Section 2 Loss of Biodiversity Accelerating

1. The State of Loss of Biodiversity in the World

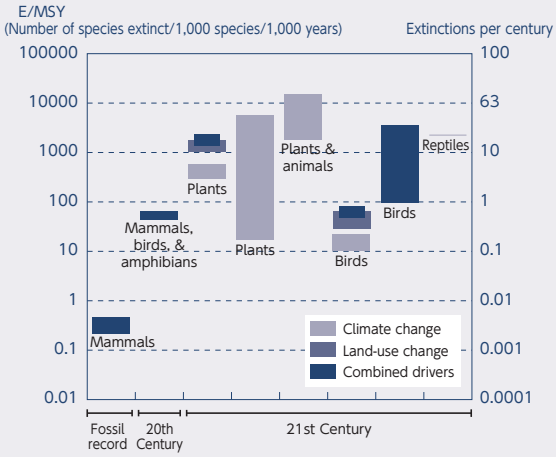
The Millennium Ecosystem Assessment, which was conducted by the United Nations from 2001 through 2005 and in which 1,360 experts from 95 countries participated, pointed out that over the past fifty years humans have changed ecosystems at a speed and on a scale that the world has never seen before, and as a result have caused qualitative and overall irreversible damage in terms of diversity of life. In addition, the Global Biodiversity Outlook 3 (GBO3) that was published by the Secretariat of the Convention on Biological Diversity in May 2010 predicted that extinction of species is proceeding at a speed much faster than in any other time in history, and that habitats will be lost and there will be changes in distribution and abundance of species.

For example, the extinction of species in the 21st century is predicted to be proceeding at a rate that far surpasses the extinction rate estimated based on fossil records and the Red List, due to disappearance of habitats resulting from climate change and changes in land use (Figure 3-2-1: Speed of Extinction Rates and 21st Century Projections Scenario). There is also a Red List Index, which is an indicator that shows the state of risks of extinction for each taxonomical group. A value of 1 indicates that all of the species in that taxonomical group are not heading toward a crisis of extinction in the near future, and a value of 0 indicates that all of the species in that taxonomical group are already extinct. Shifts in this index show that there is a danger of extinction for birds compared with the ideal situation, although the danger of extinction for birds is lower than other taxonomical groups, and that the danger of extinction for amphibians is much higher than other taxonomical groups. It can also be seen that since around the middle of the 1990s the possibility of extinction of coral has increased rapidly (Figure 3-2-2: Shifts in the Red List Index).

As an example of the state of specific ecosystem changes, here we will take a look at forests, which are representative natural environments on land. According to the Millennium Ecosystem Assessment, over the last 30 years half of the world's forest land area has been lost, and forests have decreased to the point that they now occupy approximately 31% of the Earth's surface. Trends in recent years also show that forests are continuing to decrease. In the 1990s approximately 160,000km^2 of forests was converted to other uses or lost each year. Although the speed of that loss has slowed in comparison with the 1990s, during the period from 2000 to 2010 nearly 130,000km^2 of forests, which is comparable to the combined areas of Hokkaido, Shikoku, and Kyushu, has been converted to other uses or lost each year. In terms of regions, decline is noticeable in South America, Africa, South Asia, and Southeast Asia (Figure 3-2-3: By-Country Net Change in Global Forest Area (2000 – 2010)).

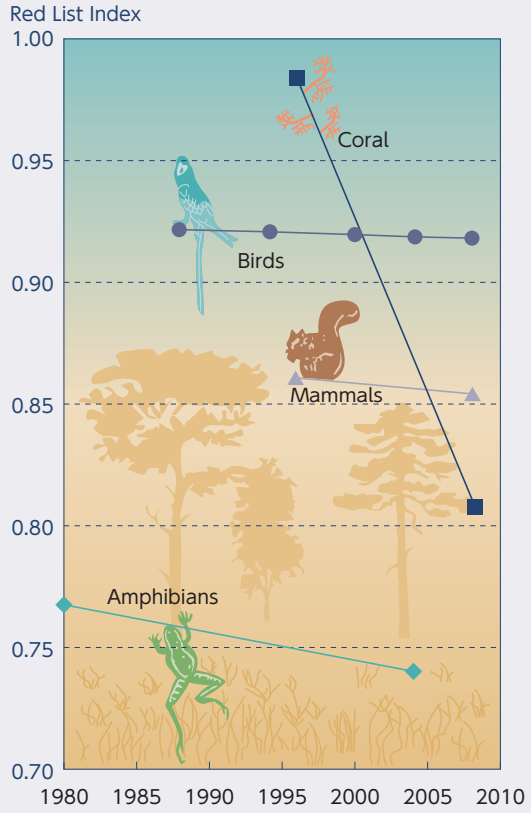
For example, the savannah region in central Brazil

