

Innovative Technologies For Integrated Water Resources Management In Africa

Ebenezer D.O. Ansa



Outline of presentation

- Background
- Pollution Monitoring Technologies
- GIS and Social Media Networks
- Pollution Control Technologies
- Criteria for Technology Selection
- Industrial Wastewater Treatment
- Domestic Wastewater Treatment

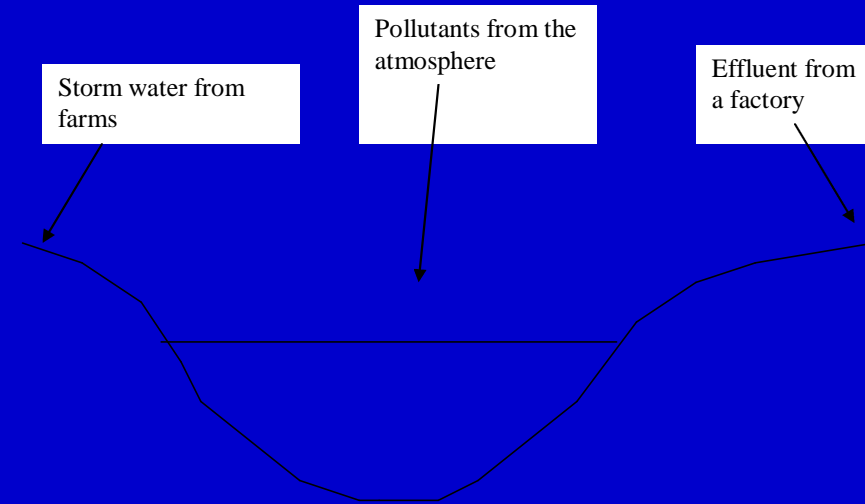
The IWRM Approach

- “The water crisis today is a crisis of managing water so badly that billions of people and the environment suffer badly”
- “Our vision is a world in which all people have access to safe and sufficient water resources to meet their needs, including food, in ways that maintain the integrity of freshwater ecosystems”

