Monitoring of Wetlands: Need and Strategies

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Wetlands

Wetlands are areas that are periodically or permanently inundated by surface or ground water and support vegetation adapted for life in saturated soil. Wetlands include swamps, marshes, bogs and similar areas.

Wetland Types

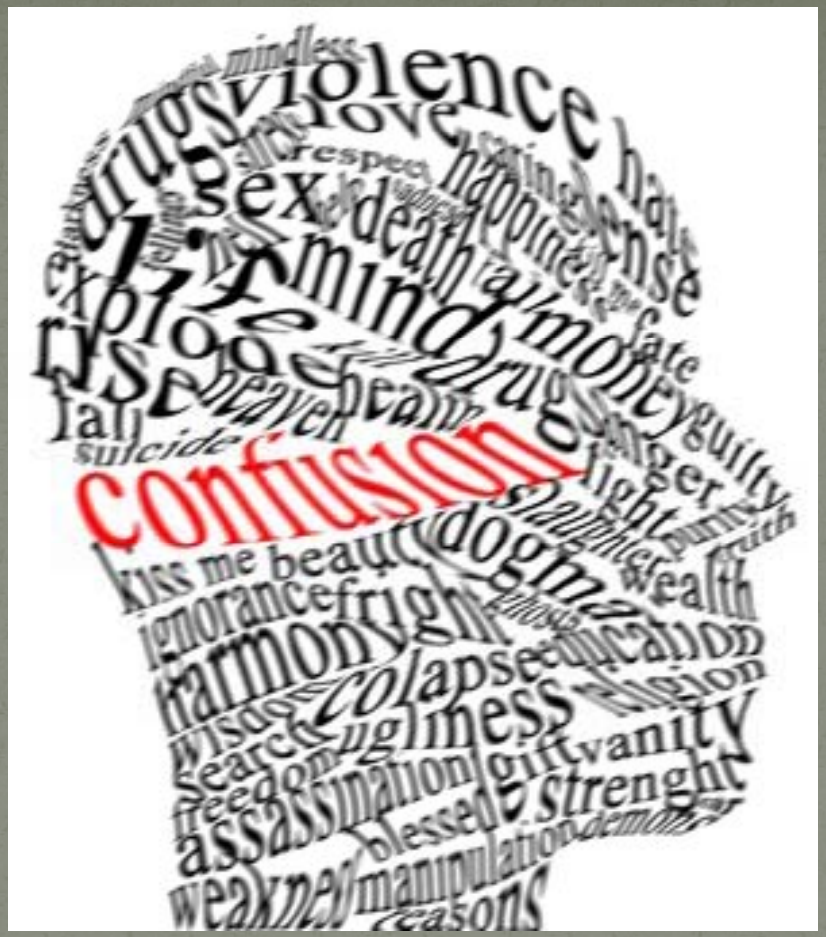
- Inland Wetland Ecosystems
  - Freshwater Marshes
  - Peatlands
  - Freshwater Swamps (Forested)
  - Riparian Wetlands
  - Open Water
- Coastal Wetland Ecosystems
  - Tidal Salt Marshes
  - Tidal Freshwater Marshes
  - Mangrove Wetlands

Kinds of Wetlands

Vary based on geographic location

- **Bog** – peat-accumulating with no inflows or outflows; supports mosses
- **Bottomland** – lowlands along streams and rivers
- **Fen** – ground-water fed; peat accumulating
- **Marsh** – frequently inundated; emergent herbaceous vegetation
- **Mire** – peat-accumulating (Europe)
- **Moor** – peat-accumulating (Europe)
- **Muskeg** – Large expanses of peatlands or bogs (Canada/Alaska)
- **Peatland** – any wetland that accumulates decaying plant matter
- **Playa** – marshlike ponds similar to potholes (southwest U.S.)
- **Pothole** – shallow, marshlike pond; found in Dakotas and Canada
- **Reedswamp** – marsh dominated by common reed (Europe)
- **Slough** – swamp or shallow lake system
- **Swamp** – wetland dominated by trees or shrubs
- **Vernal Pool** – shallow, intermittently flooded wet meadow
- **Wet Meadow** – grassland with waterlogged soil near the surface – without water for most of year
- **Wet Prairie** – similar to marsh but water levels intermediate between marsh and wet meadow

Source: Mitsch and Gosselink, 1993.



