatch (which is incidentally, so placed that direct sunlight does not enters the tanka), trap door and using the water judiciously makes the tanka water a most precious resource specially in the hot summer months. Most owners clean the tanka only once in 5 to 10 years. The water quality of water studied in Bharuch has been tested and found to be potable quality.

The system survives today due to the sheer belief and tenacity of the few people who use this system. It is disheartening to know that there are others in the town who consider the presence of the tanka in the house as a nuisance and would rather have it filled up or permanently closed off. In fact some old residences when sold to new owners completely demolish the same, including the tanka, and rebuild in the 'modern-Bombay style' flats.

The need of the hour

This attitude has taken a heavy toll on the social, cultural and heritage front. Historical buildings of heritage value lie unprotected and vandalized. Cultural practices and traditional wisdom is on the decline.

Traditional water harvesting systems depended heavily on the coordinated operation of the society. The society at large must recognize and care for the traditional systems. The easy availability of water and a lack of community feeling among the residents have combined to destroy the water harvesting systems. Public awareness and education in this regard is of extreme importance.

If ever an intervention was required to bring man and nature together again in our city – it is now. The message is now very clear that issues of common concerns – issues such as water supply – will need to be tackled jointly by the government and the people themselves.

If the neighborhood social organisations with a little help from Non Govt. Organisations (NGO's) get into the act even now they could find a few systems of water storage that can be rejuvenated. The efforts of PARZOR,the project initiated by UNESCO to document and conserve the traditional practices and customs of Parsee Zoroastrians in India are laudable in this regard. 'Only when that whole or unit of continuity which has been destroyed by the presence of conflicting factors has been restored in *another* whole ... can we claim validity for our procedure.'

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4. Sidney Hook, *From Hegel to Marx*, London, 1936.

The Cultural Value of Rivers: the Case of the Loire

Edih WENGER

Summary

The Loire river is internationally known for its famous castles, its wines, landscapes and art of living. Since 1986 it became a European reference for a free flowing, dynamic river when official plans aimed at regulating it. The largest ever French environmental mobilization occurred to save the river. Far from being a sacred river as the Ganga or a mighty power like the Mississippi or the Father Rhine, the Loire is considered as a woman who represents the French symbols of freedom, independence, beauty. It is also a cultural link between the North and South of France and their related cultures. This case shows how deep the riparian people are attached to their rivers and their cultural value. And how this strong link although sometimes forgotten can be revived to involve the public in a new culture of water management.

Keywords

River Loire, France, cultural value, symbol, mobilization.

Introduction

Father RHINE, Queen VISTULA, the beautiful blue DANUBE, ACHELOOS, the river god who coupled with the muses and engendered the sirens, MISSISSIPPI the great Waters that run, PARAGUAY the mighty, GANGA the sacred, AMAZONE the river of the legendary Amazons, HUANG HO the yellow river, plague of the Han sons. It is impossible to mention all rivers but without even being an expert, each one knows the representation of his national river and of most of mythological rivers or of those having played a role in history or culture. In Europe, it is not necessary to know the Rhine to have heard of the Loreley who dwells on its margins or the Rhine Gold guarded by the Niebelungen as says the famous opera from Richard Wagner. Everybody knows the Danube after having waltzed on the Johann Strauss' Blue Danube. The Oder-Neisse recalls second world war and the Berezina since Napoleon's retreat has entered the French language. The Nile valley and its pyramids, the Loire with its castles let people dream, so much they are famous. And in France, the Rhone and the Loire wines are indissociable from the rivers.

During centuries rivers have been painted, depicted, chanted and visited by intellectuals, artists and numerous young nobles. In this way Victor Hugo (2002, 39) summarized the fashion in the 19th century to travel along the Rhine: 'The Rhine is the river of which everybody speaks and that

nobody studies, that everybody visits and nobody knows, that one sees but forgets rapidly ...' Visionary, the writer added: 'Infallibly one day, soon perhaps, the Rhine will turn into the flagrant question of the continent.'[1] History rapidly showed he was right.

Yet, in the same century, through technological development, the engineers, contributing to the utilitarianism mentality of the time, used their genius to dominate the rivers and to take advantage from their multiple functions. Regulated, shortened, embanked, dammed, deepened, the rivers rapidly turned into waterways at the margins of which an intensive land use came into practice behind dykes.

Most of the rivers became open air sewages, carrying along urban, industrial and agricultural pollution. In 1986 a disastrous chemical accident killed the Upper Rhine for ages and was the last straw that then turned the river into a model of transboundary management aiming at restoring both water quality and ecosystems.

At the end of the 20th century almost all European rivers have been regulated, the Rhone with the Rhine and the Danube being the best representatives of the hydraulic changes. In the meantime their cultural value gave way to their modern utilisation and the people turned their back to such waterways that often were mere open air sewages.

When – a century after the Rhine – plans were made to regulate the Loire river to benefit from power generation, water in dry period, and navigation for modern boats, the 'technical mentality' of the 19th century had changed. And the development programme has not been implemented. During the campaign to save the river, the value of its cultural heritage and the visceral attachment of the French to the Loire revived the river heritage buried into the collective unconscious.

1. The Loire is a woman

'I love her, he said, for the beauty she gratifies my eyes, for the soft curves of her margins, for the fiery strands that the sun brings to flicker, the mauve strands in the shade of willows, the blue strands under moonlight, for the brisk coolness of the currents that dance on the reddish pebbles, for the glaucous mystery of her watery sides, and for the silvery ablets that leap close to wash-sheds.'(Genevoix 1922, 80). [2]

This quotation of a Loire lover can be read in numerous books published on the river and symbolises the perception that has the public at large. The Loire is a river that is not divinized, that was given no foster nor sacred role. This river has no presence in the French mythology. Yet it belongs to the cultural heritage of all French. The Loire is associated to a woman. She is lovely and free, two qualities put forward by all writers and artists and to which the French are attached:

> ' She is wild, savagely free: she bewares and shatters any constraint wherever it comes from. Bad luck to those who dared restraining her.' (Genevoix 1922, 80).

> ' The Loire is made for sensual as well as for witty pleasures ; One must admire her, praise her, love her: one cannot say that one understands her. The Loire is beautiful and beauty is a secret.' (Benjamin 1943).

1. Translated by myself like all other quotes
2. Cf. Maurice Genevoix in *Rémi des Rauches*. Personal translation.

Moreover the Loire[3] represents for the French a link between the Oc and Oil [4] territories, between the North and the South, between the Mediterranean and the Atlantic climates and their corresponding cultures.

2. The Loire cultural heritage[5]

2.1 The castles

Who has never heard of the famous Loire castles? Primarily located on the middle Loire where the valley is wider and the waters calmed, the castles have been built in the French region well-known for its charm of life and its gardens. The presence of these royal residences generated an intense artistic and literary life, in particular in the 16th century until the train arrived, substituting navigation and entailing a decline of the Loire at the beginning of the 20th century. Built principally between 1450 and 1550, these 'Loire stones' (Chenonceaux, Amboise, Azay-le-Rideau, Blois, Chambord, Sully-sur-Loire, etc.) symbolise the French history: Royal Court, Jeanne d'Arc, religion wars but also some of the greatest writers: Ronsard, Rabelais, Clément Marot and more recently Honoré de Balzac, Stendhal, René Bazin or artists like Leonard de Vinci who terminated his life there.

2.2 The wines

'The wines from the Loire and its tributaries extend over 800 km along the Allier and Cher, Indre and Vienne, Loir and Layon, etc. In the river basin, an infinity of products ... twenty varieties, red and white generate over one hundred stocks on various soils. Their names are Bonnezeaux, Savennières, Chinon, Bourgueil, Vouvray, Sancerre, Pouilly...' (Wagret 1986)[6]. The monasteries and priories played a crucial role in the extension of wine-growing in the whole region. But the local lords were not the last and the trade was even dominated by Flemish and Dutch merchants who exported all over Europe. River navigation also was key in the extent of wine-growing. Until the beginning of the 20th century, one distinguished the 'wines for the sea' exported through the Nantes harbour from the 'wines for Paris'of a lesser quality meant for urban citizens.

2.3 The fish

Seven migratory fish species still swim in the Loire. Formerly the Loire waters were so full of fish that the bargees complained at the time of the French revolution that they had to daily eat salmon. The lamprey was the most valued fish and the fishing right cost the double from other species like shad and salmon. The Loire gastronomy broadly based on the various ways of cooking fish is as well known as the wines. Nowadays, professional fishing still goes on especially downstream and the exportation of young eels towards Spain and Japan bring fortunes. Nevertheless the number of poachers endanger the future of these fisheries and fish species.

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3. The Loire is the longest French river with 1,012 km. It extends over 1/5 of the territory and runs firstly from South to North and then towards West almost cutting France into 2 pieces.
4. Oc and Oil are the main language families from resp. South and North of France.
5. Cf. Many books have been written on the Loire and its cultural heritage. A good overview is given in *Une histoire de la Loire*, Paris, éditions Ramsay, 1986.
6. *Vins de Loire, vin de gloire*, idem.

2.4 The marine

Navigation on the Loire and its tributaries is indissociable from the river life and the region. On the waterway national products as well as exotic ones were exchanged. Wines, wood, salt, spices, oil, earthenware, flour milling, industrial goods were conveyed on the Loire. Along the river margins an intense activity existed at the opposite of the present situation after navigation stopped with the competition of the train. Until then the Loire was the backbone of the French prosperity and participated to the industrial revolution. Yet, navigation was difficult and perilous and requested skilled manpower and adapted techniques and boats. 'Sapinières', 'toues', 'futreaux', 'gabarres', 'chalands'are some of the names of boats from up to downstream.

Numerous witnesses of this great era (canal-bridges, Loire and navigation houses, ex-voto, miniature boats, etc.) recall the life of the bargees who reached up to 15,000 individuals in the 18th century.

2.5 The mills

Built in the middle of the river, they hindered navigation but before disappearing in the 19th century they contributed to the wealth of cities like Moulins[7] where up to 900 had been constructed.

2.6 The legendary charm of life

Well established, this reputation is based on the abundance of food – fish, game, wines, fruits – and makes the Loire territory the place of well-eating. The famous gastronome, Curnonsky, who was born in Angers, certainly was not a stranger to this fame. Castles, gardens and also the purity of the language spoken in the region, all contributed to reinforce the feeling already chanted by a number of writers.

Down to Earth!

After navigation stopped, the Loire and the region declined and the riparians turned their back to the river. When public bodies took over from bargees and merchants to maintain the river, it turned into a 'wild' river again. Then its exploitation for power production led to the building of two hydropower dams (Grangent and Villerest) and four nuclear power plants that make the river being the most nuclearized river in the world.

3. February 7th, 1986

Prepared in secret, at least for the public at large, the integrated development programme for the Loire and its tributaries has been made public on February 6th, 1986. The minister for Environment had signed it without having asked the High Committee for the Environment for its advice as it should have been the case. The Loire river basin agency and the syndicate of local authorities were the two other partners. The latter headed by the mayor of the city of Tours rapidly took the lead.

In view of building four dams (two on the Allier, one on the Cher and one on the Loire), of protecting the Loire valley against floods through dykes, of turning the lower Loire navigable, the

7. Moulins, the name of the town on the Allier river means mills.

development programme aimed at training the river like the other European rivers. This meant murdering the Loire.

3.1 The mobilization against the programme

While the building of the two former dams on the Loire did not give rise to a strong critique, the global programme led to a long lasting opposition that succeeded in cancelling the programme. The 'Loire vivante' (living Loire) Committee was created on June 14th, 1986 and grouped the national federation of conservation organisations, WWF (the French branch of the World Wide Fund for Nature) and local groups.

Firstly based on a scientific level, the opposition rapidly became popular especially in the Upper Loire region where the first dam was planned. This underdeveloped region offers a rare quality of life and beautiful landscapes. Although rather poor, the inhabitants decided not to accept financial compensations or the prospect of a multipurpose dam with touristic equipments. 14 km of pristine gorges should have disappeared under 75 m high waters. In contradiction with the local politicians who supported the project while dreaming of economic development, the people and some local medias did not accept the idea of destroying their nature for the benefit of the middle Loire where constructions in flood-prone areas, nuclear power stations and irrigated agriculture were at stake. They were aware that the so-called disastrous flooding in 1980 in their region was an excuse. 'The dam means the death of the water'[8], of its freedom and of an art of living.

3.2 The opposition grew around two new axes: the communication battle and the international response

The programme leader devoted a huge budget for communicating on the need of and the benefits awaited from the programme. He also had to react to the criticisms of the opposition that had neither communication plan nor a budget for that. Yet, the campaign had been relayed free of charge by the media, artists and opinion multipliers. Media representatives arrived from all over Europe and further; support letters also. Thousands of petitions were handed to the prime minister. After the opponents to the Serre de la Fare dam on the Upper Loire started to occupy the planned dam place, medias and supporters crowded there. The creative and motley opposition lead by the 'Loire vivant' Committee benefited from an unexpected popular support since until then nature conservation demonstrations had had a very poor support.

'Mythical river, usually associated with poets and kings, and for a long time emblematic of charm of life, the Loire recently turned into an unprecedented ecological and political conflict centre: the dam battle. All this would be a kind of local battle if the river did not carry along together with its sediments, the dearest symbols to the French. Independence, freedom even savageness...' (Frain 1990).

The new minister for the environment stated: 'The Loire is propitious to fruitful insubordination'.[9] The minister for culture, who organized the conference 'la Loire, confluent d'art, de sciences et de nature' in 1990 in Blois, added: 'We all of a sudden get aware of our natural treasures'.[10] During the conference, many elected representatives, academics, scientists or persons from the culture

8. Marie-Rose Venot, a riparian old lady who became a charismatic figure of the opposition.
9. Brice Lalonde at the Blois conference 'La Loire confluent d'art, de sciences et de nature', 1990.
10. Jack Lang.

sector expressed their deep concern like Haroun Tazieff [11]: 'The Loire still is untamed and I don't want to see her like the Rhône, a highway-bound gloomy canal.'

