Integrated Lake Basin Management (ILBM) for Meeting the Forgotten Water Governance Challenges

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1978-88: *The appropriate technology phase*

- Issues: Urban sanitation, Community water supplies
- Activities: Low-cost water supply and sanitation

1988-94: *From 'hardware' to 'software'*

- Issues: Sustainability, Community participation and the role of women, Institution-building and human resources development
- Activities: 'Scaling up' and demonstration projects, Promotion of participatory activities

1994-1998: *Promoting the new agenda*

- Issues: Growing urban sanitary crisis, Capacity building, Demand-responsive service provision
- Activities: Structured learning, Urban sanitation, Demand-responsiveness

Water Supply and Sanitation Challgens:

- *IDWWSD* (International Decade for Water Supply and Sanitation:1978—1989)



Interim period toward MDG (1990-2001)



- *MGD* and beyond (2002 - ????)

MDG→*"The future we want: Rio+20"*

- Food security and nutrition and sustainable agriculture (3)
- Water supply and sanitation (22)
- Sustainable cities and human settlements (1)
- Health and population (1)
- Biodiversity (1)
- Desertification, land degradation and drought (2)
- Mountains (1)

The Questions

- Is IWRM adequately addressing the mainstream water issues? → *Lentic waters* and *ILBM*

- How can we improve "Governance"?

  → *ILBM Platform Process*

  → Concept of *ILLBM (Integrated Lentic – Lotic Basin Management)*

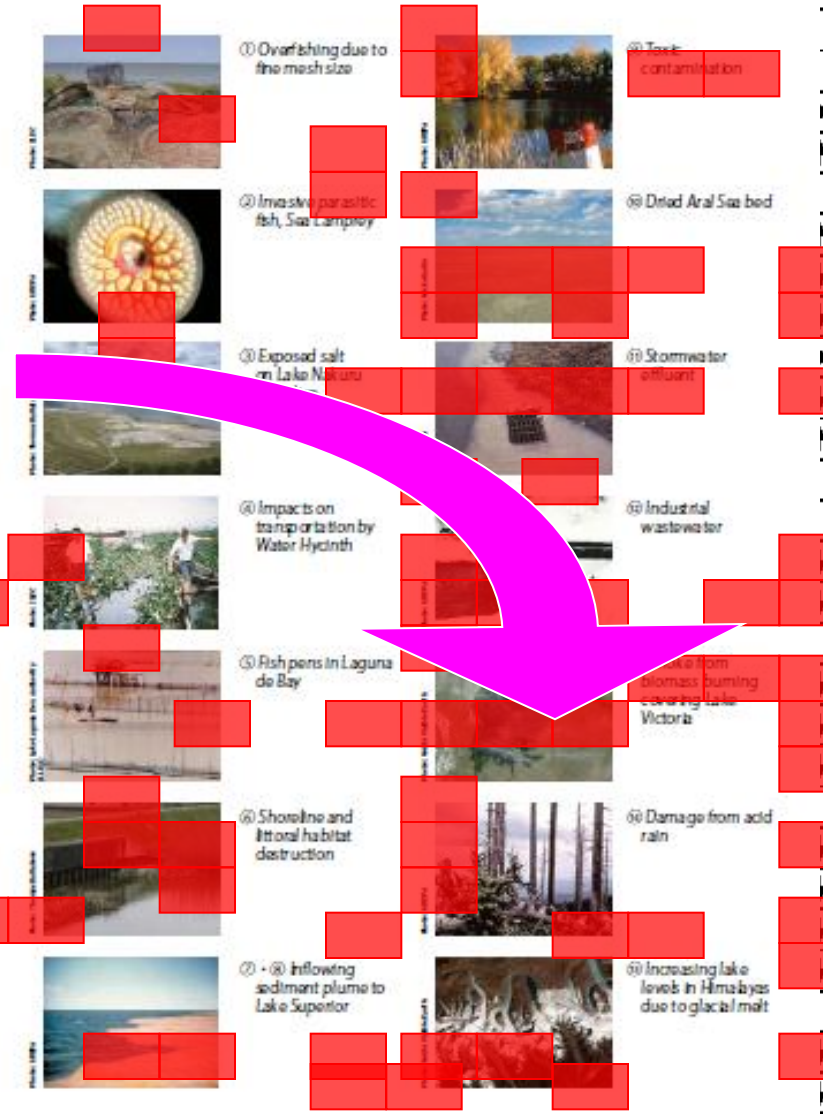
Where do “lakes” fit in in *IWRM*?

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16 Types of Lakes in the World

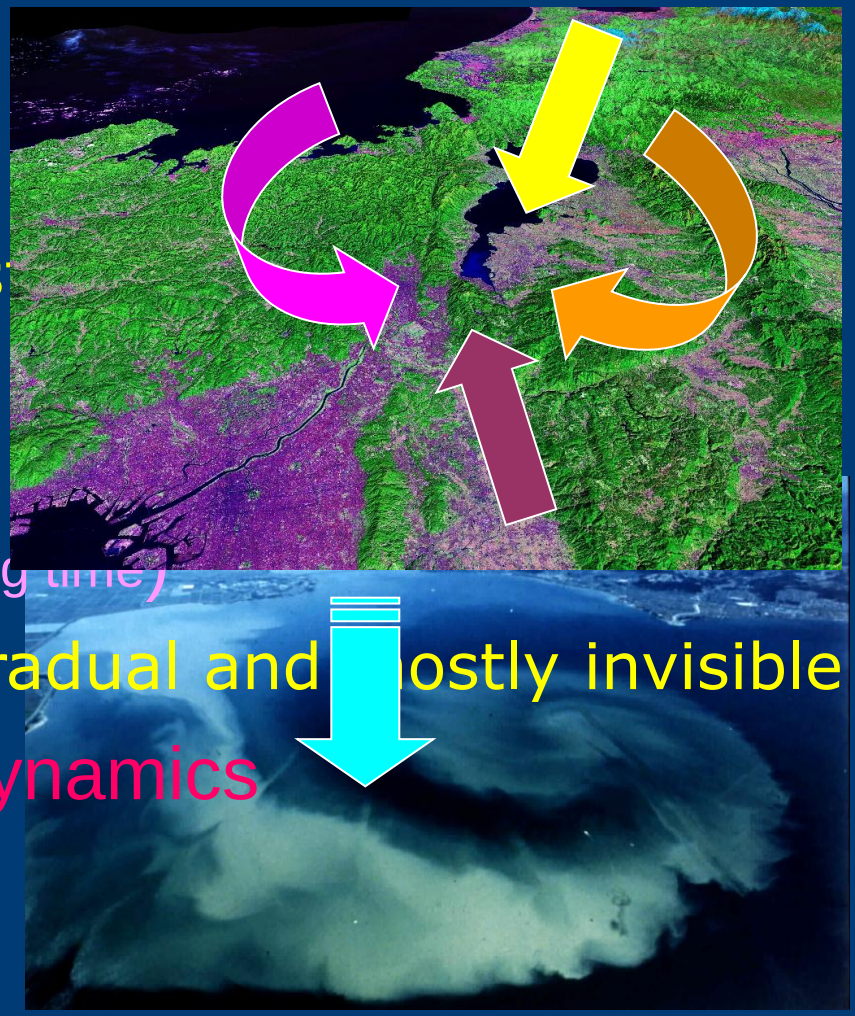
·In-Lake ·Littoral ·Basin ·Global

Lake Basin	Unsustainable fishing practices	Introduced faunal species	Salinity changes	Weed infestations	Nutrients from fish cages	Shoreline effluent discharges	Shoreline industrial discharges	Shoreline water extraction	Loss of wetlands	Excess sediment inputs	Non-point source nutrients	Agro-chemicals	Water abstraction	Changes in run-off	Effluent and stormwater	Industrial pollution	Atmospheric nutrients	Atmospheric industrial contaminants	Climate change
Aral Sea			→																
Baikal																		→	
Baringo	→																		↓
Bhoj Wetland				→															
Biwa																			↓
Chad																			↓
Champlain																		→	
Chilika Lagoo			↑	↑															
Cocibolca/ Nic																			
Constance		↓																	
Dianchi																		→	
Great Lakes (N		↓														→		→	
Issyk-kul		→														↓ 4			↓
Kariba Reserv																			↓
Laguna de Ba	→	↓	→	→												→			
Malawi/Nyasa	↓ 5			↓													↓		↓
Naivasha	↑	→		↑													↓		
Nakuru																			
Ohrid	→	↓																	
Peipsi/Chudsl	↓			→												→ 6			
Sevan	↓	↓																	
Tanganyika	↓ 5																		↓
Titicaca		↓														↓			
Toba	↓	↓		↓													↓		
Tonle Sap	↓	↓																	
Tucurui Reservoir				→															
Victoria	→	↓ 8		↑												↓ 4	↓		
Xingkai/Khanka	↓															↓ 9			
Total Occurrences	12	10	3																



