BIODIVERSITY RESTORATION IN INTENSIVE RICE FIELDS IN JAPAN

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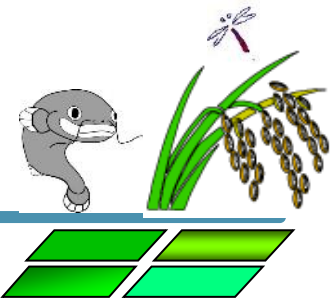
Outline



Drivers

Economic policy
Labor productivity

Pay for ecosystem services
Ecosystem restoration

Responses

Pressures

Intensification
Land consolidation
Chemicals

State

Deterioration of agri-ecosystems

Extinction of species
Pollution
Environmental risks

Impacts

1960-

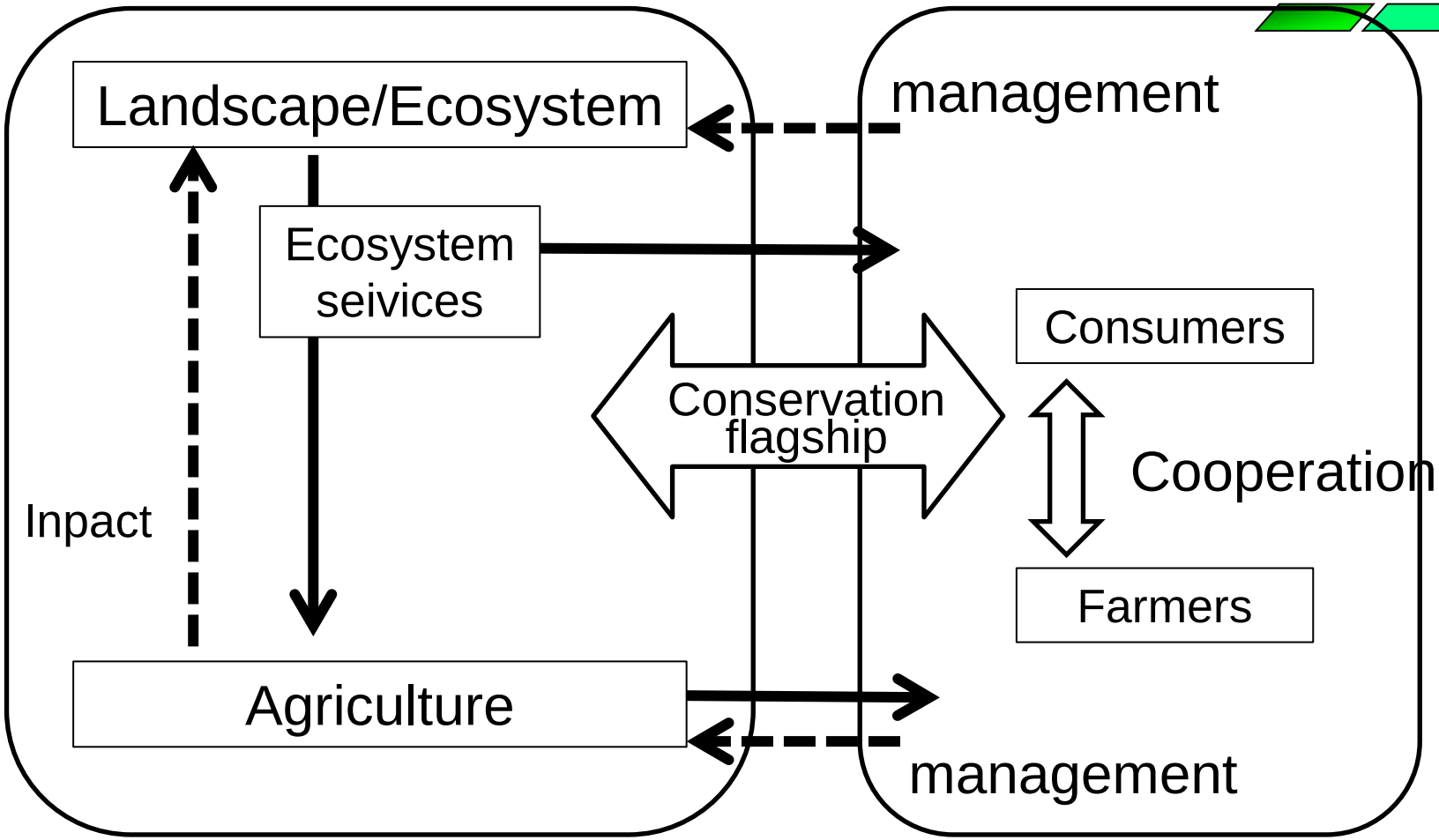
1990-

Rice fields were semi-natural habitats

Intensive food production

Ecosystem restoration

Agriculture and ecosystem



