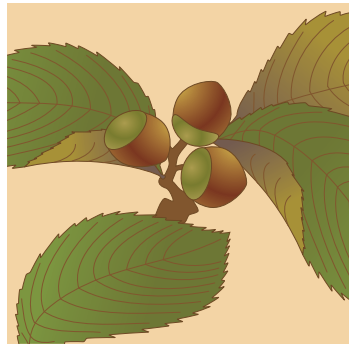


JBO2

Japan Biodiversity Outlook 2

Report of Comprehensive Assessment of Biodiversity and Ecosystem Services in Japan

- How is nature related to human well-being? -

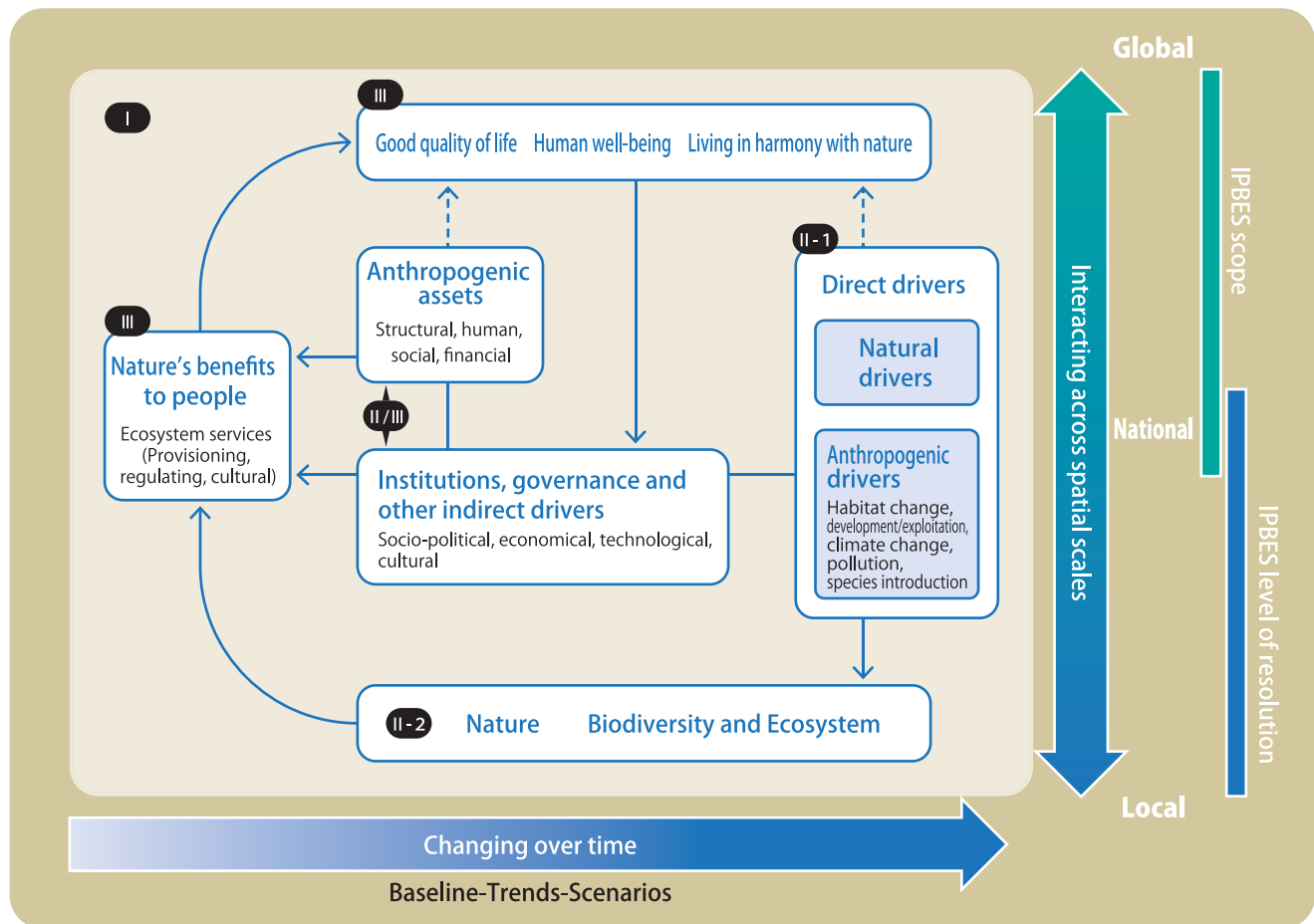


Comprehensive Assessment of Biodiversity and Ecosystem Services

The Japan Biodiversity Outlook (JBO) published in May 2010 assessed the status of biodiversity loss and its drivers, while assessment of ecosystem services and other issues remained to be addressed.

In the Tenth Meeting of the Conference of the Parties (COP10) to the Convention on Biological Diversity held in Nagoya, Aichi Prefecture in October 2010, the Aichi Biodiversity Targets were adopted as specific strategic goals to halt the loss of biodiversity. To meet the Aichi Biodiversity Targets, it is essential to scientifically assess the present state and trends of biodiversity and ecosystem services and properly incorporate the findings in government policies. To this end, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) was established

in April 2012 as an intergovernmental body for suggesting policies based on the results of studies conducted worldwide. Against this backdrop, the Committee for the Comprehensive Assessment of Biodiversity and Ecosystem Services (chairperson: Tohru Nakashizuka, Professor of Tohoku University) organized by the Ministry of the Environment of Japan compiled "The Report of Comprehensive Assessment of