Source: World Water Council, 2000

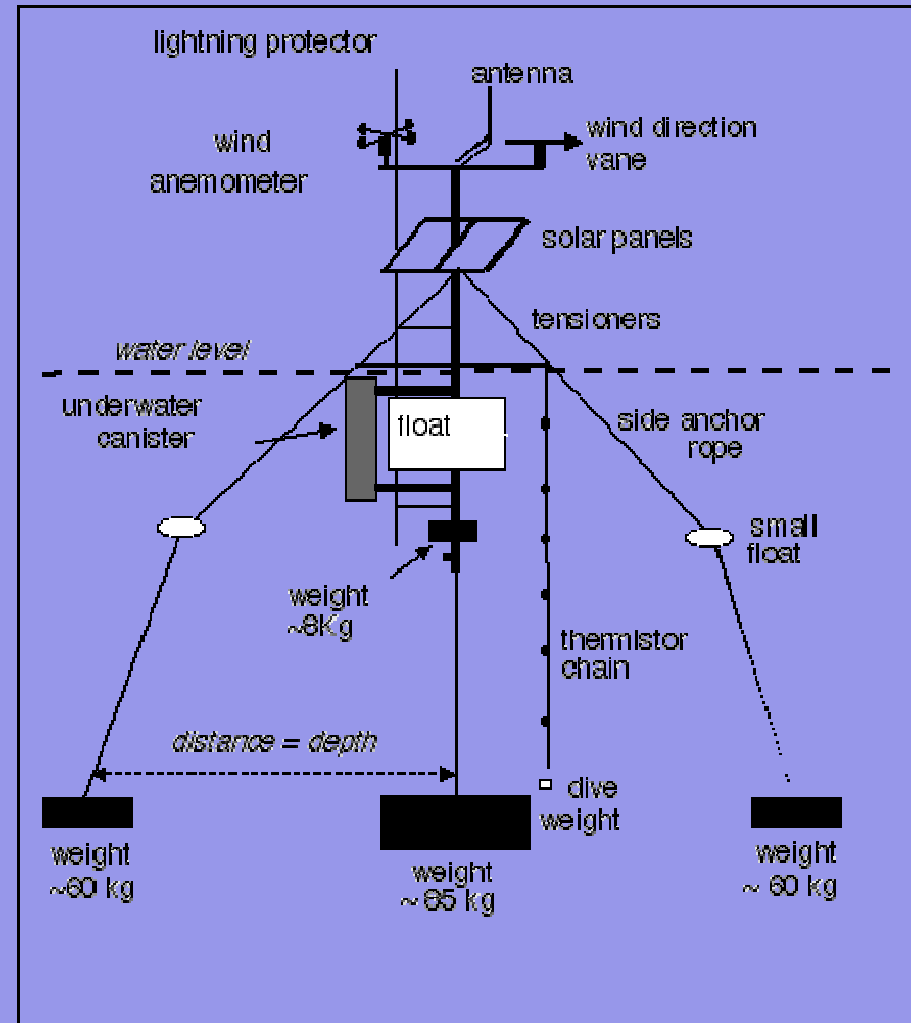
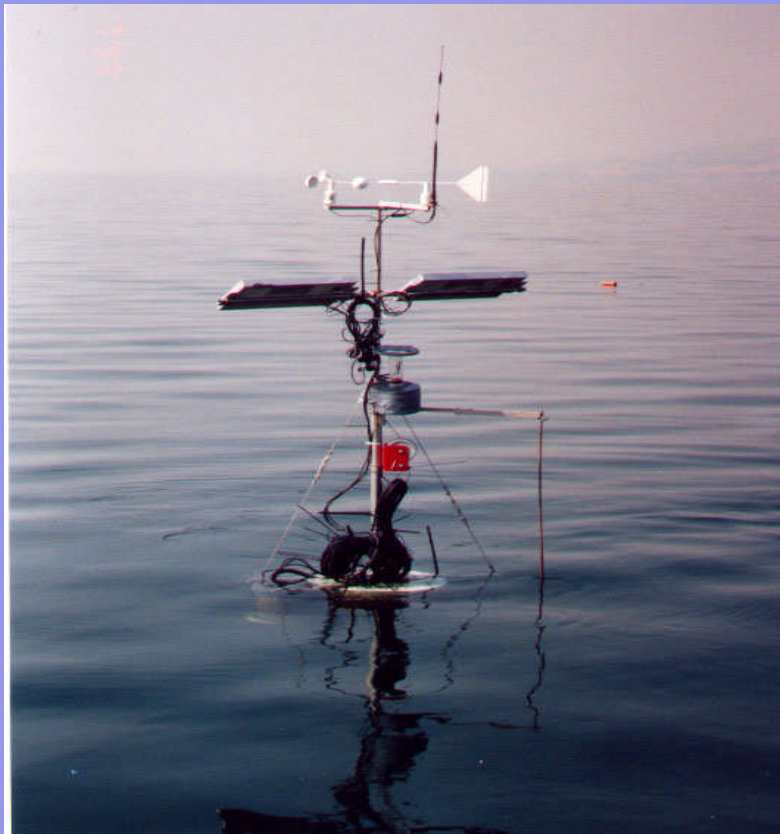
The pollution control concept

- Pollution monitoring
- Pollution control

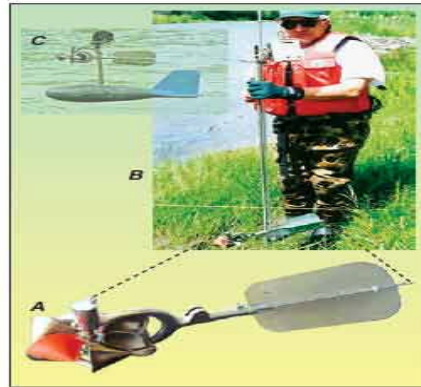


Pollution Monitoring Technologies

- The case of Lake Kinneret, Israel



Monitoring techniques



(Photograph courtesy of Michael Nolan, U.S. Geological Survey)

The current-meter method uses equipment such as (A) the Price AA current meter; (B) the Price AA current meter attached to a wading rod; and (C) the Price AA meter suspended above a heavy weight.