Figure 3-2-1 Past Extinction Rates of Species and Scenario Projection for the 21st Century



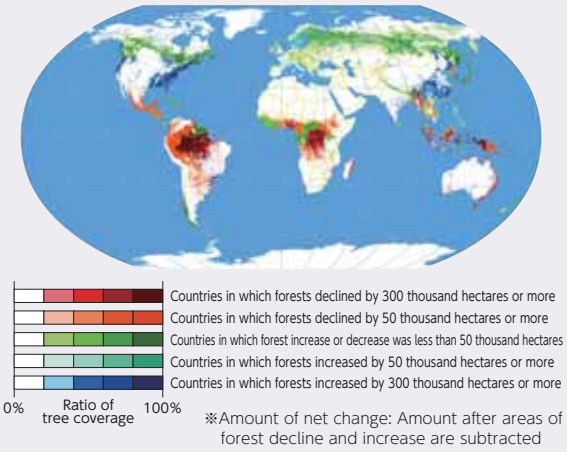
Source: Pereira et al. (2010) 「Scenarios for Global Biodiversity in the 21st Century」

Figure 3-2-2 Red List Index



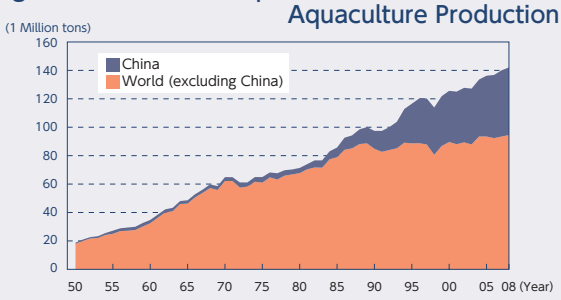
Source: Secretariat of the CBDs
"Global Biodiversity Outlook 3 (GBO3)"

Figure 3-2-3 By-Country Net Change in Global Forest Area (2000 – 2010)



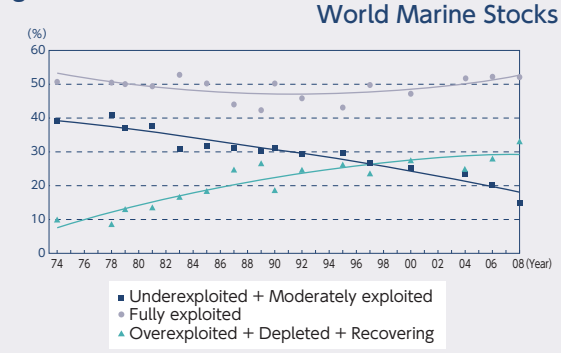
Source: The Geographical Survey Institute's "Global Map-Percent Tree Cover"

Figure 3-2-4 World Capture Fisheries and Aquaculture Production



Source: FAO's "The State of World Fisheries and Aquaculture 2010"

Figure 3-2-5 Global Trends in the State of World Marine Stocks



Source: FAO's "The State of World Fisheries and Aquaculture 2010"

called Cerrado occupies approximately one-fifth of Brazil's national land, and it is known as a region of rich biodiversity because it has many unique species of plants. In recent years, however, development of agricultural land has been proceeding rapidly to become one of the world's leading food production bases In the period from 2002 to 2008 approximately 14,000km^2 of Cerrado disappeared each year, and half of it has already been changed into agricultural land and pastures. It is said that conversion to agricultural land for growing soybeans and other uses is still continuing at present. It is feared that future world population growth, improvements in people's daily lives in developing countries, and the resulting tightness of supply and demand for food will lead to even further loss of forests.

A trend of loss of biodiversity can also be seen from the perspective of ecosystem services. For example, fishing resources are biological living resources that support our daily lives, but in recent years they are in a state in which there are concerns about over-use. The world's amount of fishing production has been continuing to increase since 1950 (Figure 3-2-4: World Capture Fisheries and Agriculture Production), but as for use of fishing resources on the other hand, in 2006 approxi-mately 60% were resources that "are being used sufficiently" and 20% are resources that are "being excessively developed, depleted or in the process of recovering from a state of depletion" (Figure 3-2-5: Shifts in the State of the World's Ocean Fishing Resources). Further, as for the genetic diversity of domesticated animals, cultivated plants, and fish species, GBO3 pointed out that "it is likely that genetic diversity of cultivated plants is declining," and there are concerns about declines in ecosystem services.