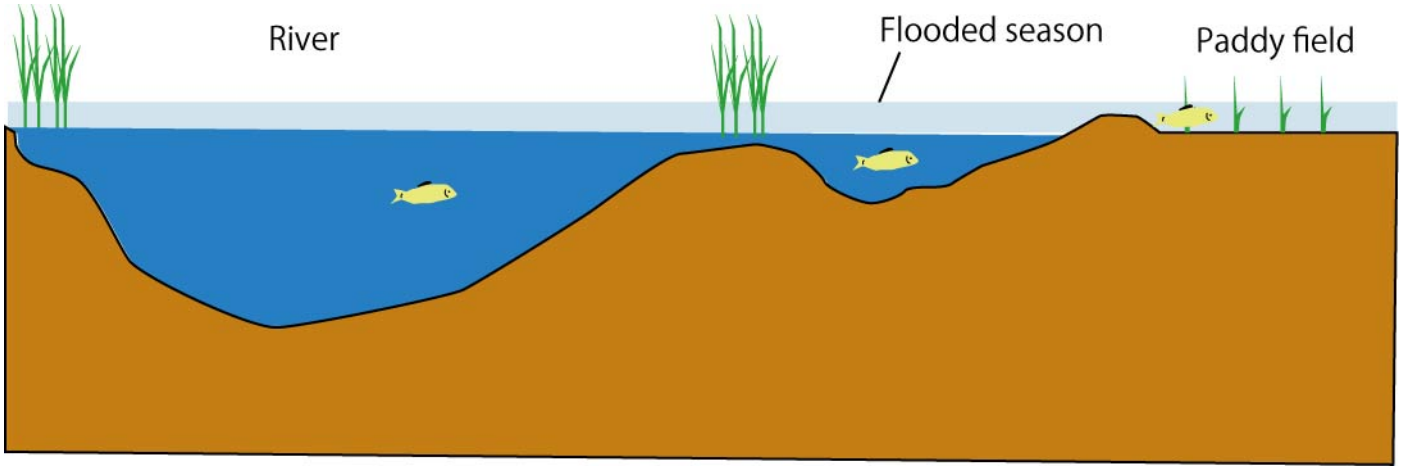
Ecosystem services of rice fields in Japan
Changes of rice farming and their effect on the ecosystem services (DPSIR)
Good practices of restoration and payments for ecosystem services

Rice farming ecosystem

- Almost 100% rice are produced in irrigated rice field in Japan
- Irrigation pond, canal, woodland, and grassland are/were needed for rice farming

Fish grow in rice fields

Scooping mud loach

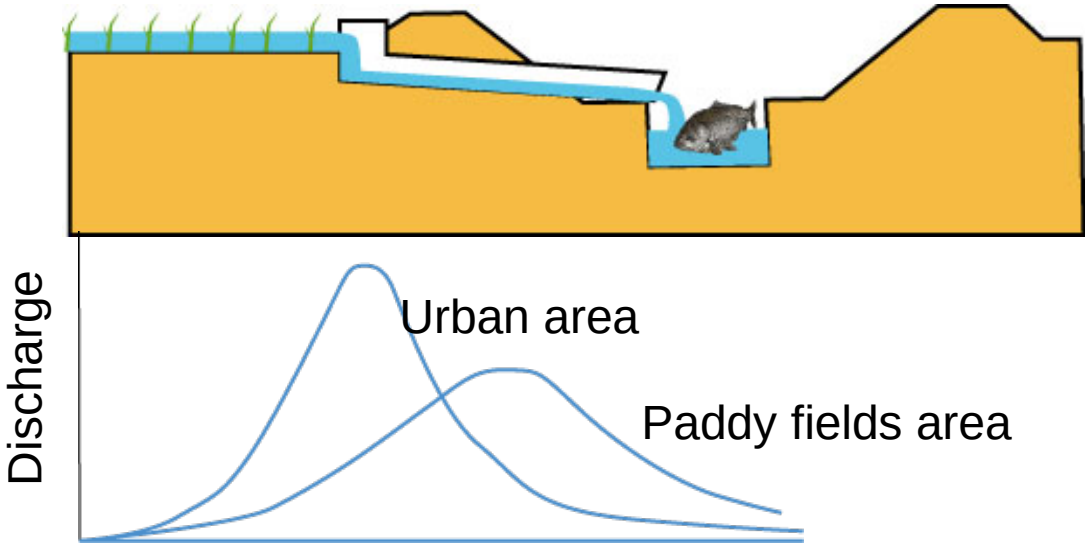


Shallow, warm, and eutrophic paddy water is good for nursery.
People use fish breeding naturally in paddies as well as cultured

