Day 4 – Water Resource Assessments

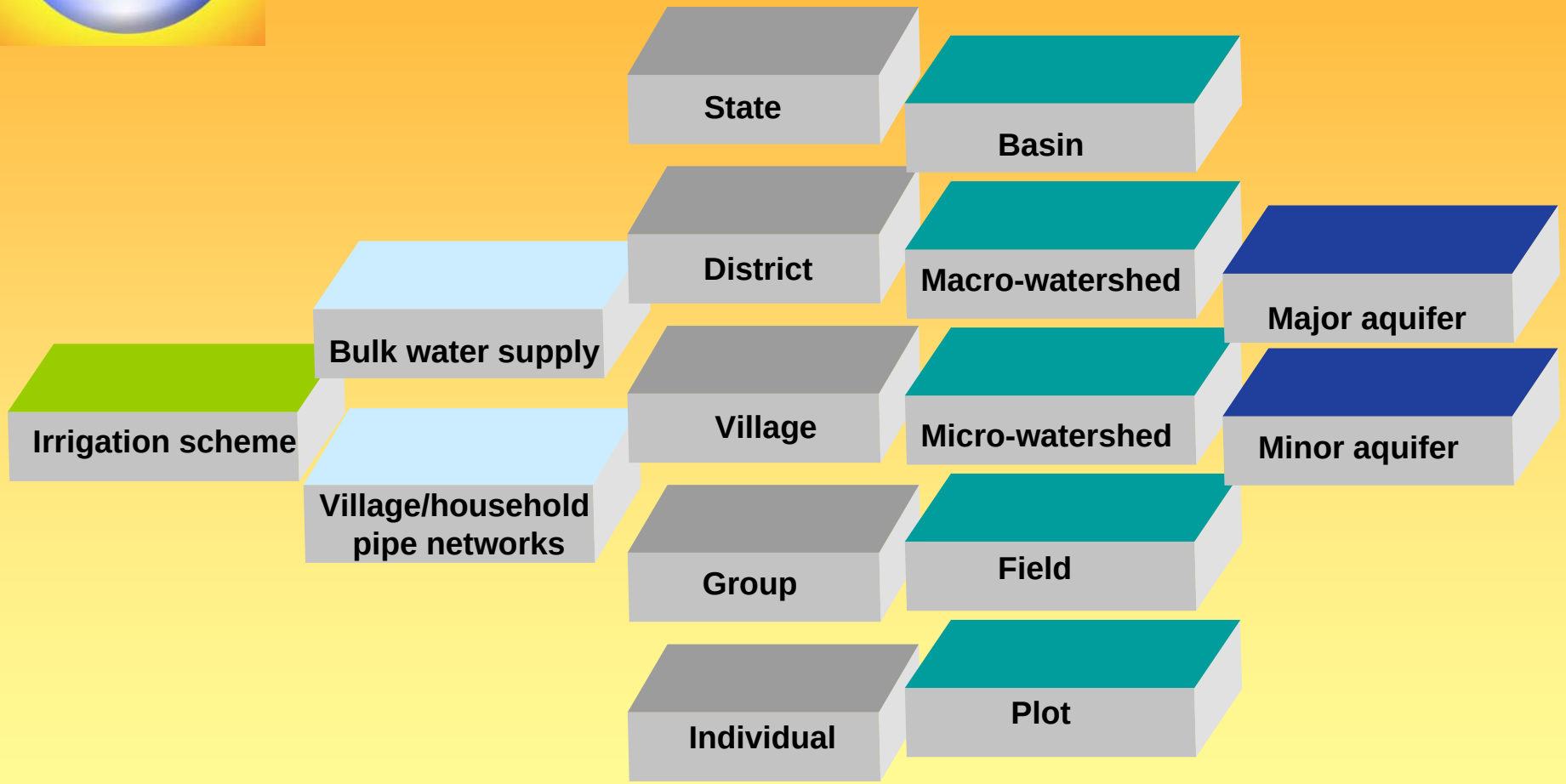