Biodiversity and Ecosystem Services in Japan (JBO2: Japan Biodiversity Outlook 2)" spending 2 years from 2014 with the help of 120 experts and published it in March 2016. JBO2 assesses the "drivers of biodiversity loss", "measures against biodiversity loss", "status of biodiversity loss", and "impact on human well-being and ecosystem services" based on the conceptual framework of the IPBES.



Conceptual Framework of IPBES and Structure of JBO2

I Chapter I "Natural Environment and Socio-economics of Japan" outlines the status and trends of natural/social environment.

II-1 Chapter II, Section 1 "Assessment of Drivers of Biodiversity Loss" assesses each driver in 4 separate categories of crisis by establishing indicators.

II-2 Chapter II, Section 2 "Assessment of the Status of Biodiversity Loss" assesses the status of biodiversity loss, by establishing indicators, for each of six ecosystem types: forest, agricultural, urban, freshwater, marine and coastal, and island ecosystems.

II/III Chapters II and III describe and assess relevant measures by establishing indicators where possible.

III Chapter III "Assessment of Changes in Ecosystem Services in relation to Human Well-being" classifies human well-being into "foundation for affluent living", "experience in nature and human health", "safety and security of living", and "culture and living in harmony with nature" and assesses the changes of ecosystem services in each category by establishing indicators.