Two years after the beginning, in 1988, the campaign gained international momentum with Prince Philip of Edinburgh – international president of WWF – visiting the Loire and declaring: 'Long live the untamed Loire' with the fear that the development programme could alter the unique feature of the river. Already proclaimed 'the last European untamed river' by the opponents, the Loire thus became the reference for the rivers in Europe. The princely visit brought the opposition an additional international echo and made the campaign even more attractive. Lots of British came to visit the Loire. And plenty letters flowed from all over the world to prevent the Loire castles or vineyards to be inundated. From abroad, the geographical preciseness was not requested but the French symbols had to be protected. When the 'Loire vivante' Committee organised a demonstration in May 1989, it rapidly became international and turned into the largest ever environmental demonstration in France.

4. A new culture for river management arose

'One does not have the right to speak of the Loire like of another river. When engineers pretended touch her, they got stuck. How can their experts' conceit understand that the Loire is not mere water ?'(Benjamin 1943).

The wide mobilization to save the Loire succeeded after several years. This victory entailed a big change:

a) in the understanding of the river:

- The regulation of the river will no longer be admitted. The choices made at the beginning for using the river and its water are disputed by several reports, expertises and counter-expertises and especially by the public opinion;
- The river that was to be developed, was in fact unknown in its functioning. Research programmes were luckily launched that still are on-going and shall hopefully fill the gaps;

b) in the management policy for the river and its waters:

- In 1990 national and regional meetings are organised on water management that ended in re-orientating water management. The Loire campaign was key in the discussion. The new water bill passed in 1992 reflected it[12]. It organises the integrated water management at basin level including protecting or restoring ecosystems and an active public participation;
- The 'Loire vivante' campaign generated similar cases around the world where initiatives for 'living rivers' were launched[13]. The Loire became an international symbol of a protected untamed river. It also serves as example for restoring developed rivers[14].

c) and in the role given to civil society in the decision-making process:

- The 'Loire vivante' movement was progressively involved in negotiation. Its point of view finally prevailed. A 'Loire Grandeur Nature' programme[15] replaced the former regulation one and the development/nature protection ratio was reversed;

11. Famous vulcanologist and also minister for Science and Research.
12. The new EU Water framework directive adopted in December 2000 owed a lot to this bill.
13. A series of 'Living rivers' committees were created in several countries (Germany, Brazil, Argentina, Paraguay, United States of America, Netherlands, Poland, etc.)
14. The Dutch-Belgian 'border' Meuse or the German middle Danube, etc.
15. It was officially announced by the government in 1994.

- The new governmental orientations as well as the E.U. Commission support to protecting the Loire allowed 10 conservation NGOs to benefit from a large budget for their local restoration projects in the frame of the EU LIFE programme (nature conservation). Put altogether the projects aimed at securing a free space for the river. The concept of free space worked out by scientists got the opportunity of a quick implementation. This concept spread over Europe within ten years and is mostly used as an alternate flood management.

d) last but not least, the cultural value of the Loire was revitalized:

- Nature and culture conservationists joined in: nature and culture are indissociable. The middle Loire valley was designated to the UNESCO List of the World Cultural Heritage in 2001;
- During the campaign numerous local initiatives revived traditions of all kinds and especially navigation. Newly created groups built boats alike traditional ones. Boat trips became popular. Discovery footpaths were established in many places, ruins were restored, houses of the Loire created, festivals reconstituted, etc.

Thus, thanks to the mobilization against the development programme, the riparians and generally speaking the French through the medias and the many manifestations proved their deep attachment to their natural, untamed, beautiful Loire and their art of living and turned it into an international symbol.

The success of the Loire campaign contributed to spread the will to save and restore rivers in other countries. On the other hand, the ecological status of most rivers as well as water quality made necessary financial and engineering efforts to rescue them. It is remarkable that the same engineers that regulated the rivers now carry out restoration programmes[16].

These two factors were key in the new awareness that:

1) something must be done,

2) something can be done,

3) and public participation is needed.

This opened the door to re-appropriation by local people of their river landscape and the cultural heritage linked to it.[17] Thus, a new culture in water management progressively is getting established.

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16. For example, the US Army Corps of Engineers spends now 27% of its budget (2002-2003) to restoring the Everglades (downstream wetlands) after having regulated the Mississippi river.
17. On the Upper Rhine for example, a transboundary (Switzerland, France, Germany) NGO coalition has been created that aims at recovering a human and environmentally friendly river landscape ; local authorities from France and Germany developed a common programme on the Rhine cultural heritage. Books, University research and cultural events tell of this new interest. In Poland the same happened about the Queen Vistula and artists, photographs, NGOs etc. are active. Also on the Danube in most of the 18 countries.

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The Rule of Water: Uncertainty and the Cultural Ecology of Water in South India

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Water use: governing frameworks and 'indigenous' practice

How should we understand the relationship between water and society; how should we study water use systems as cultural systems; how should knowledge of 'indigenous' water system shape new interventions in water management? These are some of the questions that this paper addresses. In doing so it draws on a longer study of 'the rule of water' in south India (Mosse 2003).

Two governing frameworks define water resources as the subject of professional engagement. The first is an 'engineering paradigm' which conceives of irrigation as a mathematically modelled system which can be engineered to maximise water control (Gilmartin 1995:212). Such a view, dominant within official circles for nearly two centuries, views irrigation systems as bounded and knowable, separate from society. In a second framework, technology is viewed not as a fixed arrangement specified by engineering science but as *what people do*, the focus being human behaviour (cf. Mollinga 1998). This is a 'management framework' which views irrigation systems in terms of the effectiveness and efficiency of key functions such as water acquisition and allocation, system maintenance, and conflict management

Both engineering and management approaches tend also to draw support from the economic analysis of irrigation water as a technological input in production; a quantifiable commodity judged by cost-benefit criteria (i.e., irrigation inputs in relation to crop outputs) (Bolding et al. 1995:806). The wider social and political processes involved in irrigation and their effects are largely ignored in both engineering and management frameworks.

Social, cultural and political analysis is also poorly developed in the more recent and critical 'participatory' off-shoots of these techno-economic approaches (cf. Mosse 1995). In this respect participatory approaches are distinct from (Marxist) political economy approaches which have always given overt emphasis to social relations of production (Pandian 1990). It is true that there has been a rising emphasis on 'indigenous knowledge' and indigenous water harvesting, and community-based water management; but interestingly this has not substantially shifted perspectives on water, and in some respects has only enforced a limiting conception of water-society relations. This is partly because water management has become framed by strong ideological commitments that narrow understanding of the social and cultural life of water.

There are two important but distinct movements which today re-focus attention onto indigenous water systems (and here I speak from a South Asian perspective). First, the environmental movement offers a critique of centralised state and the dominance of western technical perspectives or water resources over those of the indigenous community (e.g. Agarwal and Narain 1997). The critique has sharpened recently in the controversy over large dams in India and elsewhere, but has its roots in Gandhian visions. In simple terms the argument is that indigenous autonomous community-based systems of water common property have been eroded by the advance of state control and proprietary rights from colonial times. Water systems such as south Indian tanks are

'threatened indigenous spaces', part of a former organic village community which now provides a model for re-habilitation. Secondly, there is a movement for water resources management transfer (from state to communities of users) – a reformist state policy, linked to ideas of public sector reform, underpinned by ideas of privatisation, reducing the role of the state and strongly supported by international development donors (e.g., IIM and WUHEE 1994, Joshi and Hooja 2000).

To some extent the environmental critique and resource management tranfer share the goals of transferring water rights and responsibilities to local communities of users. But both in different ways have tended towards views of indigenous water systems which, firstly dichotomise state and community; secondly, are ahistorical; and thirdly, do not fully address the utilitarian separation of water from all other aspects of social and cultural life.

The cultural ecology of water in South India

In the remainder of this paper I want to suggest that what we need are new regionally and historically located cultural ecologies of water; that is approaches to studying water (and the development of programmes) which, (1) overcome the dichotomy of state and community, and (2) overcome the kind of dualistic thinking which confines water resources (and especially irrigation) to an economic-technical domain. We need to look at water, water harvesting, water distribution, and water use as an institutional whole overcoming the separation of the technical/economic, the political and the cultural spheres. This was the goals of my book *The rule of water.* Let me take some propositions and illustrate them from this work on ancient south Indian irrigation systems.

Firstly, water resources are never simply there; they are produced by social and political systems. Water resources are the product of history. The southern plains areas of south India are characterised by tens of thousands of interconnected tanks that capture surface flow and use it for irrigation and other purposes. The majority of these were developed with the militarization of the plains areas under the Vijayanagara empire (14th–16th century) which demanded an intensification of agriculture through irrigation in order to supply troops and supplies and settle populations displaced by war. The fact that irrigation was developed by warrior chiefs, who strongly guarded their relative autonomy within decentralised kingdoms, ensured that this water control system was highly decentralised – developed through building and interlinking local irrigation tanks.

Secondly, water systems are not only shaped by, but also shape social and political relations. Water makes history, but in far more complex ways than Wittfogel's (1957) notion of 'hydraulic despotism' assumed. The ecology of water – the fact that water flows down hill, pools, has to be shared, or is scarce in relation to demand constrains the play of social and political forces. Because water makes social connections there is a hydraulic dimension to all rural societies. Let me consider some of the ways in which water flows shaped social and political systems in south India.

Firstly, the tank systems that developed over centuries on the south Indian coastal plains were a response to heavy run-off from concentrated monsoon rainfall which had to be captured, stored behind earthen embankments and controlled through reservoirs or 'tanks'. In this ecology, more water is lost to the system through evapotranspiration than is gained through rainfall (Athreya et al. 1990:56). Without the storage of water in tanks cultivation of rice and stable settlement in this semi-arid region would not have been possible. Second, gravity flow across the sloping plain created interdependencies between cultivating communities; and this hydrological fact was used by Maravar caste warrior chiefs who developed political domains through excavating link channels that enhanced supply. Third, hydrological facts also demanded a role of these chiefs (and their political overlords) as authorities to grant water rights, or arbitrate disputes *and*, since tank systems also need maintenance to mitigate the effects of silt accumulation or corrosion, to mobilise labour for system maintenance and to invest in repair. In return overlords took a grain share of the irrigated harvest. Regional Tamil myths and morality, reveal a persisting connection between warrior power,

overlordship and religious merit, and the bringing/protection of water. Fourthly, tank irrigated agriculture involved risks and uncertainties that differed both from riverine paddy cultivation and from long-fallow dry farming. In particular they were more vulnerable to the effects of monsoon failure or flood damage. These risks and uncertainties were beyond the capacity of individuals or even villages to manage. The ecology of tank irrigation therefore demanded a supra-local authority in agriculture (to regulate and maintain). Ideologically water rights were in the gift of kings (water was a medium through which royal and divine power flowed) and the royal grant is still an idiom of water entitlement in these southern Tamil villagers.

The local authority operating tank systems in south India depended upon upward connections to powerful centres, palaces and kings, as well as local investment. But the physical demands of the system always resisted centralisation. As the British would later learn to their cost, no state could afford to maintain tens of thousands of tanks, a task which one 19th century British engineer described as 'at once too large in the aggregate, too small in detail – as well in fact [to] attempt to keep every hut in the country in repair'.[1] This was better understood by 17th and 18th century south Indian rulers who did not attempt to centralise control over water, but rather dispersed their notional rights through acts of royal gifting, especially to temples. Temples and Brahman communities became, then, nodes for investment in irrigation.

Indigenous water systems and modern regimes of control: colonial rule

So, tank irrigation technology itself not only necessitated upward connections to overlords and the state, but also ensured decentralisation. Modern administrative systems, however, have tended to misread the political and ecological logic of water, vacillating between state control on the one hand, and community management on the other – asserting bureaucratic systems of control, or inventing irrigation management traditions for communities to whom to devolve responsibilities. Neither has worked. For example, the British government in the 19th century realised too late the cost of asserting state rights and authority over decentralised irrigation systems (in the districts that they directly administered) through a centralised professional Public Works Department; and their reaction – also too late – was to try to re-create village custom and tradition of irrigation maintenance. This offers important lessons to today's efforts to create local water users' associations to carry the burden of irrigation maintenance, although I do not have space further to discuss the issue here (see Mosse 2003, Chapters 8 and 9).

The changes colonial rule brought to areas like Ramnad and Sivaganga that were administered *indirectly* through landlords, or Zamindars (the former warrior kings) were even more complex. Elsewhere I have examined in some detail the shifting governance of water resources in these regions of south India. Let me summarise a few key points. The first is that focusing on shifting systems of *governance* itself challenges standard environmental narratives which emphasise the erosion of autonomous community traditions of water use through the assertions of the colonial state. I argue that, despite its self-representation, the reach of the colonial state was curtailed and its administrative designs challenged, manipulated and especially drawn in to pre-existing systems, even though these were also profoundly altered by the encounter with colonial institutions of administration, law and engineering.

In the late eighteenth century, the British demilitarised this coastal region installing former kings as estate holding Zamindars. But these former rulers rather than becoming, as the British imagined, entrepreneurs benefiting from secure property rights, investing in the productive resources of their

1. A statement made in 1868 by Maj. R.H.Sankey, then Chief Engineer in Mysore State, cited in Vani 1992:89.

extensive estates for profit, continued to disperse state land and water resources in the form of grants to political allies, temples, Brahman communities, pilgrim houses and monastic institutions. There was, in short, no radical break with indigenous political life, and the Zamindars continued to 'rule resources' and manage risk (ecological and political) through the creation of subordinate resource holding domains. That is to say, they dealt with ecological uncertainty and pursued royal honour by pursuing decentralising political strategies.

The problem was that under British rule this political system failed to devolve corresponding obligations to invest in irrigation. A decentralising morality of kingly rule increasingly came into contradiction with a colonial bureaucratic rationality which mistook and condemned the indigenous rule of resources as 'illegal alienation and mismanagement'. The crux of the ecological (and technological problem) was that Zamindari rule operated *as if* state power was dispersible, as it previously had been, while in reality the rajas under the British had little power to devolve. Continued royal gifting merely created a landscape of complex and insecure property rights and local authority cut loose from the obligations to invest in irrigation systems.

