ILLBM:

Toward Improvement of Lake-River-Coastal Basin Governance for Sustainable Resource Use

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Outline of Presentation

1. Lentic Waters on the Globe
2. Lentic - Lotic Waters
3. Lentic - Lotic Water Features
4. Ecosystem Service Framework
5. Integrated Lentic-Lotic Basin Management
6. Global Implications
7. Conclusion

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1. Lentic and Lotic Waters on the Globe

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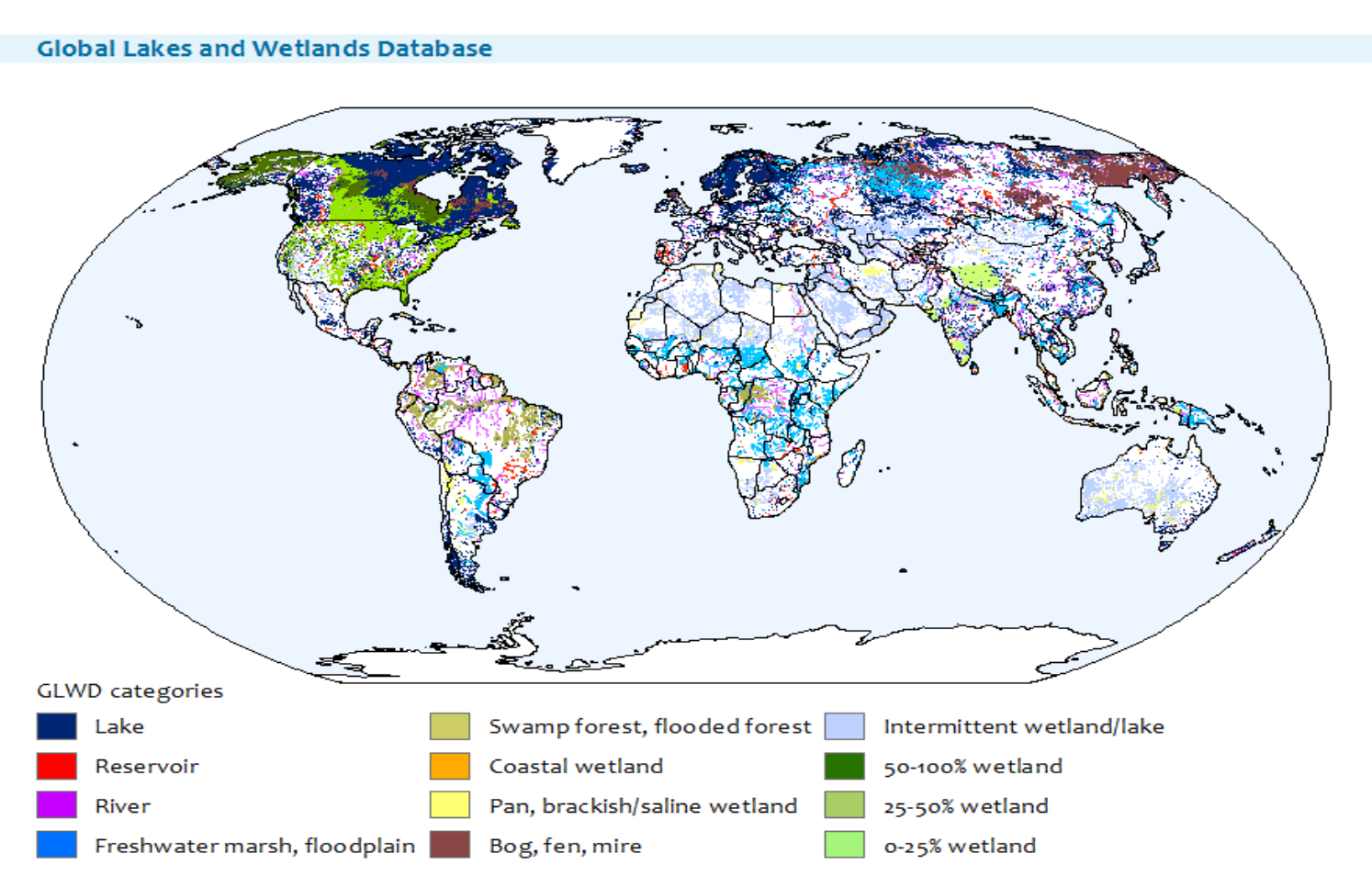
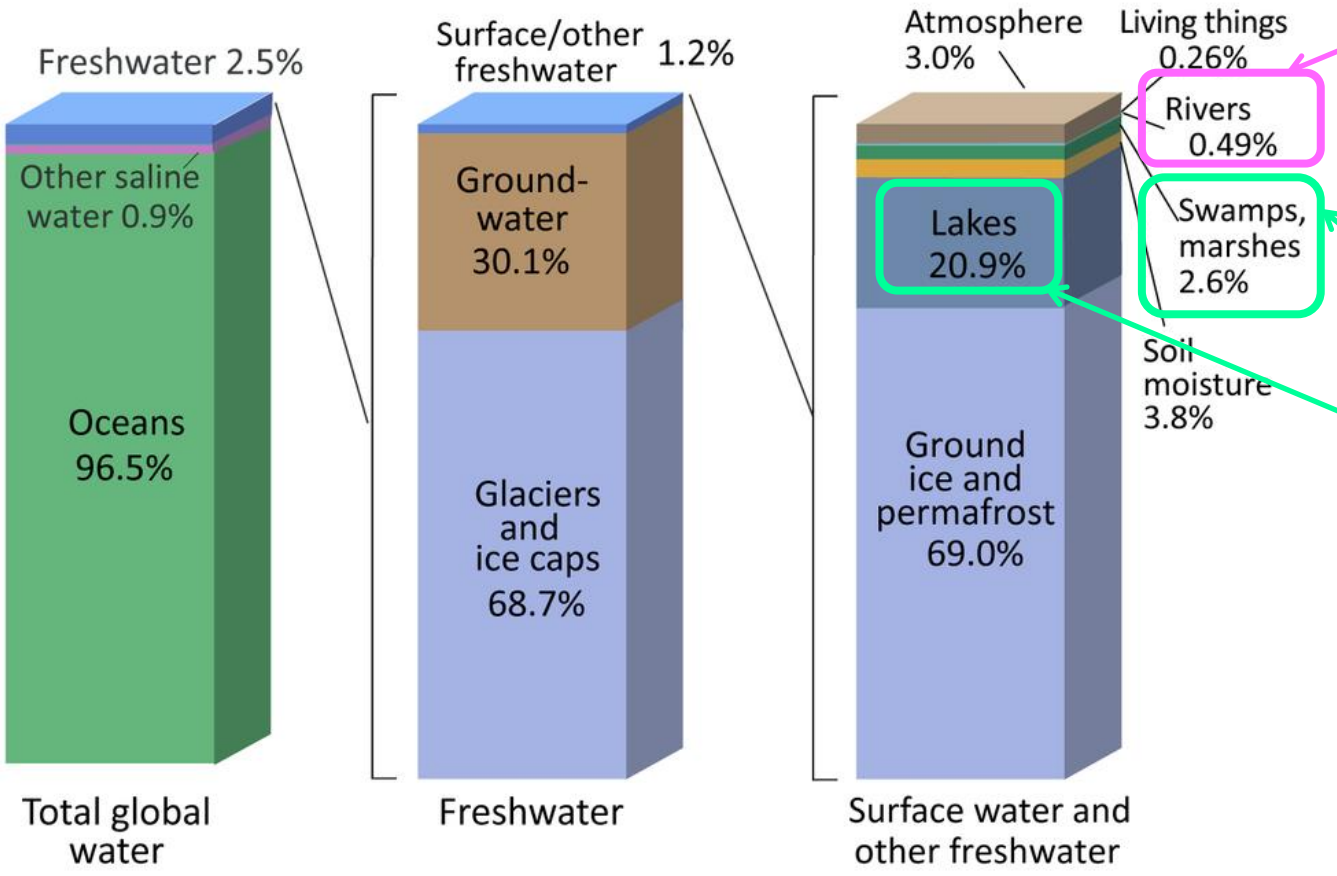
Global Lakes and Wetland Database, WWF and the Center for Environmental Systems Research, University of Kassel, Germany