Do NOT bother too much about the names

Wetland Values

- Maintain biodiversity
- Maintain water quality
- Support commercial fishing
- Reduce flood damage
- Bird watching, Boating
- Aesthetic value

Wetland Values

Habitat : Nesting, spawning, rearing and resting sites for aquatic and land species, food chain production

Hydrology: Protection of other areas from wave action and erosion, storage areas for storm water and flood water, ground and surface water aquifer recharge

Water: Water quality protection

Why to Monitor Wetland???

Do You have a Million Dollar Question ?

?

no

You Should Read More

☹

yes

OK ☺ Proceed

Recap : HSS

I am going to tell you

- Way of Monitoring
- Types of Monitoring
  - Physical and Chemical
  - Biological

Inventory Route Map

Wetland Rapid Assessment

based on maps, literature, some fieldwork

- Area
- Location
- Values
- Threats

analysis

Important values or serious threats identified?

no

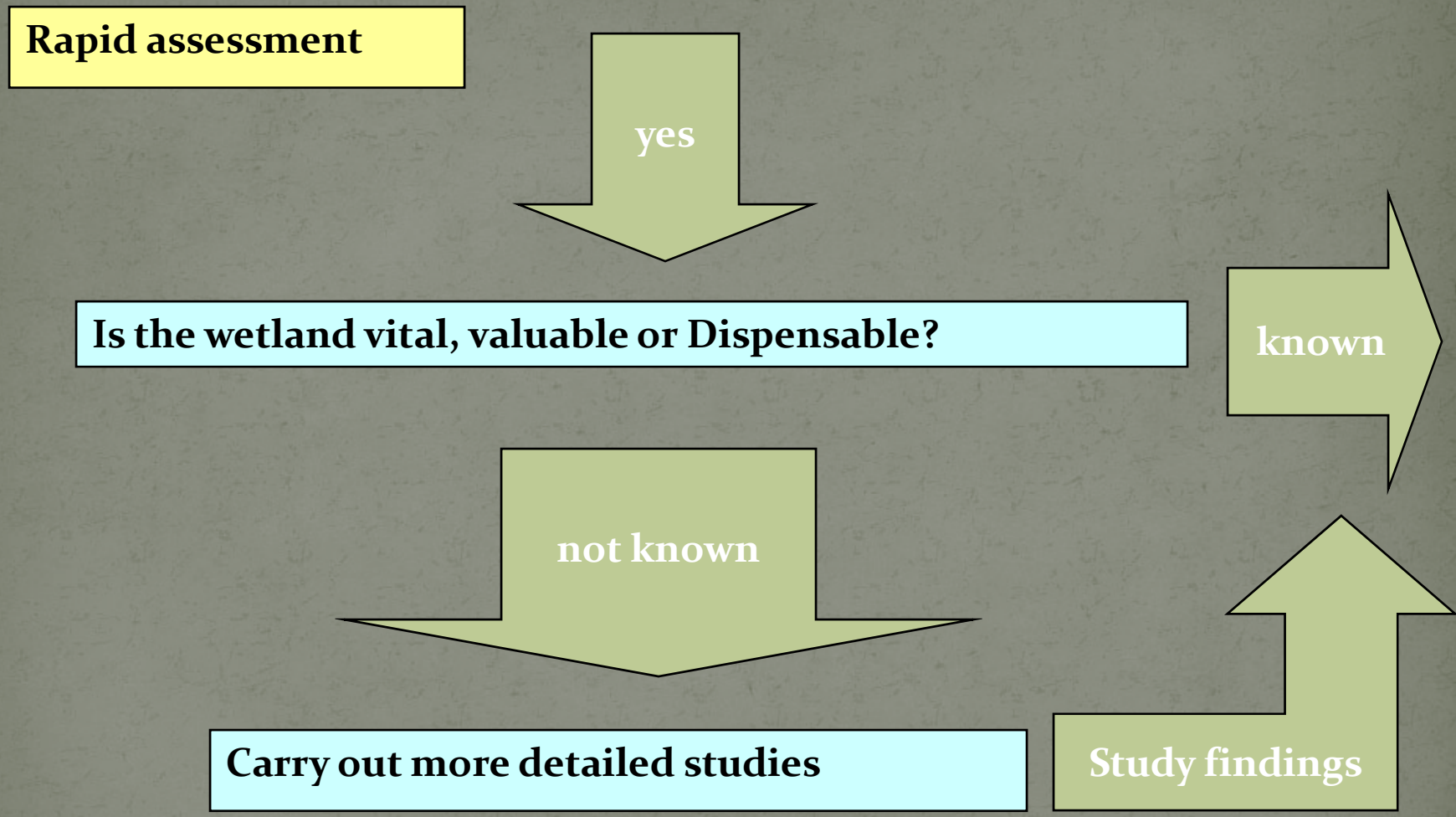
yes

ENJOYABLE

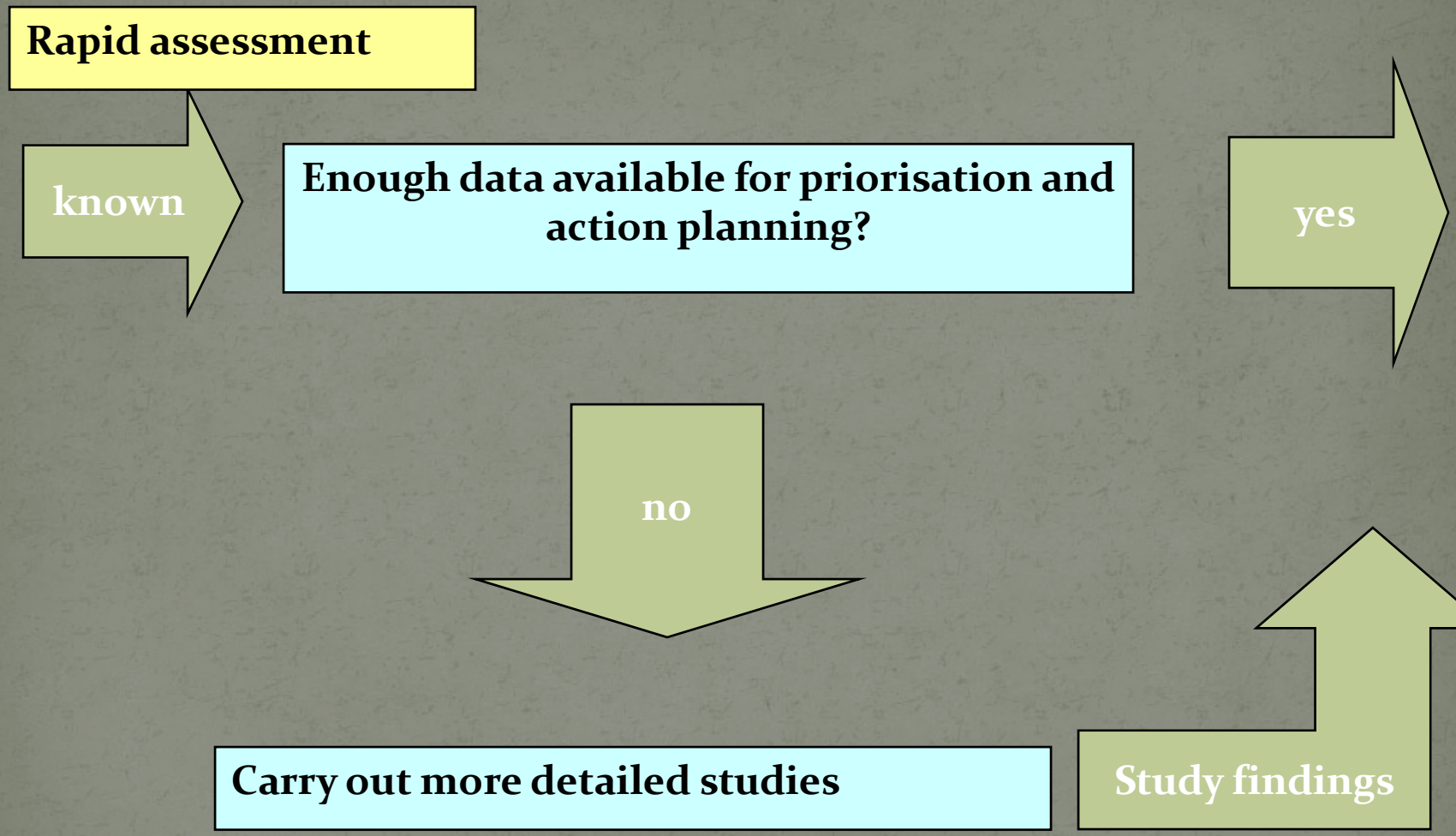

HARD
WORK
AHEAD

Do We get Lunch by at least 4
Fast ….Water Level is raising Man!!
What happen to this instrument @#$%^&*()(*&^

Inventory Route Map.....



Inventory Route Map….



Inventory Route Map

Rapid assessment

yes

Start action planning according to table below

Status

Importance	Threatened	Not threatened	Vanquished
Vital	**Restore**	**Monitor strictly**	**Restore**
Valuable	**Ensure wise use**	**Monitor**	**Restore**
Not Important	**Encourage wise use**	**Monitor?**	**Forget for the time being**

Inventory Route Map

Wetland Rapid Assessment

analysis

Important values or serious threats identified in Rapid Assessment?

no

Inventory Route Map

Rapid assessment

no

No immediate action, but reassess during

Detailed Wetlands Inventory

how

Inventory Route Map

Detailed Wetlands Inventory

how

- Regional Level
- General overview of all wetlands
- Develop data storage system
- Think about monitoring and updating

what

Inventory Route Map

Detailed Wetlands Inventory

- Area
- Location
- Wetland type
- Basic features
  - hydrology
  - ecology
- Uses
  - what
  - who
  - impact

- Land-use/cover
- Ownership
- Land-use around wetland section
  - what
  - how
  - impact on wetland
- Conservation status
- Level of threats on
  - hydrology
  - ecology

