Ecosystem Services from Satoyama-like Landscape and Human Development

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Outline of lecture

- Ecosystem Services/Biodiversity and Human Well-being
- Value (monetary & non-monetary) of Ecosystem Services
- Satoyama-like landscapes in Asia
- Where do we go from here?
Concept of “Ecosystem Services” given credence with the findings of the *Millennium Ecosystem Assessment* (2001 – 2005)
Ecosystems and Human Well-being

Health Synthesis

Millennium Ecosystem Assessment

World Health Organization
MA Framework

**Direct Drivers of Change**
- Changes in land use
- Species introduction or removal
- Technology adaptation and use
- External inputs (e.g., irrigation)
- Resource consumption
- Climate change
- Natural physical and biological drivers (e.g., volcanoes)

**Indirect Drivers of Change**
- Demographic
- Economic (globalization, trade, market and policy framework)
- Sociopolitical (governance and institutional framework)
- Science and Technology
- Cultural and Religious

**Human Well-being and Poverty Reduction**
- Basic material for a good life
- Health
- Good Social Relations
- Security
- Freedom of choice and action

**Ecosystem Services**
Largest assessment of the health of Earth’s ecosystems

Experts and Review Process
- Prepared by 1360 experts from 95 countries
- 80-person independent board of review editors
- Review comments from 850 experts and governments
- Includes information from 33 sub-global assessments

Governance
- Called for by UN Secretary General in 2000
- Authorized by governments through 4 conventions
- Partnership of UN agencies, conventions, business, non-governmental organizations with a multi-stakeholder board of directors
Ecosystem Services = Benefits people obtain from ecosystems

- **Provisioning Services**
  - Food
  - Freshwater
  - Wood fuel
  - Timber
  - Fiber
  - Genetic Resources
Ecosystem Services = Benefits people obtain from ecosystems

- **Provisioning Services**
- **Regulating Services**
  - Climate Regulation
  - Flood Regulation
  - Disease Regulation
  - Water Purification
Ecosystem Services = Benefits people obtain from ecosystems

- Provisioning Services
- Regulating Services
- Cultural Services
  - Aesthetic
  - Spiritual
  - Educational
  - Recreational
  - Social Relations
Focus: Consequences of Ecosystem Change for Human Well-being

**Constituents of Well-being**

- **Security**
  - Personal safety
  - Secure resource access
  - Security from disasters

- **Basic material for good life**
  - Adequate livelihoods
  - Sufficient nutritious food
  - Shelter
  - Access to goods

- **Freedom of choice and action**
  - Opportunity to be able to achieve what an individual values doing and being

- **Health**
  - Strength
  - Feeling well
  - Access to clean air and water

- **Good social relations**
  - Social cohesion
  - Mutual respect
  - Ability to help others

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**Ecosystem Services**

- **Provisioning**
  - Food
  - Fresh water
  - Wood and fiber
  - Fuel
  - ...

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

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

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

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**Life on Earth - Biodiversity**

**Arrow’s Color**
- Potential for mediation by socioeconomic factors
- Low
- Medium
- High

**Arrow’s Width**
- Intensity of linkages between ecosystem services and human well-being
- Weak
- Medium
- Strong

Source: Millennium Ecosystem Assessment
Biodiversity and Ecosystem Services Under Threat
国連ミレニアム エコシステム評価
生態系サービスと人類の将来

Millennium Ecosystem Assessment

Ohmsha
Findings from the MA

- Over the past 50 years, humans have changed ecosystems more rapidly and extensively than in any comparable period of time in human history, largely to meet rapidly growing demands for food, fresh water, timber, fiber and fuel.
- The changes that have been made to ecosystems have contributed to substantial net gains in human well-being and economic development, but these gains have been achieved at growing costs in the form of the degradation of many ecosystem services, increased risks of nonlinear changes, and the exacerbation of poverty for some groups of people.
Findings from the MA

- The degradation of ecosystem services could grow significantly worse during the first half of this century and is a barrier to achieving the Millennium Development Goals.
- The challenge of reversing the degradation of ecosystems while meeting increasing demands for their services can be partially met under some scenarios that the MA has considered but these involve significant changes in policies, institutions and practices, that are not currently under way.
The balance sheet

Enhanced
- Crops
- Livestock
- Aquaculture
- Carbon sequestration

Degraded
- Capture fisheries
- Wild foods
- Wood fuel
- Genetic resources
- Biochemicals
- Fresh Water
- Air quality regulation
- Regional & local climate regulation
- Erosion regulation
- Water purification
- Pest regulation
- Pollination
- Natural Hazard regulation
- Spiritual & religious
- Aesthetic values

Mixed
- Timber
- Fiber
- Water regulation
- Disease regulation
- Recreation & ecotourism