http://www.globio.info/what-is-globio/aquatic
http://snr-1349.unl.edu/navigation/waterdistribution.aspx
http://ygraph.com/graphs/waterchart-20120826T171009-2q2m6fa.jpeg

Where is Earth's Water?



Credit: U.S. Geological Survey, Water Science School. https://www.usgs.gov/special-topic/water-science-school
Data source: Igor Shiklomanov's chapter "World fresh water resources" in Peter H. Gleick (editor), 1993, Water in Crisis: A Guide to the World's Fresh Water Resources. (Numbers are rounded).

Lotic Waters

Lentic Waters

Global water systems are "Lentic - Lotic Complexes"

- Lentic waters are intricately linked with other water systems, i.e., rivers (lotic waters), ground waters, estuarine waters and oceans

2. Lentic - Lotic Waters

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- **Lentic – Lotic Waters**

  the expression of the ecological and anthropogenic state of water with evolutional and historic memories of human–nature interaction

- **Hydrostatic – Hydrodynamic Waters**

  the expression of the physical state of water

Lentic-Lotic vs. Hydrostatic-Hydrodynamic Systems: A Conceptual Framework

Strongly
Lentic - Lotic

Examples:
- natural lake-river systems,
- pond-stream systems,
- wetland-spring systems

Moderately
Lentic - Lotic

Examples:
- pond-channel systems constructed in old days, becoming naturalized

Weakly
Lentic – Lotic

Examples:
- storage tanks and pipelines
- detention ponds and discharge channels

Less Controlled

More Controlled

More Hydrostatic – Hydrodynamic

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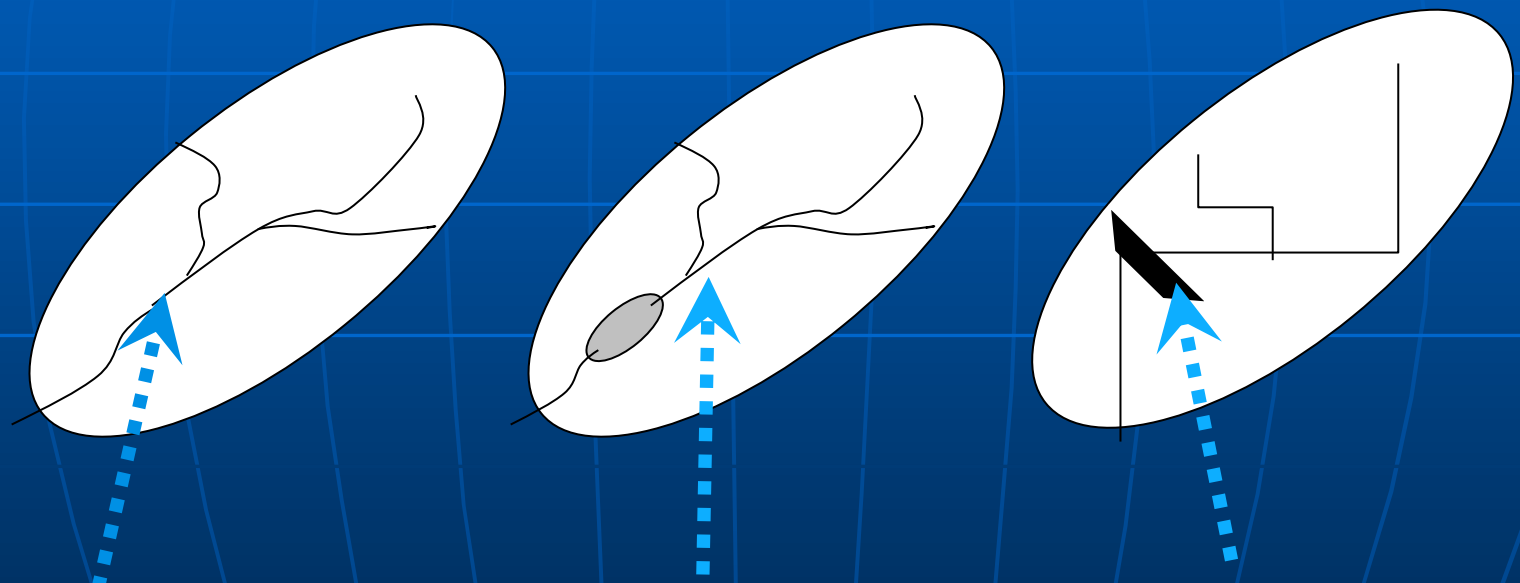
In addition, we must keep in kind that

Lake-River-Coastal Basins are Lentic – Lotic and Hydrostatic – Hydrodynamic Combinations