Inventory Route Map

Detailed Wetlands Inventory

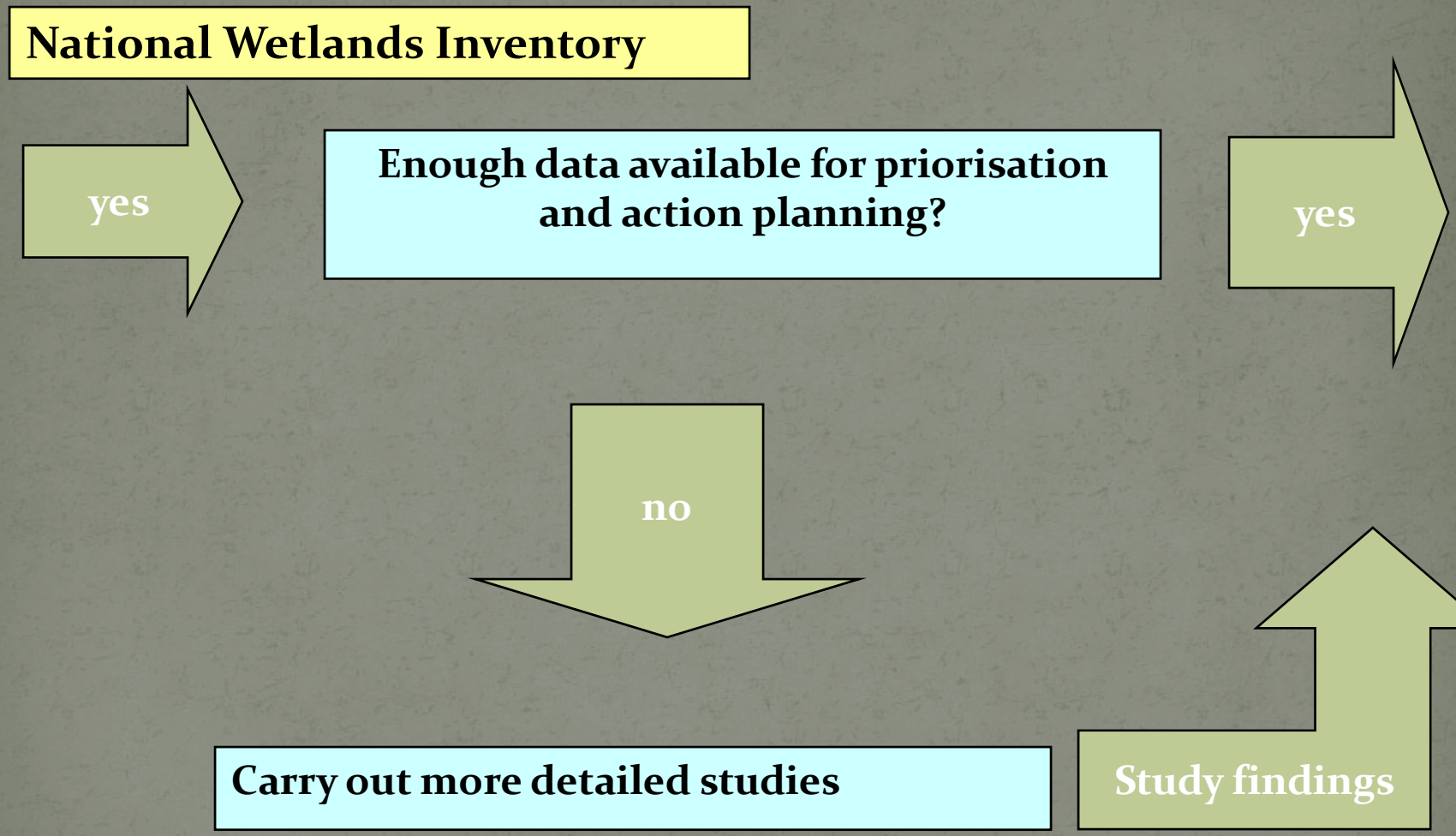
Important values or serious threats identified for specific wetlands in Detailed Wetland Inventory?

yes

no

Monitor

Inventory Route Map



Inventory Route Map

Detailed Wetlands Inventory

yes

Follow table below for action planning

Importance	Threatened	Not threatened	Vanquished
Vital	**Restore**	**Monitor strictly**	**Restore**
Valuable	**Ensure wise use**	**Monitor**	**Restore**
Dispensable	**Encourage wise use**	**Monitor ?**	**Forget for the time being**

Status

Am I confused Enough ?????
Take a break for few Seconds.....

Any Issues?