The failure of resources governance was demonstrated in an effervescence of litigation over water rights and maintenance obligations from the late nineteenth century; but equally in the failure of Anglo-Indian law to lock a highly interconnected and changing hydrology into an enduring set of generalised rules, codes and legal rights. British attempts to resolve disputes and increase efficiency through engineered solutions in masonry were similarly ineffective. And when it came to rationalising the former revenue systems based on grain shares of tank irrigated paddy, the British faced strong, organised and violent opposition from the vestiges of Maravar kingly and caste power. At the same time, revenue and market changes began to alter agriculture, giving privilege to new dryland cash cropping which transformed the distinctive relationship between community and state upon which the old political and social order had rested.

Contemporary political technology and cultural ecology of water

Despite profound changes introduced through colonial rule, my own village level field work in the 1990s showed that hydrologically mediated relations persist as an aspect of social and public life in rural south India; and this is the next point: water control technologies in south India have always been 'political technologies' in that they are ways of social ordering that themselves influence how people work, relate, or produce over long periods. Irrigated landscapes and the ecologies they produce long outlive the particular political alliances that created them (Winner 1999). The constraints of a seventeenth and eighteenth century political ecology remain built into the landscape. Hydrologically-determined interdependencies (some are competitive, some cooperative, see Mosse 2003) persist even though the warrior domains that produced them have long gone. They draw attention to antecedent political structures as well as to hydrology in the sense that villages that dispute or trade water are Maraver inheritors of warrior titles who today claim rights from ancient royal grant.

Water, of course, has to be shared within as well as between villages: this demands systems for distribution and rationing at times of scarcity. Here too there is a two-way relationship between water and society. The social arrangements of water distribution are adapted to degrees of scarcity. For example, in south India, with increasing scarcity the rotation of time-based shares, gives way to the use of water specialists (*nirpaccis*) able to irrigate on the basis of detailed knowledge of individual fields. This mitigates the normal tension between head and tail-enders. Water allocation regimes are also embedded in prevailing social systems, authority structures and patterns of caste dominance which vary across south India. In some regions water allocation marks privilege in the language of dominant share-holders; in others, it is the language of ranked lineages of the ruling caste; and in yet others the language of warrior power and dependent service, for instance that of low caste water-turners. In short, in south India, water is a common resource at the heart of

community life. Unsurprisingly, therefore the management of water calls forth the key divisions, rankings, statuses and honours of society. Water is the mirror into which south Indian village society gazes. It is a public domain, like the temples to which it is closely linked. The management and maintenance of irrigation involves elaborate ceremony, and the division of labour associated with irrigated cultivation reveals caste identities and relationships. Water is defined by regionally specific ideas of authority and public service, and as a public resource, water is deeply embroiled in the politics of caste and gender.

Despite this fact, irrigation systems are often narrowly defined in engineering discourses focussing on physical units and engineered structures in ways which ignore the wider social systems that make them work. This often results in technology failure. In south India (as elsewhere) governments continue to seek to improve systems through engineered designs – lined channels, cement weirs or diversion structures. But interventions which are seen as efficient in engineering terms, often prove to be inefficient when the wider socio-technical system is taken into account.

In 1989 with money form the European Community the PWD began to 'modernise' the irrigation system in one village in which I worked by reorganising and cement lining channels and introducing a rotational system of water distribution. Where there was an existing system worked by *nirpaccis* (water turners), the engineers saw bad management, inefficiency, transmission losses and upper-tail end inequities. Their judgements misunderstood the logic of the system; and their structures were slowly dismantled by local residents. In other cases new improved structures – diversion dams, surplus weirs – increase conflict and reduce the space for negotiation over water rights that was allowed by the now-replaced temporary brushwood dams purposefully washed away in the early monsoon to allow the filling of downstream tanks. In extensive highly interlinked systems such as these, roads, culverts or tree planting on distant catchments all inadvertently change water flows in ways that give a premium on making local farmers the arbiters of technological 'efficiency' – although it is also true that even then influential villagers and richer farmers will ensure that it is *their* rights that are fixed in permanent concrete structures, so that the technology itself (the design of weirs, sluices or field layouts) is able to do the work of social differentiation (see Shah 2003).

Water, I mentioned, is in south India a *public* resource, involving the whole community and, in the past, connecting it with political overlords. In south India these relationships have always been expressed in ritual form. Ritual is often viewed as irrelevant (or irrational) to water systems; they are not. Ritual systems are often crucial to the operation of water systems. We see this in the Balinese water temples (Lansing 1991), but in south India too tanks and temples are closely connected. As public institutions *par excellence,* temples have always been well placed to coordinate the social investments (resources and labour) necessary to operate water systems. Temple systems deal in symbolic resources that legitimise authority and mobilise the community for the operation of dispersed but inter-connected water systems. South Indian temples do not directly control water, rather their ritual systems mirror the arrangements of irrigated rice cultivation. The structures temples and tanks such as the thresholds of gateways and sluices correspond symbolically and architecturally. Tanks *and* temples together define the public irrigation system (a system of resources, authority and cooperation) in traditional south India.[2]

Ritual and religious systems are part of the understanding of water as a public or common property resource; but the social science literature has almost entirely ignored the cultural definition of water

2. There are in fact many ways in which tanks and the rice cultivation they allow are sacralised. Like the village and regional temples, tanks are 'founts of honour' (Ludden 1985). But tanks are also liminal places associated with dangerous divine power (of demon gods or spirits) propitiated through annual animal sacrifices. It is low status Pallar caste *nirpaccis* who interface with this power, and also with the socially dangerous role of apportioning shares and distributing water (Pallars also distributed grain shares after harvest at the threshing floor). .

common property. We need to ask how does water symbolise; how does its management connect to systems of authority and prestige, both locally and in relation to the state? The competition and disputes over tanks in south India only makes sense if we see that these are status institutions, arenas of village politics not just material resources.

Water management then is not a simple matter of means-ends necessities. It is difficult (and wrong) to try to plan for water management in these terms. Water systems have to be understood in their cultural specificity, beyond steady state economic and ahistorical models, (a) to reveal the wider set of social networks, values and meanings that water brings; and (b) to see the part played by water in the cultural specifics of power But there are still important practical questions to ask. What sustains and what threatens the socio-ritual systems of water management? Why do people cooperate in water management in some contexts and not in others? Under what conditions will people cooperate in the management of shared water resources. The failures of state control and the inequities of privatisation have raised the importance of such questions. However systems of community water management are often complex and hard to understand because they are a product of ecology, history and social relations. Let me illustrate.

As I undertook anthropological research on the complex tank system in southern Tamil Nadu, I began to pay attention to systematic differences in the strength of water management institutions across a part of the minor river basin that I was studying which included 89 tanks in 79 villages. I was struck by a relatively sharp contrast between villages in the predominantly sandy red soil upper catchment and those in the black soil lower catchment areas. Upper catchment villages had strong institutions of water control with dalit caste serving water turners, and sophisticated water rationing systems grounded in caste-based authority, ritually expressed through the village temples. Lower catchment villages had none of these things: water use was individually negotiated rather than embedded in social relations of caste.

At first sight the reason for the difference seemed to concern the ecology of water. On the porous upper catchment red soils rice cultivation depended entirely on water captured in tanks. Ecologically determined risk and scarcity place a high premium on maintaining sophisticated water systems, that black soil farmers could manage without on the water-retentive soils of the lower catchment, where diverse partly rainfed cultivation was possible. (as in Wade 1987). But the more I looked into the history of these tanks systems the more complex the picture became. Both upper and lower catchment areas earlier had similar social systems of water control. Why has they been eroded in one area; not in another? In the lower catchment, the settlements in the eighteen century and new cash cropping of cotton and chillies from the nineteenth century had changed local caste structures in ways that undermined the social order maintained through public resources systems – tanks and temples. By contrast, in the upper catchment villages ecological continuity of rice ecology, the local power and authority (of the old warrior caste) continued to express itself through the public institutions of water control. Leaders continued to invest in ritual systems to maintain the prestige and authority necessary to manage labour in the short growing season. Water continued to articulate authoritative caste relations; although these were also subject to new democratic challenges.

Particularly significant is the fact that villagers themselves describe the contrast between these two cultural ecologies – cooperative and non-coopeative – in terms of historically and ecologically defined differences, in ways that show how important land and water are to the identity and social life of these villages (see Mosse 2003, Chapter 7). The way in which water is managed tells us much about social relations in different areas.

To conclude, firstly, culture matters to water and water matters to culture. Rule making and collective action around water are the property of social and cultural processes (produced historically, not mathematically as equilibrium outcomes of competitive games). Secondly, in irrigation, systems involve an interplay of past and present in which antecedent political systems, residues of meaning, and ecological constraints are all important. These findings have an important bearing on the planning and execution of programmes for water resource development dependent

upon community management. But, thirdly, it is not so simple as to rely on indigenous systems. These are often inequitable, giving privileged water rights to upper castes and excluding Dalits and women. Moreover, because water is so deeply embedded in society, negotiating new institutions for water management proves to be a complex and contested task; one which is never just about water as an economic resource, but also as a symbol of identity and power. Finally, water systems in south India are as much about state as community. Their development requires not just the devolution of responsibilities to villagers under the rubric or rehabilitating tradition, but the reform of bureaucracies and rethinking questions of rights.

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A Study of the *Subak* System as Indigenous Cultural, Social and Technological System to Establish a Culturally Based Integrated Water Resources Management

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Summary

Subak system is a traditional irrigation institution in Bali Island. The system works based on the concept of the Balinese way of life, namely *Tri Hita Karana,* one of the principles of Balinese of life. It consists of three elements: *parhyangan* (supernatural realm), *pawongan* (social realm) and *palemahan* (environmental realm). Each element is a symbol with particular meanings and the relations within the element should always be kept in balance and harmony. *Tri Hita Karana* has been used in *subak* system as an indigenous cultural, social and technological system. Application of the system is implemented in a simple way through designing, constructing and operating and maintenance of irrigation system of rice field. Four principles are used in the system: environmentally sound, fairness, transparency and accountability. Based on the concept of *Tri Hita Karana, a* paradigm in integrated water resources management for irrigated agriculture has been proposed.

Keywords

Subak system, *Tri Hita Karana,* indigenous cultural, social and technological system, irrigation system, water resources management.

Introduction

Subak system is a traditional irrigation institution in Bali Island, Indonesia. It has existed in this island for centuries and has a socio-cultural and technological aspect to Balinese farmer. A lot of studies regarding *subak* system have already been conducted by many researchers. However, almost all of the studies have been conducted focusing on the aspect of traditional Balinese organization, on the technological aspect of irrigation system, and on the relationship between *subak* system and its physical condition of water resources. A study directed to attempt in sustaining and adopting the Balinese indigenous cultural, social and technological system for constructing a conceptual framework of culturally based integrated water resources management in this small island has not been conducted.

The main aims of the study, therefore, are directed to: (i) study the indigenous Balinese concept of life used in *subak* system as cultural, social, and technological system in historical perspectives, (ii) study the impact of the regional development in the form of modern irrigation system and socio-economic change due to the tourism development on the *subak* system, (iii) construct a conceptual framework of integrated water resources development in order to sustain the indigenous culture of *subak* system.

The study was conducted for three years using selected *subak* systems as in-situ laboratory.

Discussion in this paper is focused in describing the use of principle of *Tri Hita Karana* in *subak* system as a socio-cultural and technological aspect to Balinese farmer and the application of the system through designing, constructing and operating and maintenance of irrigation system of paddy field. The acceleration of economic development, particularly tourism development has affected significantly in declining performance of *subak* system, declining water resource availability and agricultural development as a whole. Based on the principle of *Tri Hita Karana*, a concept of paradigm in water resources management for irrigated agriculture is proposed.

Using the principle of Tri Hita Karana in *Subak* system

Subak system is unique and considered as an example of skilful water management for irrigated land at the foot of volcanic mountains. The system has applied the concept of *Tri Hita Karana* for centuries as cultural, social and technological system. Therefore, *suba*k can be considered as indigenous system (Susanto 1999, 143–153; Susanto et al. 1999, 43–65).

Subak system, as indigenous culturally based system, can be described as follows:

(i) Balinese's view of life basically comes from Hindu Balinese religion. With this conception, water – is known as 'Water Religion' (*Agama Tirta)*. Therefore, water is considered not only as a natural element, but also more importantly as prototype of a universal substance. Water is also regarded as the 'mother of existence' (*induk kehidupan*).

(ii) Water is regarded as the gift of God, known in Balinese as *Ida Hyang Widhi Wasa*. This one God-several manifestations, one of which is *Wisjnu*, the protector and sustainer of life and the universe, created by *Ida Hyang Hyang Widhi Wasa* in His manifestation of *Brahma,* the Creator or the God. *Wisjnu* is also god of water, whose wife is *Dewi Sri*, the goddess of rice, the staple food of the Balinese. The Balinese – especially the peasants – believe they are under the protection of this couple, *Wisjnu* dan *Dewi Sri.* This symbolically reflects the significance of water and rice in the life of the Balinese.

(iii) **Tri Hita Karana** is one of the principles of Balinese of life. It means 'three causes of happiness', which consist of three elements: *parhyangan* (supernatural realm), *pawongan* (social realm) and *palemahan* (environmental realm). Each element contains basically Balinese's view about relations they considered important in this world. *Parhyangan* is the realm of the relations between man and his Creator (the God), *pawongan* is the realm of the human or social relations, and *palemahan* is the realm of relation between man and his natural environment, especially the *sawah* (paddy field) and the paddy in it. The relations within the *Tri Hita Karana* should always be kept in balance and harmony.

(iv) **Parhyangan**. The Balinese see the relation between man and his Creator as a relation between *kaula* (servant) and *gusti* (lord). This principle can also be interpreted as the expression of recognition or of feeling that a human being is only a very small part, a tiny particle drifting along with the natural processes of the universe, which is the creation of God, the Most Powerful. The meaning of this principle in *subak* system is that Balinese should always try to protect all God's creation on earth, in order to maintain his harmonious relation with God. The principle of serving (*bhakti*) creates loyalty, willingness, to become a servant. It is the idea of serving that should be maintained with all their – more or less – original meanings or intentions. Otherwise, all the *subak rituals* will loose its spiritual meanings and they will become empty, meaningless activities. It is the custom of the Balinese to start every important activity (including agricultural activities) by giving offerings to God, which is meant as a symbol of asking the blessings, the permission and safety from God for the activities to be carried out. Behind the rituals lies the idea that as a servant of God, man cannot and should not just do what he likes or wants to do.