Biodiversity

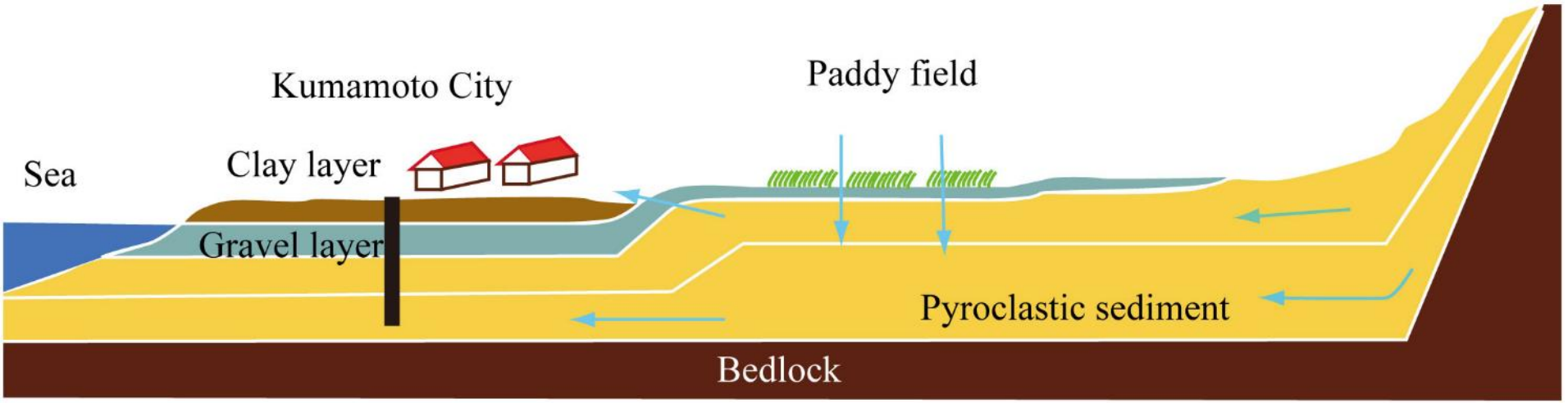
- Levees prevent soil erosion and landslide as well as provide plants including medicine and vegetable

Flood control



Paddy fields temporary store flood water and discharge it later. Therefore, during big floods, low-lying agricultural areas that include drainage channels and rivers act as a retarding basin that stores floodwater and functions as a buffer for downstream areas. The storage ability is depend on the height of levee and area of paddy fields.

Recharge ground water

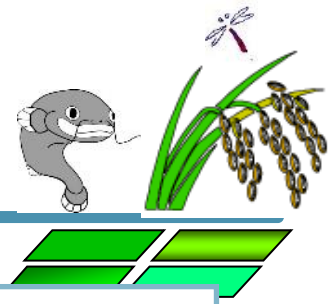


Kumamoto City with a population of 730,000 use 100% of water from ground water. Ground water was recharged by rice fields.

Nature appeared in Japanese songs

- “Back in the mountains I knew as a child
  Fish filled the rivers and rabbits ran wild”
- “Dragonflies, as red as sunset,
  Back when I was young
  In twilight skies, there on her back I’d ride
  When the day was done ”

Pressure & state change



- Use of agro-chemicals ->Eutrophication & pollution
- Land consolidation -> Landscape change
- Drainage improvement