Unique Features of Lakes

- Integrating Nature
  (Everything comes together)
  → 1. Issues are mos
- Long Retention Time
  (Problems remain long, and
  finding solutions also takes long time)
  → 2. Changes are gradual and mostly invisible
- Complex Response Dynamics
  (Everything affects
  everything else in water)
  → 3. Often unpredictable and uncontrollable



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ILBM Principles:

- “Lentic Water System” Principle
- “Change in Resource Value” Principle
- “Ecological Service” Principle
- “Governance Improvement” Principle

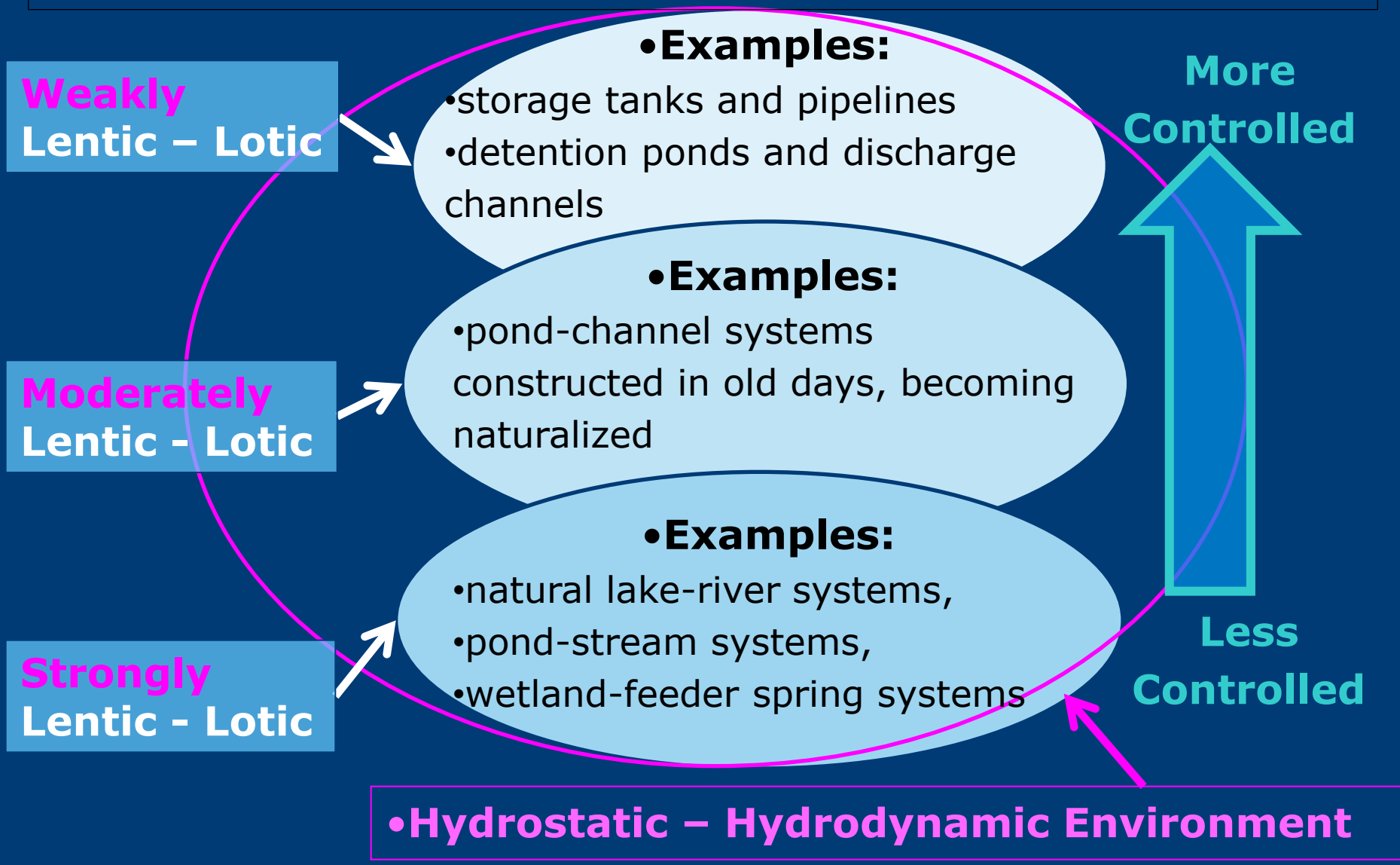
- Hydrostatic – Hydrodynamic

the expression of physical state of water

- Lentic – Lotic

  the expression of ecological and anthropogenic states of water with evolutional and historic memories of human-nature interaction

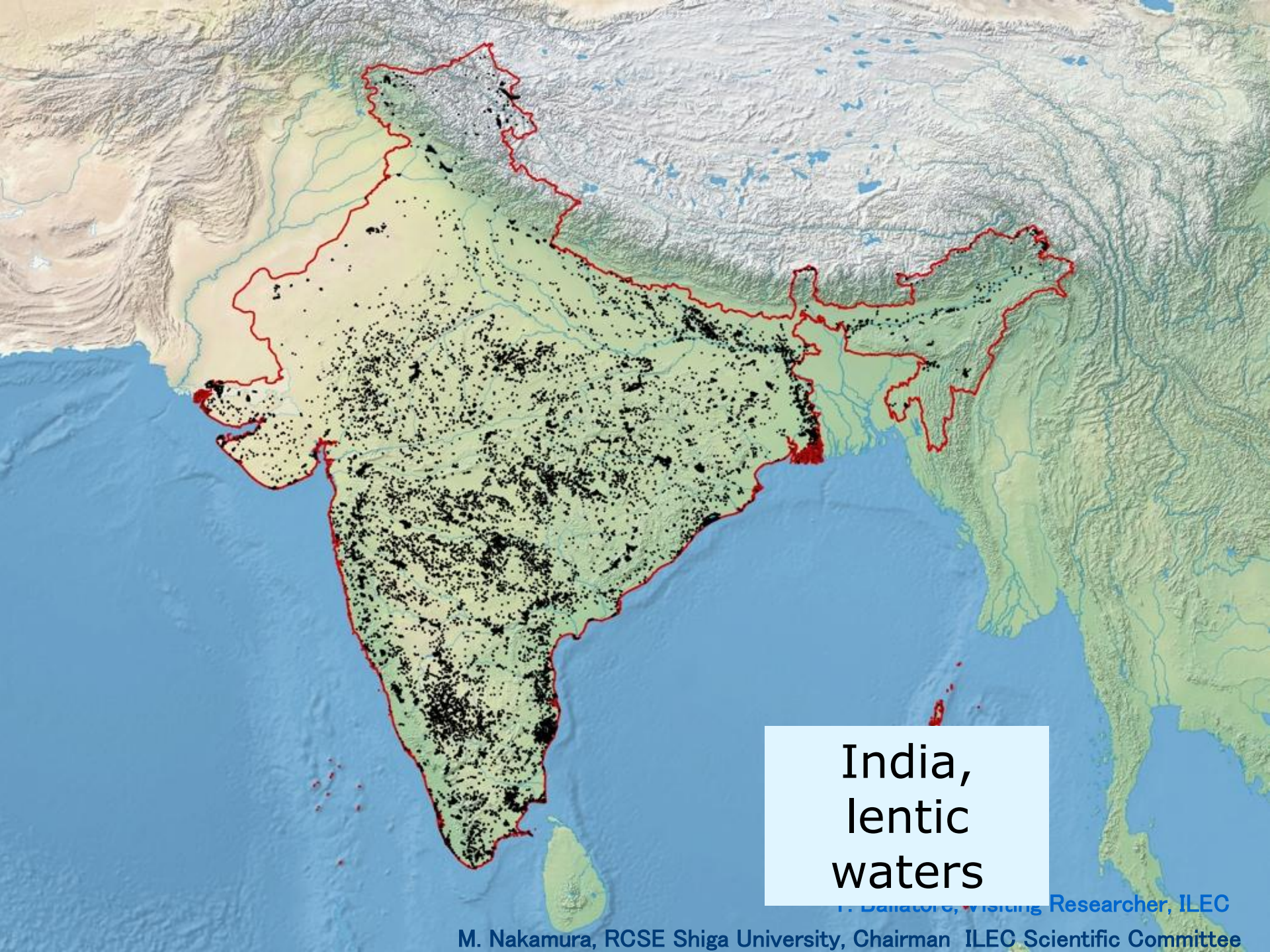
Lentic-Lotic Basin Systems in the Hydrostatic-Hydrodynamic Environment: A Conceptual Framework