(v) **Pawongan**. Based on this principle, Balinese must keep in harmony the relations between man and his fellows. The *pawongan* at the highest level consists of all Balinese farmers who are

members of the *subaks* that get water from the lake or river, while the *palemahan* covers the whole area of the land that is all the *sawah*, which get their water from the lake or river. The *Tri Hita Karana* at the second and third levels has the same forms, but of different complexity and of smaller scales. Here, two principles guide a Balinese's relations to other people: (1) *paras paros sarpanaya*, and (2) *salunglung sabayantaka. Paras paros sarpanoy*a used in *subak* system means that people must respect each other and must strive to be close to each other. Based on the principle, Balinese always try to solve every problem of their social relationship with their *subak* fellows, not by advancing or giving priority only to their own interest, but also by giving their attention and respect to the interest of others. They should help those who are in need and solve their problems together. *Salunglung sabayantaka* means mutual help. Literally means united in either good or bad situation and condition. The cooperation among the *subak* members, either in rituals, in tilling their land, in planting, in watering the paddy field, in the maintenance of the irrigation canals, or in repairing damages, and in other agricultural and religious activities, clearly shows the significance of this principle for the Balinese.

(vi) **Palemahan.** According to Balinese teachings, every Balinese should strive to achieve a harmonious relation with his environment. The conception of microenvironment among the Balinese cannot be separated from their conception of cosmos, which consists of two kinds: (*bhuana agung* (macro cosmos) and *bhuana alit* (micro cosmos). The basic idea here is unity, in which it is emphasized that a human being has to unite himself harmoniously and in balance with cosmos, since according to Balinese view a human being is basically identical with the cosmos, the macro cosmos. Therefore, a human being is also a cosmos. The universe is the macro cosmos, while the human being is the micro cosmos. In his life, a man should be able to unite or harmonize himself with nature as his reference of action. This is what the Balinese mean when they say that: 'man should learn from nature'. When the relation between macro cosmos and micro cosmos is not harmonious, negative effects would appear within the micro cosmos in the form of illness, anger, uncomfortable feelings, and the life within the community or society will also be disturbed. Restlessness will spread among the people. Therefore, it is important for the Balinese to maintain harmonious relations with macro cosmos for physical and spiritual well-being end happiness.

The harmonious relation between man and his environment can also be achieved by following the principle of maintenance and protection, which means that a Balinese should always try to protect all of God's creation on earth, in order to maintain his harmonious relation with God. This religious teaching is expressed in rituals through the offerings given by the Balinese before they start any agricultural activities, such as ploughing the land, planting the seeds, harvesting, and consuming the harvest. All of these is meant that in the end the substance of food (rice) consumed can become *amertha,* the water of life.

These principles lead the Balinese to assert the importance of close and strong cooperation or coordinated activities in their everyday life, especially in irrigated agricultural cultivation. The harmonious relation between man and his environment – in the case of *subak* is between man and earth, water, and plants (paddy) – can be achieved if men follow the religious rules manifested in rule-in-use (*awig-awig*) and the rules they establish together, specifically suited for their area.

Subak system, as a socially based system, can be explained as follows:

(i) Socially, the *subak* is a farmer institution developed based on water delivery unit instead of village (*desa*) or other administrative units. The basis of the *subak* system is its complete independence of village administration, although the farmers as the *subak* members also have some obligations to their villages. All matters pertaining to their rice cultivation, such as land preparation, planting, crop tending and harvesting arrangement, water distribution, maintaining irrigation facilities and financing religious obligations come under the responsibility of the *subak* of each particular rice field (*sawah*) complex.

(ii) *Subak* plays important role of the rural life of the Balinese farmers. The association promotes not only the material benefits for farmers as a group as well as individually, but also enrich their

socio cultural life. *Subak* runs with rules and regulation in the form of rule-in-use, namely *awig-awig*.

(iii) As a farmer's institution, *subak* can be seen as a subsystem of the socio cultural system of the Balinese. In other words, it can be said that *subak* is an agricultural or irrigation system, which is related tightly to physical and socio cultural system of the Balinese. That's why the *subak* system appears elsewhere outer Bali but in different socio cultural system with Balinese. *Subak* is peculiar only to Bali for centuries.

(iv) Duties of *subak* members institutionally as well as individually as mentioned in the *Kerta sima* dan *Awig-awig* can be categorized into two kinds. First, those directly affecting the *subak* and the members, and second, those ordered by the ruler to be carried out by *subak* members for the ruler benefits and the state in general. For the first category, the duties are related to physical, socio-economic and religious aspects.

(v) Regarding the enforcement of *subak* regulations written in rule-in-use (*awig-awig*), the capability of the institution in mobilizing local resources for running the institution, constructing irrigation facilities and undertaking religious rituals, as well as the adaptability of the *subak* institution against physical, and socio cultural changes are considered as a result of the application of the philosophy of *Tri Hita Karana* in the daily activities of the *subak*.

Subak system, as a technological based system, can be described as follows:

(i) The concept of Balinese of life of *Tri Hita Karana* used in technological aspect of *subak* system can be found in the form of developing irrigation infrastructures. The irrigation infrastructures were built simply but they can insure water right for *subak* member. Based on the concept, the irrigation system of *subak* technologically is designed and operated by considering four principles, i.e.: (i) environmentally sound; (ii) fairness; (iii) transparency; and (iv) account-ability. Using the principles, design and operation of irrigation infrastructures are performed in a simple way. However, they can ensure water demand for supplying irrigation at the rice fields belong to the *subak* members.

(ii) Irrigation infrastructures of *subak* system are closely related to the Balinese concept of threefold classification in horizontal and vertical direction. The concept of horizontal direction is that spiritually east west orientation is more important than north-east orientation. East direction means where the life comes from, since east is the direction of the sunrise. Concept of north east direction is related to the environmental characteristics. Mountainous areas lie in the northern part of Bali. While, the concept of direction in vertical view is that Balinese farmers in *subak* system believes that holy water comes from the north. North means mountain ward and east is sea ward. Therefore, north-south orientation is more familiar to them due to irrigated rice field activities.

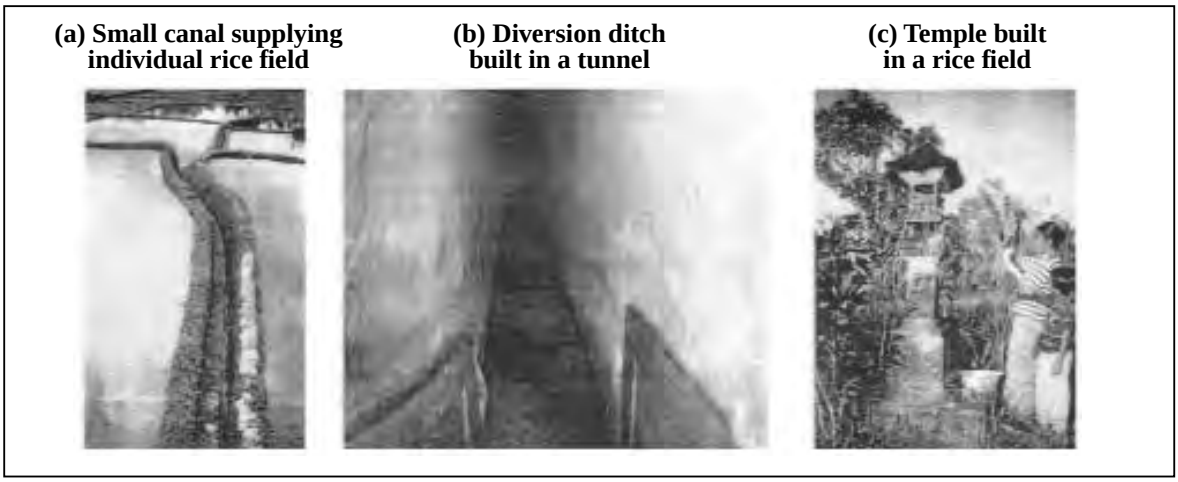

Figure 1. Some artefacts as manifestation of Tri Hita Karana principles in *subak* system

Implementation of the principle of Tri Hita Karana in irrigation system

1. Implementation in designing, constructing, operating and maintenance

As mentioned above *Tri Hita Karana* is part of Balinese way of life of Hindu's community and it has a universal principle. The principle is found also in other religions. A study of *subak* in *Buleleng* District proved that the concept is acceptable and transferable by non-Hindu's community.

Implementation of the principle in irrigation system can be found from any artifacts of *subak* system. The artifacts in the form of irrigation structures are designed environmentally sound, constructed with local based materials and operated in certain ways to ensure togetherness and tolerance to all members of *subak* system. The descriptor presented in Table 1 shows that there is relationship among the three elements of *Tri Hita Karana* in designing, constructing and operation and maintenance (O&M) of irrigation system in *subak*. As shown in the table, the system applies four principles: environmentally sound, fairness, transparency and accountability.

Table 1. Relationship among three components of *Tri Hita Karana* and their attribute descriptors in designing, constructing and operation and maintenance (O&M) of irrigation system

Relation among components	*Statement of relationship*	*Attribute descriptor*
Parahyangan-Palemahan	Statement of relationship Palemahan as a symbol of earth is created by the Almighty God as a gift for human being life, so it must be developed appropriately and environmentally in a sustainable way	Irrigation structures are designed environmentally sound
Palemahan-Pawongan	Human being wish to keep their life in harmony with nature is expressed in term of : (i) harmonizing and suitability of structure design to its environment and implementing appropriate operation and maintenance (O&M) ; (ii) using local materials in the construction of irrigation structure	Using local available material in the construction of irrigation structures. All structures are very simple, easy, ergonomical and flexible to be operated and maintained.
Parahyangan-Pawongan	Attitude of human being either as individual and social creature to serve and worship the almighty of God is attributed as living in harmony, synergies and equality among others subak. It is expressed as togetherness, tolerance and transparency in: getting water, the right and obligatory in taking part of O&M activities and giving some sanctions to violation of norms and rules.	The existence of pura in certain area of water management services as expression of community in their area to taking past in maintenance the irrigation infrastructures in togetherness. Shape of irrigation infrastructures and transparency of O&M of the structures Simplicity and flexibility in togetherness of operation of irrigation structures specially in anticipating a climate deviation.

These principles are attributed as follows (Arief, S. and Susanto, S., 1999, 123–135).

(i) *Subak* irrigation system is designed, constructed and operated based on a certain hydrologic area with clear relationship between locations of farmer's land and their irrigation network and separate feeding channels and drainage channels as well. These attributes give opportunity to all members of *subak* easily to: (i) get irrigation water proportionally to land area and its distance from water source, (ii) to have obligation and responsibility for maintaining irrigation structures in certain irrigated area, for example all members of *tempek* are responsible to maintain irrigation system in *tempek*'s area accordingly. It is not necessarry for member who belongs to a certain *tempek* to be responsible for activities in another *tempek, (iii)* implement crop diversification in their own land with certain conditions.

(ii) *Subak* irrigation system uses proportional weir as measuring device. Width of weir is proportional to amount of water allocation of the irrigated area, which is measured using traditional water allocation called *tek-tek*. One *tek-tek* reflects one share of water allocation. Traditionally one *tek-tek* means a volume of water, which flow passing through four-finger width at crest of weir. Besides reflecting those four principles, proportional weir such as most irrigation structures in *subak* is designed and operated in single way and adaptive to changing of flow either under excessive flow due to flooding or small one in dry season.

(iii) Irrigation network system in *subak* is designed ergonomically and equipped with environmental protection structures to avoid damages or failures of the system due to uncontrolled flow and natural calamity and constructed using local based materials.

2. Characteristics of irrigation infrastructures in subak samples

Three *subaks* were selected to be applied as in-situ laboratories of the study. Those are:

(i) *Subak Sungsang*, a *subak* which performs with highly affected by irrigation development conducted by the government cq. Ministry of Public Works. This sample is located in *Kerambitan* District, *Tabanan* Regency

(ii) *Subak Muwa* and *Juwuk Manis* which performs with highly affected by tourism development, located in *Ubud* District, Regency of *Gianyar*

(iii) *Subak Timbul Baru*, which performs an original *subak*, located in *Tegallalang* District, *Gianyar* Regency.

Characteristics of irrigation infrastructures in samples are shown in Table 2. From the table one knows that actual area in three *subak* samples are not different with the designed area. Fast progress of tourism in the area and location of *subak Muwa* along the main road of *Ubud* sub District are suspected as the main causes of decreasing total irrigated area. Price of land along the roads in tourism destination in Bali increases too much and causes social-economic transforms to other sectors, which support tourism such as trading, art and culture. As result, concept of *Tri Hita Karana* in *subak* is left and no longer exist as shown by the absence of temple of *Ulun Suwi Pura*, the absence of irrigation structures and the most important one is termination of O&M activities as an expression of concept of togetherness in *subak* and the rest of farmers do by themselves all of activities in O&M with no coordination by *subak* leader.

In *Juwuk Manis* despite of the fact that is located in *Ubud* and is in the same sub district with *subak Muwa*, conversion of land to other purposes beyond agricultural sector is not so strong as that in *subak Muwa*. It is so, since location of *subak Juwuk Manis* is not very closed to main roads, however, it seems to start with. Except for *subak Muwa*, all irrigation structures in these three *subak*s are under good condition, well maintained and show good performance. Both *subak Sungsang* and *subak Juwuk Manis* got some supports from the Government in term of rehabilitation of infrastructures during the Third Five Years Development Plan under the Project of Irrigation Tertiary Program. As the program was conducted with top down approach, some irrigation structures were designed and constructed with different approach to *Tri Hita Karana* concept. In

this program, most of diversion structures were not designed on proportional basis but mostly by using sluice gate or tertiary box. Farmers did not accept these types of structures and they still wanted to have proportional one. After long discussion between the Government and farmers, finally the Government agreed to change all inappropriate structures to the appropriate one. This happening occurred in *subak Sungsang* and *subak Juwuk Manis* even though this case also happened in some other *subak*s.