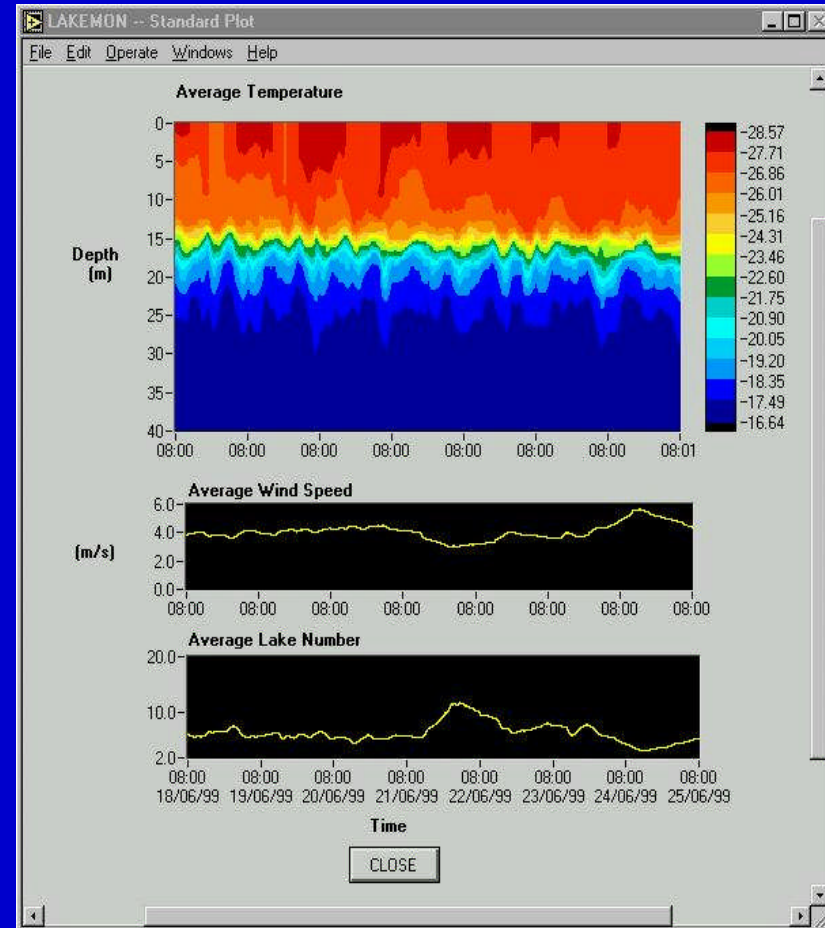
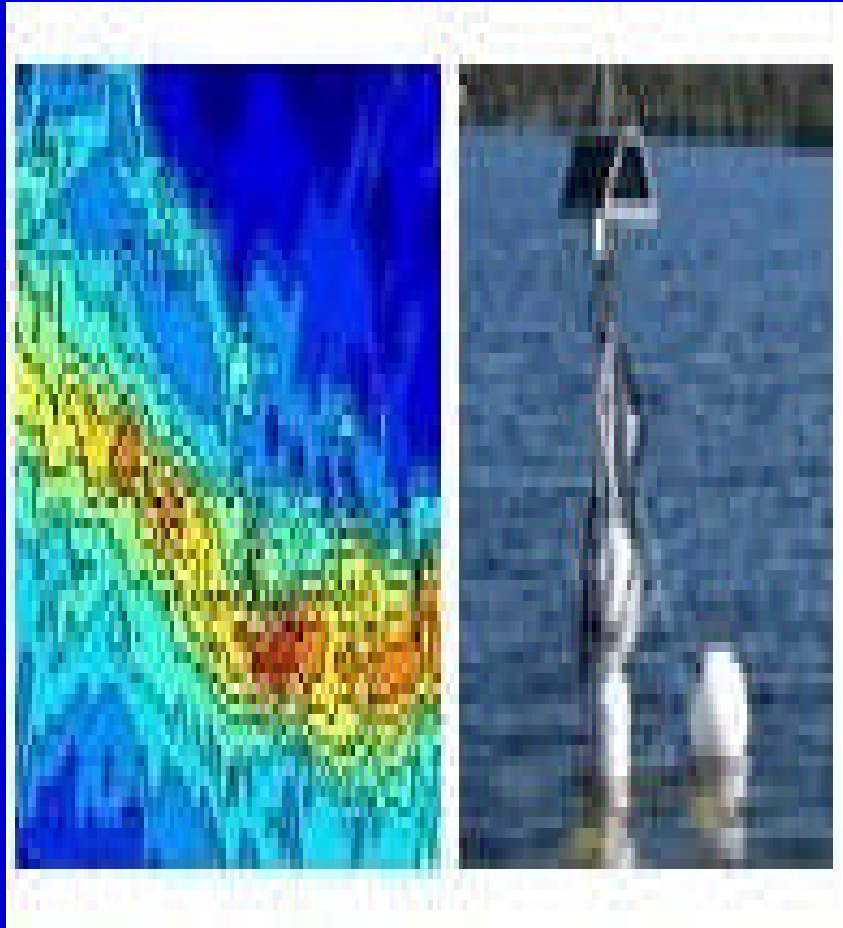