Main Conclusions of this Assessment

- 1 The biodiversity outlook in Japan has not changed significantly since the previous assessment in 2010, continuing a declining trend over a long period. The major drivers of biodiversity loss also remain the same as those discussed in the previous assessment, namely, the “First Crisis (development, direct use, and water pollution)”, “Second Crisis (reduction in use/management of *Satochi-Satoyama*)”, “Third Crisis (invasive alien species and chemical substances)”, and “Fourth Crisis (global climate change)”.
- 2 With more data becoming available compared to 2010, “the impact of climate change (Fourth Crisis) on the species distributions and ecosystems” was reassessed to be of great certainty. The impact will likely continue to increase, as climate change is predicted to expand and intensify in the future.
- 3 Our lives and cultures are supported by ecosystem services provided by biodiversity. However, many of the ecosystem services in Japan are declining compared to the past years or remain at the same level.
- 4 Many domestic provisioning services, especially certain agricultural crops, seafood, and timber products, are diminishing. The species diversity of forestry products is also on a decline, and the quality of provisioning services has been changing.
- 5 Both the supply and demand sides contribute to the decline of provisioning services, with the former responsible for the deterioration of resources through overuse, habitat destruction and other factors, and the latter responsible for underuse of resources as a result of change in lifestyles and increased dependence on imported food and resources.
- 6 One of the causes of underuse is Japan’s exceptionally heavy dependence on imported food and resources, which not only is affecting the biodiversity of other countries but may also be contributing to carbon dioxide emissions associated with transportation. Decreased domestic production of food and resources is leading to an increase of abandoned farmlands. The number of workers in the agricultural /forestry/fisheries industries is falling due to a shift in economic structure and resulting population flow from rural to urban areas, which could result in the loss of traditional knowledge and skills necessary to harness the bounties of nature.
- 7 Soil erosion control and other regulating services of artificial forests are sometimes compromised due to lack of management. In addition, reduced human activities in *Satochi-Satoyama* are creating conflicts with wild animals, thereby increasing disservices to humans, including injuries inflicted by bears.
- 8 Inter-regional food diversity is gradually being lost throughout Japan along with landscape diversity that creates a colorful mosaic of different vegetation and ecosystems. This fact suggests the loss of cultural services as well, which are rooted in each locality and its natural environment.
- 9 Interaction with nature has positive effects on our physical and mental well-being. Forest therapy is increasingly promoted in recent years because of the health benefits of walking in the woods. While urbanization has deprived children of opportunities to interact with nature on a daily basis, many people are still interested in nature and increasingly looking for ways to reconnect with rural communities and get back in nature through eco-tourism, etc.



Results of Biodiversity Assessment

Though the pressure of development has lessened compared to the periods of high economic growth and the bubble economy, small-scale development as well as exploitation of certain animal/plant species are still continuing, the impact of which may be significant for species whose habitat is already shrinking. Natural or semi-natural ecosystems, such as forests, farmlands, wetlands, and tidal flats have decreased substantially, and less than 20% of Japan's total land area remains covered by undisturbed vegetation. Around 40% of tidal flat disappeared mostly during the high economic growth period. Conversely, reduced human intervention in nature is also bringing adverse effects, tripling the area of

abandoned farmland compared to that in 1975. The negative impact of alien species is also increasing, 429 of which are listed as threat to ecosystems and indigenous species, especially to reptiles. Loss of nearly 70% of endangered reptile species is caused by alien species. The impact of climate change on biodiversity is becoming clearer. Phenological synchronism relationship between biological life cycle events and seasonal variation between alpine plants and bumblebees has been disturbed. Recent surveys and studies indicate that coral coverage around the Okinawa Main Island decreased to 7.5% in 2009, and the Japanese stone pine has accelerated its growth rate by at least 60% over the last two decades.

		Drivers of Biodiversity Loss										
		First Crisis			Second Crisis			Third Crisis			Fourth Crisis	
		Development, alternation of ecosystems	Eutrophication	Loss of endangered species	Reduced use and management of <i>Satochi-Satoyama</i>	Reduced direct use of wildlife	Loss of endangered species	Invasion and establishment of alien species	Chemical substances	Loss of endangered species	Climate change	Loss of endangered species
Long-term trend of impact	Between 50 and 20 years ago											
	From 20 years ago to the present											
Degree of impact and current trend												

Note: Descriptions of the terms used in the table are as follows:

- First Crisis is the impact on biodiversity caused by development, exploitation, and other human activities, including habitat alternation, direct use, and water pollution.
- Second Crisis is the impact caused by decline in human intervention in nature, including reduced use/management of *Satochi-Satoyama*.
- Third Crisis is the crisis brought by alien species, chemical substances, and other consequences of modern lifestyles and human activities.
- Fourth Crisis is the impact due to climate and other environmental changes, including global warming, increased occurrence of strong typhoons, change in precipitation patterns, decreased fisheries catch, and ocean acidification.

Legend	Drivers			
	Degree of impact during assessment period		Long-term and current trend of impact	
Weak		Decreasing		
Medium		Same		
Strong		Increasing		
Very strong		Increasing rapidly		

Note: Graphic symbols may not represent all of the multiple factors related to the indicators in question.
 Note: Arrows circled by dotted lines indicate that information is insufficient to make accurate assessments.