Table 2. Characteristics of land and infrastructures in subak samples

No	*Variables and parameters*	Subak *Sungsang*	Subak *Muwa*	Subak *Juwuk Manis*	Subak *Timbul Baru*
1	Area (ha) a. Plan b. Actual	 239 239	 25 2	 41,6 41,6 undulating	 14 14
2	Topography	Flat to undulating	Undulating	Undulating	Undulating
3	Infrastructures: Temple of dam (*Pura empelan*) Dam and main structures	 Well maintained permanent Dam Self funded, well maintained	 Not maintained permanent Dam, Built by Government, operated together with 13 others *subaks*. Most diversion structures are not maintained	 Well maintained Permanent Dam Built by Government, operated together with 13 others *subaks* most structures under well maintained	 Well maintained Permanent Dam Built by Government, operated together with 13 others *subaks* most structures under well maintained
	Tunnel (*aungan*) length (km) height (m) width (m) condition	 3.5 1.85 0.93 well maintained	 n.a. n.a. n.a. –	 n.a. n.a. n.a. well maintained	 2.0 1.80 1.0 well maintained
	Main Diversion Structures (*Aya*) Total width (m) Proportional ditch. Proportional width Rules Proportional ditch. Measured proportional discharge Condition	 5,65 2,35 : 2,80 1117 : 140 0,30 : 0,45 well maintained	 n.a. n.a. n.a. n.a. n.a.	 n.a. n.m. n.m. n.m. n.m.	 2,26 0,38 : 0,81 15 : 32 (0,47) 15,4 : 32 (0,49) well maintained
	Secondary Diversion Structure (*Pemaron*) Total width (m) Proportional width rules Proportional ditch Measured Proportional ditch. Condition	 n.m. n.m. n.m. n.m. well maintained	 n.a. n.a. n.a. n.a. n.a.	 n.m. n.m. n.m. n.m. n.m.	 1.63 15 : 57 50 : 100 55 : 100 well maintained

Notes: n.a. = not available data, n.m. = not measured.

In the main system most structures are built as permanent structures, all local or traditional materials such as woods, bamboo and stones were not longer used and changed to cemented structures. However in farm level, all structures still use local materials. Wood and bamboo are the most likely used as farm diversion structures. Design of proportional diversion structures and utilization of local materials depict as descriptor of *Palemahan-Pawongan* and *Parhyangan-Pawongan* relationship.

Some measurements were used to check performance of main system diversion structures in *subak Sungsang* and *Timbul Baru***.** The condition is a relative match between measured and rules proportional discharged. The diversion structures were built hydraulically correct. In all these structures farmers widen channel approach in some distances to slow down approaching velocity of water flow pass the diversion structure until closely to zero. By this condition, hydraulically almost no energy lost and streamlines are also almost horizontal to make hydrostatic pressure evenly distributed along cross section of flow above the weir crest. Seemingly, not all farmers in *subak* samples really understand about hydraulic principles in designing and construction of proportional diversion structures.

One common incorrect condition is found in the sample areas related to placement of diversion structures in a bend approach. So it makes hydrostatic pressures, which are not evenly distributed and streamlines do not any longer exist in horizontal direction. This condition causes some deviations in accuracy of flow measurements.

Water tunnel (*aungan*) is one of admirable structure built by Balinese farmers. They are able to build the tunnel until thousands meters long only using very simple tools. Some traditional tools are placed in museum of *subak* in *Tabanan*. The maximum length of tunnel in Bali is more than 5 km, which is located in District in *Jembrana, Bandung* and *Gianyar*. In *subak Sungsang* there is 2.5 km *aungan* length while in *Timbul Baru* is about 1.9 km length.

Suadnya (1992) reported about concept of *aungan* construction as manifestation of concept of *Tri Hita Karana*. Prior to starting with construction work, a ritual ceremony should be served to ensure safety in work. Manner of construction by digging in some positions such as crowing sitting or standing renders some ergonomic dimensions of tunnel. This is a manifestation of relationships between element of *Palemahan* and *Pawongan*. The ritual ceremony before farmers start with construction of *aungan* and also a meditation to be done when they face the problems (such as happened in case of construction of *aungan* in *Sungsang*) are manifestation of relationship of *Pawongan* and *Parhyangan*.

Ergonomically soundness of *aungan* is not only found in determining dimension of tunnel but it also happens in design and the manner of construction of tunnel it self. Some *calungs* or short tunnel that connect inside *aungan* with ground level are built in some distance along the *aungan* with main functions such as: short cut to go in and out of *aungan*, lighting, ventilation and check points in construction.

Most of irrigated area in Bali islands has undulating topography. Therefore, mostly all irrigation channels in *subak* are equipped with energy dissipater structures. In *subak Juwuk Manis*, empirically farmers find that the minimum height of structures is 0.3 m, so if slope of channel is too steep they make two or more steps of dissipaters. A stilling basin structures is also built when inlet channel to the farmers plot is considered too steep. By installing stilling basin, hopefully approaching velocity is not too high, erosion and scouring in bed and wall of channel do not occur. This reflects the relationship between *Palemahan* and *Parhyangan*.

The concept of *Tri Hita Karana* is also manifested in O&M procedures in three *subak* samples. Procedures and schedules of maintaining work in *subak Sungsang* for example are found by observing characteristics of sediment in the channels. Channels in the *aungan* and primary are checked and unsalted every two years, sand trap is maintained every six month and other channels every month or less based on the condition of channels. Channel systems of *subak*, which separated irrigation channel with drainage channel, give some opportunity and flexibility of farmers to select

what they want to plan. In *subak Sungsang* almost 20% of farmers grow crops instead of growing rice during the wet season. This condition reflects the relationship between *Pawongan* and *Palemahan*.

Developing a paradigm

The Balinese irrigated rice cultivation run with *subak* system is regarded as a successful and brilliant result of a long process of Balinese ecological adoption, based upon their deep knowledge and understanding of the nature around them. However, acceleration of economic development in this island affects significantly to *subak* system.

In agricultural development, *subak* has been used by the government as an institution to spread out the government program for agricultural development, such as special intensification for paddy field, rural cooperative unit and others. In this aspect, as long as it gives benefit to the farmer, *subak* as the self-organized and socialcapital open system will easily adapt to the new technology.

Tourism development, through increasing the tourism infrastructures, such as hotels, restaurants as well as entertainment's buildings, affects the increase of open forest and decreases irrigated land as well as transfers productive man power of farmers to tourism sector. It affects significantly in declining performance of *subak* system, declining water resource availability and agricultural development as a whole.

Realizing the facts and considering the development of social-welfare as part of the spirit of well-being citizenship, the concept of *Tri Hita Karana* was applied to develop a paradigm of culturally-based of integrated water resources management for irrigated agriculture. The proposed paradigm contains the following five components: (1) Culturally-based life, (2) Agricultural socio-economic structure, (3) Integrated water resources management, (4) Participation of stakeholder and water users in management, and (5) Social welfare. These five components are united in the form of pyramid as a symbol of unity concept with social welfare as the top of the pyramid (Susanto, S. 1999, 135–145).

The first component of culturally based of life in the paradigm considers that every kind of irrigated agricultural development must take cultural realities into account and make room for cultural growth but also be open to cultural change. Such traditional irrigation system of *subak* that was developed from indigenous knowledge and technology of Balinese farmers must be appreciated.

The second component of agricultural socio-economic structure means farmers of irrigated agriculture should be placed as part of food (rice) producer. Therefore, socially the farmers can organize themselves to arrange their bargaining position in determining market price of agricultural production. In this context, designing rational macro economic policy must consider necessary conditions to empower the poor farmers for self-help.

The third component of integrated water resources management placed in the paradigm considers the fact that conflicting demand of water resources between various sectors has been increased. Since all surface and sub-surface water related activities are closely inter-linked through upstream-downstream relation in river basin and aquifer, there is a need to consider that a river basin is a unit of regional development. As a unit of regional development, managing river basin should be considered in the form of coordination, planning of systems for monitoring and evaluation, environmental protection, integrated land and water resources uses, procedure for stake-holder participation. Policy makers is aware of issues concerning water scarcity and water needs, equity of access to water, water right, sustainability of adequacy and quality of delivery, stake-holder.

The success or failure of any kind of irrigated agricultural development and sustainability of its impacts depends on the stakeholders and the ability of farmer communities affected to participate in the development. However, participation is still only rarely systematically incorporated as a management technique. In this paradigm, participation is united in the other four foundation

components with the same strength to achieve the fifth component: social welfare. Description of the paradigm into its parameters is presented in Table 3**.**

Table 3. Parameters of the paradigm

Paradigm component	*Parameter*
Culturally based of life	• Make room for cultural growth but open to cultural changes • Shared value of belief system, religious, family, ethic group, village, tradition in developing water resources management for irrigated agriculture regulations
Agricultural socio-economic structure	• Rational policy of agricultural macro economic • Long enduring and self organized water resources and irrigation system • Positioning farmer institution as a social capital • Bargaining position of farmer institution in determining market price of agricultural production
Integrated water resources management	• Since all surface and sub-surface water related activities are closely inter-linked trough upstream-downstream relation in river basin and aquifer, there is consideration for river basin as a unit of regional development • As a unit of regional development, there is consideration in managing river basin, in the form of: coordination, planning of systems for monitoring and evaluation, environmental protection, integrated land and water resources uses, procedure for stake-holder participation. • Policy makers is aware of issues concerning water scarcity and water needs, equity of access to water, water right, sustainability of adequacy and quality of delivery, stake-holder participation • Institution and process for sharing of water resources among multiple types of use
Participation of stake-holder and water users in management	• Stake-holder participation in the allocation and management of water resources by means of: (i) establishing water right for all users based on economic, endogenous cultural and social, and environmental considerations, (ii) developing tool for assessing the impact of livelihood right and ecology, and (iii) production incentive-based policy frame work to enhance farmer institution participation • Water users participation in the form of: (i) opportunity to involve in development in planning process, (ii) opportunity for farmer institution to become an agent of agricultural producer, including water, agricultural inputs production and agricultural products
Social welfare	• Considering that water resources management for sustainable irrigated agriculture is a multi-dimensional process aimed to peace, satisfaction of basic need and securing life for all in dignity, the capacity of societies to have a future, parameter of social welfare is directed to: (i) increasing agricultural productivity and removing poverty, (ii) ensure quantity and quality of water supply, (iii) improve incentive based agricultural production system for enhancing farmer income per capita, (iv) improve education, skill and knowledge, (v) ensure farmer community aspiration.

Based on the concept of paradigm, developing policy of water resource management for sustainable irrigated agriculture can be proposed as follows:

(i) Irrigated land play role in producing food (rice) in Indonesia. Considering that small share of the world's agricultural food production, mainly (rice) is traded in international markets and the world price in highly unstable, to feed the population with heavy reliance on rice imports is not feasible. Inducing farmers to produce this rice for their own needs as well as surplus for urban consumers, required governments to pursue an efficient water resources management and development for sustainable irrigated agriculture that focused on poor farmers, reached them to markets and raised the productivity of rice cultivation.

(ii) Physically, investment of rural infrastructures, rehabilitation of developed irrigation system, development of new irrigation system as far as feasible, improving the capability of small and village irrigation system must be considered. Improvement of the water use efficiency as well as enhancing research on high yielding rice varieties are another consideration that must be focused.

Conclusion

1) Balinese *subak* system is a traditional system, unique and considered as an example of skilful water management for irrigated land at the foot of volcanic mountains. The system works using the principles of the Balinese way of life, namely *Tri Hita Karana,* one of the principles of Balinese of life. It contains three principles. Those are: *parhyangan* (supernatural realm), *pawongan* (social realm) and *palemahan* (environmental realm). Each relation is a symbol with particular meanings and the relations within the element should always be kept in balance and harmony. Therefore, *Tri Hita Karana* has been used in *subak* system as an indigenous cultural, cultural and technological system.

2) The concept of *Tri Hita Karana* is used in *subak* system in the form of constructing, designing, and operating and maintenance of irrigation system of rice field. It is implemented based on a certain hydrologic area with clear relationship between locations of farmer's land and their irrigation network and separate feeding channels and drainage channels as well. Four principles are applied: environmentally sound, fairness, transparency and accountability.

3) S*ubak* irrigation system uses width of weir as measurement device constructed with local materials and it is proportional to amount of water allocation of the irrigated area, called *tek-tek*. One *tek-tek* reflects one share of water allocation. Besides reflecting those four principles, proportional weir such as most irrigation structures in *subak* is designed and operated in single way and adaptive to changing of flow either under excessive flow due to flooding or small one in dry season. These attributes give opportunity to all members of *subak* easily to:

   (i) get irrigation water proportionally to land area and its distance from water source;
   (ii) have obligation and responsibility for maintaining irrigation structures in certain irrigated area;
   (iii) implement crop diversification in their own land with certain conditions.

Due to the acceleration of economic development, particularly tourism development affects significantly in declining performance of *subak* system, declining water resource availability and agricultural development as a whole. The status of this island as both the centre of tourism development and rice production centre should be strongly considered to preserve properly. Based on the concept of *Tri Hita Karana,* a paradigm of water resources management for irrigated agriculture has been proposed.

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Changing Attitudes in a Time of Transition: a Change of Mentality Towards Water Consumption in Post-Soviet Uzbekistan

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Summary

Uzbekistan inherited its water-consumption ethic from the Soviet Union, under whose environmental policy water was considered a resource available at no charge. This was reflected in the mentality of that time: control over water consumption was not carefully maintained, and efficiency was not an issue for Soviet planners. Poor water-consumption ethics translated into uncontrolled water usage, which could be seen in both agricultural irrigation and household usage. This, in turn, led to catastrophic water shortages and the Aral Sea disaster.

Yet the winds of change in people's thinking have been stirred up by the transition towards a market-based society. In a transitional market-oriented economy, water is not a resource to be taken for granted as provided by the state (as it was in the Soviet system), but a product with a high value that must be paid for by each member of society. With this realization, the thinking of people in both urban and rural areas of Uzbekistan is beginning to evolve.

The efficient consumption of water does require new systems of monitoring and advanced systems of irrigation, but human efforts at the local level may prove to be efficient and cost-effective substitutes to the policy of technical modernization. Above all, as indicated above, the task of achieving efficient water consumption would require an evolution in thinking; a change of mentality and an understanding of the urgency of the problem, as well as the development of environmental education programs. In this respect, local initiatives such as at the level of Mahalla (local neighborhood communities) and Water Consumers Associations are instrumental in carrying out this task.