Introduction

Challenges in IWRM

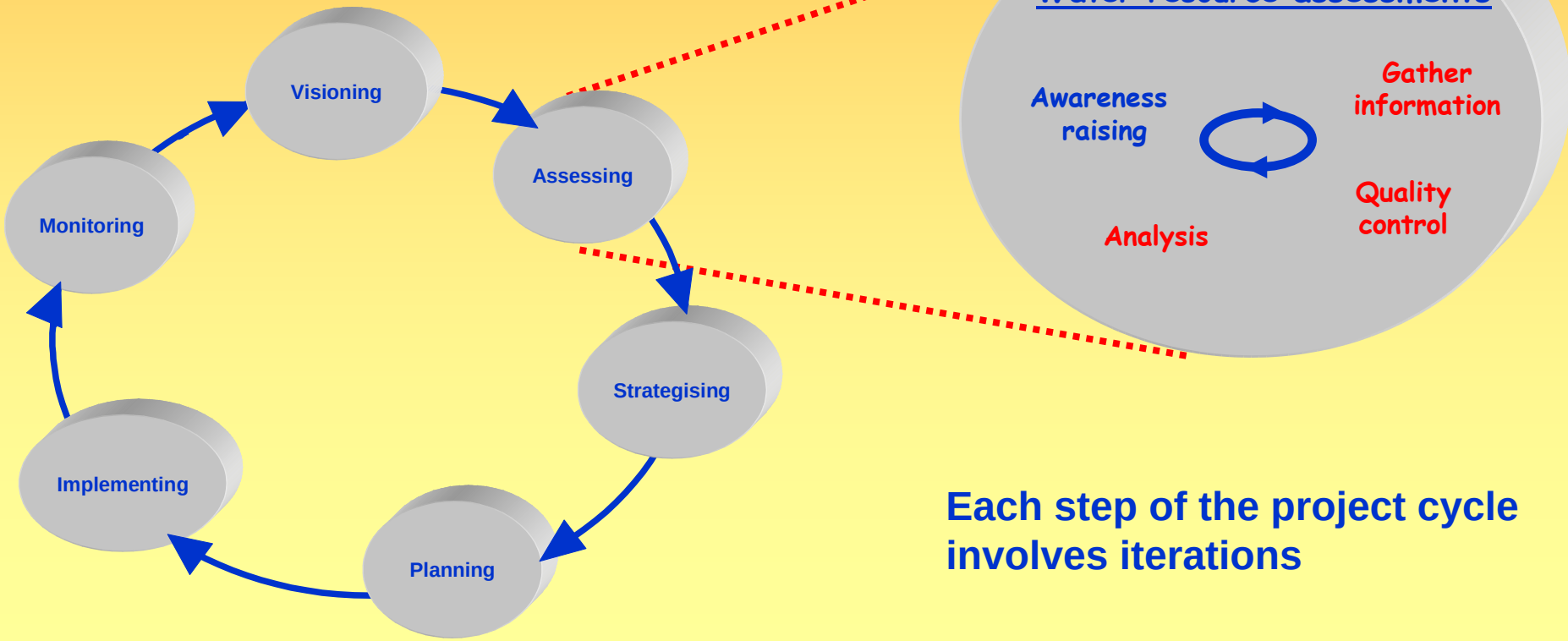
Dealing with:

- Scale/levels
- Sectors
- Variability and uncertainty

Scale/Levels/Sectors/Variability

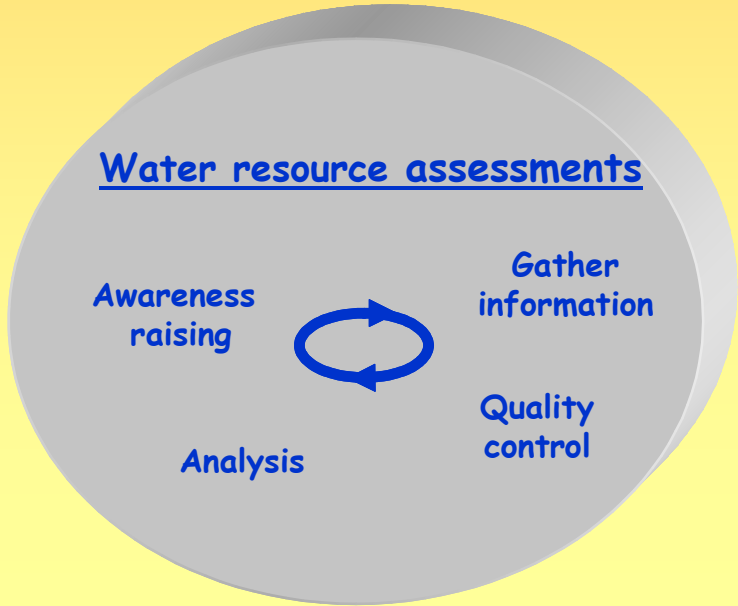


Modified from Batchelor et al, 2002



Each step of the project cycle involves iterations

Step	Objectives	Activities	Tools	Outputs
Step 2 – Assessing	▪ Main causes of water problems identified ▪ Agreed and shared information-base developed	▪ Awareness raising ▪ Identify information sources ▪ Information collection ▪ Quality control and cross-checking ▪ Data storage ▪ Analysis	▪ Data collection ▪ Various PRA tools (maps) ▪ RIDA analysis ▪ Bayesian networks ▪ Statistical/time series analysis	▪ Report ▪ Summary sheets ▪ Maps ▪ Photographs ▪ Common agreed GIS/Database ▪ Other dissemination materials



Water Resources Assessment

- Knowledge of the current status of water services and resources and trends in demand and use is a precondition for successful water management.
- Understanding of factors affecting patterns of access and entitlement to water resources is fundamental

Water Resources Assessment

- Water resource assessment is a systematic study of the status of water services and resources, and of trends in accessibility and demand within a specific domain of interest.
- Applicable at any relevant level, e.g. village, sub-catchment or municipality
- Known under various different names, such as water accounting and water resource audits

Water Resources Assessment

- Identify the minimum information needs required to make a good decision: minimum acceptable precision and maximum permissible uncertainty
  - Collecting information is expensive – so it must be minimal; problem focussed; structured
- Consolidate, quality control, reconcile, and gap fill information from a wide range of sources
- Establish a common, agreed and trusted information base that can be used by stakeholders as a basis for informed and effective decision making.

Water Resources Assessment

WRAs can help to clarify:

- Current status of water resources at different scales, including inter- and intra-annual variability
- Current water use (including variability), and the resulting societal and environmental trade-offs
- Scale related externalities, especially when patterns of water use are considered over a range of temporal and spatial scales
- Social and institutional factors affecting access to water and their reliability
- Opportunities for saving or making more productive, efficient and/or equitable use of water;
- Efficacy and transparency of existing water-related policies decision-making processes
- Conflicts between existing information sets, and the overall accuracy of government (and other) statistics

Water Resources Assessment

Light (or rapid)	Problem-focussed	Comprehensive
Initial identification of priority problems	Focussed on an individual problem or a group of problems. Usually follows on from a light water resource assessment	Aimed at developing a comprehensive water-related information base that covers all water related issues with a given area of interest
Initial assessment of relatively easily accessible quality-controlled secondary data. Primary data collection restricted to gap filling	Detailed assessment of quality controlled secondary data with additional primary data collected if necessary	Comprehensive consolidation, quality control and assessment of secondary data. Primary data to fill gaps and, in some cases, as part of a long-term M&E programme
Secondary data, and rapid appraisal techniques for collecting societal information	Targeted rapid or participatory appraisal techniques for collecting information that is specific to problems	Participatory appraisal techniques for collecting societal information, and detailed measurement of physical
Initial assessment of causes of problems	Detailed assessment of root causes of individual problems	Detailed assessment of root causes of problems, linkages between problems and externalities that influence water availability and use