(Photograph courtesy of Michael Nolan, U.S. Geological Survey)

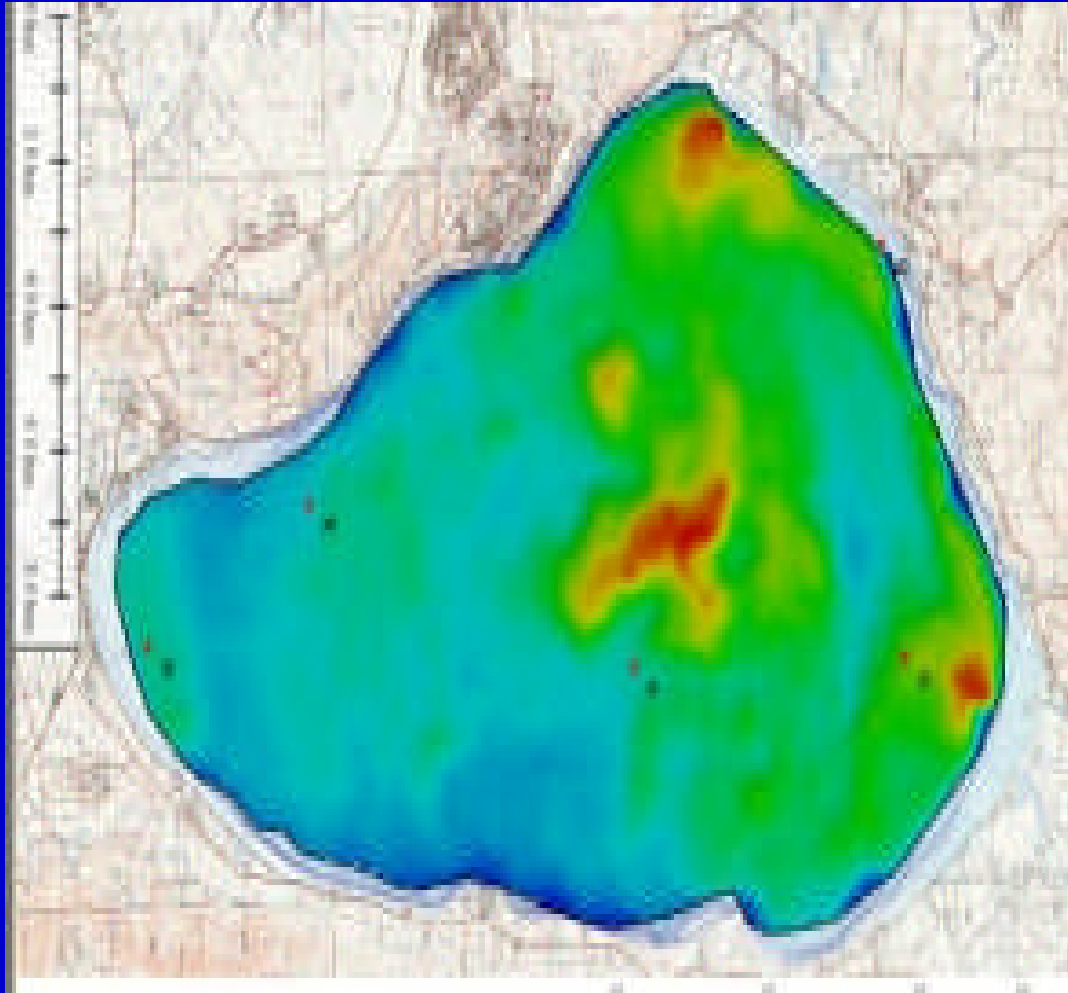
To measure velocity beneath ice, a mechanical current meter with a polymer rotor is attached to an ice rod and submerged through a hole drilled in the ice.



