

Ise Bay Eco-Compatible River Basin Research Project :
**Management and Its Biodiversity of Ecosystem
 in River Basin Complex with
 Terrestrial and Coastal Marine Areas Connected**

*International Workshop for Networking Biodiversity Observation Activities
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Introduction of Research Project:

“Research and Development in Assessment and Restoration for
Eco-Compatible Management of **River Basin Complex** around **Ise Bay**”

the special coordination fund for promoting science and technology
 for sustainable national land management (2006-2010)

supported by MEXT, Japan

Issues for Application Submission
 “Sustainable River Basin Management
 Technology”

River Basin Complex around Ise Bay
 10 rivers of class A pouring into Ise Bay
 Japan Alps higher than 2000m
 Monsoon Asia
 Nagoya metropolis
 Active agriculture and fishery



Organization:

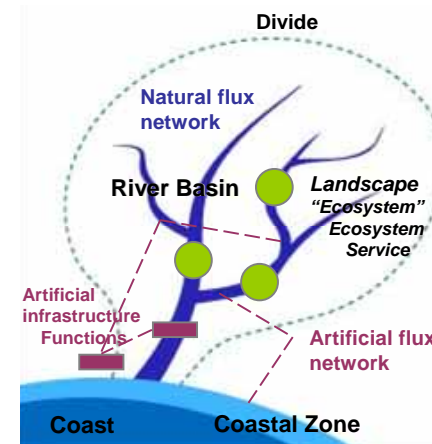
- Nagoya University [Core]
- NILM (National Institute for Land and Infrastructure Management)
- PWRI (Public Works Research Institute)
- NIES (National Institute for Environmental Studies)
- NIRE (National Institute for Rural Engineering)
- NRIFE (National Research Institute of Fisheries Engineering)
- NRIA (National Research Institute of Aquaculture)

Terrestrial – River – Bay - Ocean

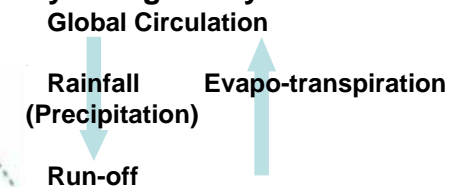
Scientific aspects:
 Hydrology and Hydraulics
 River engineering
 Water resources engineering
 Environmental Engineering
 Limnology
 Ecology and Biology

Governmental aspects:
 National land and infrastructure management
 Agriculture activities
 Fishery activities
 Environmental conservation