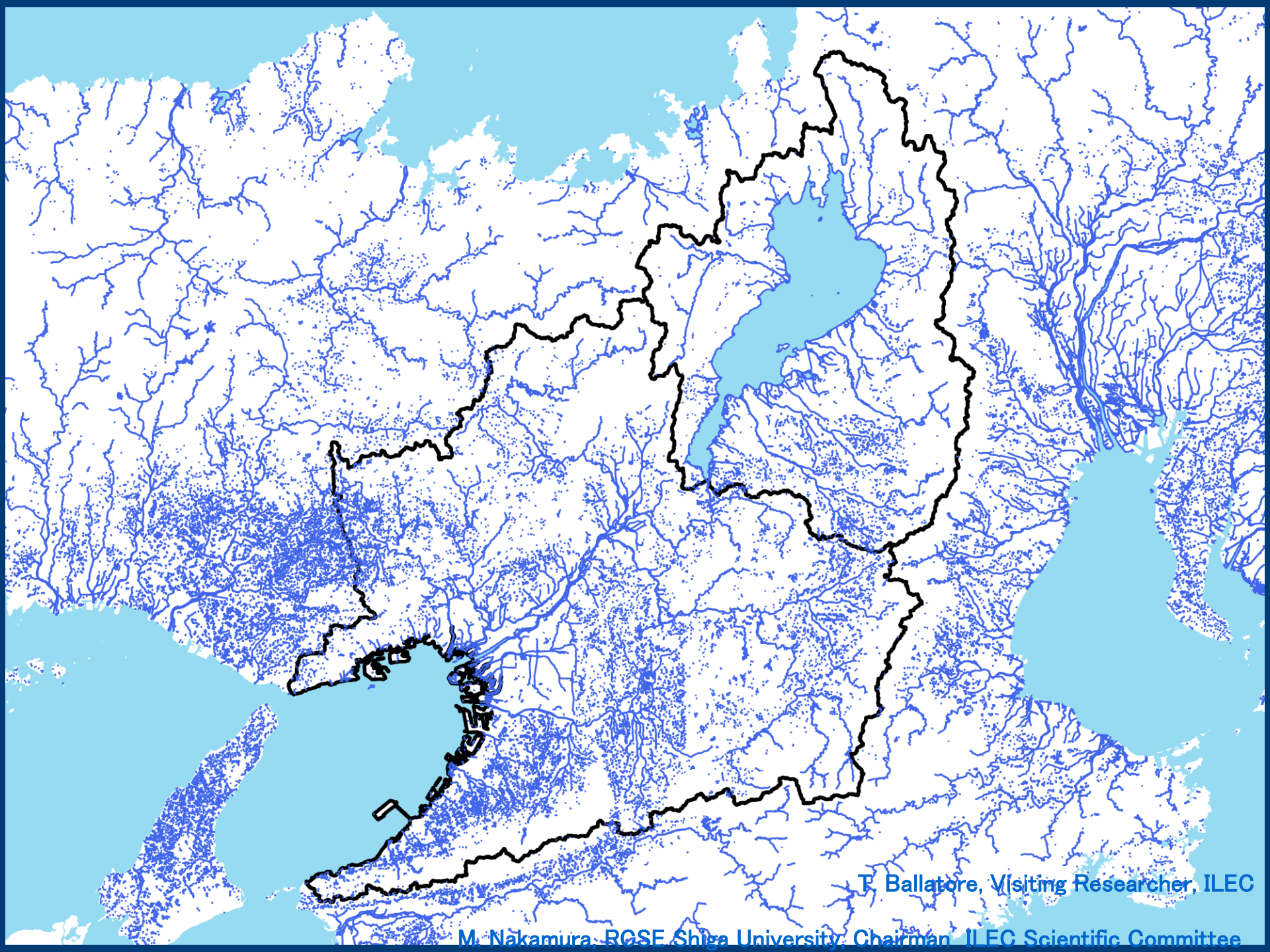
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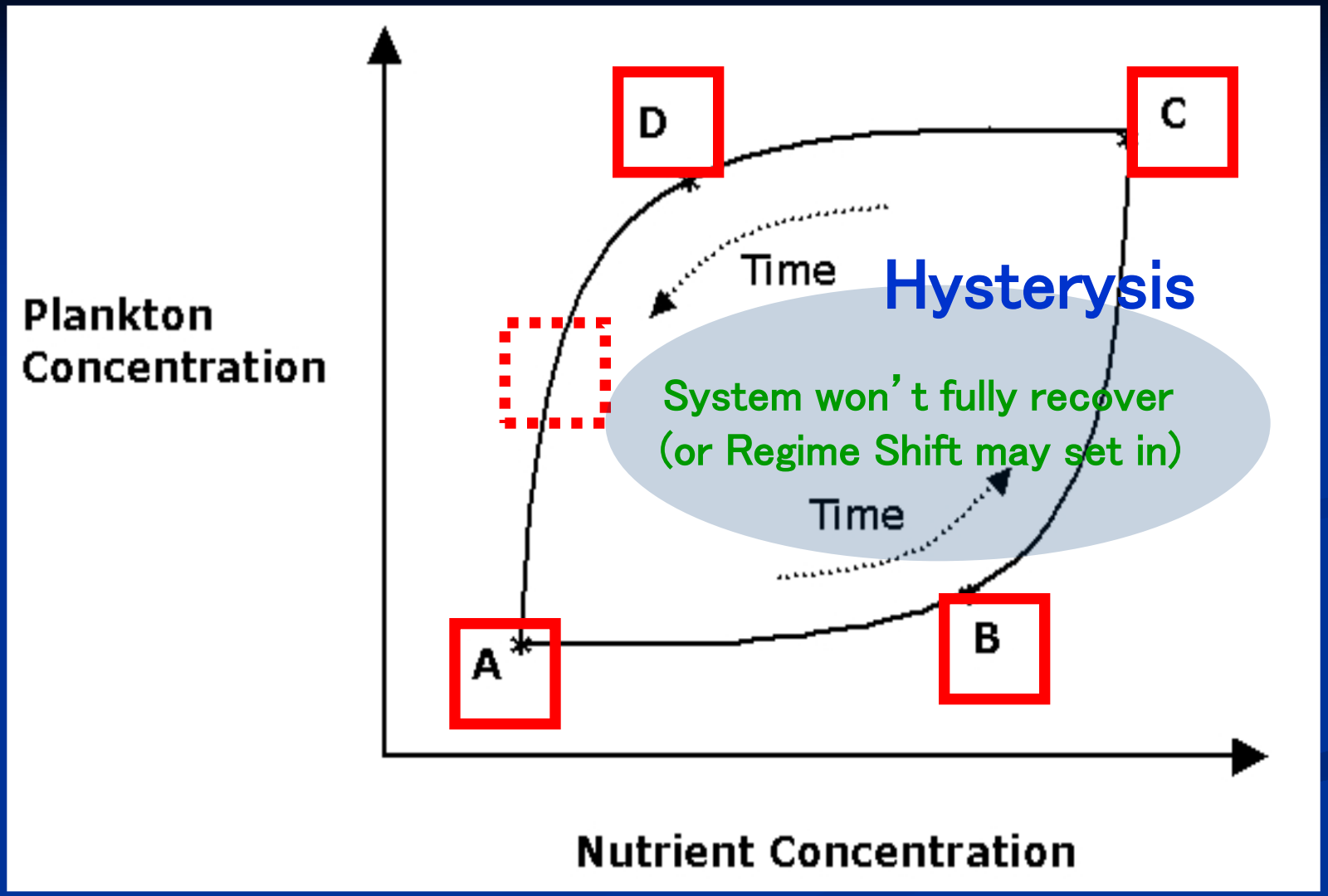


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ILBM Principles:

- “Ecological Service” Principle
- “Change in Resource Value” Principle
- “Lentic Water System” Principle
- “Governance Improvement” Principle


Plankton
Concentration
D
C
Time
Hysterysis
System won't fully recover
(or Regime Shift may set in)
Time
A
B
Nutrient Concentration

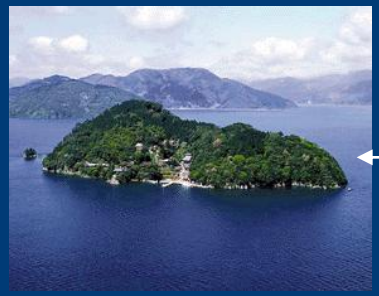
ILBM Principles:

- “Lentic Water System” Principle
- “Change in Resource Value” Principle
- “Ecological Service” Principle
- “Governance Improvement” Principle

Ecosystem Services









Resource Provision Service

Regulating Service

Cultural Service

Supporting Service

We all **want** **this value**

We tend to **forget** **these values**

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Without Timely Conservation, all Ecosystem Services may Disappear.