Bottom Line: 60% of Ecosystem Services are Degraded
Nature loss bigger issue than current banking crisis

- A 2008 European Union-commissioned study has determined that the global economy is losing more money from the disappearance of forests than through the recent banking crisis.
- The study puts the annual cost of forest loss at between 2 trillion dollars and 5 trillion dollars.
- The figure comes from adding the value of the various services that forests perform, such as providing clean water and absorbing carbon dioxide.
The Economics of Ecosystems and Biodiversity

- The cost of natural decline dwarfs losses on the financial markets
- It’s not only greater but it’s also continuous, it's been happening every year, year after year,”
- So whereas Wall Street by various calculations has to date lost, within the financial sector, 1-1.5 trillion dollars, the reality is that at today’s rate, we are losing natural capital at least between 2-5 trillion dollars every year
The Economics of Ecosystems and Biodiversity

- As forests decline, nature stops providing services which it used to provide essentially for free.
- So, the human economy either has to provide them instead, perhaps through building reservoirs, building facilities to sequester carbon dioxide, or farming foods that were once naturally available.
Ecosystem Services
Degradation also Impacts on Human Health
Why do Ecosystems Matter to Human Health?

- Ecosystems are the planet's life-support systems - for the human species and all other forms of life.
- Ecosystem services are indispensable to the well-being and health of people everywhere.
- The causal links between environmental change and human health are complex because often they are indirect, displaced in space and time, and dependent on a number of modifying forces.
Why do ecosystems matter to human health?

- Anopheles stephensi mosquito, a known malaria vector, with a distribution from Egypt to China, obtaining a blood meal from a human host.
- In the wild, mosquito larvae are found in sites such as stream pools and margins, puddles, irrigation channels and springs.
- In urban areas the larvae are found in a wide variety of artificial containers including cisterns, wells, tubs and fountains.
Why do ecosystems matter to human health?

Bark of white willow (Salix alba) was recommended as a pain reliever by the Ancient Greek physician, Hippocrates. Salicin, the active ingredient in willow bark – similarly found in the spirea or meadowsweet plant (Filipendula ulmaria/Spiraea ulmaria) – was discovered in the early 1800s. Aspirin® was introduced to the public in 1899, following synthesis of the salicin derivative: acetylsalicylic acid.
Is this the future ginseng of Malaysia?

Some pertinent issues
• Wild population is depleting
• Large-scale cultivation is not successful
• Adulteration of products
• The fate of investment in MIT R & D?
• Role of SMI and Local industries?

Tongkat Ali (Eurycoma longifolias)
Basic Global Scenario, to 2050

- Population will increase, unevenly
- Energy use will approximately triple
- Food production must double
- Waste generation will escalate greatly
- With current technologies and economic priorities:
  - Climate change will continue
  - More species will be lost, faster than ever
  - Nature’s buffers will diminish (reefs, forest, mangroves, etc.)
  - Land degradation will continue
  - Fisheries will continue to decline/disappear
  - Oceans will become more acidic (CO$_2$ uptake)
  - Soils and waterways will undergo nitrification
  - Fresh water availability and quality will decline in many regions

These are our life-support systems. They provide the basic inputs and stability required for health and survival.
Back to Nature?
Satoyama Landscape

Source: Ministry of Environment, Japan
The ex-situ benefits of satoyama and satoumi are significant. Services generated from satoyama and satoumi are enjoyed also by others beyond the immediate satoyama and satoumi setting. For instance, most of the rice, seaweed, fish, bamboo shoots, timber for housing and other services enjoyed by people in urban areas have their origin in rural satoyama and satoumi areas.

The ecosystem services link the urban and rural areas together.
<table>
<thead>
<tr>
<th>Country</th>
<th>Description</th>
<th>Mentioned Area</th>
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<tbody>
<tr>
<td>Cambodia</td>
<td>Chamkar</td>
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<tr>
<td>Indonesia</td>
<td>Hutan kepungan sialang pekarangan</td>
<td>Melayu Riau</td>
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<tr>
<td>India</td>
<td>Sacred groves</td>
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<td>Malaysia</td>
<td>Kampong; desa</td>
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<tr>
<td>Philippines</td>
<td>muyong, uma, payuh</td>
<td>Ifugao/indigenous people</td>
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<tr>
<td>Republic of Korea</td>
<td>maeul/ maeulsoop</td>
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<tr>
<td>Thailand</td>
<td>Satoyama-like landscape established by the King</td>
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A new development paradigm is needed for Asia-Pacific.

Continuing economic growth & Improving quality of life without compromising limited ecological carrying capacity.
How can Sustainability be secured?

Sustainability needs to be secured through a social process involving all stakeholders in the communities. It should be a deliberative process that sets a dividing line between the moral and ethical values of preserving and managing the system in a sustainable manner.
Terima kasih