River Basin



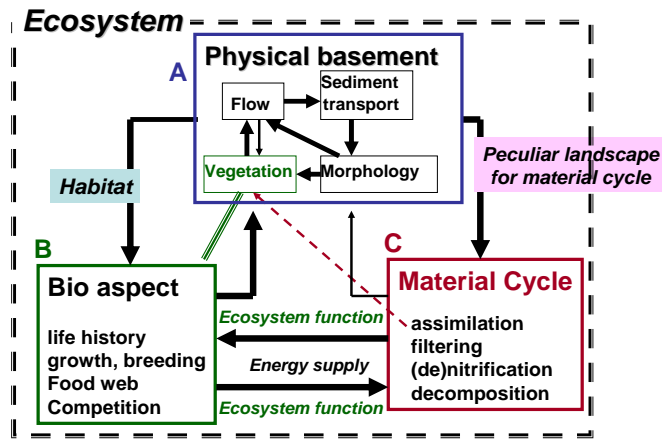
Hydrological Cycle



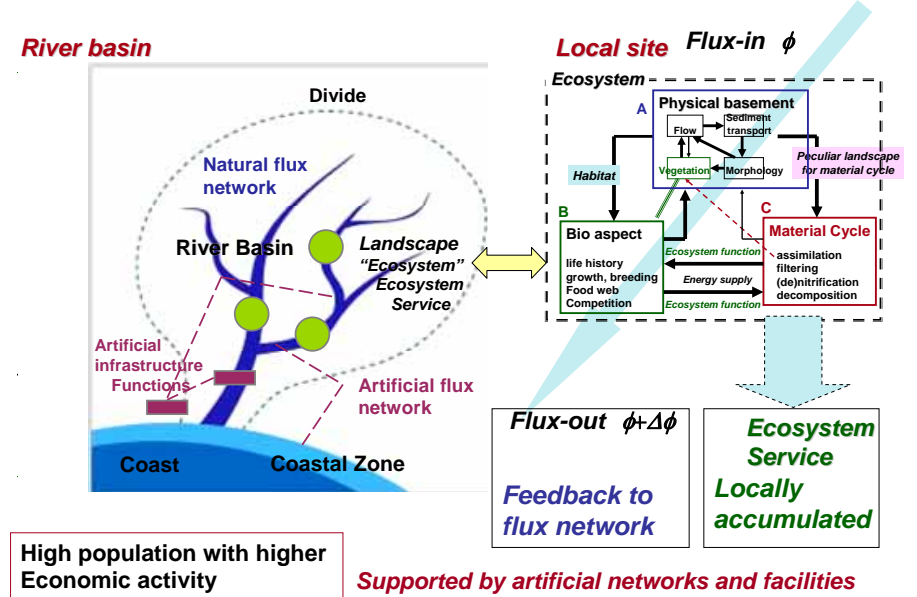
Network fluxes

- Water
hydraulic condition
- Sediment
fluvial process
- Materials
(Biophilic elements)
material cycle
(inorganic, organic)
- Biological aspects

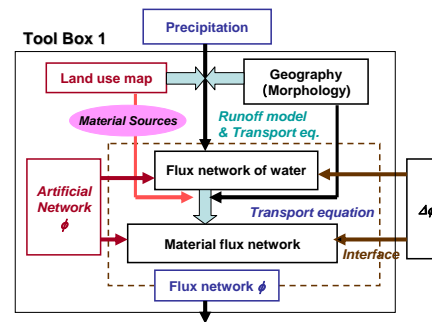
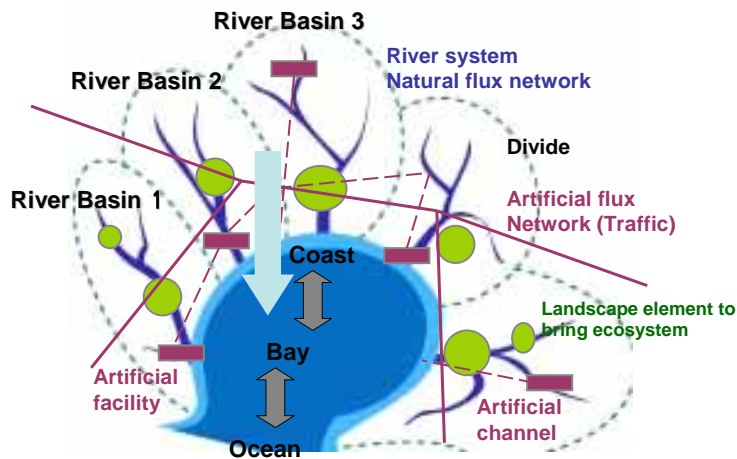
Distributed Landscape = Local Ecosystem
as an interrelating system of (A) Physical basement, (B) biological aspect and © Material cycle