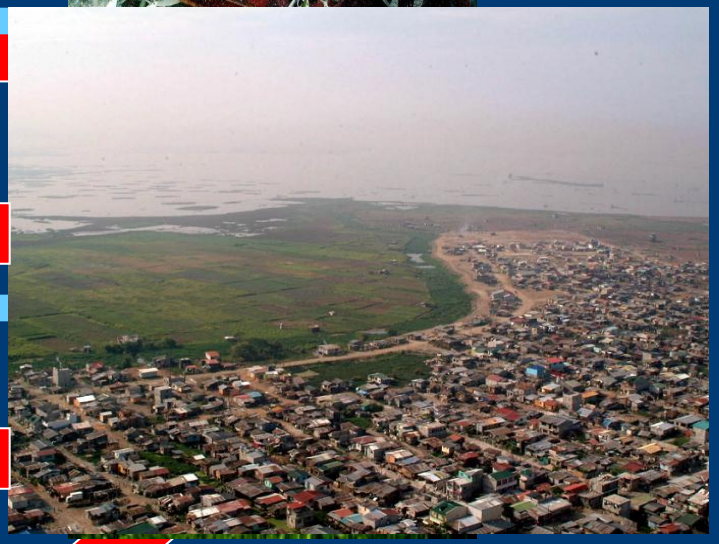
Exploitation of
Resource Provision
Service

Loss of
Regulating Service

Cultural Service

Supporting Service





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ILBM Principles:

- “Lentic Water System” Principle
- “Change in Resource Value” Principle
- “Ecological Service” Principle
- “Governance Improvement” Principle

Lake Features lead to

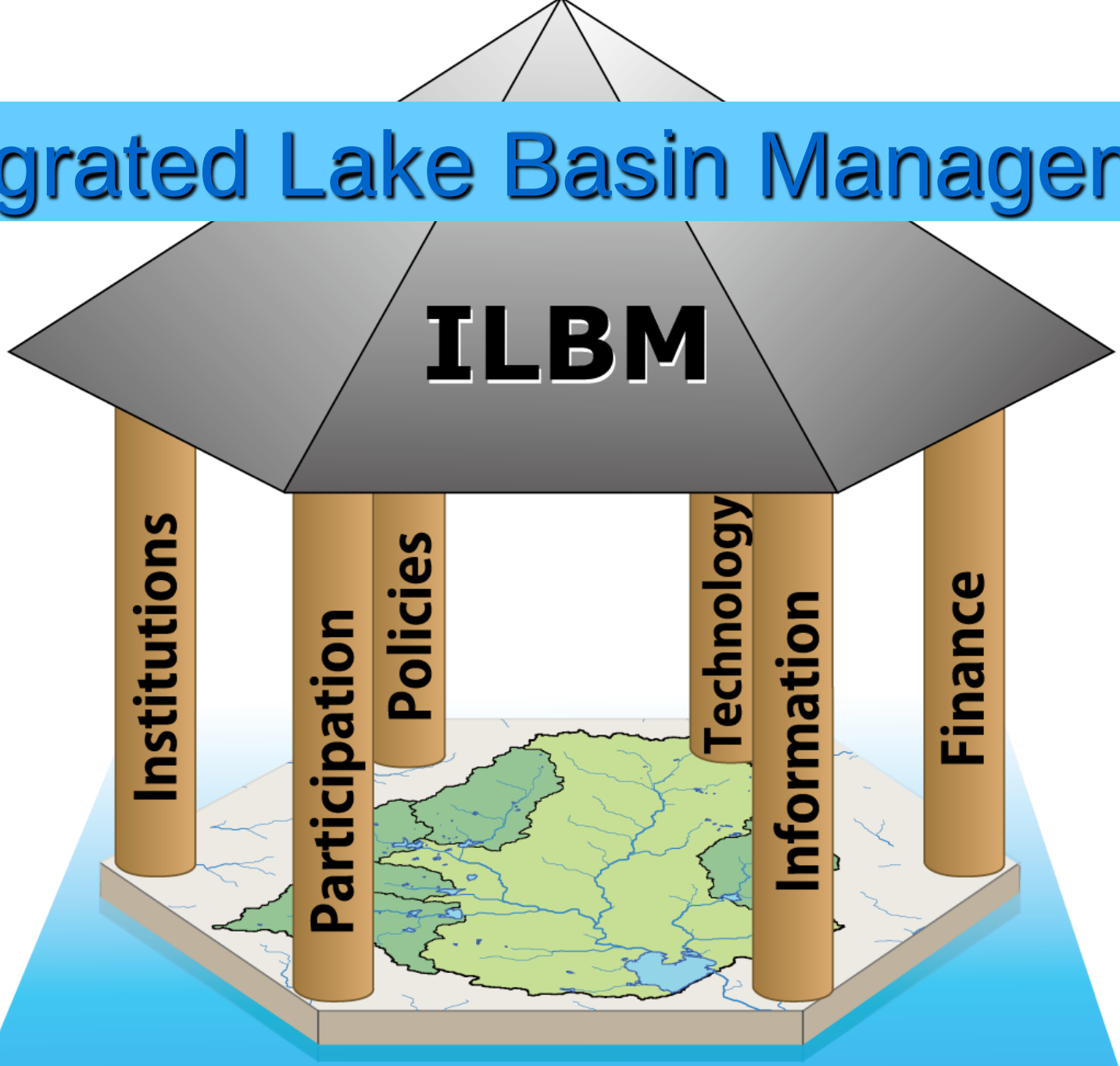
Management Requirements, i.e.,

1. Issues are mostly inseparable
2. Changes are gradual and invisible
3. Unpredictable and Uncontrollable

so what do we Need to do?

and what are the Challenges?

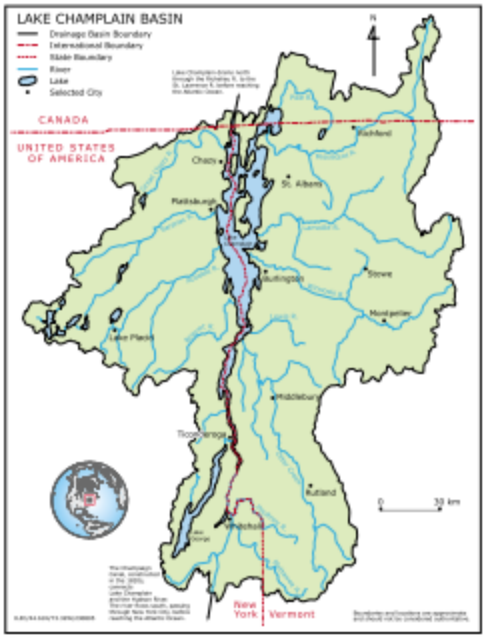
Integrated Lake Basin Management



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(a) High Lenticity: Lake Toba Basin.



