For our sustainable society with biodiversity

Sub-Global Assessment of Satoyama-Satoumi in Chiba

Chiba Biodiversity Center
When our grandparents were children, most people lived by taking the various blessings of the Satoyama-Satoumi and using them in different ways. People formed groups called “Yui” and “Kou” in order to help each other and get hard work done. People also made local rules such as “Iriai” and “Irihama” to prevent the overexploitation of natural resources so that they could continue to receive the blessings of the Satoyama-Satoumi. This careful and moderate use of the Satoyama-Satoumi led to mosaic landscapes with rich biodiversity.

**What is Satoyama-Satoumi?** Satoyama-Satoumi is a concept of sustainable system consisting of human being, nature, and culture, where human habitation is integrated with neighboring environments such as rice paddies, fields, forests, grasslands, rivers, ponds, seacoasts, oceans, and so on.

**What are Ecosystem Services?** Ecosystem services are the natural benefits people obtain from ecosystems. These include provisioning services (material benefits such as food, timber, and water), regulating services (functional benefits such as water purification and erosion regulation), and cultural services (non-material benefits obtained through spiritual enrichment, recreation, and aesthetic experiences) and so on.
Our everyday life strongly depends on resources such as food and timber from abroad. As urban development progressed, artificial facilities replaced the ecosystems’ role of regulating conditions such as air and water quality, flooding, and erosion.

Many resources from abroad

Supplying water outside of the watershed by constructing dams

Wastewater treatment by artificial facilities

Flood control by artificial facilities such as concrete revetments

Our urban lifestyles have resulted in the deterioration of ecosystems such as forests, farmland, and tideland, which has led to a loss of biodiversity and ecosystem services. Mass importation of resources also has a negative impact on the biodiversity and ecosystem services in the countries the resources come from.

Can we maintain such an urban lifestyle? Is it sustainable?

Sub Global Assessment of Satoyama-Satoumi in Chiba prefecture: The aims of the project are to analyze current conditions of biodiversity and ecosystem services of Satoyama-Satoumi in Chiba prefecture and work towards a sustainable society. The project team was established in 2008, and is composed of the staff from the Nature Conservation Division, Agriculture, Forestry and Fisheries Department, Land Development Department, Chiba Prefectural Environmental Research Center, and Natural History Museum and Institute, Chiba.
Our lifestyles have changed drastically in the last hundred years as we have moved from a rural to urban lifestyle. Let's take a look at just how our lifestyles have changed.

**Population growth and urbanization**

Before 1940, the population in Chiba was under 2 million. It increased rapidly from the 1970’s to 1980’s and reached 6 million in 2002.

The northwest of Chiba has a high population density (red) and urbanizing area (pink) that is continuing to increase its population, while in the southern and north eastern areas (blue) the population is decreasing and the average age is increasing.

**Change in Occupations**

Before 1960, most of the population was involved in primary (resource) industries. However, a large part of the population shifted from the primary industries to the secondary (manufacturing) and tertiary (service) industries during the high-growth period. As a result, primary industry is facing a serious shortage of workers and few people work with the land and nature anymore.

**Change from circulation society to one-way flux**

In the past, local communities were able to capitalize on the resources they gathered from Satoyama-Satoumi in a self-sustaining and interdependent system. However, the pursuit of material wealth and convenience, and the development of distribution economics and scientific advancement, have led to the amount of energy and resources coming from outside increasing and created an open ecosystem reliant on the outside.

**Classification by population density, population growth rate, and population age**

Urbanizing rural areas and Depopulating and Aging areas

<table>
<thead>
<tr>
<th>Population density (people/ km²)</th>
<th>Population increase (%)</th>
<th>Population decrease (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Okuyama</td>
<td>Less than -5</td>
<td>Less than -20</td>
</tr>
<tr>
<td>Depopulation and aging</td>
<td>Less than -5</td>
<td>Less than -20</td>
</tr>
<tr>
<td>Population decrease and aging</td>
<td>Less than -5</td>
<td>Less than -20</td>
</tr>
<tr>
<td>Population decrease</td>
<td>Less than -5</td>
<td>Less than -20</td>
</tr>
<tr>
<td>Population increase</td>
<td>Less than -5</td>
<td>Less than -20</td>
</tr>
</tbody>
</table>
### How have ecosystem services changed? -Provisioning Service-

#### Provisioning Services

**Food**

Although Chiba Prefecture is famous as an agricultural prefecture, its food self-sufficiency rate on a calorific supply base was lower than the average national rate in 2007. Thus, even residents in Chiba depend heavily on foods from outside of the prefecture.

As for agriculture, the total agricultural output was third highest among 47 prefectures in 2008, while the number of farm households and farmland area has been decreasing. In contrast, area of abandoned farmland has been increasing.

The annual fish catch peaked around 1980. It was caused by a large catch of sardine. On the other hand, the catch of shells rapidly decreased due to the reclamation of tideland.

