

River Basin Management, Adv.

Chapter 5 RIVER ECOSYSTEM MANAGEMENT

Environmental Management of Rivers

Revision of river law in 1997

Target of environmental management of river

Strategies for river environmental management

Water quality management

Space management master plan

Close-to-nature river improvement

Traditional river works

Riparian vegetation, fish,

Census of rivers

Water discharge management

Water release to seriously discharge decreased reach downstream of intake for hydropower

Environmental discharge

Habitat restoration

Environmental assessment

Pollution → Ecosystem → Sustainability

EIA

SEA

EIA=Envaironmental Impact Assessment

SEA=Strategic Environmental Assessment

↑

↑

Project

Master plan

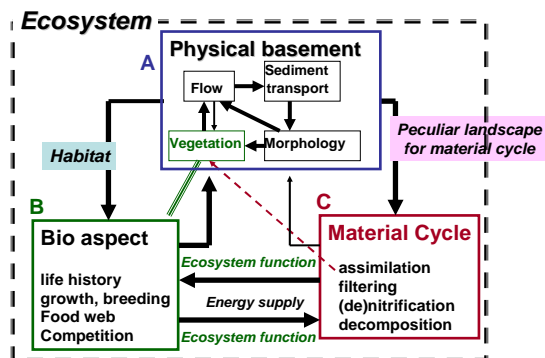
Structure and Functions of River Ecosystem

Interrelating system

Physical basement (fluvial process)

Biological aspects

Material cycle (biophilic elements)



Concept of landscape

Geomorphology, weather

Flux network→stock

Water→ aquatic, terrestrial

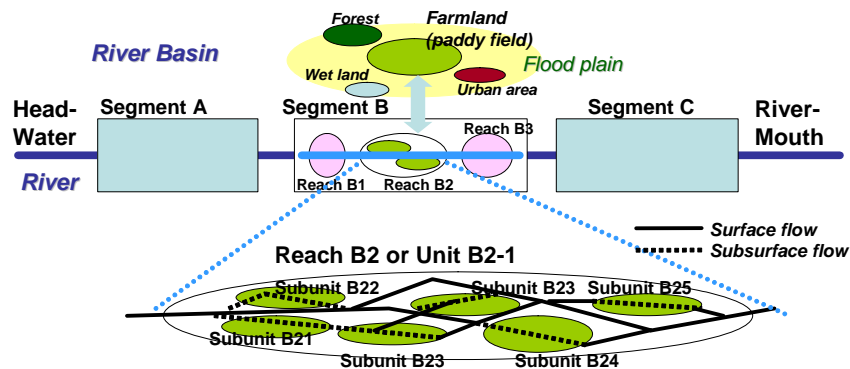
Sediment→ morphology

Biophilic elements→ biomass

Hierarchy of scales

Connectivity among sub-landscapes←Flux network

Flux (flow) and stock



Ecosystem Service ← *ecosystem function, ecological function*

UN Millennium Ecosystem Assessment (2001-2005)

Provisioning services

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

Regulating services

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

Supporting services

- nutrient dispersal and cycling
- seed dispersal
- Primary production

Cultural services

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

Evaluation of Ecosystem

PHABSIM (Physical Habitat Simulation)

HIS=Habitat Suitability Index →CSI

Preference curves

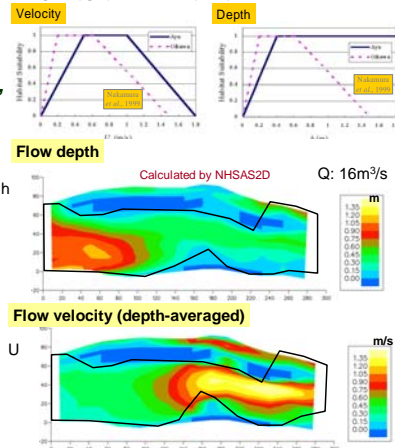
WUA=Weighted Usable Area

Habitat

Evaluation of "Habitat Suitability" (PHSIM or HEP)



Examples of preference curve for Ayu and Oikawa

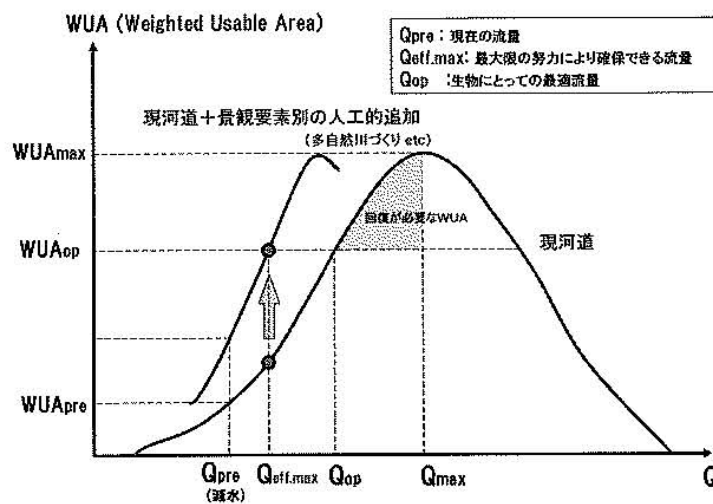


IFIM (Instream Flow Incremental Methodology)

WUA=func(Q)

Evaluation of the effect of human activities ← water usage, restoration

Form of function can also be altered by human activities



Population Dynamics Modeling

Growth (Individual mass), breeding (number of individuals)

$$dM/dt = \text{func}(M, \dots)$$

Eco-Compatible Management of River Basin (Complex)

Management Target:

Sustainability

←resources depletion, global warming

Loss of bio-diversity

Strategy=Eco-compatible management

Restoration of landscapes, Rehabilitation of water/material flux networks



Several similar reaches constitutes a homogeneous segment.

←Sandy river segment with alternate sand bars.

←River segments are neighboring to flood plain utilized by human activities.

River basin

River basin complex