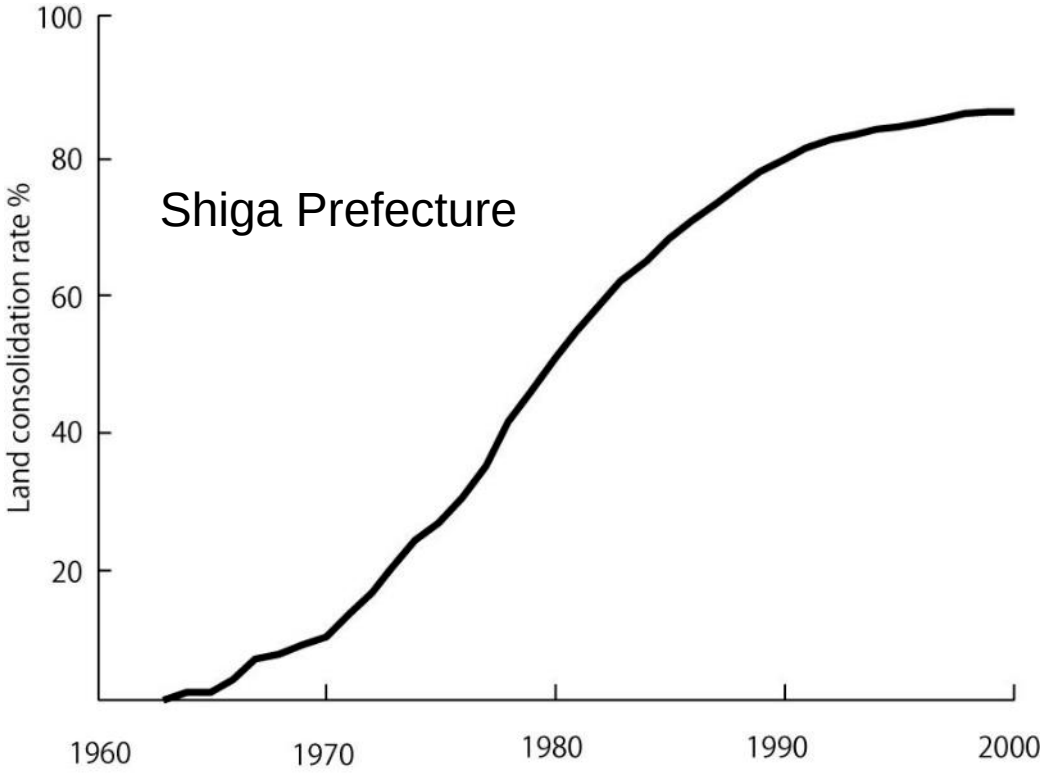
Deterioration of wetland function

- Depopulation, aging in rural area, & policy of reducing acreage

  ->Abandonment of paddy fields 3,900 km^2

  ->Deterioration of wetland function

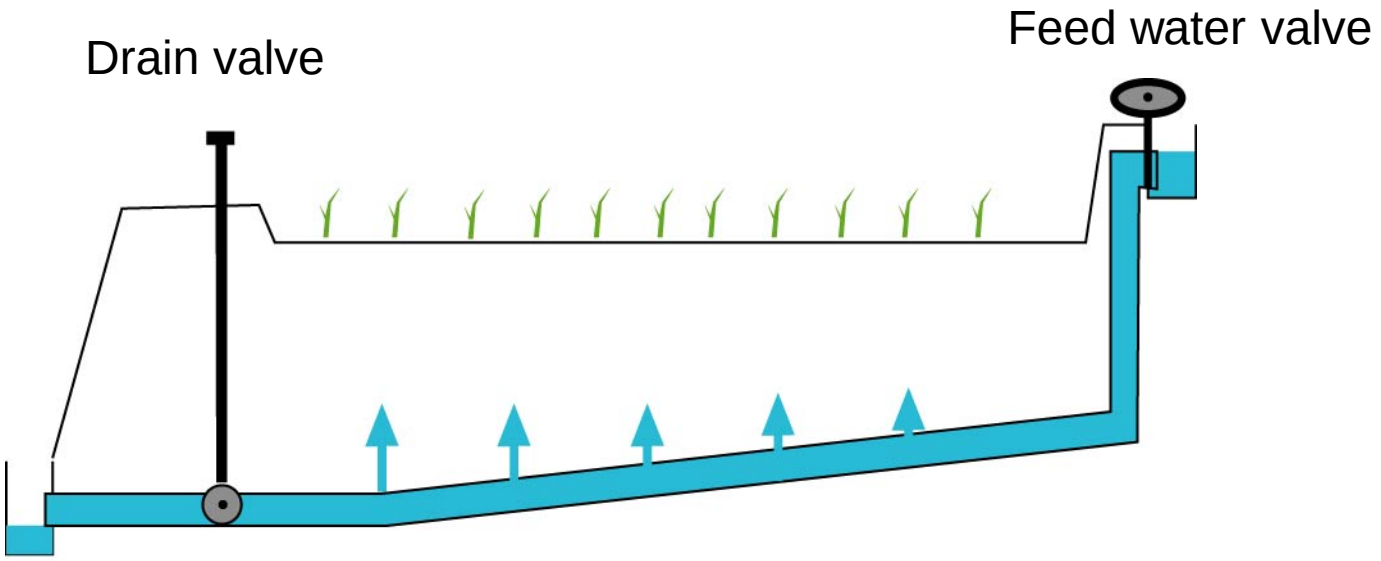
Farmland consolidation



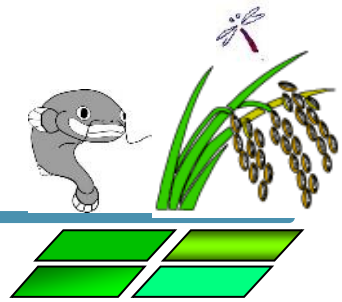
Mosaic of small paddy fields and seminatural grassland was changed to large uniform landscape

Land consolidation and drainage improvement

- Conversion to fields equipped with deeper ditches for rapid draining has almost eliminated wet winter rice fields.