Results of Ecosystem Services Assessment

Ecosystem services brought about by biodiversity in Japan are declining or remaining at the same level for the most part. Provisioning services of agricultural and fisheries products are particularly seeing a notable decline. Marine fisheries catch decreased to around 30% of the peak-time level while that of inland water fisheries fell to as low as 20% as of present. Though deterioration of tidal flats, seaweed/seagrass beds, and other habitat areas has been pointed as the cause of decline in fisheries resources, results of expert questionnaire surveys suggest overuse as an additional driver.

Decrease in domestic food production and use of resources has led to the increase of abandoned farmlands,

the rate of which is 7.9% of the total farmland area as of 2010. There are also forests that are not properly managed due to manpower shortage and neglect. 73% of managed forests, which are strongly expected to bring about public benefits, is well maintained as of FY2014, however, the rate is projected to fall to 56% if systematic management is not implemented. These figures indicate underuse of agricultural and forest resources.

In addition, ecosystem disservices are increasing in the form of conflicts between humans and wild animals as a result of reduced human activities in hilly and mountainous areas. The annual number of people injured by bears has risen ten fold in some years over the past three decades.

		Assessment Result		
		Between 50 and 20 years ago	From 20 years ago to present	Overuse or underuse*
Provisioning services	Agricultural crops	↓	↘	Underuse (based on data)
	Non-timber forest products	↗	↘	Underuse (based on questionnaire)
	Seafood	↗	↘	Overuse (based on data)
	Freshwater	—	→	Overuse (based on questionnaire)
	Timber	↘	→	Underuse (based on data)
	Raw materials	↘	↘	Underuse (based on data)
Regulating services	Climate	—	↘	—
	Air quality	—	→	—
	Water	—	↘	—
	Soil	→	—	—
	Disaster mitigation	↗	→	—
	Biological control	—	↘	—
Cultural services	Religion/festivals	↓	↘	—
	Education	↘	→	—
	Landscape	—	↘	—
	Traditional arts & crafts	↘	↘	—
	Tourism/recreation	↗	↘	—
Dis-service	Damage caused by wild animals	—	↗	—

Note: Descriptions of the terms used in the table are as follows:

- Provisioning services are services that provide food, fuel, timber, fiber, medicine, water and other important resources for human living brought by agriculture, forestry, fisheries.
- Regulating services are services that modulate the environment, such as climate alleviation, flood mitigation and water purification by forests.
- Cultural services are services that provide spiritual fulfillment, aesthetic enjoyment, religious/social foundation, recreational opportunities, etc.

*: Validity of the quantitative assessment was examined by taking into account the results of expert questionnaire surveys conducted as part of JBO2.

Quantitative trend in services received	
Legend	Result of quantitative assessment
	Increasing ↑
	Slightly increasing ↗
	Same →
	Slightly decreasing ↘
	Decreasing ↓
	Where data is insufficient
	Increasing ↑
	Slightly increasing ↗
	Same →
	Slightly decreasing ↘
	Decreasing ↓

Note: Graphic symbols may not represent all of the multiple factors related to the indicators in question.

Note: Arrows surrounded by dotted lines indicate that data is insufficient to make quantitative assessment.

Dependence on Overseas Ecosystem Services and Changes in Social Structure

Increase in International Trade of Natural Resources and Dependence on Imports

Unlike older times when people consumed mostly locally-produced goods, inter-regional food diversity is becoming lost in modern Japanese society giving way to homogenization. Chronological assessment of these products clearly indicates that species diversity of forestry products is declining.

In addition to the problems of overuse/underuse of ecosystem services, new problems are arising with the expansion of global trade of food and resources. Japan's heavy dependence on overseas ecosystems stands out among other nations in the world. In terms of ecological footprint, which measures the area of land necessary to supply resources and absorb CO₂ consumed and emitted by human activities, Japan demands 2.4 times more from other countries' ecosystems than its own ecosystems can provide in a sustainable manner. Japan's dependence on foreign water resources for its own consumption needs in terms of "virtual water", a hypothetical quantity of water that would be required if all imported agricultural and industrial products were produced domestically, is over 1,000%, by far the world's highest followed by the United Kingdom (712%). The high dependency on water and