Natural lotic system

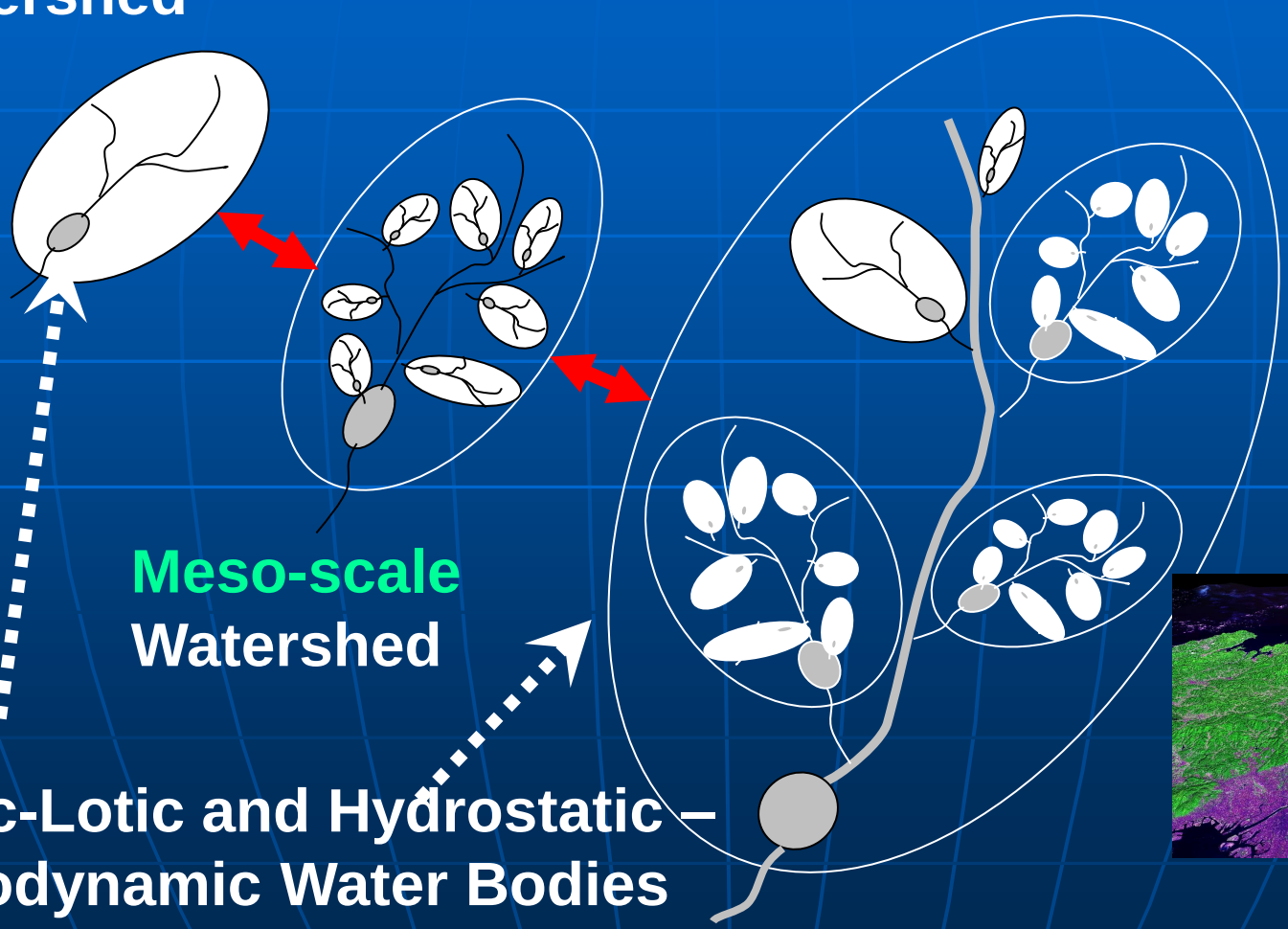
Natural lentic – lotic system

Man-made lakes and channels

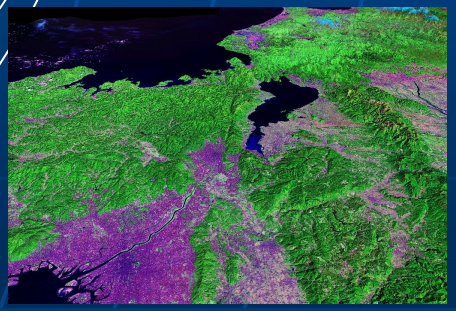
A basin consists of many basins

Micro-scale Watershed

Macro-scale Watershed



Meso-scale Watershed