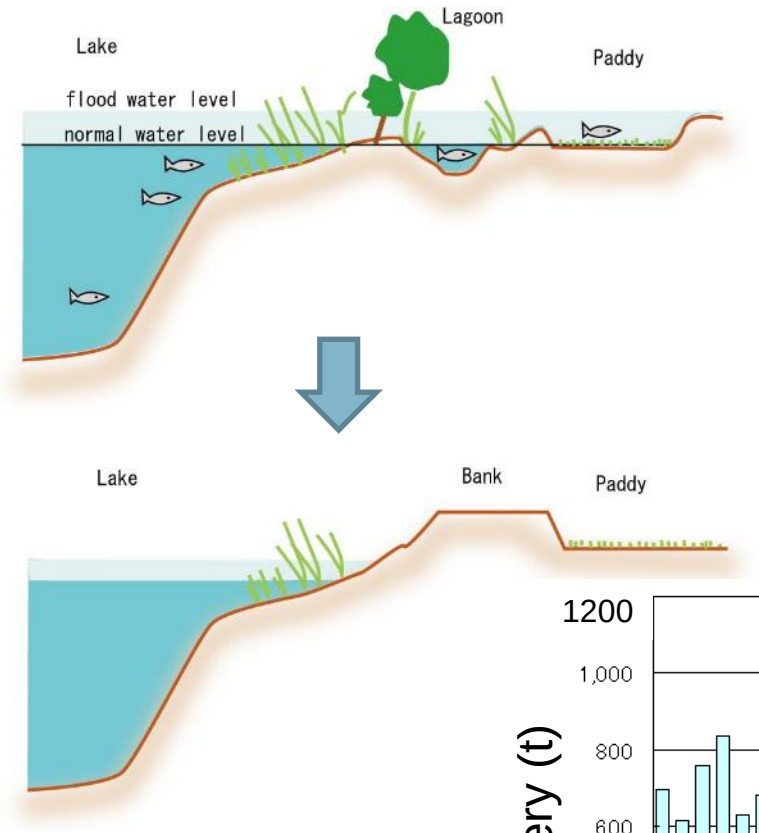


Impact

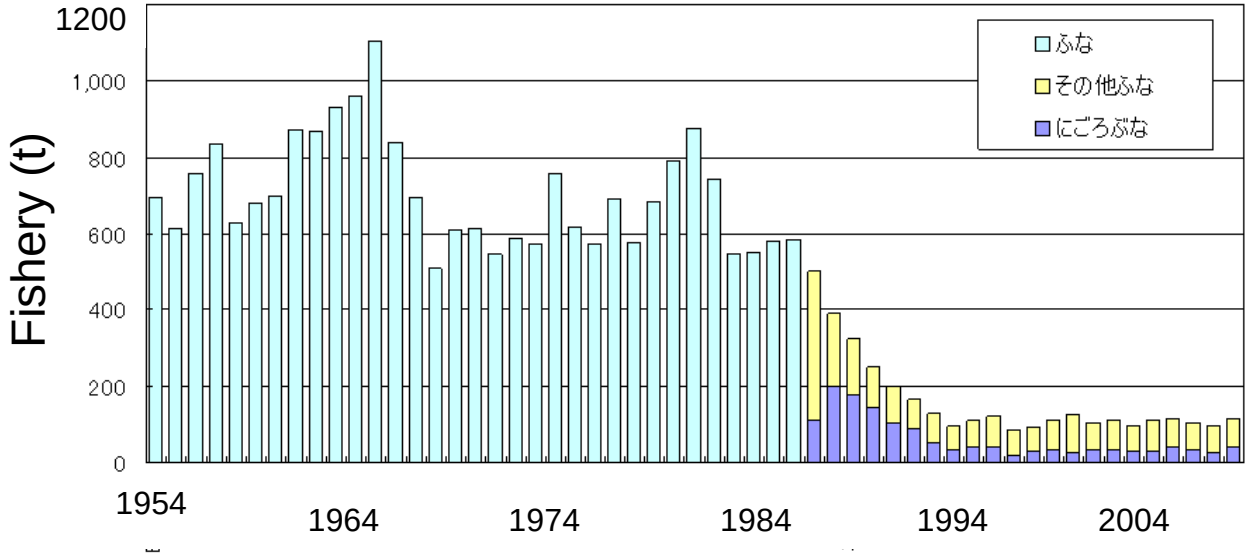


- Outflow of chemical fertilizers caused eutrophication in rivers and lakes
- Coastal fishery suffer damage
- Urban climate change
- Decrease in available water
- Biodiversity loss by pesticide and herbicide
- NO_3-N pollution of groundwater