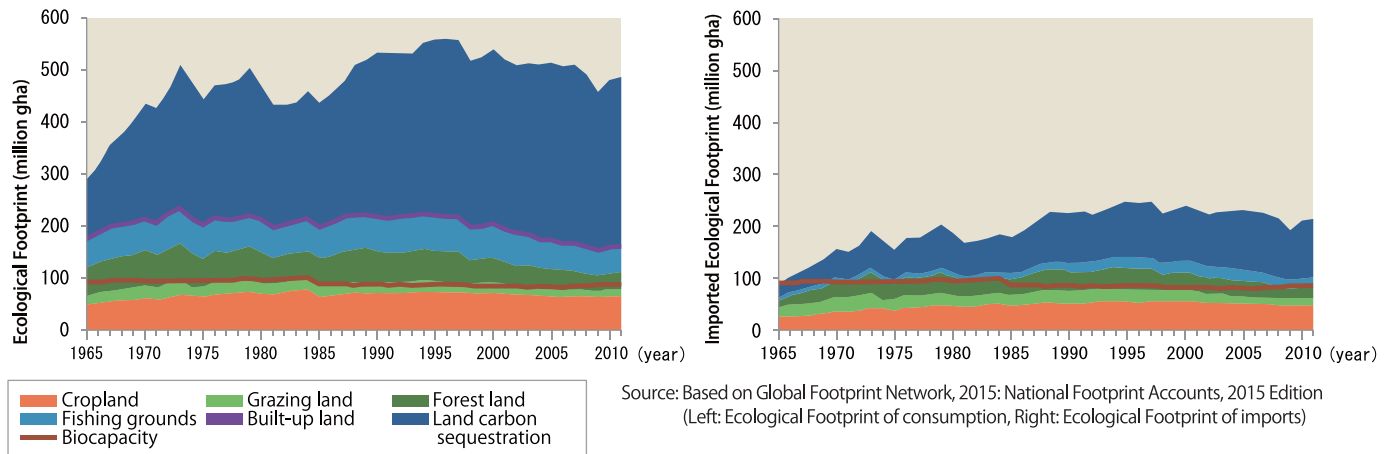
other resources abroad could also exacerbate the increase of CO₂ emissions associated with transportation.

Changes in Social Structure

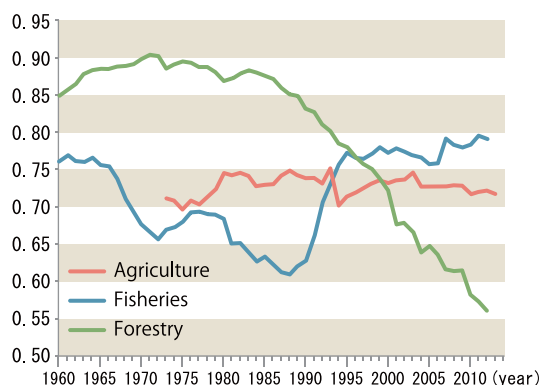
With the shift of industrial and economic structures from agricultural/forestry/fisheries industries to industrial /commercial industries, the population began migrating from rural areas to Tokyo and other metropolitan areas. The number of people working in the primary industry has been falling continuously and now accounts for only 18% of the peak figure. The number of people engaged in traditional arts and crafts, which characterize local industries, has also been dropping at an alarming rate.

In addition, rapid urbanization is depriving children of playgrounds and opportunities to commune with nature. Recent surveys on the status of children's hands-on activities show a year-by-year decline in the percentage of children who responded that they have engaged in activities to interact with wild animals and plants "many times" outside school. On the other hand, nearly 90% of people are currently interested in nature, and an increasing number of people are looking into eco-tourism, green tourism, two-residence lifestyle, and other ways to reconnect with nature and rural areas.