**Timber and Energy**

Timber production in Chiba Prefecture decreased in the 1970s, eventually dropping below one-fourth the maximum production in 2000.

Most timber consumed in Chiba Prefecture comes from overseas. While fuelwood and charcoal were commonly used as home energy before, the production dramatically decreased between 1940 and 1960. It was caused by a shift from fuelwood and charcoal to fossil fuels.

**Water Supply**

Sources for water supplies became increasingly dependent on dams. The use of water from local rivers and groundwater sources fell into relative obscurity.

Over 94% of Chiba Prefecture has access to tap water. About 70% of water consumed in Chiba prefecture comes from reservoirs along the Tone River, while only around 30% comes from local river and groundwater sources.
-Regulating Services and Cultural Services-

**Regulating Services**

**Water Purification**

The amount of pollutant flowing into the lakes and rivers has increased due to the population growth and higher living standards brought by economic growth. The ecosystem’s natural water purification functions have been decreased due to “improvements” such as the reclamation of tidelands and concreting of rivers, leading to deterioration in water quality. Although the improvement of sewage systems is contributing to a reduction in pollution, Chiba’s water sources continue to be polluted. To improve water quality, it will be necessary to recover and conserve the ecosystem and its services.

**Water (flood) Regulation**

The water holding and flood control abilities of forest and farmland ecosystems have declined due to urbanization, leading to rivers filling up with rain more quickly and more frequent urban flood disasters. To avert floods, river improvement and flood-control facilities improvement are progressing.

**Cultural Services**

**Belief / Events**

In addition to the feeling of awe inspired by nature, people obtained the wisdom to learn from nature and relate what they had learned to their everyday lives. Additionally people established various cooperative systems to achieve sustainable use of local resources. However these have been lost.

**Traditional Knowledge/Techniques**

In Satoyama-Satoumi, people had folk knowledge and various techniques, such as the “Sudate” fishing method and “Kazusa-bori” well digging. These are associated with nature and living things. However such traditional knowledge and techniques have been lost.

**Recreation**

Opportunities for recreation with nature, such as playing near water and in the forest, sea bathing, and shellfish gathering, decreased with the degradation of the natural environment. Children prefer to play in their houses rather than in the fields.
Japanese people have lived contentedly focusing on material comforts since around 1970s. Before that it was the ecosystem services from Satoyama-Satoumi that supported human well-being.

However, these services have been replaced by a dependence on materials from outside sources as urbanization has progressed, and the regulating service has been replaced with human devices.

Even in the area of spiritual well-being, culture and information from outside of the region have become a part of our everyday life.

Such changes in ecosystem services are caused by 5 types of driving factors; the destruction of nature, artificial management, environmental pollution, the introduction of alien species, and climate change. Moreover, these driving factors result from 5 types of indirect drivers (population, economy & industry, socio-politics, culture, and science & technology) which are caused by the change of our society and lifestyles along with globalization and modernization.

To conserve biodiversity and ecosystem services in the Satoyama-Satoumi, we must reconsider our present society and lifestyle.
What is the future of the Satoyama-Satoumi? Human society has changed from village communities which depended on local natural environments to a global society which is represented by the development of science and technology, urbanization, and civilization. The scenarios that we are discussing assume two directions: “globalization vs. localization” and “artificial vs. natural”. On the basis of these two axes, we have developed four scenarios as shown in the following figure.

**Future Scenarios of Chiba SGA**

**Future scenarios based on the history of human society**

- **Globalization**
  - **Biotope Restoration Society**
    - Conservation and restoration of nature, such as greening and environmentally friendly agriculture, will be thoroughly conducted with foreign techniques and resources.
  - **Mega-City Society**
    - Modification of nature ecosystems to artificial systems, such as vegetable factories, will be developed by foreign resources and new technology.
- **Localization**
  - **Satoyama-Satoumi Renaissance Society**
    - Conservation and restoration of nature will be thoroughly conducted to enhance the function of natural ecosystems by local resources and traditional technology.
  - **Compact Recycle Society**
    - Modification of nature ecosystems to artificial systems, such as natural renewable energy, will be developed by local techniques and resources.

Published in 15th October, 2010
Published by the Nature Conservation Division, Environmental and Community Affairs Department, Chiba Prefectural Government
Edited by the Chiba Biodiversity Center, Nature Conservation Division, Environmental and Community Affairs Department, Chiba Prefectural Government
The editorial assistance provided by the River Environment Division, Land Development Department, and Chiba Prefectural Government
Illustrated by Kentarou Aoki
Chiba Biodiversity Center: 955-2, Aoba-cho, Chuou-ku, Chiba-shi, Chiba, Japan, 260-0852 Phone: 043-265-3601 E-mail: bdc@mz.pref.chiba.lg.jp
* The contents of this booklet based on the Report of the Chiba Biodiversity Center vol.2