Decreasing fishery in lakes



Several species of fish spawn flooding wetland with emerged plants. Paddy fields used to be spawning sites, but land consolidation cut off channels for fish to migrate between Lake Biwa and the paddies



Impact:

Endangered species in rice fields

Crested ibis EX

Platycodon grandiflorus VU

Monochoria korsakowii VU

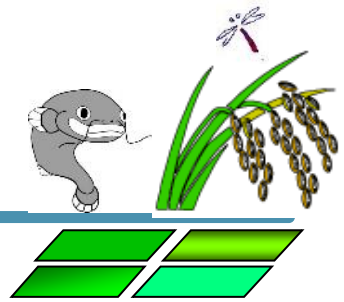
Rana porosa brevipoda EN

Oryzias latipes VU

Outdoor children

These used to be common in countryside

Response: policies

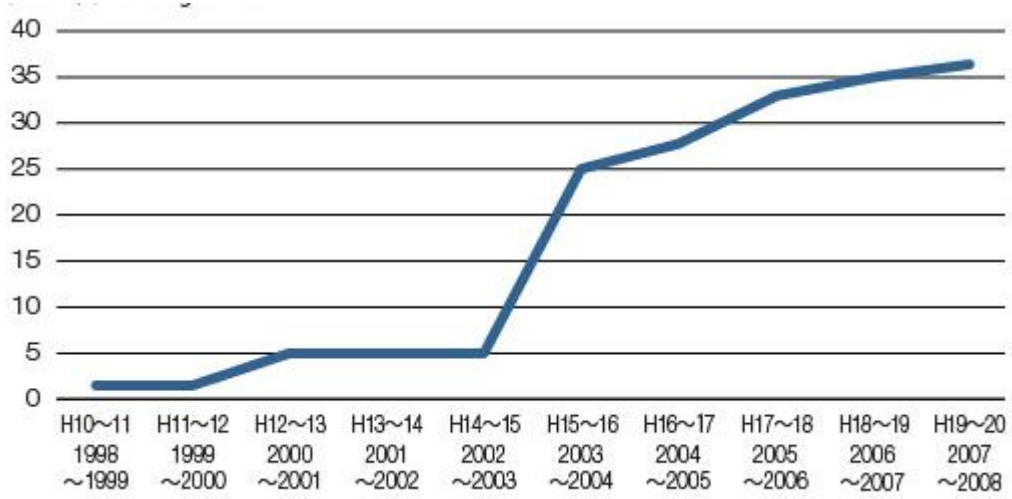


- 1999 The Basic Law on Food, Agriculture
- and Rural Areas
- 1999 Law for Promoting the Introduction of Sustainable Agricultural Production Practices
- 2000 Direct Payment in Hilly and Mountainous Areas
- 2006 Law for Promoting Organic Agriculture
- 2007 Biodiversity Strategy in Agriculture
- 2011 Direct Payment for Sustainable Agricultural Production Practices

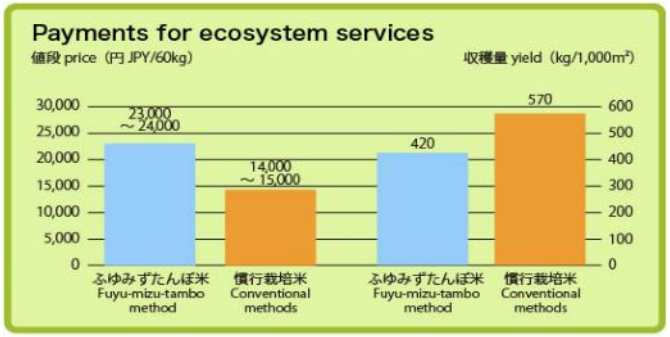
Winter flooding for geese

Weed control
Feeding site for water birds
Breeding site for red frogs
Enrichment of soil by bird's droppings

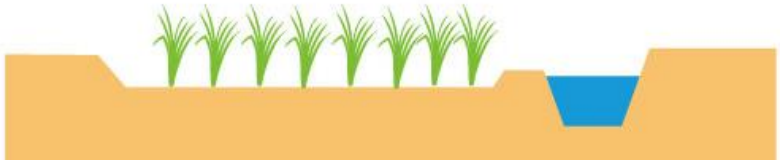
The rice grown in winter-flooded paddy fields are sold at a premium price of \24,000 compared to approximately \14,000 for rice grown with conventional methods