Real Time Monitoring on Lake Kinneret



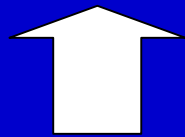
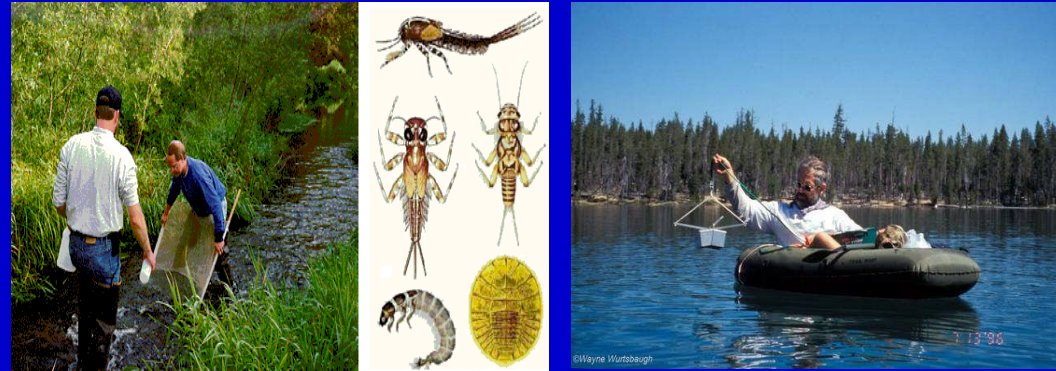
Real Time Monitoring- Chlorophyll-a measurement



Biological Sampling Methods

Example: Benthic organisms

- Tedious
- Time consuming
- Inaccurate



Sorting, identifying
and counting under
dissecting microscope

Sampling in
water with
equipment

Washing and
transferring samples
into bottles

Biological Sampling Methods

New methods



GIS and Social Media Networks in IWRM

twitter

- AWRA meeting to explore possibilities
- Objective includes
- Saving lives
- Water supply
- The environment



Pollution control

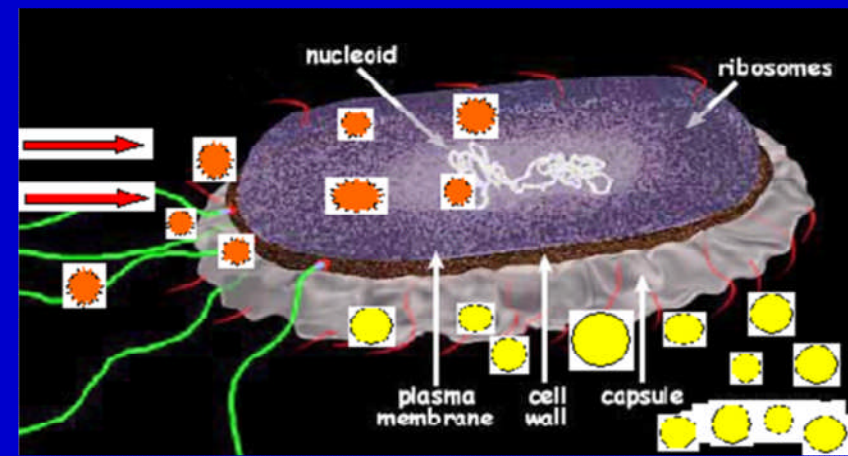
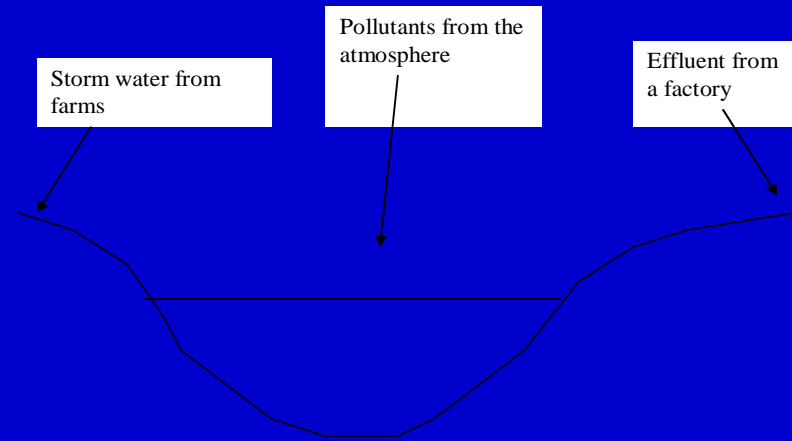
Criteria for technology selection

- Robustness
- Waste generation
- Re-use benefits
- Extent of chemical use and degree of environmental nuisance
- Energy source and other costs