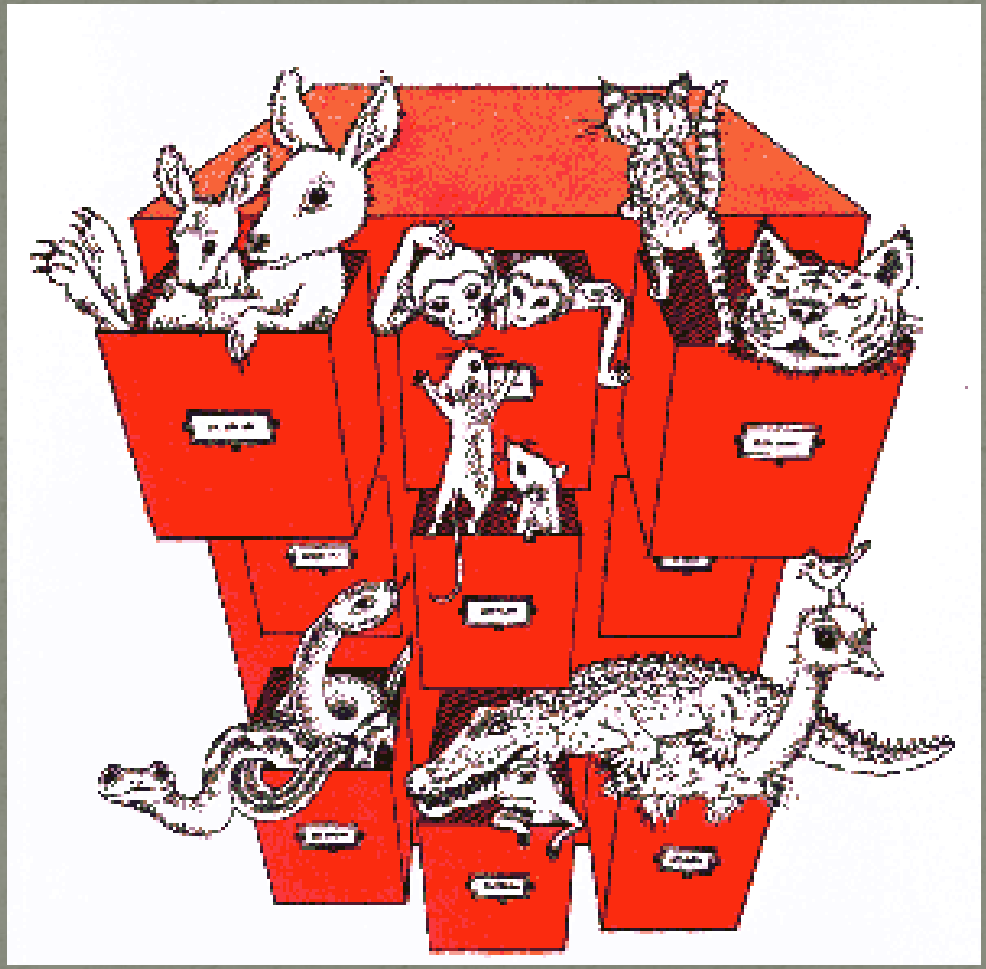
Types of Monitoring

1. **Biological quality elements** (diatoms, macro-invertebrates, fish,etc)
2. **Hydromorphological quality elements** (water flow, bed structure, etc)
3. **Physico-chemical quality elements** (temperature, salinity, conductivity, N, P, etc)

Biological quality elements

	Benthic Invertebrates	Diatoms	Fish	Phytoplankton
MEASURED PARAMETERS	composition, abundance diversity and presence of diversity taxa	composition and abundance presence of diversity taxa	composition and abundance, sensitive species diversity, age structure	composition, abundace and planctonic blooms, presence of sesitive taxa
SAMPLING METHODOLOGY	KA Subramanian	Under development	nets	integrated sample(3-4 m), depth sample
TYPICAL SAMPLING FREQUENCY	6 month/ annualy	quaterly /6 monthly	annual	monthly/ quaterly