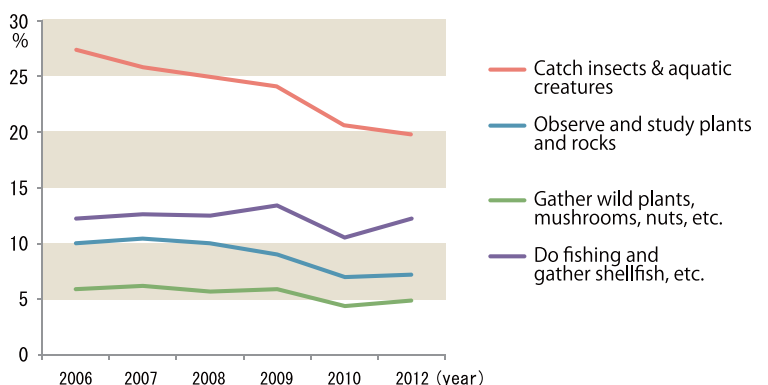
Japan's Ecological Footprint



Diversity trends of agricultural/fisheries/forestry products



Percentage of children who responded that they have engaged in the inquired activities "many times" outside school



Source: Based on study on the youth's status of hands-on activities, etc. by the National Institute for Youth Education

From Assessment to Action – looking to 2050

■ Key Findings of This Assessment

Biodiversity remains on a declining trend driven by the same major factors (1st to 4th Crises) as those of the previous assessment.

Impact of climate change on species distribution and ecosystems has been reassessed to be of great certainty.

Many domestic ecosystem services have been either declining or remaining at the same level compared to the past years.

Domestic provisioning services have been declining compared to the past years.

Decline of provisioning services is caused by overuse, habitat destruction and others, and underuse.

Dependence on imported food and resources and reduced domestic production are underlying causes of underuse.

Regulating services are declining and disservices are increasing due to reduced human activities, etc.

Cultural services rooted in local communities and natural environment are diminishing.

While opportunities to interact with nature on a daily basis have decreased, people looking into eco-tourism and other ways to reconnect with nature are increasing.

■ Challenges

Enhance mainstreaming of biodiversity into various strategies to raise awareness and encourage actions.

Develop personnel to implement cross-sectoral efforts, and foster collaboration among related organizations.

Recognize the “sound material-cycling socio-ecological sphere” and develop a mechanism for supporting sustainable use and management of biodiversity and ecosystem services.

Recreate a vision regarding appropriate land management by taking the population decrease into account.

Promote the use, management, and governance of ecosystems based on updated scientific findings and traditional wisdom.

Promote the planned and balanced use of domestic resources.

Provide social support for consumers to buy more sustainable products.

Effectively utilize ecosystem services for promoting health.

Incorporate ecosystem services in the implementation of various projects and programs.

■ Individual Roles

National Government

Place greater emphasis on studies and responses rooted in assessment findings, indicate nationwide targets, and provide stronger incentives for various parties to take actions to mitigate the loss of biodiversity.
Example: Spread nationwide the concept of “sound material-cycling socio-ecological sphere” in collaboration with various organizations.

Researchers & NGOs

Participate in and contribute to assessments by upgrading biodiversity measurements and compiling information on ecosystem services and well-being, etc.
Example: Assess the potential supply capacities of ecosystem services.

Based on the findings of this Assessment, the following actions need to be taken at each entity.

Businesses

Recognize and assess the impacts that one’s own business activities have upon biodiversity, and strive to develop strategies to mitigate them.
Example: Review the supply chain from the perspective of biodiversity conservation.

Local Governments

Assess biodiversity on regional scales, design and continuously implement Local Biodiversity Strategies and related programs.
Example: Introduce a Forest Environment Tax, etc. to incorporate ecosystem services into socio-economic systems.


Citizens

Review one’s own lifestyle habits toward conserving and using biodiversity in a sustainable manner, and participate in consensus-building and action processes at the national government, local government, business, and community levels.
Example: “Declaration of My Actions”



This leaflet is a summary of the Report of Comprehensive Assessment of Biodiversity and Ecosystem Services in Japan (JBO2) with the section "Individual Roles" added by the Ministry of the Environment. For the full report and more detailed information, please visit the official website (in Japanese): <http://www.biodic.go.jp/biodiversity/>



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Design work: Yachiyo Engineering Co., Ltd.

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