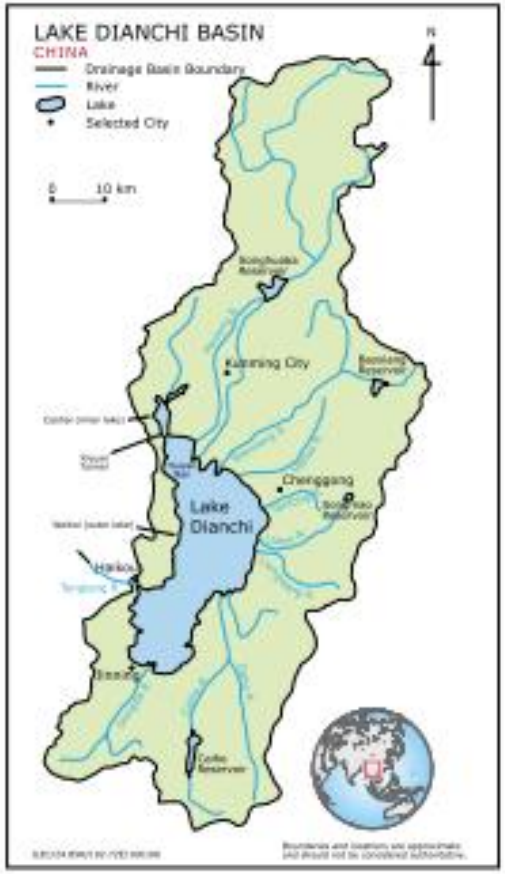
(b) Moderate Lenticity: Lake Champlain Basin



(c) Low Lenticity: Tucurui Reservoir Basin

Figures A1-1 a-c. Examples of Lenticity

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(a) Far Upstream: Lake Dianchi Basin



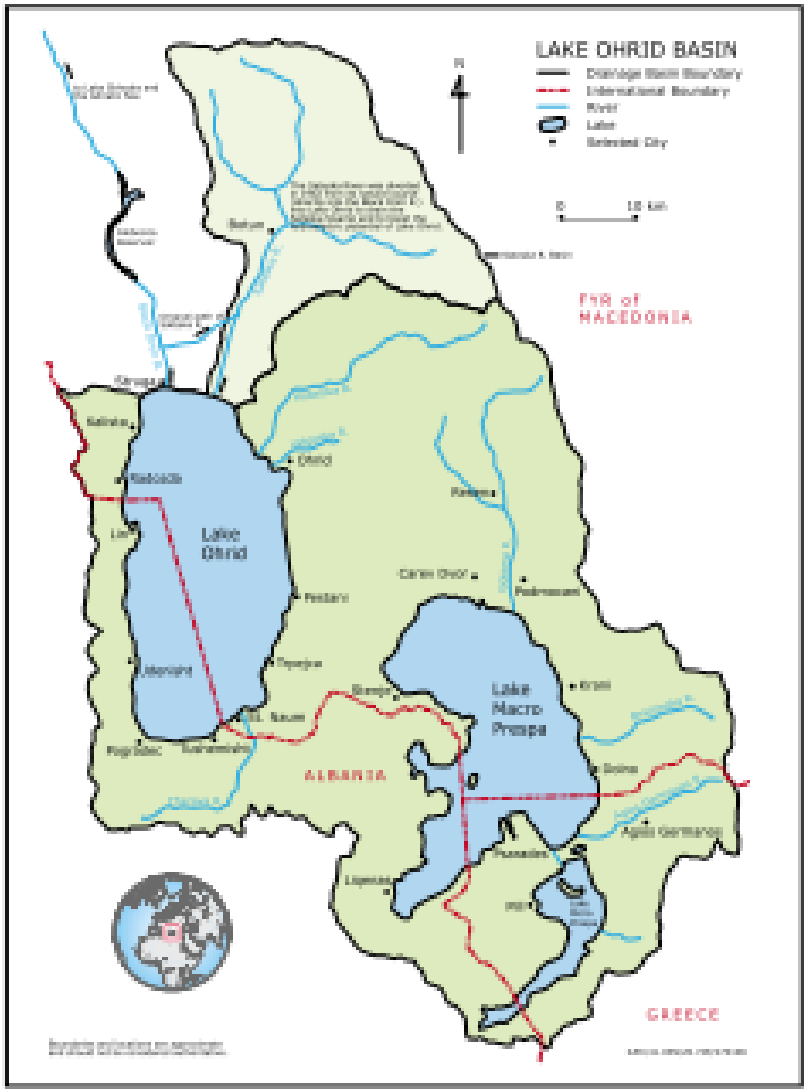
(b) Midstream: Lake Cocibolca Basin



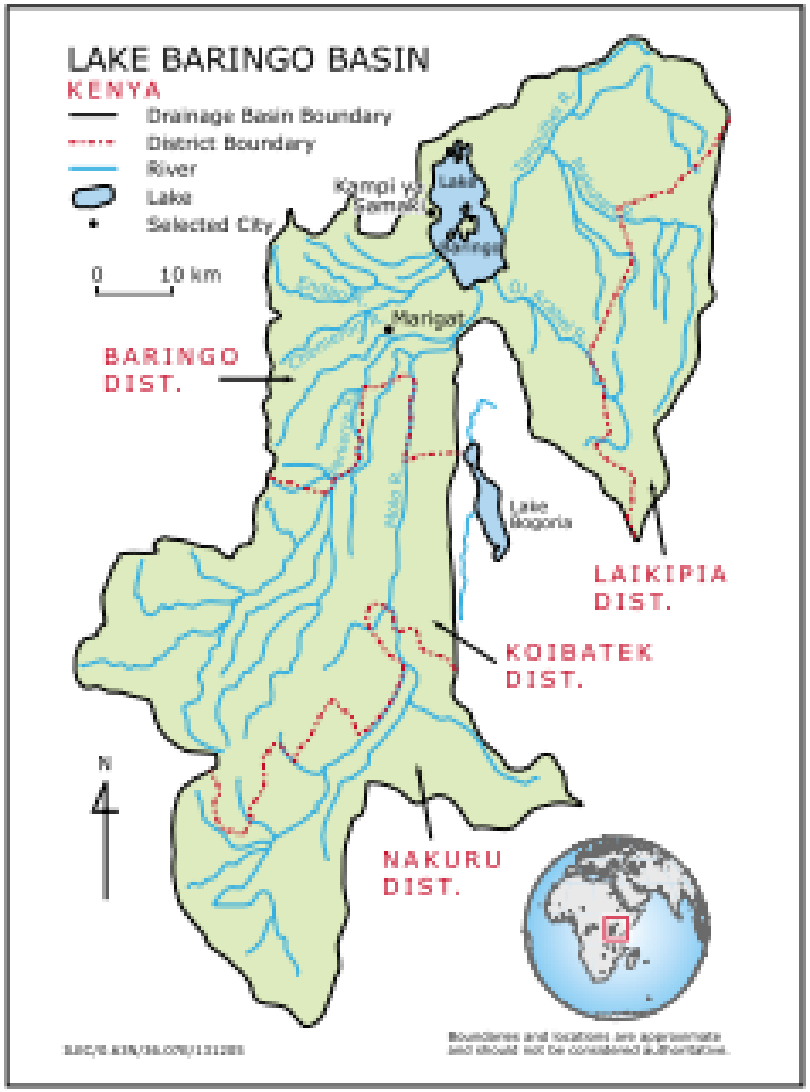
(c) Completely Downstream: Lake Nakuru Basin

Figures A1-2 a-c. Examples of Hydrological Position

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(a) Groundwater In: Lake Ohrid Basin



