Japan’s Experience in Providing Positive Incentives

Economic Valuation of Biodiversity, Ecosystems and Ecosystem Services, and Policy Measures

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Case Studies on Valuation & Positive Incentives

- Valuation and incentive measures at national level
  - The total economic value of agriculture, forestry and fisheries, and the process incorporating into the basic law and direct payments program for sustainable use

- Valuation and incentive measures at regional and local level
  - Riverhead forests and watershed conservation by local forest environmental tax

- TEEB cases on protected areas and payment for ecosystem services
  - Oku-Aizu forest ecosystem reserve, protected area
  - Kabukuri-numa, Ramsar-site wetland and surrounding paddy fields
    - PES and labeling, trust of abandoned paddy and reconversion to wetland

- On-going and future research activities and policy needs
TEEB’s Tiered Approach

• Putting the tiered approach into practice
  • Valuation for policy & decision making

• Recognizing values
  • Identifying issues and assessing services
  • The full range of ES affected and stakeholders involved

• Demonstrating values
  • Using appropriate methods. Linkages over scale and time, e.g., local to global, current vs. future use, upstream to downstream, urban to local

• Capturing values (and finding solutions)
  • To overcome undervaluation, using economically informed policy instruments
Japan’s experience at national level

Recognizing, Demonstrating, and Capturing Ecosystem Services from Agriculture, Forestry and Fisheries
### Economic valuation and agri-environmental policy

- ES from agriculture, e.g., flood regulation, water supply and purification, cultural landscape, have been drawing attentions as important benefits for human well-being since the early 1970s.
- Nationwide studies of economic valuation of ES from agriculture was one of the popular approaches to make people recognize their values.
- Estimating practices by replacement cost and CV was one of the major driving forces to make national agri-environmental policy measures, and then positive incentives for sustainable agriculture were provided.
  - The Basic Law on Food, Agriculture and Rural Areas in 1999
  - Direct payments for paddy- and upland-field farming in hilly and mountainous areas in 2001 (808,467ha)
  - Direct payments for flat farming areas in 2007 (1,425,000ha)
  - Total area of farmland: 4,609,000ha (2009)
### Economic Valuation of ES from Agriculture and Rural Areas

<table>
<thead>
<tr>
<th>Year</th>
<th>Type of goods</th>
<th>Methods</th>
<th>Estimated value/year (billion yen)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>Farmland</td>
<td>Replacement cost</td>
<td>12,170</td>
</tr>
<tr>
<td>1991</td>
<td>Rice paddy field</td>
<td>Replacement cost</td>
<td>4,704</td>
</tr>
<tr>
<td>1991</td>
<td>a) Rice paddy field</td>
<td>Hedonic pricing</td>
<td>a) 11,867</td>
</tr>
<tr>
<td></td>
<td>b) Upland field</td>
<td></td>
<td>b) 14,215</td>
</tr>
<tr>
<td></td>
<td>c) Pasture</td>
<td></td>
<td>c) 4,492</td>
</tr>
<tr>
<td>1995</td>
<td>a) Rice paddy field</td>
<td>Replacement cost</td>
<td>a) 4,628</td>
</tr>
<tr>
<td></td>
<td>b) Upland field</td>
<td></td>
<td>b) 2,026</td>
</tr>
<tr>
<td>1996</td>
<td>Agriculture &amp; agri. villages</td>
<td>Contingent valuation (Willingness to pay)</td>
<td>4,107</td>
</tr>
<tr>
<td>1998</td>
<td>Agriculture &amp; agri. villages</td>
<td>Replacement cost</td>
<td>3,032</td>
</tr>
<tr>
<td></td>
<td>in hilly &amp; mountain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td>Agriculture &amp; rural areas in hilly &amp; mountain</td>
<td>Contingent valuation (Willingness to pay)</td>
<td>3,248</td>
</tr>
<tr>
<td>2001</td>
<td>Agricultural &amp; agri. villages</td>
<td>Replacement cost</td>
<td>8,223</td>
</tr>
</tbody>
</table>
### Economic Valuation of ES from Forests