Keywords

Transition, local community, water management, water consumption ethic.

Introduction

The 1990s brought unprecedented rapid change upon the world, materialized in the fall of the Soviet Union and the transition to a market economy in Eastern Europe and Central Asia. The effects of these changes have cut through all aspects of international relations, down to the level of individual relations within local communities. This has exposed the reality that a new approach is required, which takes into account that local needs and traditional tools are on par with global demands, to both understand and implement the reforms that would lead to a conflict-free, environmentally safe and prosperous society. This is especially so when the issue of water consumption in Central Asian communities is considered.

Many people view environmental issues in purely technical terms, as problems that require the expertise of physical scientists alone [Cable&Cable 2000, 2]. While most physical problems resist easy solutions, the environment is even more comprehensively complex [Cable&Cable 2000, 2]. The smallest deliberate change to the Earth's ecology has an almost infinite number of possible outcomes, and artificial systems are limited in their ability to predict what would actually occur as a result of ecological tampering.

With the recent rise of new environmental movements, and with a new ethic of environmental preservation growing stronger around the world, the causal link between environmental problems and social destruction is increasingly clear. Many experts warn that resource deficiencies are becoming more acute for a range of reasons, such as the growth of rural populations, deforestation combined with erosion, and a host of other forms of environmental degradation [Lund 2000, 25]. As the UN Secretary General's *Millennium Report* states, 'global freshwater consumption rose six-fold between 1990–95 – more than twice the rate of population growth' [*Millennium Report 2000*, 44].

The Secretary General's description corresponds to the realities of Uzbekistan and Central Asia. Uzbekistan inherited its water-consumption ethic from the Soviet Union, under whose environmental policy water was considered a resource available free of charge. This policy reflected the general mentality of that time: Control over water consumption was not carefully maintained, and efficiency was not an issue for Soviet planners [for example, see Khusanov 2002, 26]. A poor water-consumption ethic translated into uncontrolled water usage both in the household and in agricultural irrigation. This, in turn, led to catastrophic water shortages and the Aral Sea disaster.

An analysis by the UN experts confirmed that, apart from climatic factor, the severity of water shortages in Uzbekistan was due to poor 'water management practices at both the national and regional levels', along with inefficient irrigation techniques and technology as well as agricultural and crop production policies [Rumer 2002, 17].

In addition, in Uzbekistan as in the whole of Central Asia, there are four main channels through which water scarcity may cause social disruption[1]:

1. The first one involves economic decline due to a decrease in the quantity or quality of resources;
2. The second channel involves population migration, when some groups migrate seeking resources to replace those that have been depleted;
3. The third channel involves the weakening of political institutions. When resource scarcities increase, the people's confidence in their government erodes;
4. The fourth channel is derived from the third. Weak political institutions and illegitimacy lead to environmental regression and lower social standards.

Yet the winds of change in people's thinking have been stirred up by the transition towards a market-based society. In a transitional market-oriented economy, water is not a resource to be taken for granted as provided by the state (as it was in the Soviet system), but a product with a high value that must be paid for by each member of society. With this assumption in mind, the awareness and attitude of people in both urban and rural areas of Uzbekistan are beginning to evolve.

There is a widely-shared comprehension of the fact that water deficiency should be dealt with in this region by reducing both water consumption and the demand for water, implying an

1. The point about resource scarcity conflict has been made by J. Maxwell and R. Reuveny. In this paper, it is applied to the case of water scarcity.

intensification of water usage and a decrease in its overall volume. This should include, among other measures, saving water at all levels of the water-users' hierarchy, which means a drive towards the 'horizons of water productivity' in several stages [Dukhovniy 2002, 16–17].

At the center of this change in awareness are two main questions, which will be addressed in the remainder of this paper:

I. How should water be distributed to satisfy socio-economic needs?
II. How should the rational use, and conservation, of water be provided for?

There is a widely held understanding that addressing these two issues is a complex task. This, on the other hand, leads to recognition of the urgent necessity for people to deal with these problems at the local, as opposed to the governmental, level. And this understanding represents one of the most drastic changes in the mentalities of people who, in the past, expected the government to take responsibility for the actions of individuals, and blamed the government alone for any water supply deficiencies when they occurred.

I. How should water be distributed to satisfy needs in the agricultural sector?

After gaining its independence, reform of Uzbekistan's largely agrarian economy was at the top of the governmental agenda. One of the main points in this agenda is the issue of how to deal with buying and selling land, which are prohibited in Uzbekistan largely because of the unresolved issue of water privatization. The Soviet regime operated through state-sponsored collective farms, which distributed water and other resources. Yet, the production incentives and capacities of such a system remained very low. Therefore, after gaining its independence, Uzbekistan pursued the course of creating smaller market-oriented agricultural production units: *shirkats* (large sized), farm (medium-sized) and *dehkan* (household-sized). In the long-term, the government prefers establishing more balanced, medium-sized farmer-type enterprises (as opposed to very small or very large enterprises).

Whatever the form of private entrepreneurship in the agricultural sector, the issues of water supply, its technical implementation and its maintenance are as complicated as they are crucial for the success of any enterprise. One of the initiatives taken to address these issues in Uzbekistan has been the creation of Water Consumers Associations – initially government-subsidized – as an alternative to government-run water-distribution schemes. These schemes are still under heavy government control but they are now more accessible to local water consumers, offer bigger self-governance incentives for local agricultural producers and involve a higher level of local community participation in the alleviation of water shortages. The overall aim is to decrease water consumption in several stages: first would include through reduction of unproductive water losses (it makes at least 20% of total water uptake), and at a later stage through higher technologically advanced forms of irrigation which require improvement of financial capacities of both Government and water users [Dukhovniy 2002, 17].

This represents a fundamental change in water-distribution policy in the Uzbek countryside.

Water Consumers Association (WCA) building strategy

As mentioned above, three types of agricultural production enterprises were established to replace *sovhoz* and *kolhoz* production units. The role played by government in these units is still high, but the overall aim is to gradually decrease governmental influence as much as possible. One way to do so is to cut the number of large-scale government-run agricultural producers, turning them into smaller, more flexible farm-type enterprises. As water is a scarce resource in this region and can not be easily privatized, the biggest problem in pursuing this goal is formulating systems for equal

water distribution as well as management and maintenance of water facilities. In order to resolve this problem, it was proposed that Water Consumers Associations be founded to carry out the following functions:

1. Facilitation of water distribution to members of the association,
2. Facilitation of maintenance of water-related facilities (water canals, small dams and water pumps), and
3. Regulation of water consumption among the members of association.

Establishment of these associations was proposed in Government Resolution N 8, according to which 143 associations have been established. Overall membership in these associations stands at 19,019 farm-type enterprises and 12,798 dehkan-type units, comprising 345,021ha. of land to supply with water.

Membership in the association is open to all local agricultural producers. In many cases, associations unite several localities that share the same basin of water irrigation. The services of associations, and their concomitant fees, differ from one region and locality to another. The service fee is determined on the basis of calculations that take into consideration locality (distance from the water), technical equipment required to provide water and other costs related to the provision of water. At the same time, fees are paid in several installments by users – system, which exempts them from the pressure and burden of paying for all services at once.

Each association is a non-profit organization. That is why the associations charge only fees for maintenance of water facilities, technical renewals and salaries of employees. The overall budget of each association is decided upon at the annual meeting of members. The costs to be covered by the association members are as follows:

1. Costs of administration and technicians responsible for running association's day-to-day operations (approximately 4–5 persons). Out of this number, only technicians and specialists directly involved in water supply are hired on a permanent basis. Costs for transportation along water canals, office equipment and other related costs are also included.
2. Costs of water supply and the maintenance (and repairs) of water supply networks.
3. Costs of water-system development and technical upgrade, etc.

The overall sample-scheme for the formation of Water Consumers Associations is offered in the Resolution of the Government of Uzbekistan N 8, as follows:

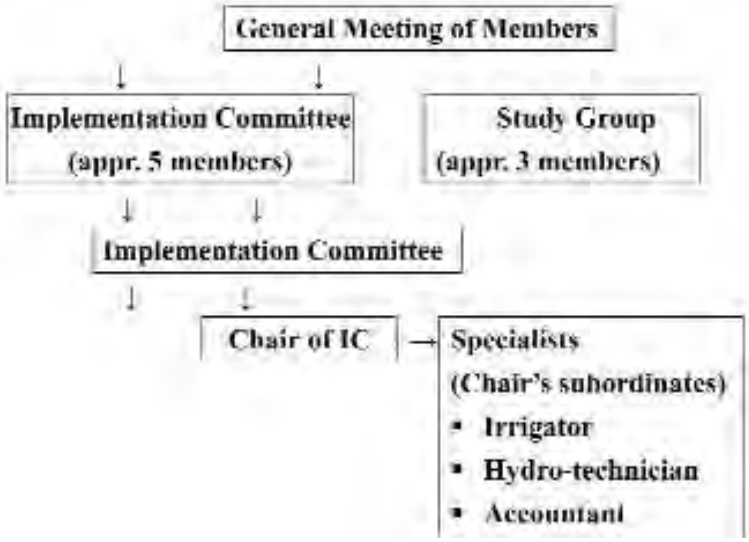

Table 1. The sample-scheme for Water Consumers Association as outlined in the resolution of Government of Uzbekistan N 8

The sample-scheme for the creation of such Water Consumer Associations defines the number of staff-members and specialists that should be hired to provide the members of such Associations with the most needed services. For instance,

- The Chair of the Implementation Committee is a representative of the will of the General Meeting of the association, who is charged with responsibility to run the association on behalf of members and to manage the overall affairs (finance, technical supply, repairing of facilities, etc.).

- The Chief Irrigator is a specialist responsible for all issues related to water management within the territory under the association's jurisdiction. He is also responsible for planning, facilitation and measurement of effective water supply to individual water consumers. He is also expected to provide effective control over implementation of the contracts between the association and other public and governmental organizations regarding water management within the territory of the association.

- The hydro-technician is an irrigation specialist who is mainly responsible for water-related works in the plantations (observation of actual level of water in the canals, supervision of repairing works and observation of water levels, which are taken from common pools into private fields).

- The accountant is the specialist of the association charged with regulation of most financial affairs related to the activities of the association.

Each association functions as follows: Firstly, every member of the association receives his/her own records book in which the monthly payment fees as well as the final due dates of those fees are stated. This book also contains all records regarding past payments and future due payments to the association. The first payment of the year is normally 20% of the total amount paid by the same consumer during the previous year. This 20% is paid at the end of the previous year. The overall additional amount of payment is then re-calculated every time the consumer files for water or other services.

Perceived goals of the association system of agricultural water supply

The final goal of creating Water Consumers Associations is two-fold. Firstly, it is to reduce the level of water consumption. Water consumption in Central Asia is generally excessive, and the ineffectiveness of water management remains yet to be improved [Golubev 2001, 12]. For instance, the efficiency of irrigation systems in Central Asia is between 55–60% due to seepage from distributing canals and a predominantly furrow method of watering [Golubev 2001, 13]. Another example is the lack of incentives for peasants to conserve water [Rumer 2002, 17]. Therefore, Water Consumers' Associations are called upon to help resolve the task of improving water consumption efficiency and eventually the consumption ethic.

Secondly, this measure is not simply to provide agricultural producers with water; it is to create an institution through which local producers themselves can facilitate their own effective consumption and accumulation of excess water, and also accommodate the task of enriching their own land. This is exemplified in the following indirect tasks that associations are expected to facilitate and to accomplish:

1. Improving the quality of the soil's capacity for water efficiency;
2. Accumulating of snow, melts and rainwater in reservoirs;
3. Reducing evaporation and soil absorption wastage through targeted irrigation;

Progress in the tasks mentioned above would not only lead to increased agricultural output but would also further enhance the water-consumption ethic in the region. In particular, these institutions would engage a larger number of members of society in water control and the preservation of nature based on the understanding that the 'water in dry areas determines landscape, life, bio-diversity and further stability of environment' [Dukhovniy 2002, 18]. Therefore, the Water

Consumers Association provides a way to bring about public awareness of the idea that the sustainability of water resource use depends upon the attitudes of each member of society, and not only on the activities of resource management structures. By helping to establish such a system, the Government would stimulate local agricultural producers to use less water, and at the same time would reduce the burden of governmental control over this sector of agriculture.

The problems of Water Consumers Association

One of the main problems of such associations is that they are critically under-funded. Small and medium-sized agricultural producers such as farmers or dehkans are not yet able to cover all the costs relating to the installation of new technology, maintenance and extension of existing water networks. They do not draw enough profit from their production to make investments in the water distribution network. As a result, these associations are effective in using existing water distribution networks, but they are not self-reliant, as they still receive funding from the government.

In order to support these institutions, the Ministry of Water Resource Management of Uzbekistan has initiated several programs. One of them is to create two well-equipped Water Consumers Associations in each region of Uzbekistan, which can then serve as models and training bases for the staff of other newly-established or soon-to-be-established Water Consumers Associations. They would normally be named 'Regional Water Consumers Association Training Centers'. Another initiative to support this kind of association is being negotiated with USAID. At present, there are several such model associations including:

1. Nazarhan-arna Association, established on the Amu Darya River in Kara-kalpak Autonomous Republic.
2. Sohil Association, established in a district of Navbahor in Navoi region.
3. Qoshiquloq and Oq Qoya Associations, created in the Mirzabod district of Syrdarya region.
4. Oq Oltin Association, created in the Yzavan district of Ferghana region.

II. How to provide for rational use, preservation and environmental education?

The second level at which to consider the problems of water consumption is a local or societal level. Human agency can play a major role in water conservation [Trushin 1998, 270]. The actions of people to efficiently consume and conserve water fall in line with the integrated approach to land and water management, as advocated by some authors on the region, and represent a major change in mentality [see Adeel 2001: 141].

The situation in urban areas, which are relatively well provided for in terms of fresh drinking water, is indicative of such a change. For instance, in cities, drinking water is used less and less often for washing household carpets, private cars and irrigating small gardens in front of apartment blocks. Partly, this has been made possible by the introduction of water-measuring devices in each household, representing market-economy incentives that motivate residents to effectively use water. These, at times extremely painful, market incentives bring up new generations more aware of the urgency of efficient water consumption.