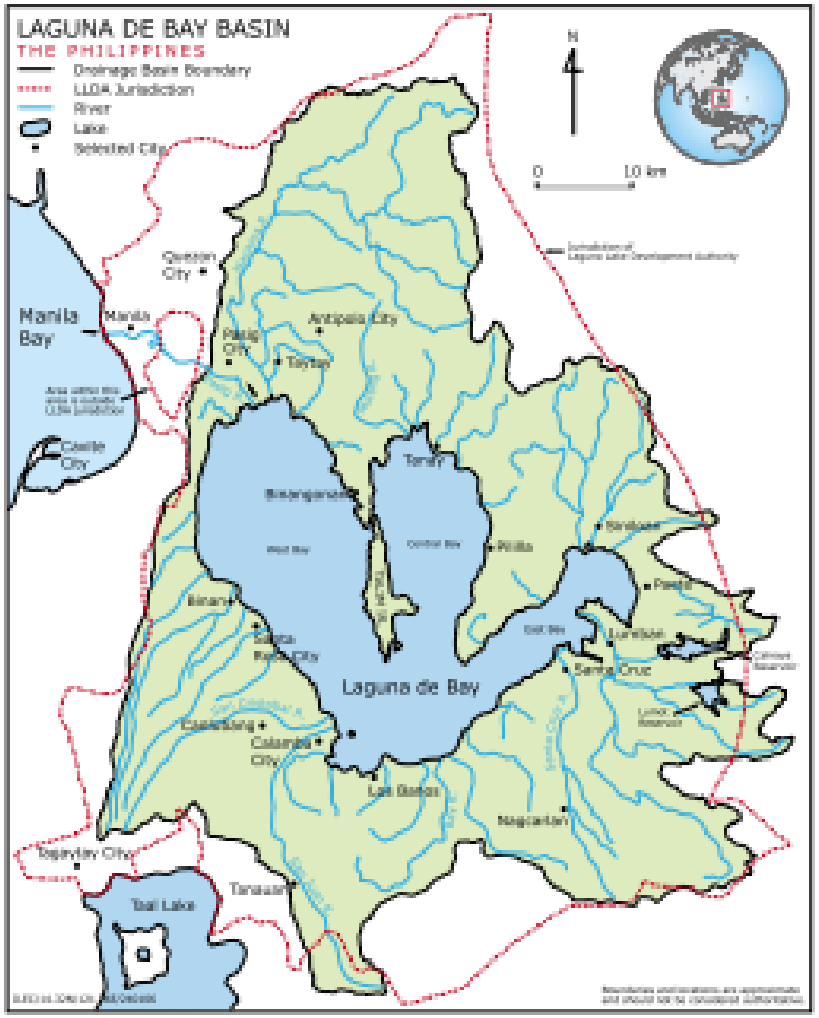
(b) Groundwater Out: Lake Baringo Basin

Figures A1-3 a-b. Examples of Groundwater Connections

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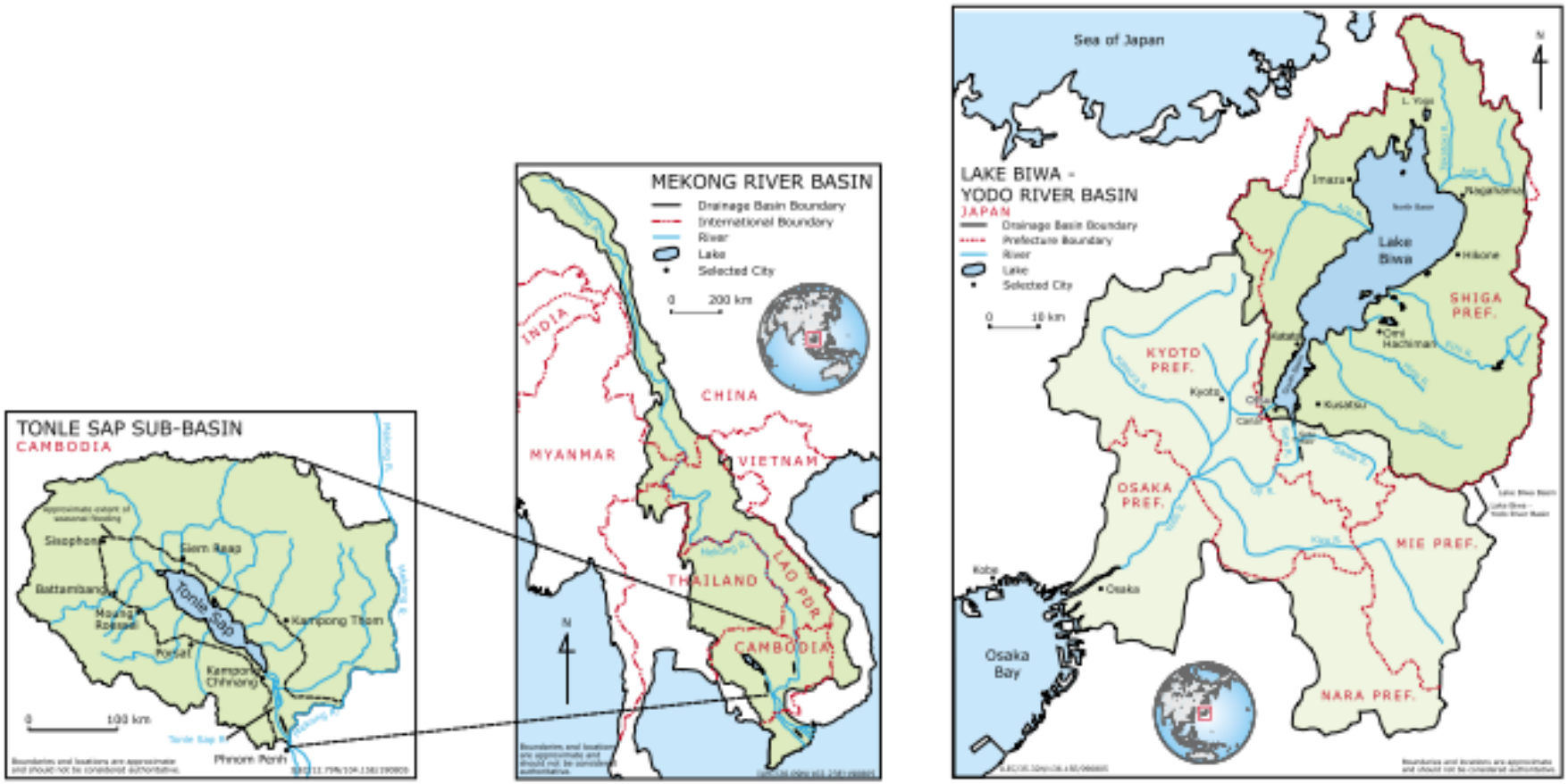
(c) LME In: Chilika Lagoon Basin



(d) Out to LME: Laguna de Bay Basin

Figures A1-3 c-d. Examples of LME Connections

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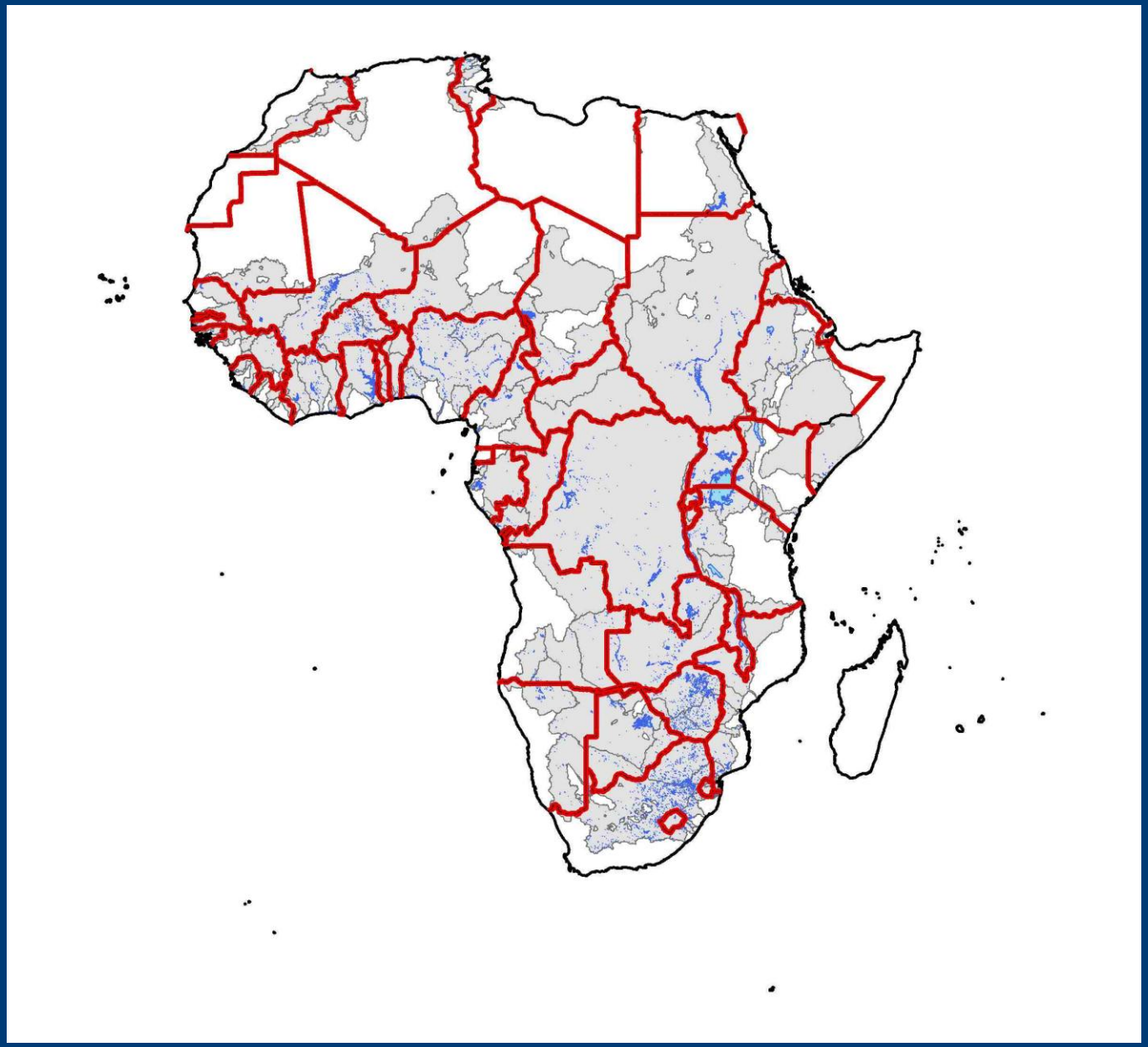