Acrage (ha) applying the water flooding in Tajiri City



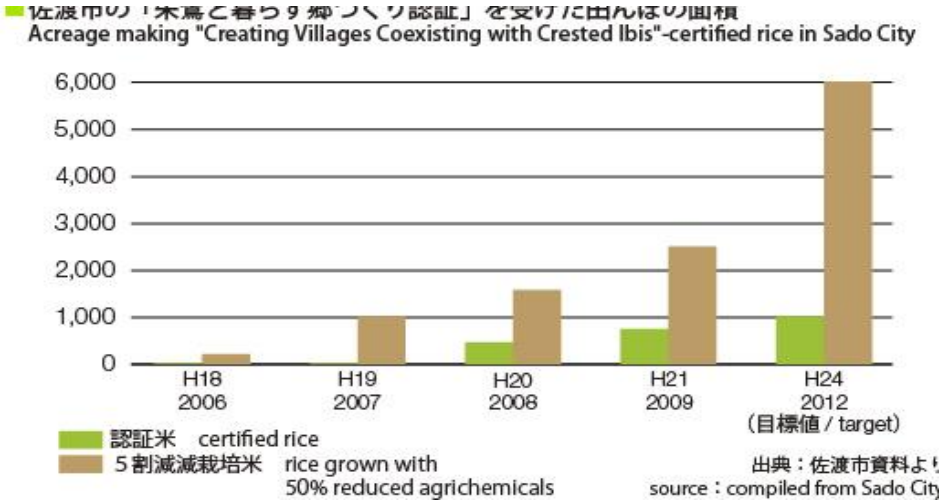
Creating village living with the crested ibis



Channel for living things.
Fish and tadpoles can survive in non-irrigation season

Condition of certification
1) reduce the use of chemical pesticides and fertilizers to at least 50 percent of conventional farming methods
2) adopt a farming, which include the winter-flooding of rice paddies and the installation of channels, fishways and biotopes
3) acquire certification as eco-farmers

The city grants \1,000 / 1,000m^2
Crested ibis rice is sold double price



Fish cradle rice paddy

1) Pesticides with the lowest level of fish toxicity are used.
2) Rice fields are properly managed so that fish habitats are not affected.
3) Efforts are made to enable hatchlings to move out from the paddies to the channels before draining the fields.
4) the fishways are set up in the drainage canals to spawn native fish species that run up the paddy field.