**ES from Forests**: 70,264 billion yen (2001)

- CO₂ absorption, erosion and landslide prevention, flood mitigation, fostering water resources, water purification, recreation & amenity
- Replacement cost method have been used for economic valuation of ES from Japan’s forests since 1972

The valuation results led to various forest conservation measures and activities, e.g. conservation forest, protected forest, forest ecosystem reserve, and direct payment program

- “Conservation forest” is particularly important for providing public benefits, such as securing water resource and preventing disasters
  - The total area of conservation forest is 48% of total forest area, 32% of total land area in Japan
- **ES from fishery & fishing villages: 10,742 billion yen (2003)**
  - Material cycle promotion, ecosystem conservation, life & property protection, disaster prevention & rescue, relaxation & education, etc.
- Economic valuation and implementation of direct payment programs in agriculture and forestry, stimulated Fishery Agencies and Japan fisheries cooperatives
- They also started direct payments for communities in fishing villages of solitary islands. For this policy-making purpose, the value of ES from fishery & fishing villages was estimated by replacement cost method.
Payment for Ecosystem Services (Engel et al. 2008)

Conversion to pasture

Forest conservation (reference point)

Forest conservation with PES

Benefits to ecosystem managers

Costs to downstream populations and others

Minimum payment

Maximum payment

Reduced water services

Loss of biodiversity

Carbon emissions

Benefits to ecosystem managers

Costs to downstream populations and others

Minimum payment

Maximum payment

PES
Japan’s experience at regional and local level

Valuation and policy, positive incentives to conserve biodiversity and ecosystems
## Estimated economic values of biodiversity/ecosystem services in Japan (Yoshida & Hayashi)

<table>
<thead>
<tr>
<th>Valuation subject</th>
<th>Value of benefits</th>
<th>Valuation method</th>
<th>Author (year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recreational benefits in satoyama, transfer of benefits</td>
<td>1,272-1,617 yen per household/year 293-459 yen per capita/year</td>
<td>CVM</td>
<td>Fujimoto et al. (2006)</td>
</tr>
<tr>
<td>Groundwater recharge from rice paddies, PES</td>
<td>1,045-2,287 yen per household/year</td>
<td>CVM</td>
<td>Yamane et al. (2003)</td>
</tr>
<tr>
<td>Forest biodiversity conservation, zoning</td>
<td>767 yen/%/year</td>
<td>Conjoint analysis</td>
<td>Kuriyama et al. (2006)</td>
</tr>
<tr>
<td>Landscape and ecosystem of Yaku Island, world heritage</td>
<td>1,566-5,655 yen per capita</td>
<td>CVM</td>
<td>Kuriyama et al. (1999)</td>
</tr>
<tr>
<td>Recreational benefits of forest parks</td>
<td>2,633 yen per capita</td>
<td>Travel cost method</td>
<td>Nakatani &amp; Demura (1997)</td>
</tr>
<tr>
<td>Public functions of forests (bird species)</td>
<td>29 yen per species household/year</td>
<td>Conjoint analysis</td>
<td>Tsuge (2001)</td>
</tr>
<tr>
<td>Ecosystem loss induced by exotic species</td>
<td>1,850 yen per household/year</td>
<td>CVM</td>
<td>Nishizawa et al. (2006)</td>
</tr>
<tr>
<td>Wetland restoration of Kushiro Wetland</td>
<td>N.A.</td>
<td>Conjoint analysis</td>
<td>Ito et al. (2009)</td>
</tr>
<tr>
<td>Restoration of rare lake species</td>
<td>1,600-6,800 yen per capita/year</td>
<td>Conjoint analysis</td>
<td>Mitani et al. (2008)</td>
</tr>
<tr>
<td>Introduction of endemic species to forest parks</td>
<td>61 yen per household/year</td>
<td>Conjoint analysis</td>
<td>Yoshida &amp; Nakanishi (2009)</td>
</tr>
<tr>
<td>Forest environment taxes</td>
<td>2,209-2,817 yen per household/year</td>
<td>CVM, conjoint analysis</td>
<td>Yoshida &amp; Demura (2006)</td>
</tr>
</tbody>
</table>
Forest Conservation Tax