Indeed, the measures mentioned above do produce the needed effect for mentality change in water consumption. However, in addition, there is a need to promote action for building and strengthening existing institutional capacities to effectively address and integrate cross-sector aspects [Adeel 2001, 141]. One such example in Uzbekistan is local community – *mahalla*.

Firstly, local units of self-governance – such as *mahalla* (neighborhood communities) – also exert control, preventing irrational or irresponsible use of water. Local neighborhood communities are

represented by their bodies of self-governance – mahalla committees – which increasingly assert their administrative powers. They are primarily responsible for maintaining order in the territories of their respective communities. They can not directly intervene into private household water usage. Household usage is regulated by client–provider relations. But mahalla committees still exercise substantial authority over the use of public pipes outside the private household. For instance, in some communities, water supply systems are built in yards. These facilities are often abused by those who try to use fresh drinking water in gardening, car washing or carpet cleaning. In such situations, mahalla committees are expected to prevent such violators from using fresh water in such inappropriate ways.

Secondly, local communities are effective in maintaining the water supply and heating facilities. As has been the case after the collapse of the socialist system of communal support, those facilities are rarely being renovated. Insufficient funds have been invested for repairs as the economic priorities of each country often lie in profit-making fields. In this regard, local communities and their mahalla committees initiate repairs of running pipes in apartments and renovate water-based general heating systems. They also observe the careful and efficient use of such facilities, which translates into a more efficient use of water and other resources. In this sense, local self-governance units partly accept the burden of the government, and therefore, promote the active participation of the local population in governing their neighborhoods.

Thirdly, in many instances, mahalla committees serve not only as strict controllers of water abuse, but are also extremely effective forums for environmental education programs. In mahalla committees, elders enjoy unquestioned respect and obedience. Therefore, in traditional societies, such as Uzbekistan, environmental education within mahalla committees and neighboring communities would be much more effective than that offered by the conventional curricula at mainstream educational institutions. While not always and everywhere, there are indications that this type of thinking is becoming prevalent. This shift in attitudes symbolizes the drastic evolution Uzbekistan has undergone since the Soviet period. In this sense, what is important for mahalla is to find the way to bring the knowledge required and educate the educators for local environmental education programs.

While mahalla environmental protection potential and the water shortage reduction capacity of mahalla are materialized in three functions, it possesses a vastly larger number of traditional indigenous features and means, which can be effectively utilized for dealing locally with global issues. Action-oriented research in such issues is instrumental in offering more ways to deal with environmental concerns.

Conclusion

This paper analyzed the change in thinking of people about water consumption and water related issues. With the collapse of the old economic system, a new kind of political, economic, and social reality came into existence. Environmental regress and water-related problems in Uzbekistan and other Central Asian states require new approaches and new type of thinking in dealing with these issues.

As indicated in this paper, the efficient consumption of water does require new systems of monitoring and advanced systems of irrigation, but local communities prove that human efforts at the local level may prove efficient and cost-effective substitutes to the policy of technical modernization. This is especially true when the financial resources to invest in such technology are not available. Above all, as discussed above, the task of achieving efficient water consumption requires an evolution in thinking; a change of mentality and an understanding of the urgency of the problem, as well as the development of environmental education programs. In this respect, local initiatives at the level of local neighborhood communities – mahalla – and Water Consumers Associations are instrumental in carrying out this task.

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APPENDICES

Appendix 1: Performances and exhibitions

During the two days of the sessions, a music performance was presented, several videos were shown, and photographs and children's paintings were exhibited. These annexes outline some of the eventsDuring the two days of the sessions, a music performance was presented, several videos were shown, and photographs and children's paintings were exhibited. This appendix outlines some of the events..

Music of Water
The Original Soundscape of Water
The Treasure We Hand over to the Next Generation

Tsutomu SHIBASAKI

Water Network

Concept

The project of 'The Original Soundscape of Water' is to think again about the precious environment and culture disappearing from our daily life under the theme of 'Music of Water. '

The culture of Japan can be said that it originated from blessed water. Actually the annual average rainfall in Japan is almost two times that of most other countries in the world. This wealth of rainfall generated magnificent forests which covers almost 70% of our country. Japanese traditional culture was called 'Wood' culture. This indicates to us that the wealth of water generated Japanese culture. Also, Japan' s wealth of water has long been an inspiration to its traditional music. Shakuhachi (Japanese bamboo flute) is made of bamboo. Koto (Japanese harp) is made of the paulownia tree, and the body of Tsuzumi (Japanese drum) is made of the cherry tree. Nature, winds and water (streams, falls, rivers, waves, etc.) have rhythm and sound, through which we can feel safe and relax. We think that Japanese traditional music reflect nature of Japan, forests and water.

Now, clean water and beautiful forests are disappearing, which directly lead to the destruction of our live and culture. Actually good materials of Japanese traditional musical instruments are decreasing and its music also growing rare in our daily lives.

The objective of our project 'Mizu-No-Oto-Genfukei (The Original Soundscape of Water)' is to rebuild the ties between culture and water (nature). We have created original tunes themed on Water with Japanese traditional musical instruments, hoping that we will support the handing over of beautiful water and culture to the next generation.

Forests enjoy the blessings of the sun and receive messages from the sky and the universe beyond, while water brings us what the forests have obtained. Thus, both forests and water link all lives on the earth together. Based on such an idea, we planned out this project and created original 'Music of Water'. We would be happy if we can offer a chance to people to think over the serious environmental problems facing our society and give them the heart to cherish water and culture we are losing now.

Please listen to the sound of water, and feel the sound of Japan. The Original Soundscape of Water is now here on the stage.

Concert activities

Since 1996, Water Network (Japanese NGO) has held outdoor concerts themed 'Music of Water' over 30 times. As the theme of the concert is our relationship with water, we have appealed the following messages.

From the forest to the sea, following river from upstream to downstream

We held outdoor concerts following river from upstream to downstream, appealing the preciousness of water network of river we are neglecting in our daily life. We modeled Arakawa River and held outdoor concert at the headstream and at the mouth of the river. Also, we focused on Asahi River in Okayama, Sagae River in Yamagata, Hiigawa River and Lake Shinji in Shimane.

Water links the world

In this project we are trying to appeal that water links the world. In 1999 we held concert at the venue of photo exhibition of Panama Canal which connecting Atlantic Ocean and Pacific Ocean.

In the concert at the Embassy of Sweden we focused on forest and lakes of Sweden. Also, in 2000, we challenged South-America tour (Brazil, Paraguay, Uruguay and Argentina). We made a demonstration at Iguazu Falls and followed Parana River and La Plata River, appealing transboundary water connection through 'Music of Water'.

Today's Program

Head Stream in Kyoto (improvisation by Shakuhachi and O-tsuzumi)

WAVES II (Composed and computer programmed by Motoi Yokoya)

Players

Retsuzan Tanabe, Shakuhachi (Japanese bamboo flute)

Kunio Sugiura -O-tsuzumi, Ko-tuzumi (Japanese percussion)

Chie Sakurai-Koto (Japanese harp)

International Children's Paintings on the Environment

From the collection of the National Museum of Ethnology, Osaka

Since 1991, the Foundation for Global Peace and Environment (FGPE) and the United Nations Environment Programme (UNEP) have sponsored the annual International Children's Painting Competition on the Environment. About 10,000 children around the world send their paintings every year, foIlowing the theme 'Preserve the Beautiful Oceans, Skies, and Forests for the Future!'. Winning paintings have been printed as posters – including the U.N. World Environmental Day official poster, calendars, and postcards for distribution worldwide.

The colorful paintings by children depict the beauty of their country's nature, as well as various environmental disasters threatening their daily lives. Children are unashamed and honest in their view of the surroundings. Same pictures seem to accuse adults for the havoc wrought in the name of development. Other pictures show children's hopes to live in harmony with nature, sharing the sorrow and pain of life with the polluted oceans and sympathizing with animals in disappearing forests.

Mr. Kiyoshi AWAZU, chairman of the FGPE, wrote:

> 'Children's pictures exceed our expectations in their uniqueness, and some are very humorous and cheerful. They also expose the attitudes of grown-ups who tend to promote their own interest rather than protecting the environment. It all shows that children are intuitively much more concerned about global environmental crises than we realize.'

All original paintings entered in the International Children's Painting Competition on the Environment (which amount to more than 80,000) are valuable materials of modern anthropology and are collected in the National Museum of Ethnology (NME) in Osaka, Japan. Here, images and expressions of the Earth, as reflected in the hearts of children around the world, can be studied and handed down to future generations.

There is no language barrier constraining these children's pictures; they can directly convey their messages on protecting the environment, moving people around the world. Here in conference the room and the booth for 'Water and Cultural Diversity', pictures related to water and selected by staffs of NME are on exhibition.

Some of the children's paintings at the 'Water and Cultural Diversity' booth

Children's paintings from the NME's collection

Photo Exhibition: Four Seasons of Rice Fields in Japan

Yagi Yoshimitsu

Photographer,
Member of Japan Professional Photographers Society,
Lecturer of NHK Cultural Center, Lecturer of Aichi University

Rice is a staple food of Japanese. The rice fields have given fruitful harvest by rich rain in any place of plain or mountain area in Japan, except Hokkaido area.

The landscape of rice field is produced in cooperation with humankind and nature. The rice terraces in deep mountain side are especially beautiful as crystals of integrated human wisdoms. In case of Japan which is up to 80% covered with undulated area, rice fields have protected our field of life from landslide and flood by keeping water and making a water flow slowly.

Also, they have kept freshwater organizations' ecosystem and fed saltwater fishes by producing vegetable planktons.

Rice field is a cultural and environmental heritage for us and our next generations.

Location:
Oku-Mikawa District, North-East Area of AICHI Prefecture, Japan

Spring
Rice fields with rich freshwater in mountain site

Spring
Singular traditional rice planting by handwork

Early summer
The rice field is a treasure house of diverse kinds of insect, group of herons comes to pick them

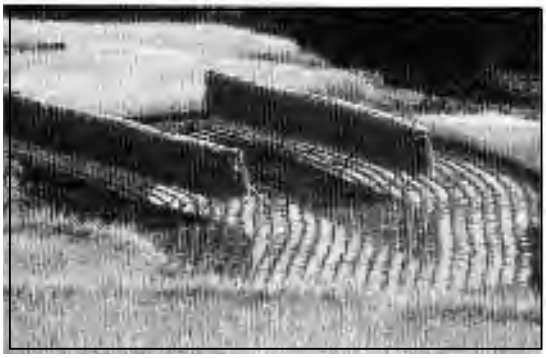
Late spring
Swimming frog in spring weather

Early summer
Thistles on ridge of rice field

Early summer
Koi-Nobori for the boys festival

Autumn
Scarecrows keeping rice from sparrow

Autumn
Ears of rice bent low by their load of fruit



Autumn
Hanged ears of rice on Haza

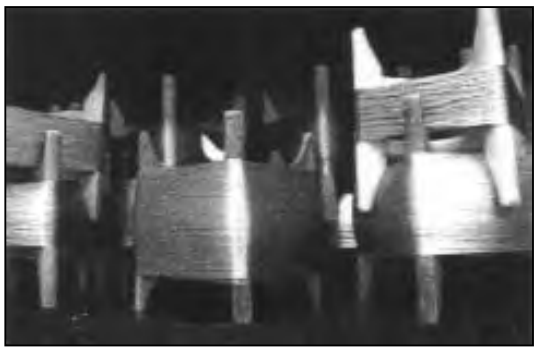
Winter
Rice terraces with snow after harvest

Films Produced by Kyoto Seika University and Kyoto University of Art and Design

On show in the conference hall are promotional films for the 3rd World Water Forum. The films are produced on commission by students of Kyoto Seika University and Kyoto University of Art and Design.

Kyoto Seika University's contribution was created by five students, and is entitled 'Water culture today: clothing, eating and living.' The students filmed places and things related to water in Kyoto city.

The Kyoto University of Art and Design piece was created by six students. Each student filmed 30 seconds on the theme 'water,' then edited their pieces into one film. The resulting piece contains footage of children playing with water, computer designed images of fish and of Kyoto's famous dancing girl, Maiko.