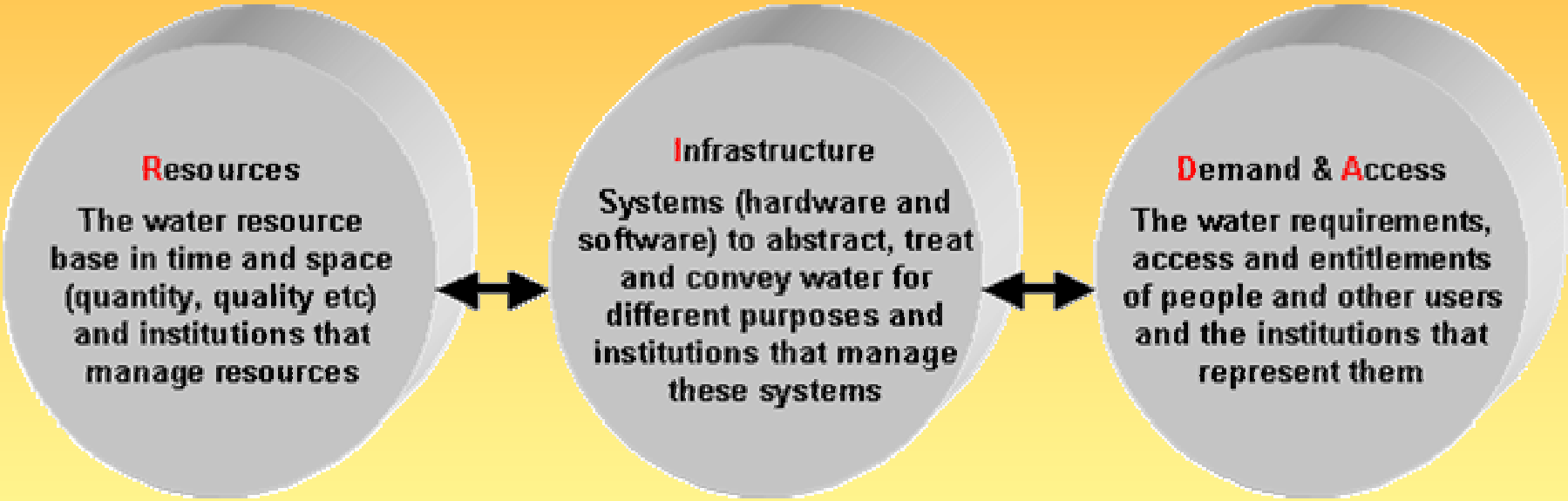
Water Resources Assessment

- In order to clarify these issues, a WRA needs to look into:
  - Current demand for, and access to, water of all the main water users and uses (including the environment)
  - Current capacity of supply and storage infrastructure
  - Current water resource availability
- Time series and sensitivity analysis

RIDA framework

- RIDA is a framework to structure water resource assessments
- Based on the understanding that water **resources** are linked to **users** by supply (and disposal) **infrastructure**

RIDA framework



RIDA framework

- Deals with different scales and boundaries
  - Catchment boundaries and administrative boundaries
  - Catchment scale and local scale
  - Temporal variability and reliability
- Systematically dealing with multiple sources for multiple uses

RIDA framework

- An initial step in performing a WRA is to specify the spatial and temporal boundaries
- Define the boundaries according to scales and units that are most consistent with effective action
- Sometimes best to work according to administrative units, sometimes hydrological units
- RIDA structure can prove helpful in identifying the relevant institutional boundaries and scales
- GIS can help analyse and present information on the basis of both administrative and hydrological units

Doing a RIDA analysis – an example for domestic water supply

- In the village (demand and access)
  - How much water do people get every day?
    - Water metre reading
    - Using buckets to measure
    - Water use diary
  - Are there major differences in the access of different user groups?
    - Social mapping
    - Household water use surveys
  - How much water would people LIKE to get/ be willing to pay for?
    - Focus group discussions
  - How reliable is the supply?
    - Focus group discussions
  - Is the quality acceptable?
    - Focus group/ household discussions
    - Water quality testing
  - What are the key institutions involved in managing access to the supply?
    - Social mapping