Lentic-Lotic and Hydrostatic – Hydrodynamic Water Bodies

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3. Lentic – Lotic Water Features

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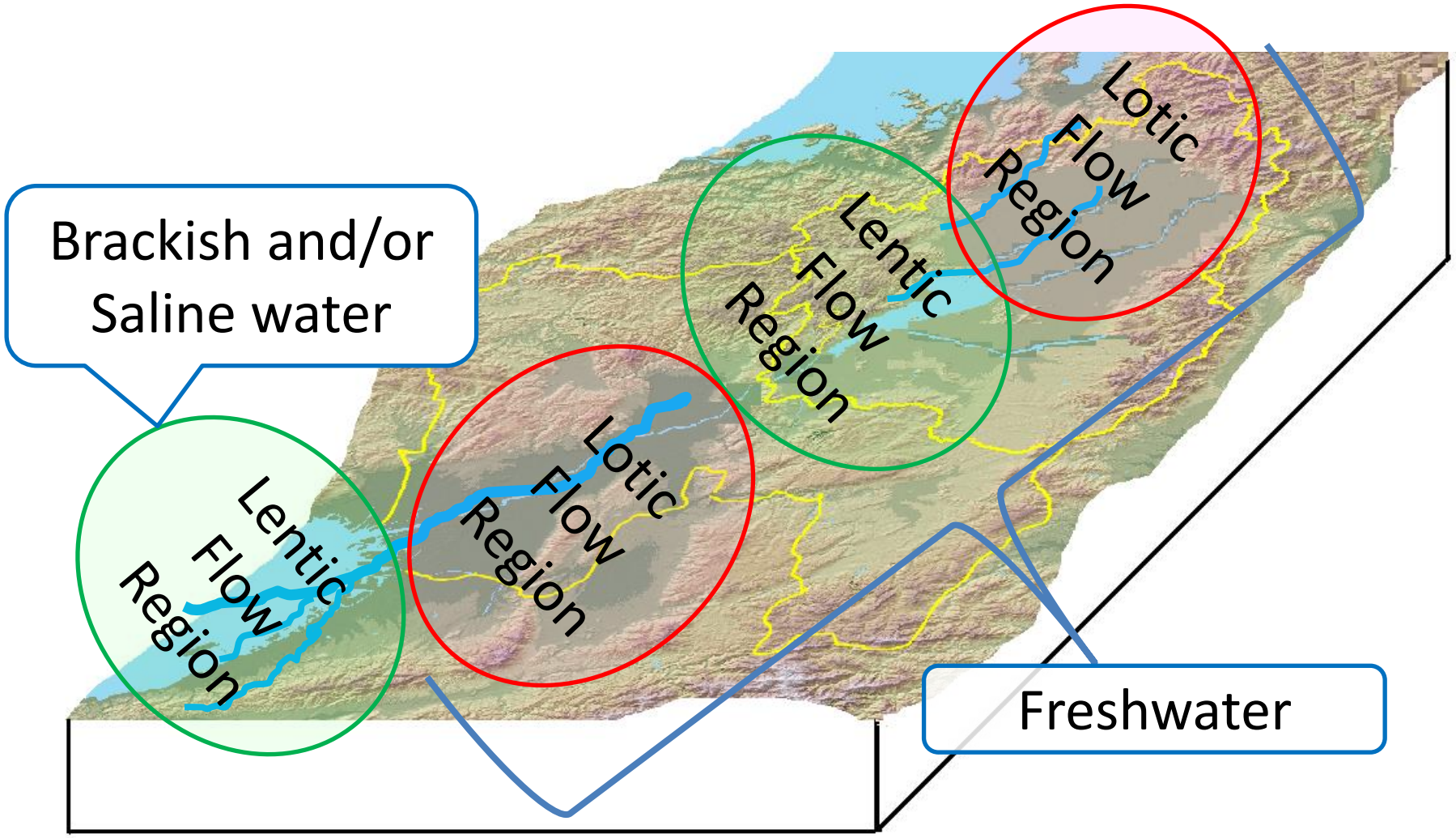
Lentic and Lotic Flow Regions