Roles of Flux Networks and Distributed Landscapes

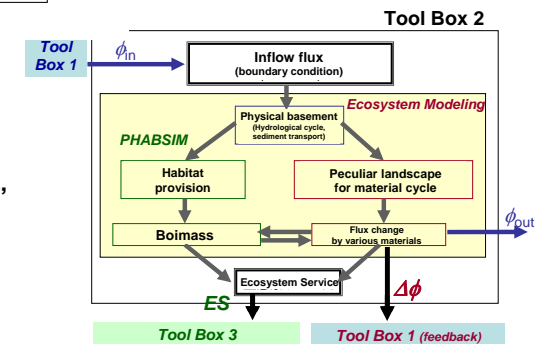


River basin complex around a bay



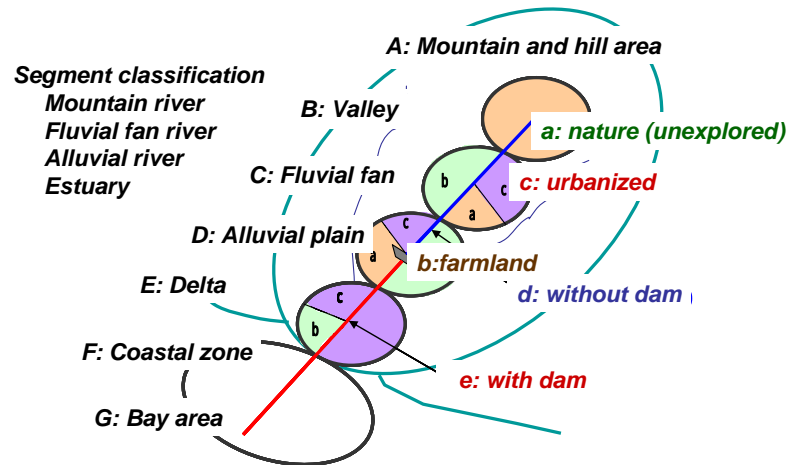
Tool Box 1 to describe flux networks

Tool Box 2 To evaluate $\Delta\phi$ and ES
 Developed for various "categorized landscapes"



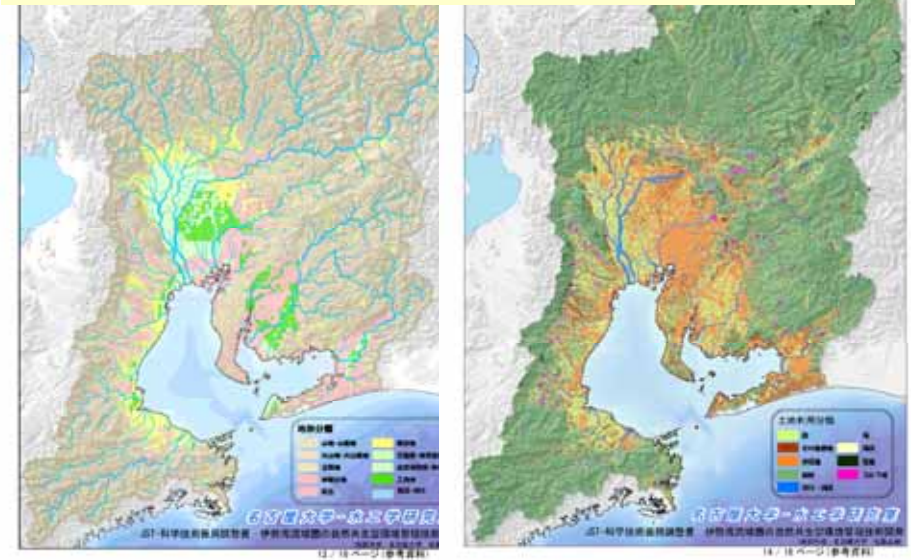
“Categorized landscapes”

Natural geography × Artificial Land Use



Ecosystem functions, menus for management or/and restoration are characterized by categorization of landscapes.

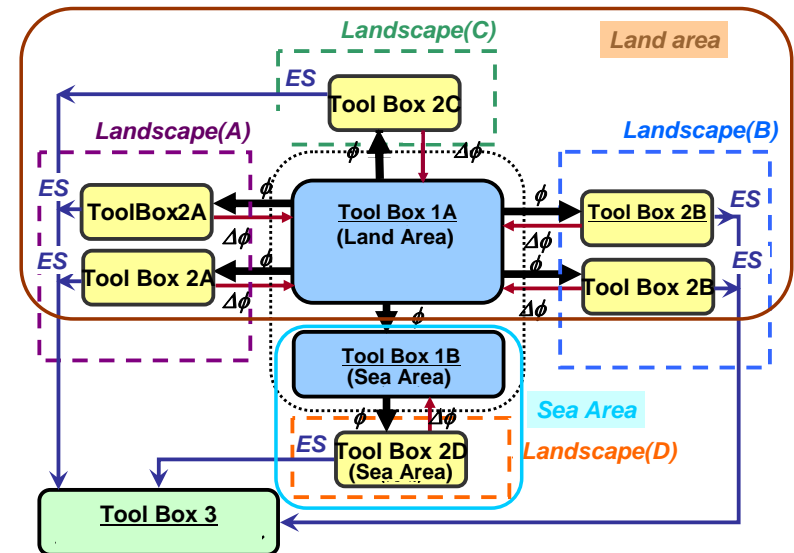
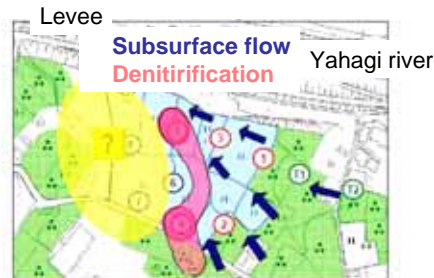
Classification of geography and Land use GIS
River basin complex
= Categorized landscapes connected by flux network