(e) River In: Tonle Sap Basin

(f) Out to River: Lake Biwa-Yodo River Basin

Figures A1-3 e-f. Examples of River Connections

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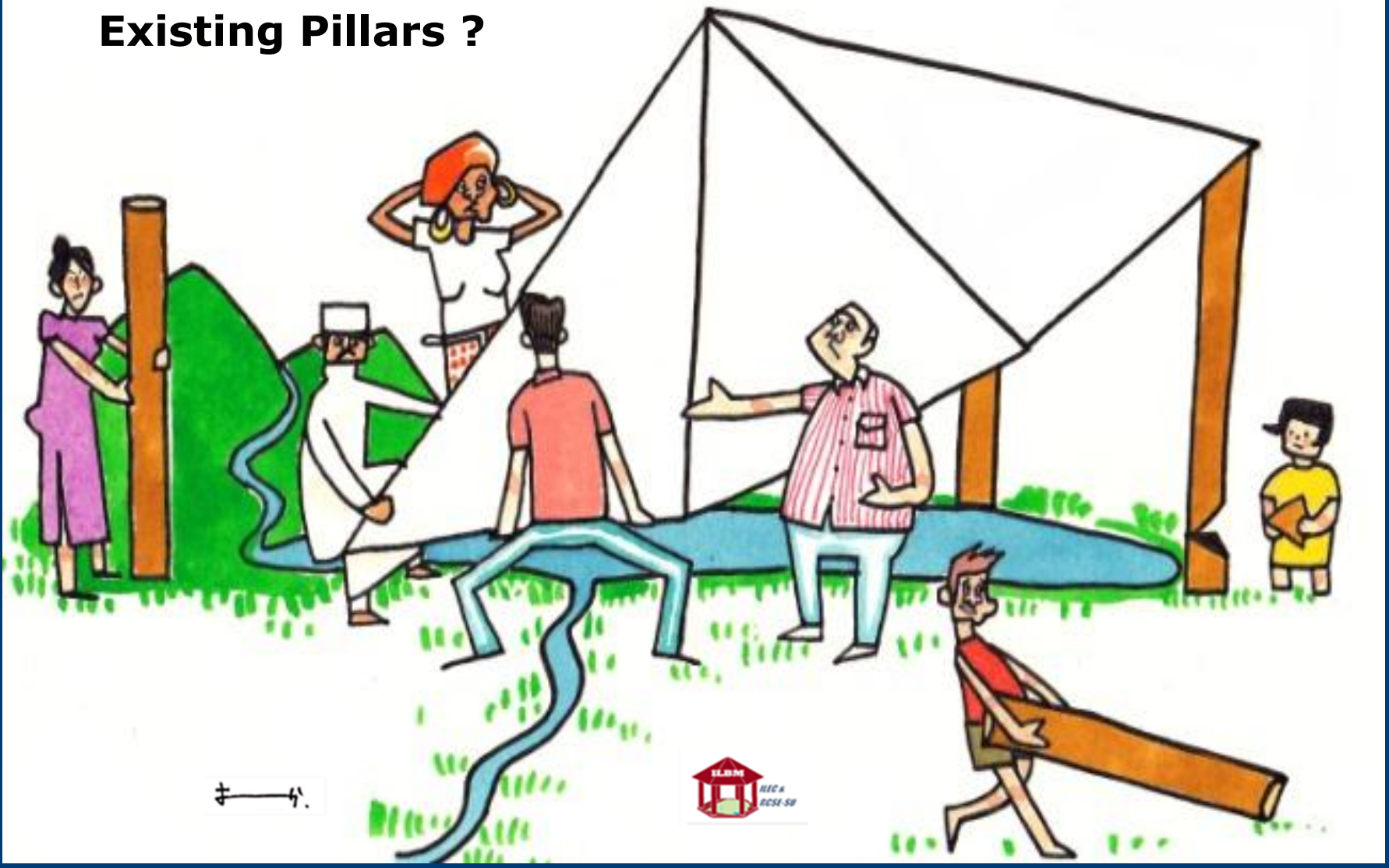
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Existing Pillars ?



Do What We Can!



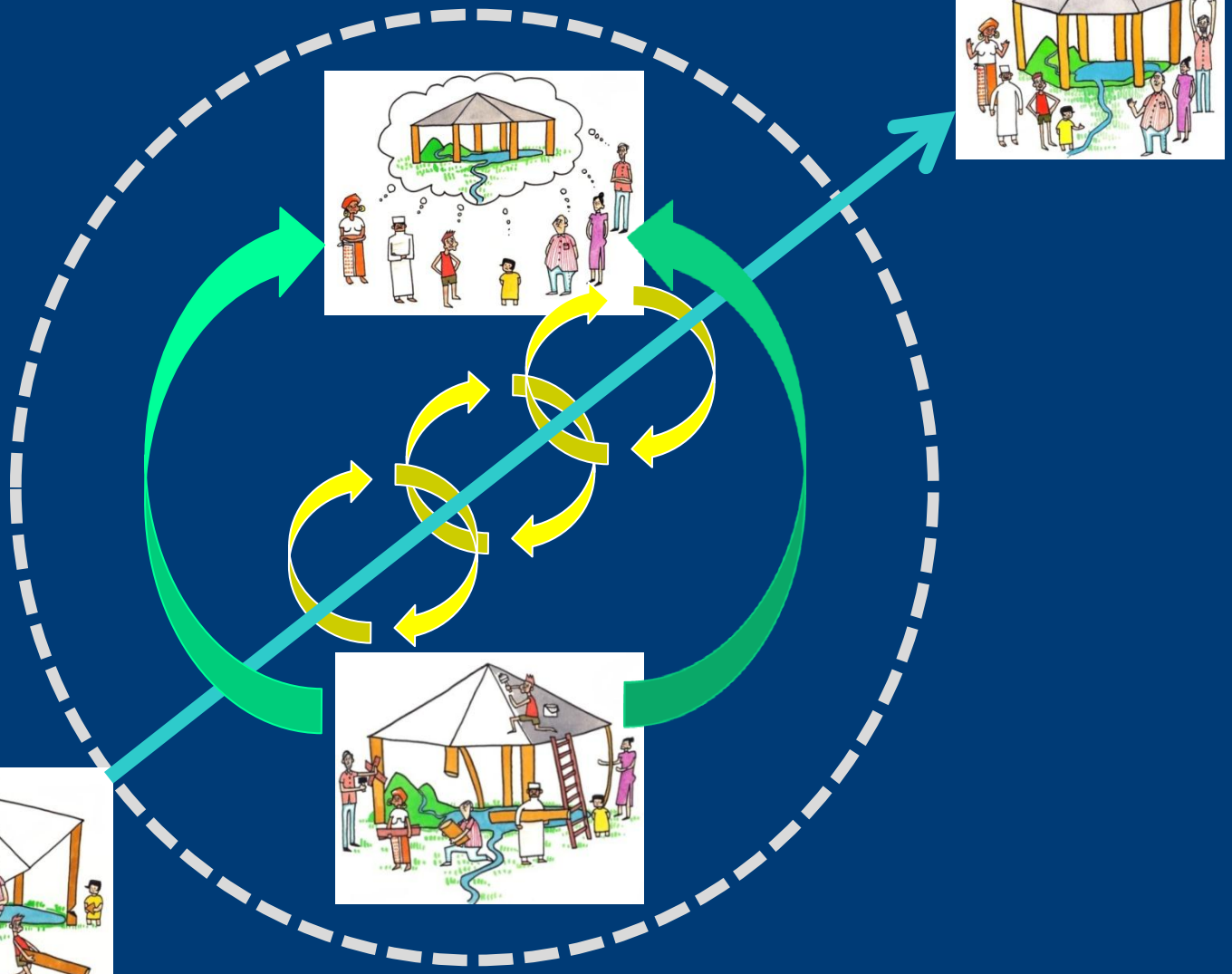
Everyone Lives in the Basin of some Lentic System, and ILBM helps them Live Happily