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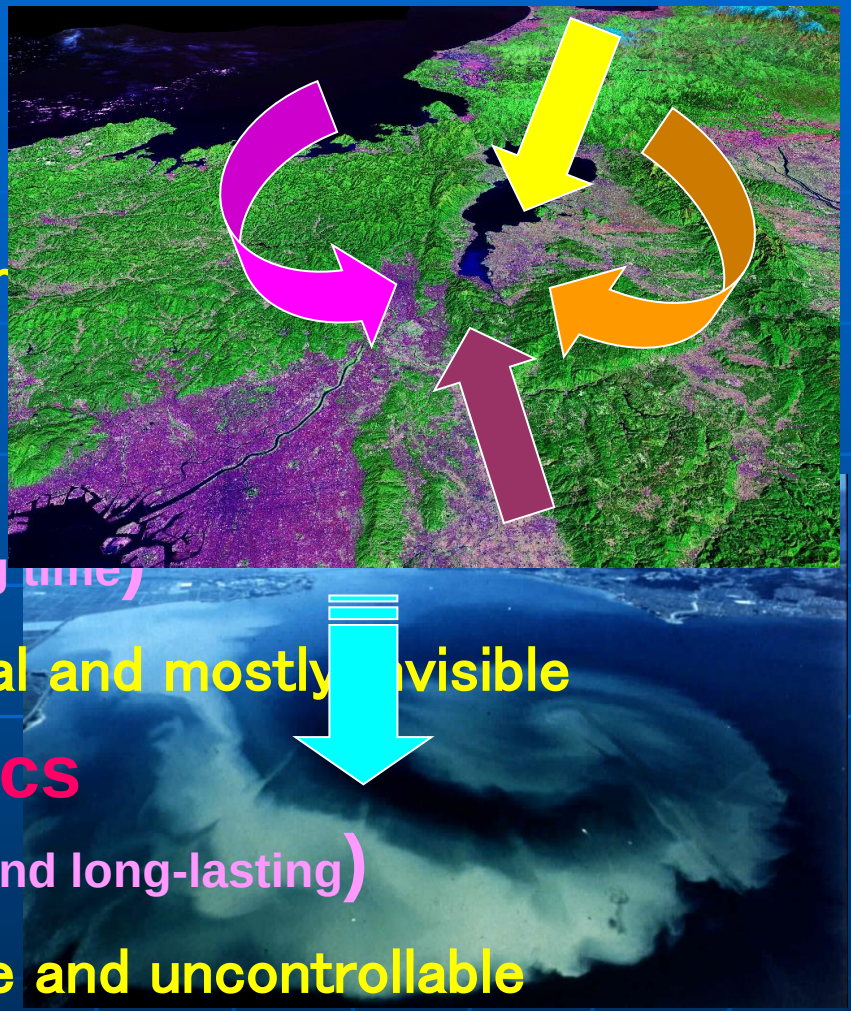
Differences and Similarities between Lentic and Lotic Waters