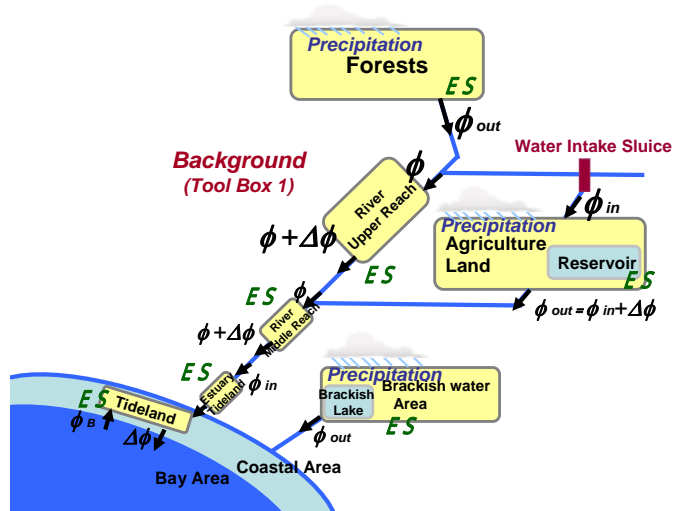
Examples of Categorized landscape:

Sandy river with alternate bars and its flood plain with human activity

- (1) Suppressed instream flow for irrigation
- (2) River morphology (alternate bars, vegetation, degradation)
- (3) Land use changes: flood plain, rice pad, farmland (tea), and residential area
- (4) Ground flow flux with nitrogen (nitrate ion and denitrification)



Tool Box 3
to standardize and integrate ES of various landscapes



Various policy menus change $\Delta\phi$ and ES at different sites. The change of $\Delta\phi$ are fed back and propagated basin-wide by using TB-2, while ES at various sites are standardized and integrated by using TB-3.

Assessment of management policy

Ecosystem service Millennium Ecosystem Assessment (MEA). 2005.

Provisioning services

- food, crops, wild foods, and spices
- water
- pharmaceuticals, biochemicals, and industrial products
- energy (hydro power, biomass fuels)

Regulating services

- carbon sequestration and climate regulation
- waste decomposition and detoxification
- purification of water
- crop pollination
- pest and disease control

Supporting services

- nutrient dispersal and cycling
- seed dispersal
- primary production

Cultural services

- cultural, intellectual and spiritual inspiration
- recreation, experiences (including ecotourism)
- scientific discovery

Various ecosystem services recognized in local sites (in management or restoration program)

- Food provision
- Water purification
- Suppression of green-house gas
- Recreation, culture, ..etc.

Equivalent artificial facilities (construction and operation) - eco-compatible menu Accounted by "fossil fuels"

Standardized integrated evaluation

functional species

Habitat for functional species
endangered species
species with intimate relation with functional species (food web)

key stone species to support the above

.....

"bio-diversity" index

Diversity of physical condition
concept of "categorized landscape"

Summary

River basin is a representative scale for both primary human activities and ecosystem, and it is a proper scale for management.

It has been expanded to "river basin complex" by artificial connection of flux network and having common fate with a bay.

For sustainable river basin management, "eco-compatible management scenario" is advantageous for accepting more "ecosystem service" to avoid exhaustion of fossil fuels and conserving "bio-diversity".

In order to draw a road map to "eco-compatible management of river basin complex", assessment techniques should be developed.

Three tool boxes are developed by our research group:

TB-1 to describe flux network connectable with local change of flux by eco-compatible management, TB-2 to evaluate eco-system service and flux change by ecological function for various categorized landscapes, and TB-3 to standardize and integrate various ecosystem services accumulated locally.