Cyclic Platform Process

More Sustainable

Level of Sustainability

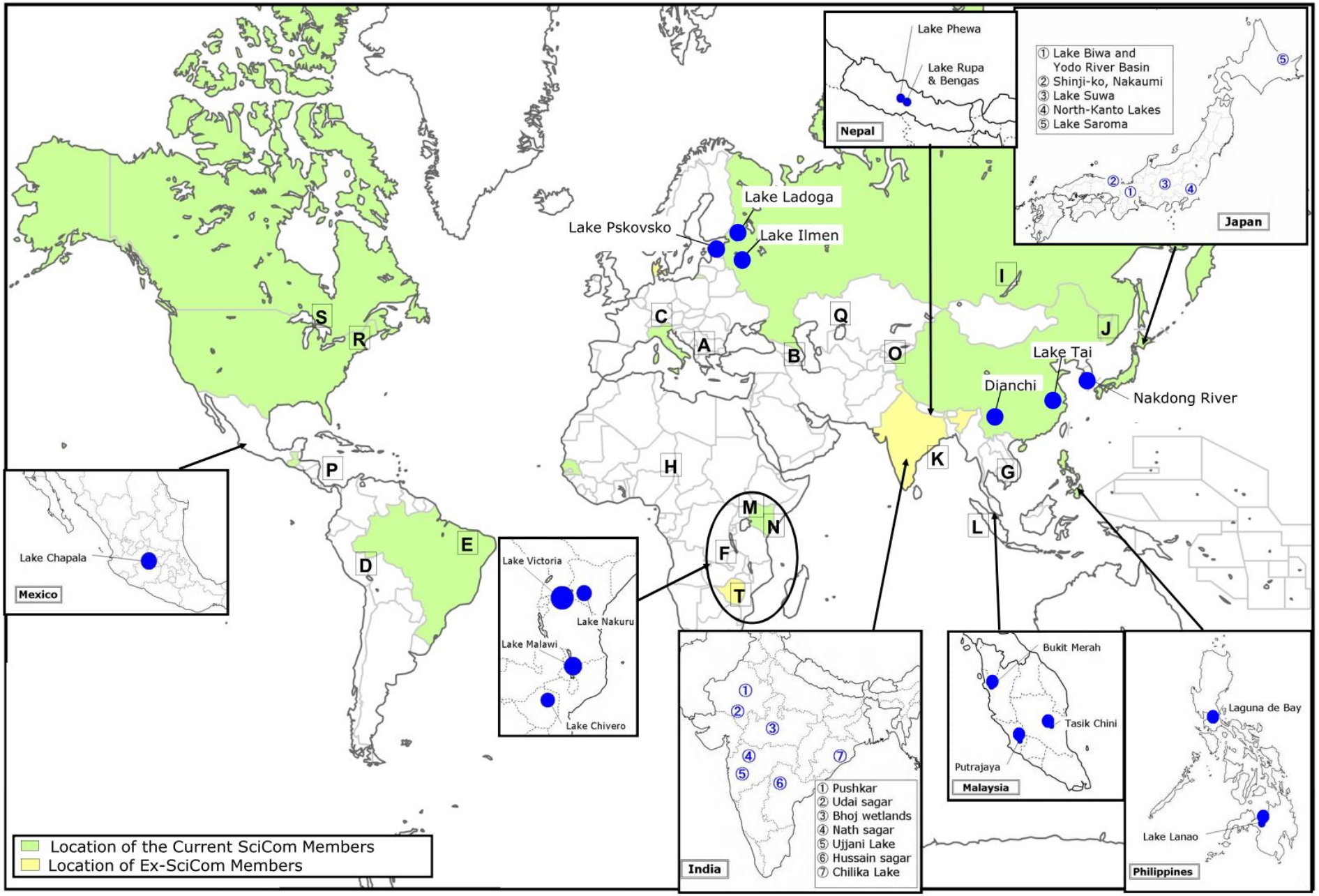


Future

Time

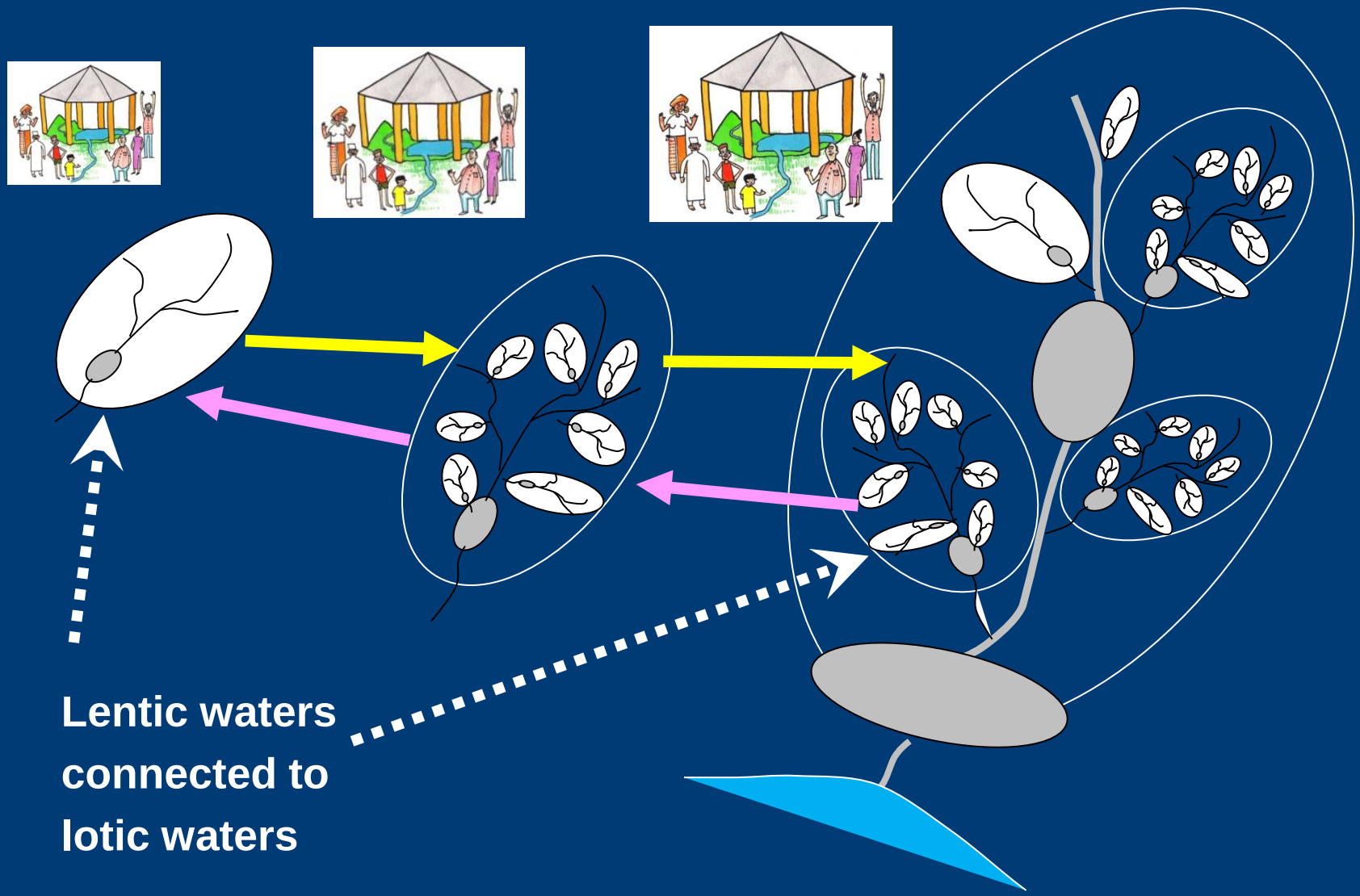
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ILBM Project Lake Basins (2008-2010)



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ILBM Platforms may need to be developed at micro, meso, and macro levels



IWRM + *ILBM (ILLBM)*



ILLRM