Ecosystem Services and Values for Stakeholders

Takaaki Niren

University of Shiga Prefecture

Ecosystem

- ✓ A dynamic complex of plant, animal, and microorganism communities and the nonliving environment interacting as a function unit
- ✓ Providing a variety of benefits to people

Ecosystem Services

Supporting
- Nutrient cycling
- Soil formation
- Primary production
- .....

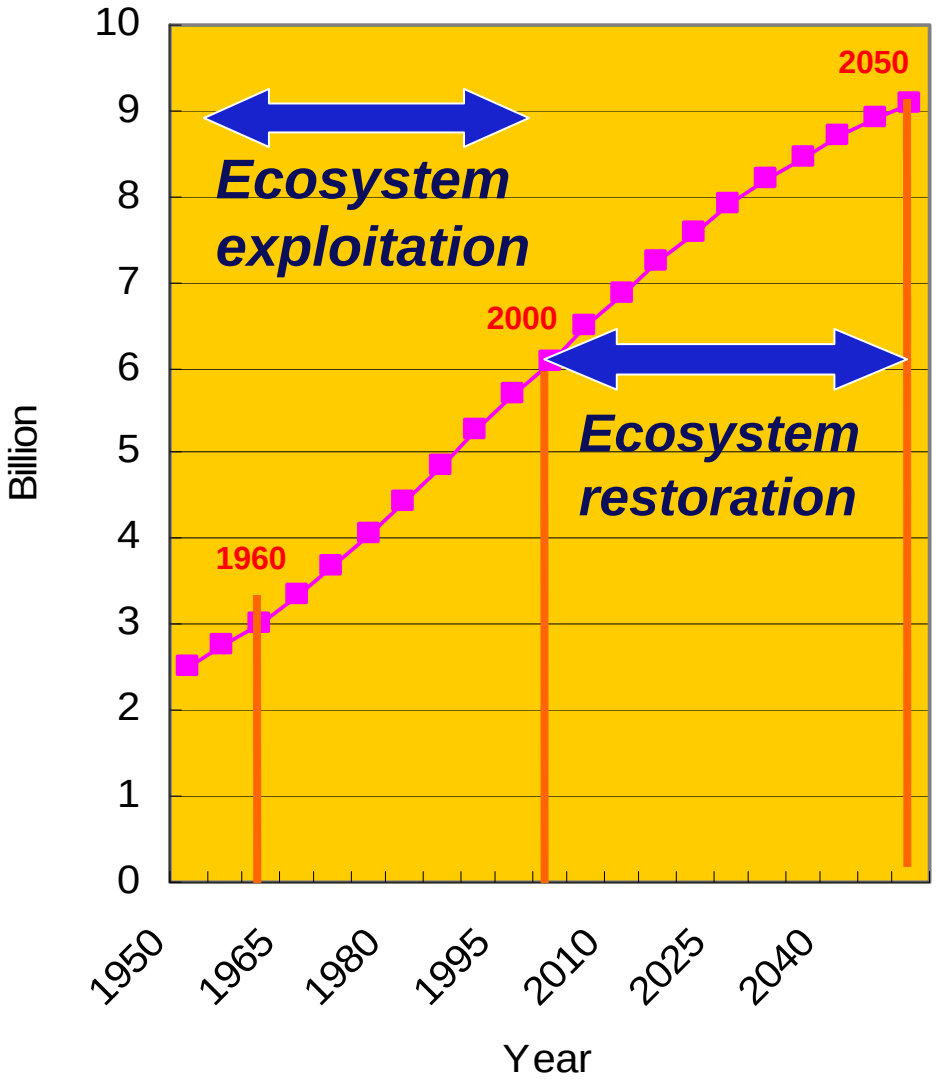
Provisioning
- Food
- Fresh water
- wood and fiber
- Fuel
- ....

Regulating
- Climate regulation
- Flood regulation
- Disease regulation
- Water purification
- ....