- **Local environmental tax**
  - Payments for Ecosystem Services (PES) based on Beneficiaries Pay Principle
  - Raising a fund for forest conservation to maintain stable water supply, etc.
  - Operated by a prefecture government (30/47 prefectures)
  - Kochi Prefecture implemented in 2002, and imposed 500 yen/taxpayer
  - Additional water charge vs. new local tax

- **Background**
  - Needs for better management of abandoned afforested areas
  - Loss of ecosystem services, e.g., regulating & provisioning services
  - Budgetary constraint of prefecture government

- **A case study of Kanagawa Prefecture**
  - The result of a willingness-to-pay survey supported decision-making process about the tax rate/amount
  - Contingent valuation method and conjoint analysis were used to elicit WTP
### Local Environmental Tax of Kanagawa Prefecture

- **Purpose:** conservation and management of the source of rivers for better drinking water supply
- **Prefectural Government of Kanagawa and Yoshida (2003)** conducted WTP survey to assess an appropriate tax amount/rate
- **Median WTP:** 3,600 yen/year/person
- **Kanagawa Prefecture finally decided to collect 950 yen (year/taxpayer) in average**
  - The amount varies with one’s income
  - An estimated result of a WTP function revealed positive income elasticity. Higher income, higher payment
- **In 2008, total amount of tax collected was 4 billion yen**
A) Conservation of Oku-Aizu forest ecosystem reserve
   - Choice experiments, TEEB D2 case study
   - Protection of forest ecosystems and sustainable use by local communities
   - The largest forest ecosystem reserve

B) Kabukuri-numa and the surrounding rice paddies, Ramsar site
   - Contingent valuation and choice experiments
   - Collective action of farmers, NGOs and governments
Economic Valuation
Ecosystem Res:
Authors: Kentaro Yoshida

Short title: Valuing forests for different protection strategies, Japan

Key message: The total economic value of the OKU-AIZU forest strategies shows strong willingness to pay for the conservation of the forest.


1. What is the problem?

Oku-Aizu is the name of region including four small towns in a region. It is located in the Southwest of Fukushima Prefecture. The total area of Oku-Aizu forest ecosystem reserve is 33,392 29 forest ecosystem reserves in Japan, including world heritage.

Kestoring agricultural wetlands benefits both farmers and geese
Author: Hiroshi Nishimiya

Short title: Flooding rice paddies for migrating birds, Japan

Key Message: The Kabukuri-numa wetlands have been restored as agricultural wetlands and the goose population has increased because of paddy field flooding in the winter.


What is the problem?

Since the beginning of the 20th century, most Japanese wetlands have been converted to rice paddies (Kurechi, 2010). Historically, this change involved converting wetlands to wet paddy farms. However, over time, dry paddies have gradually become the norm – due to the influence of new civil engineering technologies. Recently, however, restoration of wetland habitat through wet-paddy rice farming is occurring. In the Kabukuri-numa wetland and surrounding paddies in the Miyagi prefecture in the northern part of the country, 429ha of paddies have been registered as protected wetlands under the Ramsar Convention in 2005.

Modern rice production methods that keep rice paddies dry during winter (in pursuit of higher productivity and efficiency) seriously impact many wetland-dependent species (Kurechi, 2010). Restoration, therefore, involves flooding rice paddies during winter. In this particular...
No-Entry Zone within 20km from the nuclear power station.
Economic Valuation of Oku-Aizu Forest Reserve
options, each with differing levels of ecosystem services and differing costs. Each set has three or more alternatives, one of which has a known monetary value. Some sets may have non-monetary values (social, cultural, spiritual). Respondents choose between different choice sets. Implicitly, as they choose, they make trade-offs between the attributes.