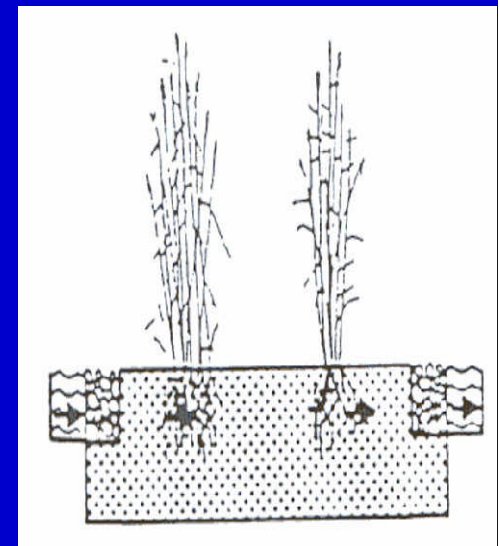
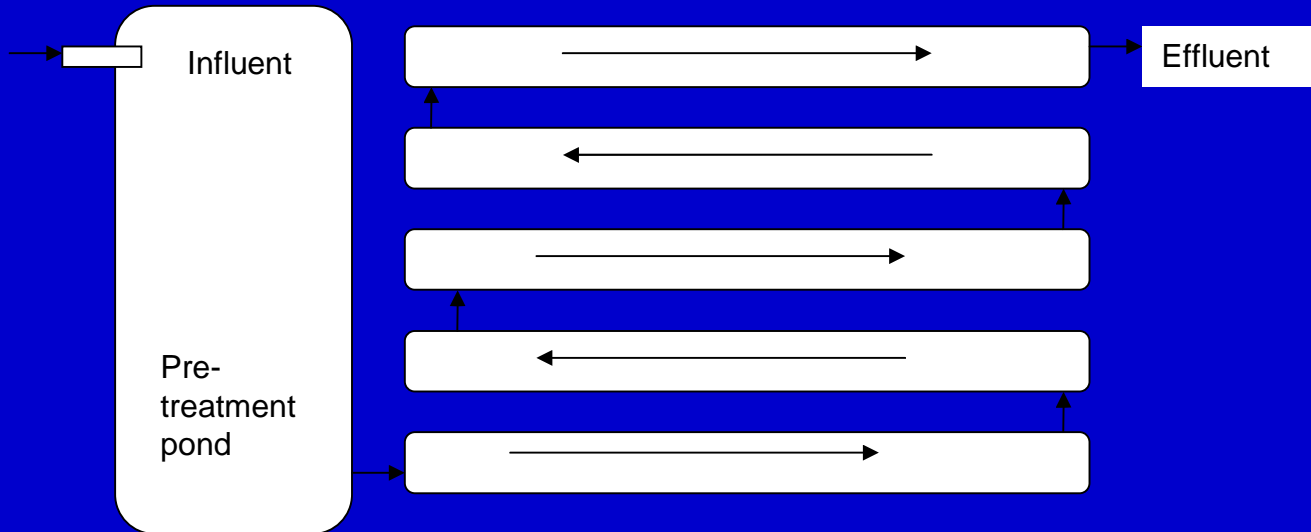
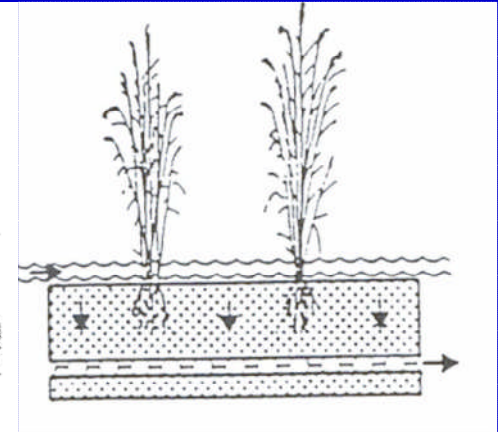
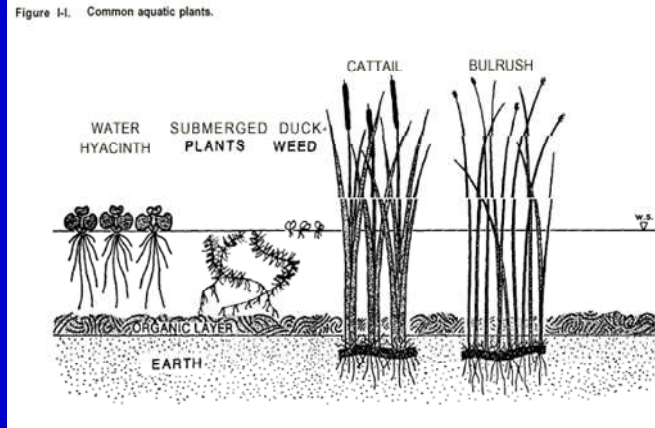
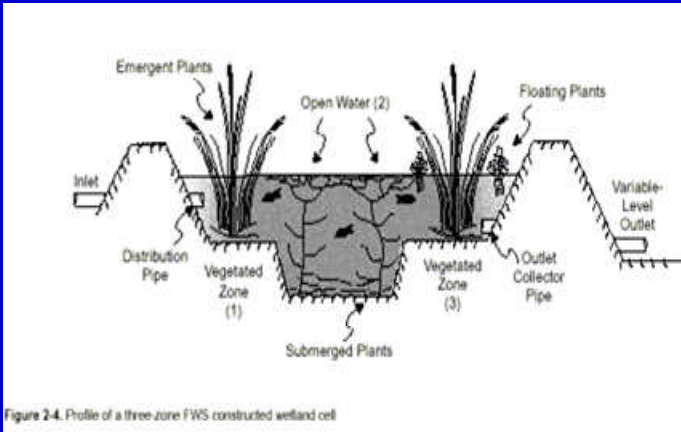
Eco-technologies: What are they ?