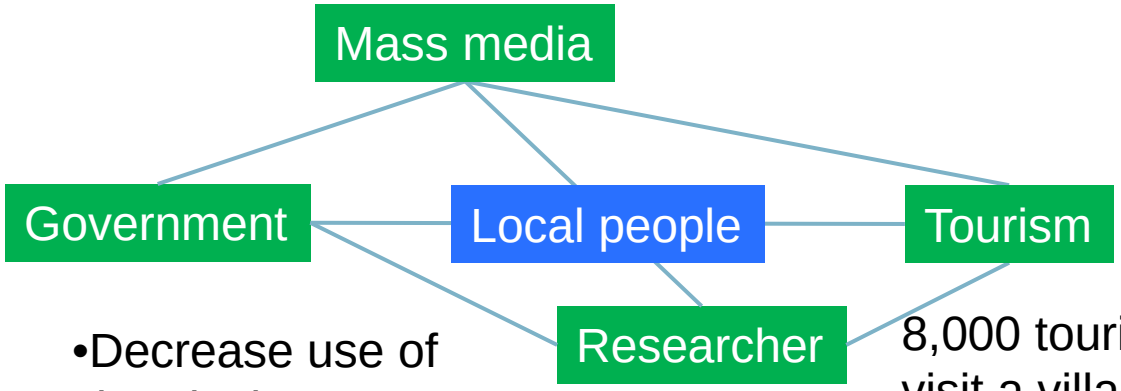
Establish a local brand

Culture

Biodiversity conscious farming

Landscape

People pay and work for terrace paddy, \30,000 / year

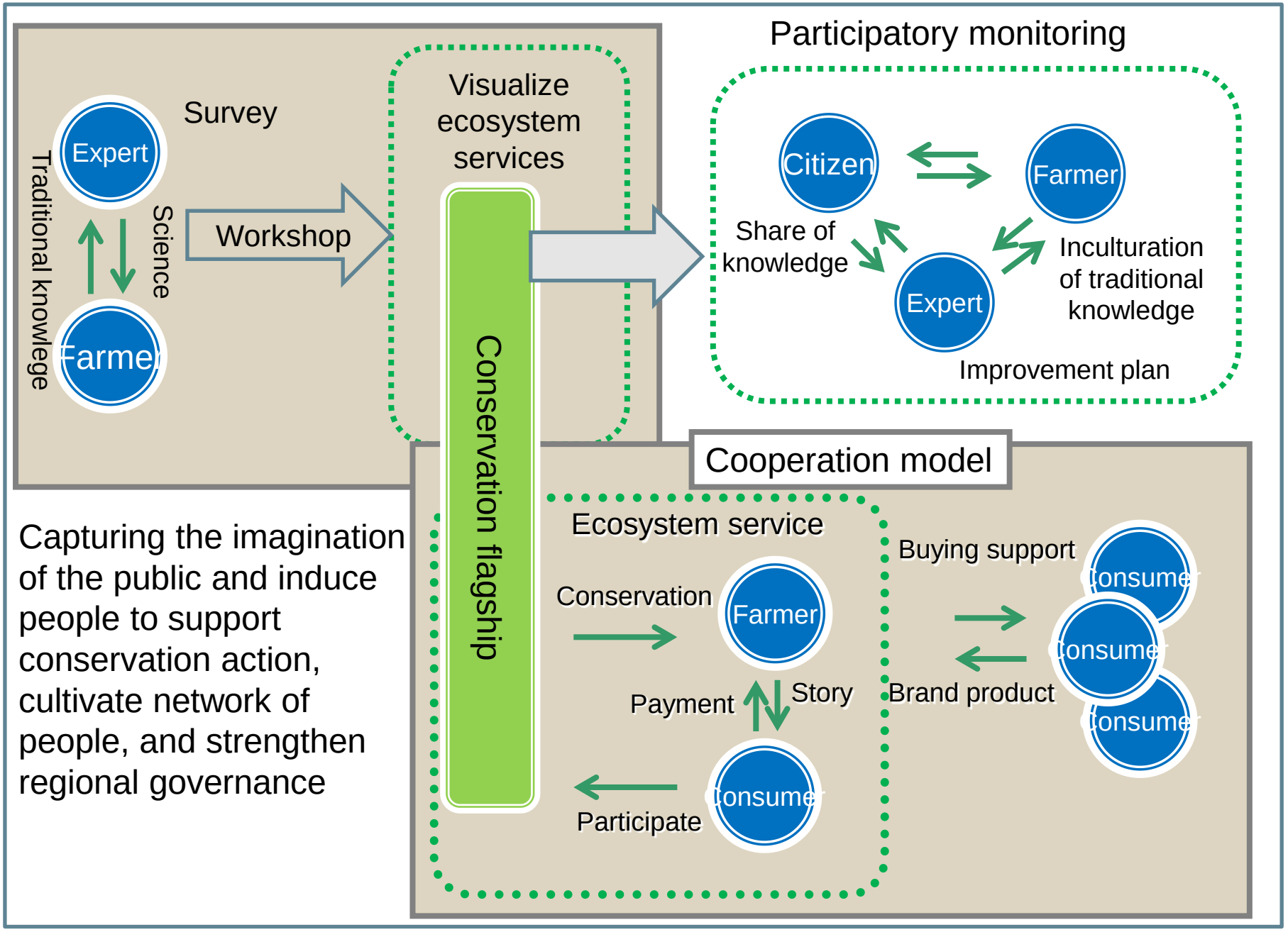


•Decrease use of chemicals
•Setting 3 symbolic living thiings
・Late midseason drainage

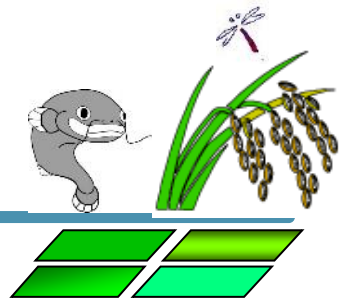
¥6,000/10kg

8,000 tourist/yr visit a village of 700 population

Wine labeled terrace paddy


Survey
Expert
Traditional knowlege
Science
Farmer
Workshop
Visualize ecosystem services
Conservation flagship
Participatory monitoring
Citizen
Farmer
Share of knowledge
Expert
Inculturation of traditional knowledge
Improvement plan
Cooperation model
Ecosystem service
Conservation
Farmer
Payment
Story
Consumer
Participate
Buying support
Consumer
Consumer
Consumer
Brand product
Capturing the imagination of the public and induce people to support conservation action, cultivate network of people, and strengthen regional governance

Conclusion



- Ecosystem services of rice fields and the pressures on the ecosystem function are reported here along with steps to improve awareness and restore it.
- Local-scale rice production with low agricultural chemicals and chemical fertilizer spread started.
- Cultural & spiritual connection to living things play an important role in spread of sustainable agriculture including reduced chemicals.
- However, there is a need to have more cases to integrate all the functions at the local or regional scale to represent area-specific characteristics of multifunctionality