Cultural
- Aesthetic
- Spiritual
- Educational
- Recreational
- ....

Millennium Ecosystem Assessment (2005)

Human impact to ecosystem



UN, World Population Prospect (2004)

- ✓ More 3 billion people until 2050 on the same ecosystem
- ✓ Wise management of the ecosystem

Human impacts on freshwater ecosystem services

Threats to aquatic ecosystem services from human activities, Part1		
Human activity	**Impact on aquatic Ecosystems**	**Values/Services at Risk**
Dam construction	**Alters timing and quantity of river flows, water temperature, nutrient and sediment transport, delta replenishment, blocks fish migration**	**Habitat for native species, sports and commercial fisheries, maintenance of deltas and their economies**
Dike and levee construction	**Destroys hydrologic connection between river and floodplain habitat**	**Habitat, sports and commercial fisheries, natural floodplain fertility; natural flood control**
Excessive river diversions	**Depletes streamflows to ecologically damaging levels**	**Habitat, sports and commercial fisheries, recreation, pollution dilution, hydropower, transportation**
Draining of wetlands	**Eliminates key component of aquatic environment**	**Natural flood control, habitat for fish and waterfowl, recreation, natural water purification**
Deforestation/ poor land use	**Alters runoff patterns, inhibits natural recharge, fills water bodies with silt**	**Water supply quantity and quality, fish and wildlife habitat, transportation , flood control**
Uncontrolled pollution	**Diminishes water quality**	**Water supply, habitat, commercial fisheries, recreation**

Threats to aquatic ecosystem services from human activities, Part 2

Human activity	Impact on aquatic Ecosystems	Values/Services at Risk
Overharvesting	Depletes living resources	Sports and commercial fisheries, waterfowl, other living resources
Introduction of exotic species	Eliminates native spieces, alters production and nutrient cycling	sports and commercial fisheries, waterfowl, water quality, fish and wildlife habitat, transportation
Release of metals and acid-forming pollutants to air and water	Alters chemistry of rivers and lakes	Habitat, fisheries, recreation
Emmision of climate-altering air pollutants	Has potential to make daramatic changes in runoff patterns from increases in temperature and change in rainfall	Water supply, hydropower, transportation, fish and wildlife habitat, pollutin dilution, recreation, fisheries, flood control
Population and consumption growth	Increases pressures to dam and divert more water, drain more wetlands, etc.; increases water pollution, acid rain, and potential for climate change	Virtually all aquatic ecosystem services

G.C. Daily, ed., *Nature's Services: Societal Dependence on Natural Ecosystems*, Island Press, 1997.