- At the water works (infrastructure)
  - What is the design supply capacity of the network?
    - Discussions with engineers
    - Plans
  - How much water is supplied (put into the system)
    - Metre readings
    - Manager assessment
  - What is the quantity/proportion of unaccounted for water?
    - Records
    - Estimates
  - What are the key institutions involved in managing water supply?
    - Interviews
    - Reports, etc

- At the river/aquifer (resources)
  - What is the quantity/quality of water available for the water supply system? Are there issues with variability?
    - Hydrological data
    - Expert opinion
  - What is the licensed/permitted limit to abstraction
    - Expert opinion
    - Reports, etc
  - Who are the main actors/institutions involved in water resource management?
    - Key informant interviews etc.

RIDA framework

- Computer models may be useful in carrying out a RIDA analysis
- Examples of EXCEL information:

	Demand and Access	Year 1	Year 2
Domestic	Population	30,000	50,000
	Average per-capita actual use (lpcd)	15lcd	
	Range of per-capita actual water use (lpcd)	8-40	40-60
	Actual use, total (m^3/yr)	**164,250**	
	Average demand (lpcd)	50lcd	
	Demand, total (m^3/yr)	**574,500**	**912,500**
	% households on network	75	
	% households unserved	15	
	Acceptability	Low	
Agricultural	Total cultivated area (donum)		
	Gross irrigated area (donum)		
	Net irrigated area (donum)		
	Potential water requirements(m^3/yr)		
	Actual irrigation water use (m^3/yr)		
	Livestock water use (m^3/yr)		
	Actual use, total (m^3/yr)		
	Demand, total (m^3/yr)		
Industrial	**Actual use total (m^3/yr)**		
	Demand total (m^3/yr)		
Other	**Actual use total (m^3/yr)**		
	Demand total (m^3/yr)		
Total actual use	**(m^3/yr)**	**164,250**	
Total demand	**(m^3/yr)**	**574,500**	**912,500**

	Infrastructure	Year 1	Year 2
Domestic	Design supply capacity (lpcd)	30	50
	Design supply capacity **(m^3/yr)**	**328,500**	**547,500**
	Av. % losses	25%	10%
Sanitation	Type		
	% access or coverage		
Agricultural	Design supply capacity **(m^3/yr)**		
	Av. % losses		
Industrial	Design supply capacity **(m^3/yr)**		
	Av. % losses		
Other	Design supply capacity **(m^3/yr)**		
	Av. % losses		
Storage	Volume surface water storage (m^3)		
Total (actual)	**(m^3/yr)**	**246,375**	**912,500**
Total (design)	**(m^3/yr)**	**328,500**	**821,250**

Resources

Rainfall	Av. Annual rainfall (mm)		Standard deviation		
		Domestic	Agricultural	Industrial	Other
Springs	Av. Annual yield (m^3/yr)	50,000			
	% acceptable water quality				
Groundwater	Av. Annual sustainable yield (m^3/yr)	250,000			
	% acceptable water quality				
Surface water	Av. Annual availability (m^3/yr)	75,000			
	% acceptable water quality				
Wastewater	Av. Annual availability (m^3/yr)				
	% acceptable water quality				
Desalination	Av. Annual availability (m^3/yr)				
Transfer	Av. Annual availability (m^3/yr)				
Total	Annual availability all sources (m3/yr)	300,000			
	Annual availability - acceptable quality				
Total	**Annual availability all sources (m^3/yr)**	375,000			
	Acceptable quality all sources (m^3/yr)				

Group exercise

Task

- Identify your unit of analysis
- Look at the summary information sheets
- Fill these out, with the data you have for your local case study area
- Analyse the outcomes
- Identify the institutional factors governing resources, infrastructure and demand
- How do they shape/influence the outcomes identified earlier?

Group exercise

Questions for reflection and discussion:

- What is the most useful unit for analysis: the village, the catchment, the governorate? Why?
- Do you have all required data for different units of analysis? What is lacking?
- Is it necessary to have all the lacking data? Or, is it already possible to draw conclusions based on what you have?
- What are the major outcomes you see as a result of this analysis?
- Does it reveal new insights? Why or why not?