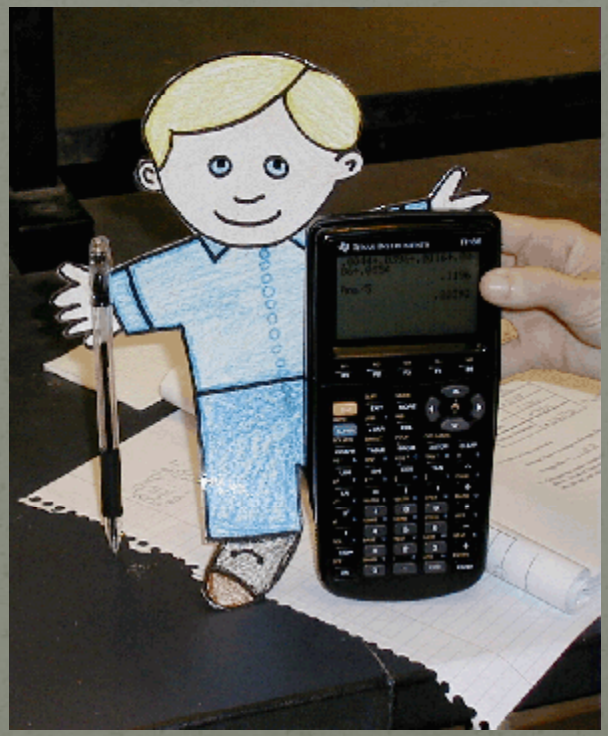
Sort and Identify



Hydromorphological quality elements

	Quality and dynamics of water flow in to lake	Connection to ground water bodies	Lake - River continuity	Lake depth & width variations	Structure and substrate of the lake bed	Structure of the riparian zone
MEASURED PARAMETERS	historical flows, modelled flows, real time flows, current velocity	water table height, surface water discharge	number and type of barrier,and associated provision for fish passage	river cross-section, flow	cross-sections, particle size and location of cwd	length, width, species present, continuity, ground cover
TYPICAL SAMPLING FREQUENCY	in-situ ,real time	6 months, depending on climatology, and geology	every 5-6 years	annual	annual	annual

After Hydromorphological Analysis #Calculations



Physico-chemical quality elements

	Thermal condition	Oxigenation conditions	Salinity	Acidification status	Nutrients
MEASURED PARAMETERS	temperature	DO2 (mg/l)	conductivity, Ca concentration	pH,ANC, alcalinity	TP, TN, SRP, NO3+, NO2, NH4
SAMPLING METHODOLOGY	in-situ using submersible probe	same as temperature or sample collection and winklers titration	same as temp	same as temp, sample collection	sample collection in field followed by lab analyses
TYPICAL SAMPLING FREQUENCY	fortnightly/ monthly	fortnightly/ monthly	fortnightly/ monthly	fortnightly/ monthly	fortnightly/ monthly more frequently during flooding

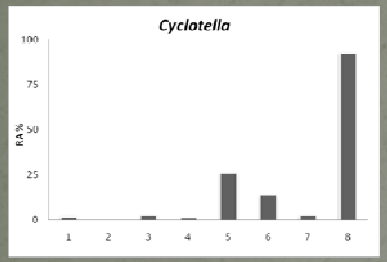
Field Measurements

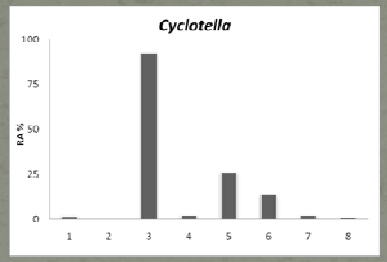
- Dissolved Oxygen (mg/L)
- Water Temperature
- pH
- Conductivity
- Turbidity (NTUs)
- Transparency (cm)

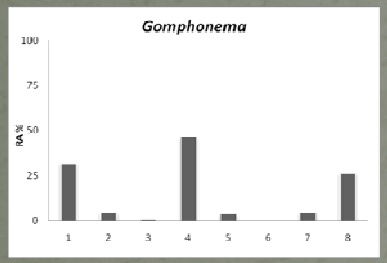
Laboratory Analysis

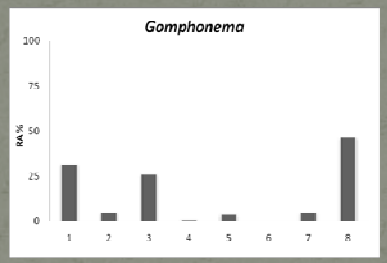
- Total Phosphorus
- Orthophosphorus
- Nitrates and Nitrites
- Ammonia Nitrogen
- Total Kjeldahl Nitrogen
- Fecal Coliform
- Chemical Oxygen Demand
- Sodium
- Potassium

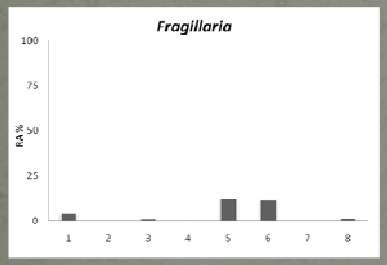
- At the End of the Day
  - Try to figure out the possible relationships among these parameters.