Functions			Lentic Waters	Lotic Waters
enclosed-ness			greater	lesser
retention capacity	water flow		long	short
	constituent materials	sediments	cumulating irreversible	transient reversible
		water mass	steady with smaller variance	steady with larger variance
habitat environment			more static and stational	more dynamic and transient
organics decomposition			more steady and slower	more unsteady and faster
oxygenation transfer			slow	fast
transport capacity			small	large

Lentic Water Features

- **Integrating Nature**
  (Everything comes together)
  → 1. Issues are mostly ir
- **Long Retention Time**
  (Problems remain long, and
  finding solutions also takes long time)
  → 2. Changes are gradual and mostly invisible
- **Slow Natural Dynamics**
  (Most phenomena are gradual and long-lasting)
  → 3. Often unpredictable and uncontrollable



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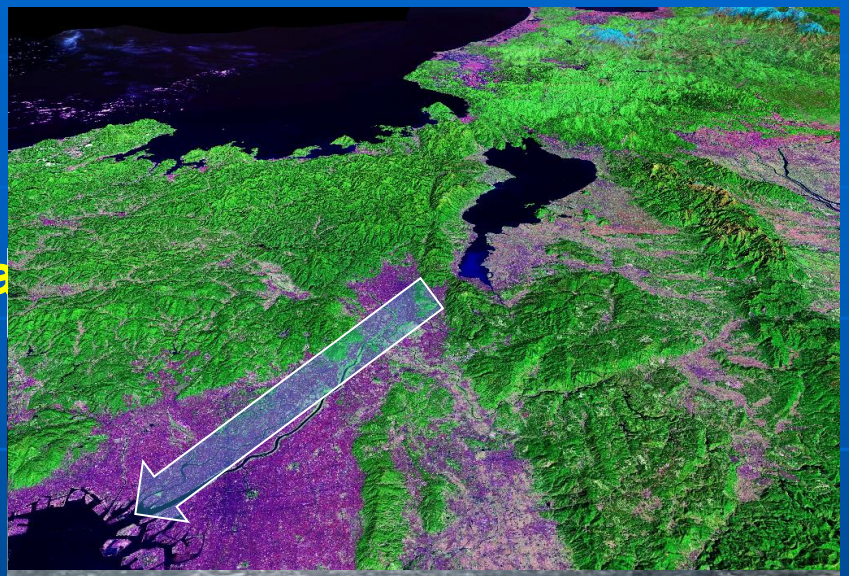
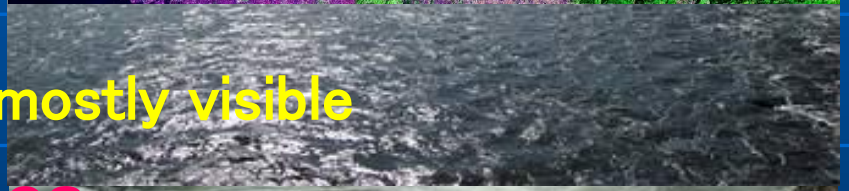
Lontic Water Features

- **Transient Nature**
  (Everything flows downstream)
  → 1. Issues are mostly sepa
- **Short Retention Time**
  (Problems get transported from upstream to downstream)
  → 2. Changes are fast and mostly visible
- **Rapid Natural Dynamics**
  (Most phenomena are fast and short-lived)
  → 3. Predictable and controllable, with limits





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4. Ecosystem Service Framework of the Lentic Systems

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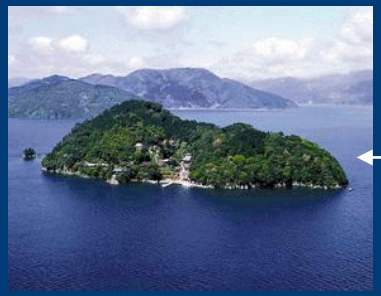
Ecosystem Services



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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5. Integrated Lentic and Lotic Basin Management (ILLBM)

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A Typical Conventional Planning and Implementation Process