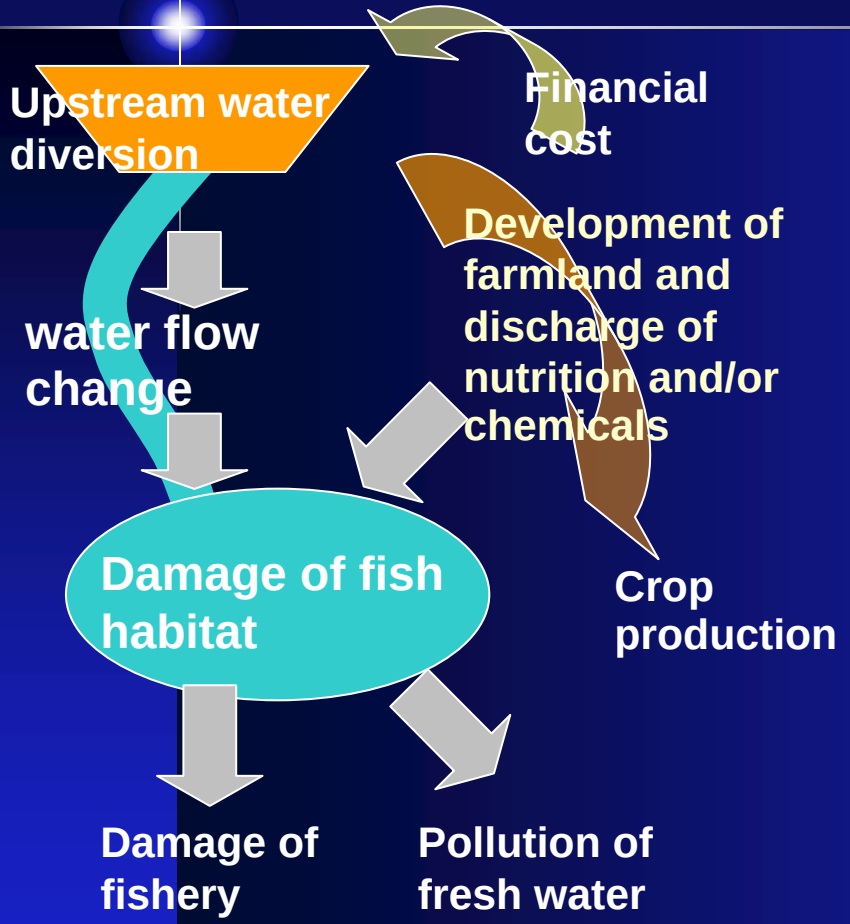
Strategy of Ecosystem management

- ✓ **Exploitation,20th century strategy: to rule water by large dams, levees, river diversion, and other big engineering projects seeking for flood control and water resources development, not for ecosystem management**
- ✓ **Restoration,21th century strategy: to make partnership with water by restore ecosystem**

Ecosystem management for lake environment

1. Ecosystem services of lake environment
2. Benefits of ecosystem services and their stakeholders
3. Damages of ecosystem services by human activities and their stakeholders
4. Valuation of benefit and cost
5. Appraisal of Efficiency, Equity and Sustainability

Value of ecosystem services



- ✓ Tow kinds of cost and benefit: Financial (internal) and external
- ✓ Visible internal costs and benefits flow through trading (market).
- ✓ Invisible external costs and benefits flow through ecosystem.
- ✓ External costs and benefits come down to some stakeholders and affect welfare of the society.

Why stakeholders for new strategy?

- ✓ Integrity of aquatic ecosystem
- ✓ Variety of ecosystem services
- ✓ Locality of aquatic ecosystem
- ✓ Variety of stakeholder interests around aquatic ecosystem

New strategy, Government to Governance

- ✓ **Target: from ruling water for specific purpose to derive good interrelationship between man and water**
- ✓ **Limit of government: vertical administrative system and an uniform standard for diverse situations**
- ✓ **Transform to governance: participatory decision-making, sharing ecosystem value, social learning**

New strategy, regulation to incentives

- ✓ **Ecosystems, not dose-response relation with human impact but complex dynamics**
- ✓ **Efficient resource use, reducing human impact and enhancing welfare**
- ✓ **Incentives, promoting efficient resource use**
- ✓ **Institutional arrangement, promoting beneficial externality and discouraging damaging externality**

Payments for environmental services, PES

- ✓ **Agri-environmental Payments, EU: Payments for the provision of environmental benefits in countryside, for those environmental benefits beyond the level of good agricultural practice**
- ✓ **Heredia,Costa Rica: Payments for upstream forest conservation benefits from downstream water users**
- ✓ **Price supporting policy is advantageous to rich farmer and incompatible to the WTO free trade policy.**
- ✓ **PES can take into account of externality, ecosystem stewardship benefits.**

Program of Agricultural practices fostering environment, Shiga Prefecture, Japan

Agreement of agricultural practices fostering environment

Compliance requirement:

1. **Application of chemicals and chemical fertilizer under the half amount of customary practices**
2. **Appropriate application of composts**
3. **Appropriate water discharge without fertile soil**

execution

Payments for environmental benefits

Certification of agricultural products fostering environment