Dye thread of Nishijin

Fushimi water

Appendix 2: Programme as of 16 March 2003

Session 1: Opening Plenary

Sunday 16 March 2003, Kyoto International Conference Hall, Room B I

13:00-15:30h (150') [Garder? idem pour chacune des sessions]

Chairperson: Janos Bogardi, Division of Water Sciences, UNESCO

OPENING REMARKS

13:00-13:15 **On behalf of HRH Prince Talal** (Saudi Arabia)
(presented by Janos BOGARDI)
President of AGFUND (Arab Gulf Programme for United Nations Development Organizations) and UNESCO Special Envoy for Water

13:15-13:25 **Jean-Louis Oliver** (France)
Deputy Secretary-General of French Water Academy

KEYNOTE SPEECH

13:25-13:55 **Tadao ANDO** (Japan)
Architect, Professor of the University of Tokyo
Water and the Daily Life

MUSIC

13:55-14:05 **Music of Water**
Tsutomu SHIBASAKI - Water Network

PRESENTATIONS

14:05-14:20 **1. Kazuhiro TAKAI** (Japan)
Okami-no-Kami and Kifune Shrine

14:20-14:35 **2. Evo MORALES** (Bolivia)
Representative of Indigenous Peoples' Organizations

14:35-14:50 **3. Jeannette ARMSTRONG** (Canada, Okanagan/Syilix Nation)
Traditional Knowledge Keeper

14:50-15:00 **4. Pakihana HAWKE** (New Zealand)
An Indigenous Maori Perspective on Water

15:00-15:15 **5. Maria Jose VIÑALS** (Spain)
Ramsar's Convention on Cultural Values of Wetlands

15:15-15:30 **6. Marta PAN** (France)
Presentation of her work and its relation to water

Session 2: Translating the Cultural Dimension of Water into Action

Sunday 16 March 2003 Kyoto International Conference Hall, Room B-I

15:45-18:30h (165')

Chairperson: Yoshihiro KAIDA, Kyoto University (Japan)

15:45-15:55 **1. Terje TVEDT** (Norway)
The Idea of Water: Concepts and Representations – The first volume of 'The History of Water and Civilization'

15:55-16:05 **2. Misako OHNUKI** (Japan)
ACCU Programmes on Implementing Water and Environmental Materials for different people in indigenous languages in Asia and the Pacific UNESCO Member States

16:05-16:15 **3. Francis JOSÉ-MARIA** (France)
Sharing water: an educational program on water and cultural diversity

16:15-16:25 **4. Claude SALVETTI** (France)
Method Guide For Water Education Actions: Water Classes and Two Case Studies: Gori (Mali) and Ngaoundere (Cameroon)

16:25-16:35 **5. Claudine BRELET** (France)
NETWA - A pilote-project: a Network on Water Anthropology for Engineering and Sociocultural Interaction

16:35-16:45 **6. Lye MUDABA Yoka** (Democratic Republic of Congo)
The Congo River Through Various Founding Myths: The Hope of an Integrated Construction of AFRICA

16:45-16:55 **7. Honoré MOBONDA** (Republic of Congo)
The Cultural Interaction of the Congolese with the River as a Traditional Data Base for International Cooperation

16:55-17:05 **8. Samia GALAL Saad** (Egypt)
Muslim Women and Water Resources

17:05-17:15 **9. José T. BADELLES** (Philippines)
Water People

17:15-17:25 **10. Masayuki AIZAWA** (Japan)
Project Hydroscape

17:25- 17:35 **11. Bernadette DE VANSSAY** (France)
Some tools for a new strategy of water management

17:35-18:30 **Discussion and wrap-up**

Session 3: Water Management and Cultural Heritage

Monday 17 March 2003 Kyoto International Conference Hall, Room B I

08:45-11:15h (150')

Chairperson: Kenzo TOKI, Ritsumeikan University

08:45-08:50	**Kenzo TOKI** (Japan) *Opening*
08:50-09:05	**1. Masami KOBAYASHI** (Japan) *Traditional Practice of Water Management for Disaster Prevention in Shirakawa-go, Gifu, Japan*
09:05-09:20	**2. Takayuki OKUBO** (Japan) *Proposal: Environmental Water Supply System (EWSS) for Protection of Cultural Heritage from Earthquake Fire, Kyoto*
09:20-09:35	**3. Kamya RAMACHANDRAN** (India) *The Sacred Spaces for Water: Temple Tanks of South India*
09:35-09:50	**4. Ly VANNA** (Cambodia) *Living in a Proto-Type Prehistoric Alluvial Environment: Water and the Villagers of Samrong Sen in Kampong Chhnang Province, Central Cambodia*
09:50-10:05	**5. Fekri HASSAN** (UK) *Dams and Cultural Heritage Management: A Strategy for Action*
00:05-10:25	**6. Tolga EROGAN** (Turkey) *Water and Cultural Heritage: Zeugma*
10:25-11:10	**Discussion** (45')
11:10-11:15	**Kenzo TOKI** (Japan) *Wrap up*

Session 4: Indigenous World Views and Spirituality

Monday 17 March 2003 Kyoto International Conference Hall, Room I
09:00-11:30h(150')

Chairperson: Esther CAMAC, Ixacavaa

09:00-09:05 **1. Introduction by Esther CAMAC** (Chairperson)

09:05-09:20 **2. Masanori TOYOOKA** (Japan)
What is Ainu Association ?

09:20-09:35 **3. Pakihana HAWKE** (New Zealand)
Darlene SANDERSON (Canada)
Water and its Connection to Spirituality from a Cree Perspective: Its Relationship to Health, Education, Law and the Environment

09:35-09:50 **4. Jebra Ram MUCHAHARY** (India)
A Forgotten Legend: Khoina Santi

09:50-10:05 **5. Jim WHARTON** (Australia)
Water and Kooma peoples

10:05-10:20 **6. Tom GOLDTOOTH,** (USA)
The Indigenous Declaration on Water

10:20-10:35 **7. Jim ENOTE** (Zuni) (USA)
Thinking Critically about Maps, Water, Justice and Equity in Indigenous Communities

10:35-10:50 **8. Francisco PENA** (México)
Indigenous Peoples and Control of Water Resources in Mexico

10:50- 11:05 **9. Eleanor BANG-OA,** (Philippines)
Traditional Water Management Systems of The Kankanaeys of Besao (Northern Philippines)

11:05-11:30 **Discussion**
led by **Esther CAMAC** and **David GROENFELDT** (USA)

Session 5: Community Life and Water Management

Monday 17 March 2003 Kyoto International Conference Hall, Room B-1
11:15 - 13:15h (120')

Chairperson: Jean-Louis OLIVER, French Water Academy

11:15-11:25	**1. Takeo IHARA** (Japan) *Community Builder: Focusing on the Shikoku 88 Watersides*
11:25-11:35	**2. PHAM QUYNH PHUONG/ NGO DUC THINH (Vietnam)** *Natural and social aspects of Vietnamese Water Puppetry*
11:35- 11:45	**3. Houria TAZI SADEQ** (Morocco) *Water, an Essential Resource for a New Way Forward*
11:45-11:55	**4. Kohji MICHIOKU** (Japan) *Restoration project of Chikusa River in cooperation with local inhabitants, government and scientists*
11:55- 12:05	**5. Roberto SANTINI** (Italy) *I Bottini The Medieval Acqueduct of Siena*
12:05-12:15	**6. Guoqing MA** (China) *Public Water and Private Water: Water Management and Community in Nomadic Mongolian and Traditional Agricultural Mongolian in Inner Mongolia*
12:15- 12:25	**7. Sibiri BADOUN** (Burkina Faso) *Role and functions of water in African community life*
12:25-12:35	**8**. **Michihisa SUZUKI** (Japan) *The Message We Want to Convey from Kyoto, the Water Capital*
12:35-12:45	**9. Alain HENRY** (France) *Reconciling modern water management with the political culture of traditional societies*
12:45- 13:15	**Discussion and wrap-up**

Session 6: Indigenous Water Vision and Rights: a New Perspective for Better Water Management

Monday 17 March 2003 Kyoto International Conference Hall, Room B1
14:00h - 17:00h (180')

Chairpersons: Joji CARINO and Victoria TAULI CORPUZ, Tebtebba Foundation

14:00-14:05	**1. Introduction** by **Joji CARINO / Victoria TAULI CORPUZ (Chairpersons, Philippines)**
14:05-14:20	**2. Leonidas IZA** (Ecuador) *The Confederation of Indigenous Nationalities of Ecuador*
14:20-14:35	**3. Video Presentation 'The Blood of the Mother Earth'**
14:35-14:50	**4. Pablo SOLON** (Bolivia) *From Porto Alegre to Kyoto: Alternatives from the Indigenous and Cultural Diversity Perspective*
14:50-15:05	**5. Rocio BUSTAMANTE** (Bolivia) *Water Laws, Water Policy and Indigenous Water Rights: The WALIR Programme*
15:05-15:20	**6. Rutgerd BOELENS (**Netherlands) with **Paulina PALACIOS** (Ecuador) *The Struggle for Indigenous Water Rights and the Cultural Politics of Participation*
15:20-15:50	**Discussion** (30 min.) led by **Joji CARINO** / V**ictoria TAULI CORPUZ** and **Douglas NAKASHIMA**
15:50-16:05	**7. Issyad AG KATO** (Niger) *Overview of an Innovative Hydraulic Organization to Serve a Group of Semi-Nomadic Pastoral Tuaregs of the Mountains of The Northern Niger, whose Mode of Life has been Damaged by the Years of Draught*
16:05-16:20	**8. Tshepo KHUMBANE** (South Africa) *Indigenous Water Management and Water Rights*
16:20-16:35	**9. Santos Augusto ORATO** (Guatemala) *The Guardians of Trees and Water – NOJ: e chajinel rech le che' ruk le ja'*
16:35-17:00	**Discussion** (25 min.) led by **Joji CARINO** / V**ictoria TAULI CORPUZ** and **Douglas NAKASHIMA**

Session 7: Wrap-up Plenary

Monday 17 March 2003 Kyoto International Conference Hall, Room B1
17:00h - 19:00h (120')

Chairperson: Andras SZÖLLÖSI-NAGY, Division of Water Sciences, UNESCO

PRESENTATIONS

17:00-17:10 **1. Lord SELBORNE**
President of the COMEST Subcommission of Freshwater, Commission on the Ethics of Sciences and Technology (COMEST)

17:10-17:20 **2. Takaya KAWABE and Miyuki KOYAMA** (Japan)
Water Saving and Cultural Diversity in Environmental Education System of Kids' ISO 14000 Programme

17:20-17:30 **3. Jean-Pierre CABOUAT**
Treasurer of Water Academy

SESSION REPORTS

17:30-17:35 **4. Joji CARINO** and **Miguel SOLANES**
Pre-forum Sessions of indigenous people's convenors

17:35-17:40 **5. Martin REUSS**
Pre-forum Session

17:40-17:45 **6. Yoshihiro KAIDA**
Session 2 'Translating the Cultural Dimension of Water into Action'

17:45-17:50 **7. Kenzo TOKI or Masami KOBAYASHI**
Session 3 'Water Management and Cultural Heritage'

17:50-17:55 **8. Miguel SOLANES**
Session 4 'Indigenous World Views and Spirituality'

17:55-18:00 **9. Joji CARIÑO**
Session 6 'Indigenous Water Vision and Rights'

18:00-18:05 **10. to be confirmed**
Session 5 'Community life and Water Management'

CLOSING REMARKS

18:40-18:50 **11. Jean-Louis OLIVER**
Deputy Secretary General of Water Academy

18:50-19:00 **12. Andras SZÖLLÖSI-NAGY**
Director of the Division of Water Sciences, UNESCO

Pre-Forum Colloquium on 'Water and Cultural Diversity'

Saturday 15 March 2003
Venue: Kyoto International Community House, Special Conference Room
2-1 Torii-cho, Awataguchi, Sakyo-ku, Kyoto
9:30-17:30

SESSION A **Chairperson: David Mosse, University of London**

9:30-10:00 **1. KEYNOTE SPEECH**
Shoichiro TAKEZAWA (Japan)
Two World Views; Two Relationships to Water: The Bozo of West Africa

10:00-10:30 **2. Ram Kumar PANDAY** (Nepal)
Water and Cultural Diversity in Nepal

10:30-10:45 ***Break***

10:45- 11:15 **3. Kavas Kapadia** (India)
Water harvesting-The 'tanka' in Zoroastrian houses of Bharuch-India

11:15-11:45 **4. Edith WENGER** (France)
When the Cultural Value of Natural Rivers leads to a new Management Culture

11:45-12:30 **Discussion**

12:30-14:00 ***Lunch Break***

SESSION B **Chairperson: Janos BOGARDI, UNESCO-IHP**

14:00-14:30 **5. KEYNOTE SPEECH**
David MOSSE (UK)
The Rule of Water: Uncertainty and the Cultural Ecology of Water in South India

14:30- 15:00 **6. Sahid SUSANTO** (Indonesia)
A Study Of The Subak System As Indigenous Cultural, Social And Technological System To Establish A Culturally Based Integrated Water Resources Management

15:00-15:15 ***Break***

15:15-15:45 **7. Francis JOSE MARIA** (France)
Video presentation of the program 'Sharing water resources'

15:45-16:15 **8. Richard Coopey** (UK)
Ownership and Control: Public and Private Water Resources in World History

Appendix 3: Final Declaration

3rd World Water Forum
16-23 March 2003, Kyoto, Shiga and Osaka, Japan

Theme 'Water and Cultural Diversity'

STATEMENT TO THE MINISTERIAL CONFERENCE

22 March 2003

Preamble

1. The UNESCO Universal Declaration of Cultural Diversity (2001) and the Johannesburg Declaration on Sustainable Development (2002) urge the dialogue and cooperation within human society and among cultures in order to wisely use and sustainably manage earth's resources. Water is a vital resource, having economic, ecological, social and spiritual functions. Consequently its management determines to great extent sustainability. Due to its fundamental role in society's life, water has a strong cultural dimension. Without understanding and considering the cultural aspects of our water problems no sustainable solution can be found.

Issues

2. Relations between peoples and their environment are embedded in culture.
3. The ways in which water is conceived and valued, understood and managed, used or abused, worshipped or desecrated, are influenced by the cultures of which we are a part.
4. Water is life, physical, emotional and spiritual. It should not be considered merely as an economic resource. Sharing water is an ethical imperative and expression of human solidarity. The intimate relationship between water and peoples should be explicitly taken into account in all decision-making processes.
5. As the frequent failure of 'imported solutions' has proven, water resources management will fail without the full consideration of these cultural implications.
6. Cultural diversity, developed during the millennia by human societies, constitutes a treasure of sustainable practices and innovative approaches. Indigenous knowledge holders should be full partners with scientists to find solutions for water-related problems.
7. Indigenous ways of life and knowledge are an integral part of humanity's heritage and cultural diversity. Indigenous peoples have an important role to play in sustainable water resources management. In this context, due respect must be given to indigenous peoples' rights.

Objectives

8. Sustain and further affirm cultural diversity and heritage, the knowledge, legal and societal pluralism that secure our ability to adapt in a changing world.

9. Participatory decision making in IWRM should take into account all facets of cultural diversity and seek informed consensus.

10. Cultural diversity, stakeholder involvement and intercultural dialogue should be the guiding principles for the development of awareness raising, educational and capacity building material and methods.

11. UNESCO, COMEST[1], related institutions and networks should elaborate appropriate guidance for the development of those materials and methods.

Action Plan

12. The results of the 3WWF Theme Water and Cultural Diversity should be published and disseminated to educational institutions.

13. The intention of the World Water Council is welcomed to create a specific working group on the relationship between water and culture (including aspects of cultural diversity and heritage) and invites professional associations to explicitly address this issue in their respective work programmes, involving indigenous peoples in these processes.

14. Incorporate in scientific and professional conferences, sessions on the relevant indigenous and customary knowledge and practices.

15. Promote an ethical framework and the formulation of legislative and institutional policies to facilitate the implementation of the above actions and initiatives.

1. World Commission on the Ethics of Scientific Knowledge and Technology.

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