1. Set a Goal
2. Develop Alternatives
3. Select a Strategy
4. Implement with Resources
5. Refine and Evaluate

Development of Management Plan and Implementation

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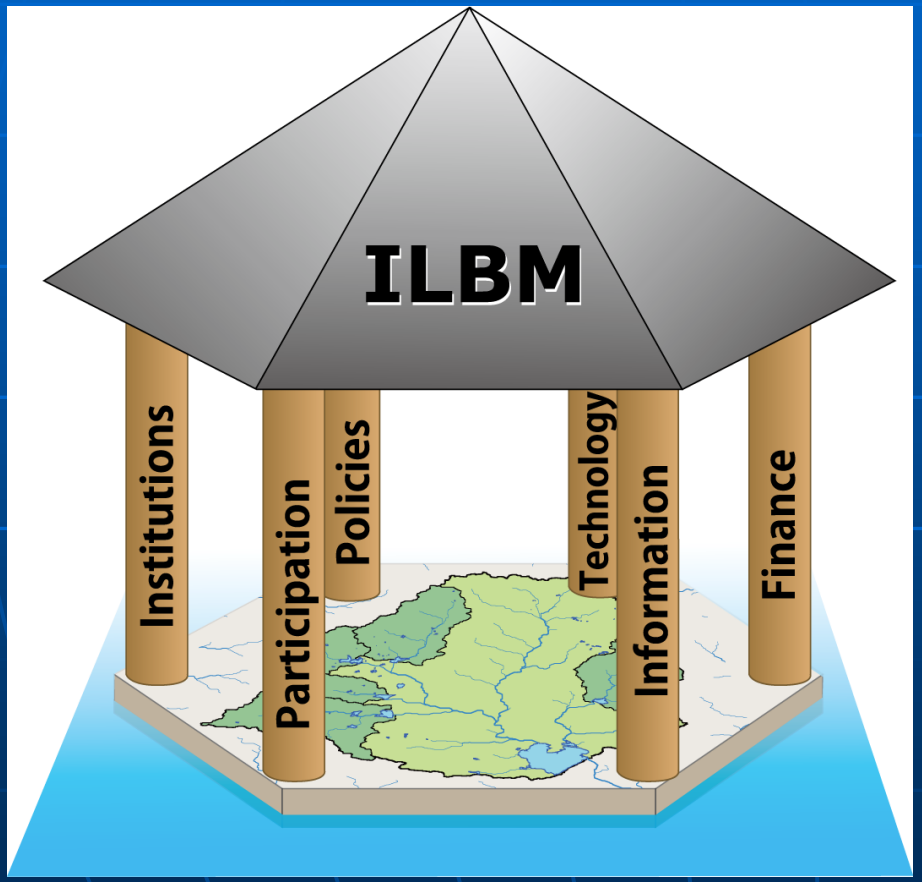
ILBM and ILLBM: a Governance Improvement Process



Improvement of

Six Pillars of Governance

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Integrated Lake Basin Management

Governance Gear

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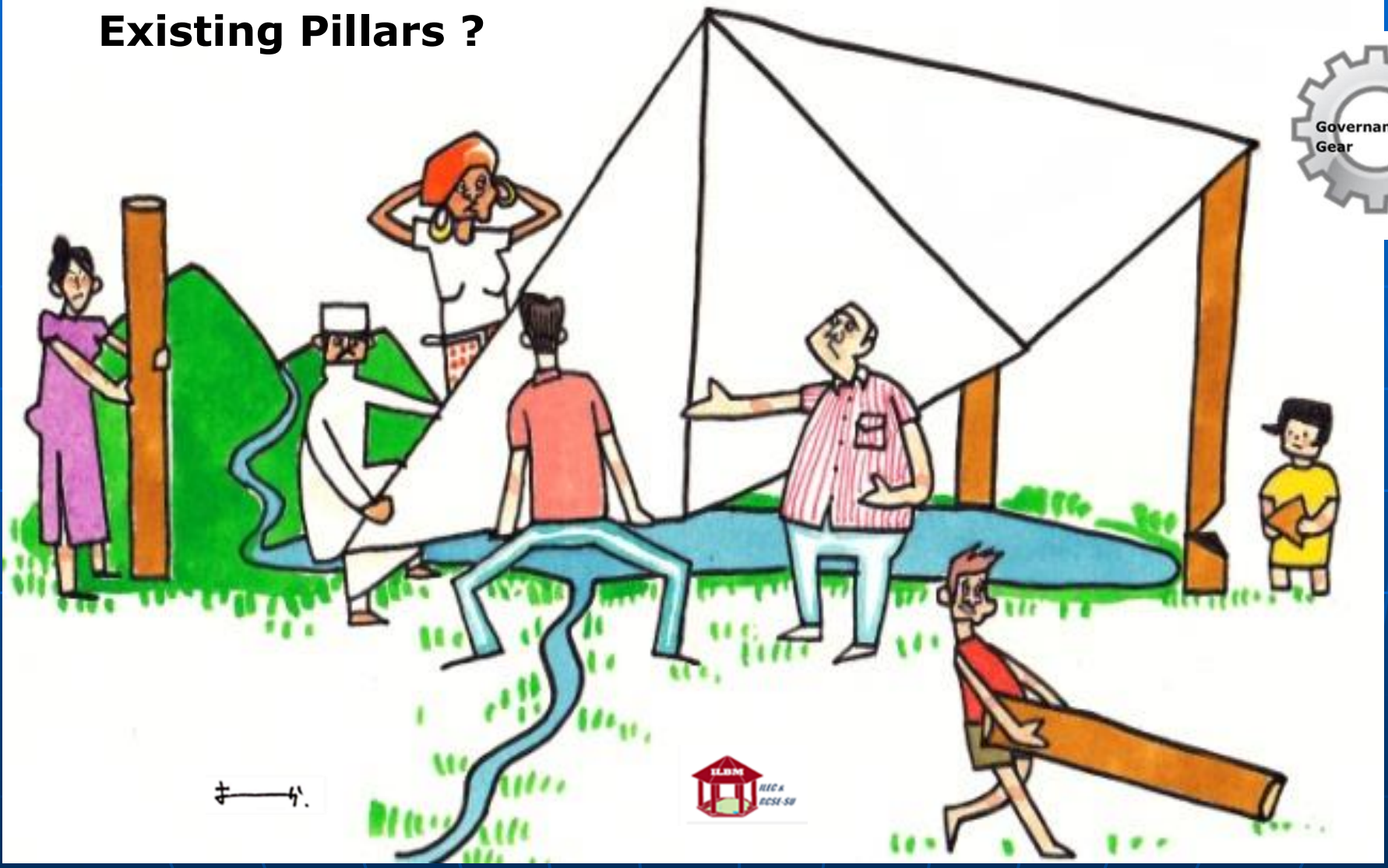
Existing Pillars ?