- Sustainable systems that operates on ecological principles with benefits to both human society and the environment (University of Washington)
- Engineered systems that utilize the natural functions of wetland vegetation, soils and their microbial populations to treat contaminants in surface water, ground water or waste streams (Interstate Technology & Regulatory Council, USA)

Eco-technologies in IWRM



Industrial effluents and storm water: Constructed Wetlands



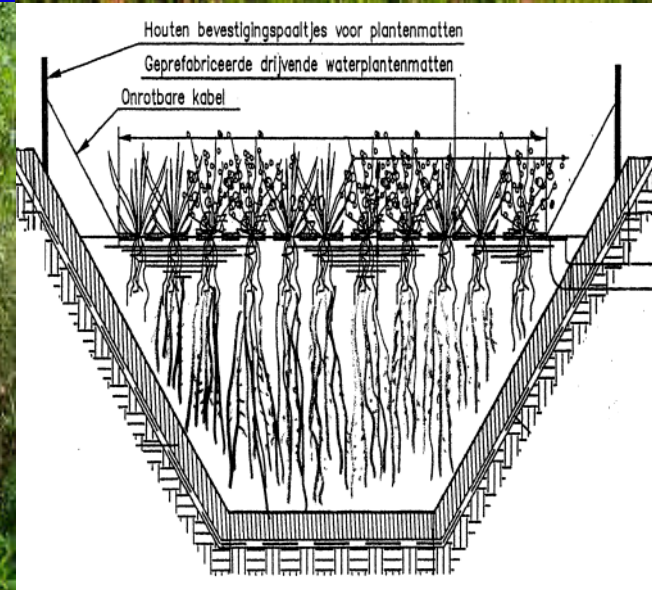
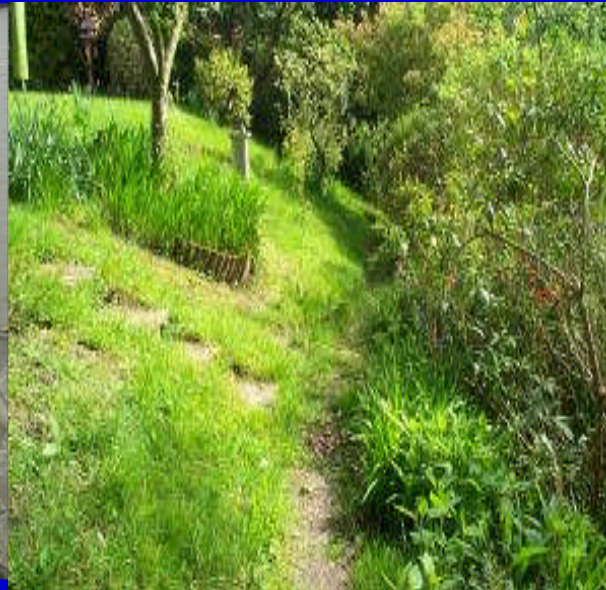
Putrajaya constructed wetland