PARTICIPATORY VALUATION

Participatory valuation is often carried out after a focus group exercise where stakeholders voice concerns and table issues to infer values indirectly. For instance, participants may be asked to use counters.

Box 3.5 Oku-Aizu Forest Ecosystem Reserve in Japan

There are 20 forest ecosystem reserves in Japan, including world heritage sites designated by the Forestry Agency. The Oku-Aizu forest ecosystem reserve is the largest. However, in comparison with other forest ecosystem reserves in Japan, its buffer zone is larger to allow for the use of forest ecosystem services by locals (mushroom and wild plant harvesting, for example).

Choice experiments were used to estimate the economic value of Oku-Aizu forest ecosystem reserve. A choice set consisted of three profiles (hypothetical protected area) and one status-quo scenario (keeping things as they are). Each profile had four area attributes and one price attribute.

The data were collected through two identical surveys – a regional mail survey and a nationwide internet survey. After analysis, the results showed a higher willingness-to-pay (US$ 80/year) for stricter protection of the ecosystem as compared with maintaining the status quo (US$ 12/year).

Source: Valuing forests for different protection strategies, Japan, TEEBcase based on Ken'ichi Yoshida (see TEEBweb.org)
Oku-Aizu Forest Reserve and Green Corridor

Core Zone
“Strict Protection”

Buffer Zone
Conservation & Min. Use

Green Corridor
Connecting Reserves

29 Reserves for Forest Ecosystems Conservation

出所：林野庁

全国の森林生態系保護地域
WTP for Forest Ecosystem Reserve

Note: Wildlife control area is a part of hypothetical scenario to mitigate severe damages from wild animals.
Paddy Fields as Wetlands
Kabukuri-numa and the surrounding rice paddies
## Policy Measures and PES

- Kabukuri-numa (wetland) is one of the most important wintering sites of *migratory wild birds*.

- For managing the wintering ground, measures such as water management, clean-ups, channel maintenance and water quality improvement are regularly conducted by collective actions of *farmers* and *NGOs*, and *local government*.

- In winter and post-harvest, the rice fields are left flooded for wild birds to winter in the site (*winter-water paddy*).

- Farmers sell *value-added rice* (*fuyumizu-tambo-mai*), organic and wildbird-friendly (labeling).

- Central and local government give direct payments (*cross-compliance*) to compensate the loss of farmers’ income and additional costs incurred by bird-friendly farming practices.
The number of wild geese is increasing because of wetland restoration and winter paddy management. 10 years ago, there were 10,000 birds. More than 70,000 birds are present now.
Economic Valuation of Kabukuri-numa and the Surrounding Rice Paddies

- Stated preference willingness-to-pay survey
  - CVM and Choice Experiments
  - Nationwide internet survey
  - Number of samples: 3257 persons

- CVM to elicit individual WTP for conservation of Kabukuri-numa and the surrounding rice paddies

- Estimated median WTP: 925 yen/household/year

- Choice Experiments
  - Latent class model shows diverse and dispersed distribution
  - local interests in ecotourism promotion and urban interests in conservation (more winter-water paddies and wetlands)
On-going and Future Research/Policy

- Incorporating the value of biodiversity and ecosystem services into national accounting
- Linking economic valuation to the comprehensive assessment of biodiversity of Japan
  - Collaborative research of natural and social scientists
- Assessing benefits of achieving Aichi Target to expand PA
  - Original value estimates and benefits transfer
- Networking international cooperation to protect endangered species and their habitats, e.g., migratory birds
  - Reducing risks of habitat degradation and extinction due to bird flu
WTP Survey for Aichi Biodiversity Target: Protected Areas

Forest & Mountains
Satoyama & agricultural land
River & wetland
Coast & marine

Nationwide internet survey in Dec. 2010, 1451 samples
Recognizing the values for setup international network for protecting endangered species and biodiversity

Thank you very much

Protected area in winter

Feeding by locals