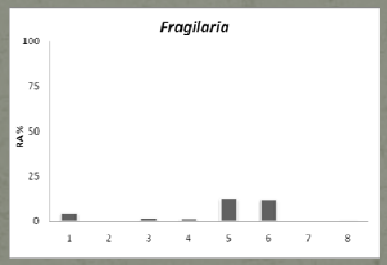


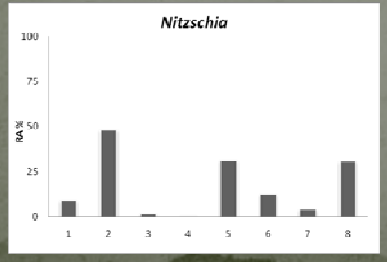


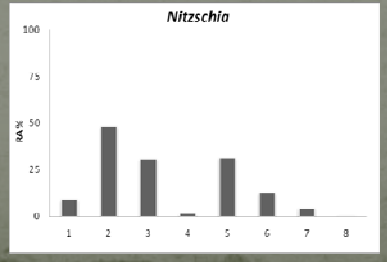


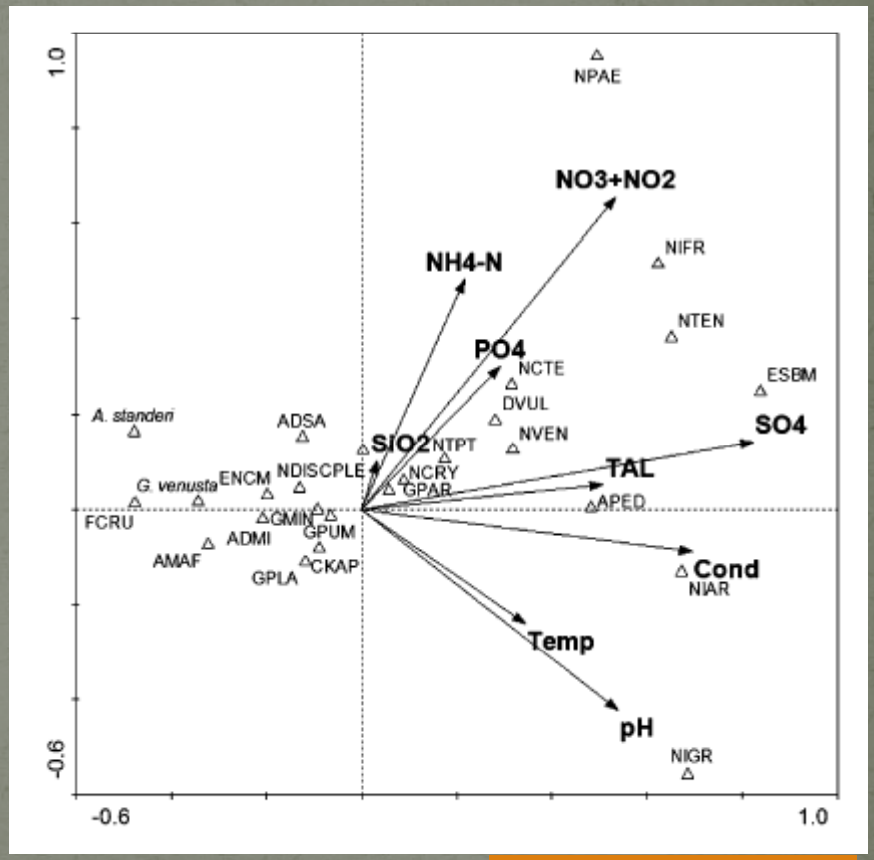












Simple

Little Complicated

Try to get a PRECISE ANSWER for your question.

1. Write Paper
2. Instruct concerned authorities about the condition and possible conservation strategies !

Thanks for your attention

Questions & Discussions.

Write to me:
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