- 24 wetland cells (200ha)
- Removes agricultural pollutants before entry into adjoining lake.
- Removal by 6 cells were as follows:
 - TN: 82%, $\text{NO}_3\text{-N}$: 71%,
 PO_4 : 84%
- Wetland created a pleasant landscape for eco-tourism and wild life

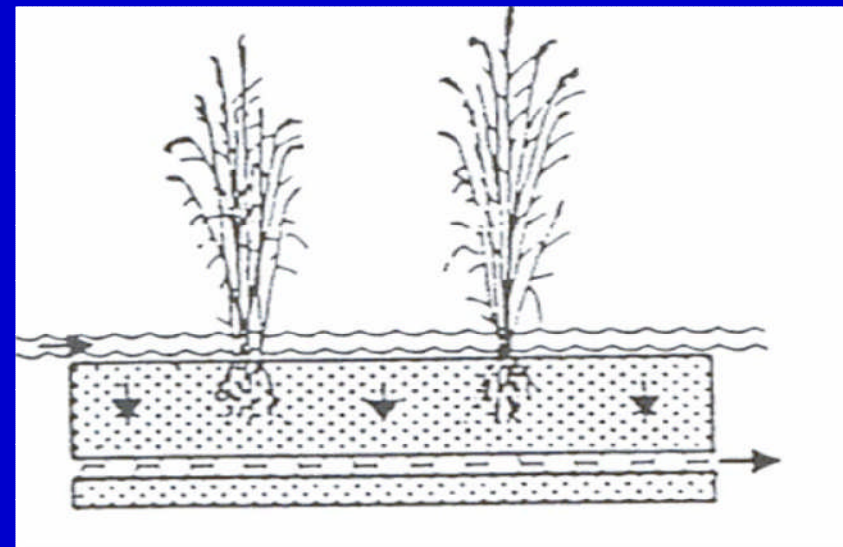
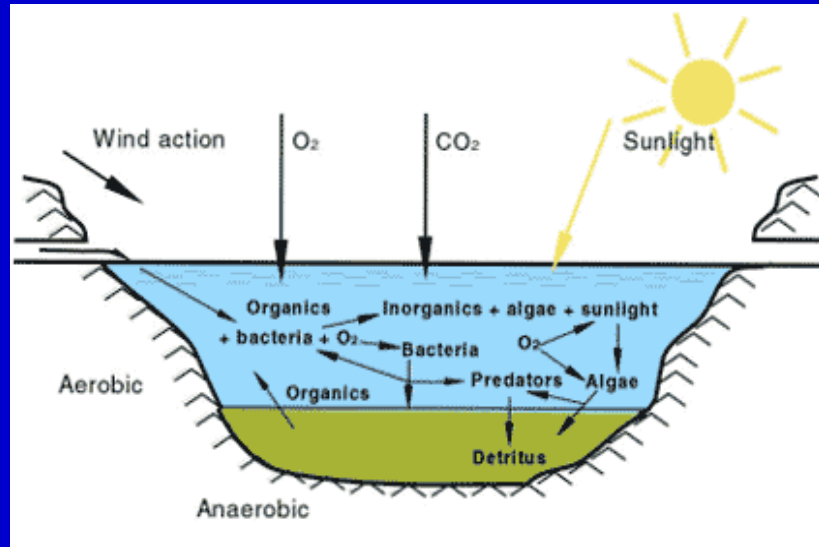


Africa's resource potential in relation to eco-technology use

- Sunshine
- Diversity
- Labour and land

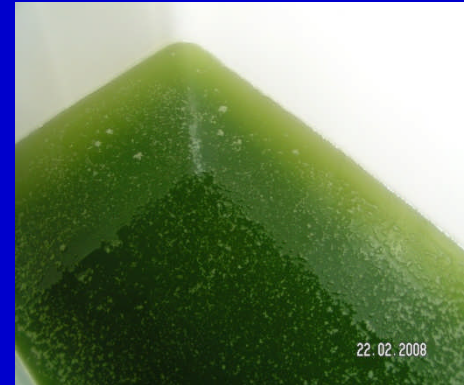


Pollutants from domestic sources



Benefits of combined WSPs and CWs

- Robustness
- High purification rates
- Nutrient removal
- Mosquito breeding
- Aesthetic value
- Erosion
- Economic benefits



Key message

- 70% of water abstraction from basins could be saved in Ghana
- A shift towards use of real time technologies
- Pollution prevention and control is the way forward
- Economic benefits
- Research is essential to adapt these technologies

Thank you