Governance Gear

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Lake Basin Management with Governance Improvement

Need Fixing and Strengthening the Governance Pillars

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Cyclic Platform Process

More Sustainable

Level of Sustainability

Time

Future

1. Acknowledge the state of lake basin

2. Identify issues, needs and challenges

3. Seek ways to strengthen the governance pillars

4. Assess the governance improvements

Monitoring, Reconnaissance Survey, Inventory and Databases

5. Continue effort, eventually to reach the long-term goal

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A Cyclic ILBM Platform

ILBM Platform Activities

Foster and Evolve a Common Vision

Describe the state of **Lake Basin Management**

Analyze of issues, needs, and challenges regarding **Six Governance Pillars**

Integrate ways and means for meeting the challenges, and **implement the agreed actions**

Assess improvement in Governance Pillars

Supporting Activities

See, for example, the World Lake Vision

See Lake Brief guidelines

See Lake Brief guidelines

Monitoring, Reconnais-sance Survey, Inventory and Databases

Seek information on global experiences

Conduct stakeholder consultations

Use ***Indicators*** *(see 4.3 in Chapter 4)*

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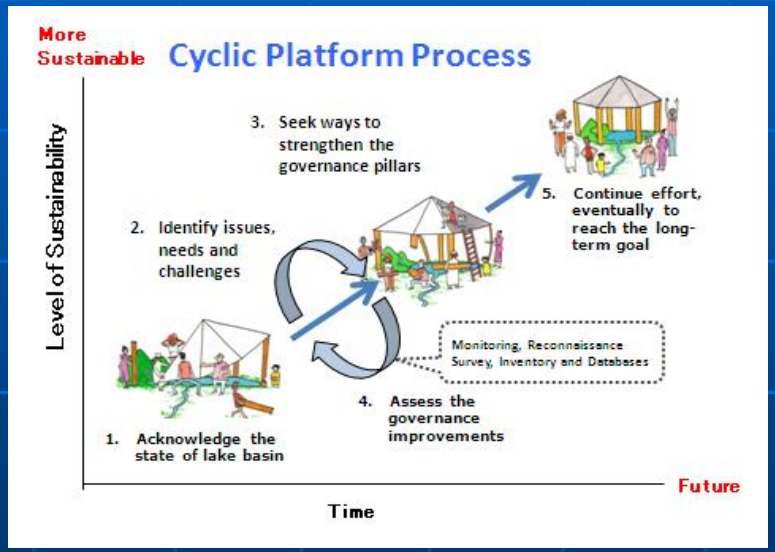
For Successful Lake Basin Management ……

- **Planning and Implementation Cycle**

1. Set a Goal
2. Develop Alternatives
3. Select a Strategy
4. Implement with Resources
5. Refine and Evaluate

- **Governance Improvement Cycle (ILBM and ILLBM)**



Planning/ Implementation and ILBM need to be implemented together

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6. Global Implications

Global Water Resources Crisis

→ IWRM (Integrated Water Resources Management) :

impact on policy reforms in water resources, particularly in developing countries

Global Degradation of River Basins

→ IRBM (Integrated River Basin Management) :

impact on policy and program development in basin management

IWRM, IRBM .....

"Lentic Water" features are not particularly noted.

Conclusion

IWRM

IRBM

What is the missing link?

"lentic properties of water systems" on the globe!

↓

Integrated Lake Basin as well as Integrated Lake-River-Coastal Basin Management

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IWRM + *ILLBM*

IWRM

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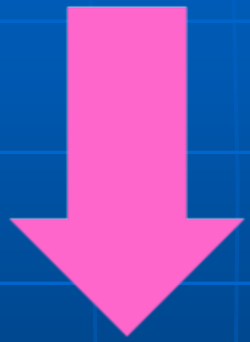
ILBM

(Integrated Lake Basin Management)



IL^{2}BM

(Integrated Lentic –Lotic Basin Management)

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Everyone, of Man and of Nature, Lives in the Basins with Lentic Property, and ILBM and ILLBM are meant to help them Thrive Happily Together