Thus, worldwide loss of biodiversity continues unabatedly on the various levels of ecosystems, species, and genes, and it is having an impact on ecosystem services. What will happen if that loss continues from now on? GBO3 warns that if the Earth's system pushes beyond a certain tipping point, the risks of a dramatic biodiversity loss and the subsequent deterioration of a wide range of ecosystem services will increase. There is a theory that in the past Easter Island, which is in the southeast part of the Pacific Ocean, went through a tragic process because of population increase and destruction of the limited environment on the island, and its civilization was destroyed. Although the limits of energy resources, mainly fossil fuels, and mineral resources have been known for some time, unless we also use ecosystem services such as food supply and climate adjustment in a sustainable manner, we might this time reproduce a history of cultural destruction similar to that of Easter Island on a global scale. In order to keep the Earth from surpassing its tipping point due to dramatic biodiversity loss, we must steadily proceed with efforts for underlying factors such as loss and deterioration of habitats and economic activities. At COP10, post-2010 targets (the Aichi Biodiversity Targets) were adopted as global targets related to biodiversity to be reached by 2020. At the United Nations General Assembly held in December of last year, it was decided to make the period from 2011 to 2020 the "United Nations Decade on Biodiversity." It can be said that efforts made between 2010 and 2020 aimed at conservation and restoration of biodiversity will be the keys to whether or not the Earth surpasses its tipping point.

2. The State of Loss of Biodiversity in Japan

Japan Biodiversity Outlook (JBO), which was released in May 2010, was an assessment of the state of Japan's biodiversity from the late 1950s to the present, made by experts and based on specific information such as statistics and documents. JBO concluded that, "Loss of biodiversity as a result of human activities in Japan has affected all ecosystems including forests and mountains, cultivated land, urban areas, inland water, marine and coastal areas, and islands, and the loss is continuing on the whole" (Figure 3-2-6: Biodiversity Loss in Japan).

As causes for the loss, there are direct causes due to human activities and development, and indirect causes in the background, such as socio-economic changes. Among these, the direct causes are laid out as four crises in the National Biodiversity Strategy. As for the "First Crisis," which was brought about by human activities and development, although the speed of development will further decline if there is population decline and low growth, it is expected that the effects of development done in the past will continue. However, the largest impacts as causes of extinction of species and endangered species in Japan are the ones caused by development.

On the other hand, there are reports of examples such as that sweetfish, which disappeared once, are returning to rivers in cities because of improvements in the water quality of the rivers due to the diffusion of sewerage systems. In recent years there are also fishing catch amounts that, although not the same as in the past, are starting to recover as a result of efforts for steady recovery of resources through resource management, including a complete ban on fishing for three years and then setting an allowable amount of catch after the ban was lifted, as was done with Sandfish fishing in Akita Prefecture (Figure 3-2-7: Shifts in Amounts of Sandfish Catches in Akita Prefecture). It can be said that there are cases when ecosystems still have the ability to recover, and it is possible to restore the habitats of living things and biological resources by alleviating effects from human activities such as development, or by conducting appropriate management of resources.

In places such as *satochi-satoyama*, the "Second Crisis" caused by reduction of human activities is a serious problem. Due to factors such as population decreases and aging in farming and mountain villages, it has become difficult to maintain and manage places such as *satochi-satoyama*, and there are concerns about

Figure 3-2-6 Biodiversity Loss in Japan

Biodiversity loss as of 2010	Current state of loss and trends		Causes of loss (degree of impact) and current trends				
	Degree of loss from original state	Degree of loss from state as of latter 1950s, and current trends	First Crisis: Development/change Direct use Water pollution	Second Crisis: Reduction in use and management	Third Crisis: Invasive alien species Chemical substances	Crisis of climate change	Other
Forest and mountain systems	■	→	◔	◔	◔	◔ ＊1	
Cultivated systems	–	↘	◔	◔	◔	◔	Decrease in local varieties of crops and livestock
Urban systems	–	→	◔	–	◔	◔	
Inland water systems	■	↘	◔	◔	◔ ＊2	◔	
Marine and coastal ecosystems	■	↘	◔	–	◔ ＊3	◔	Outbreaks of coral predators/ Coralline flat
Island ecosystems	■	↘	◔	–	◔	◔	

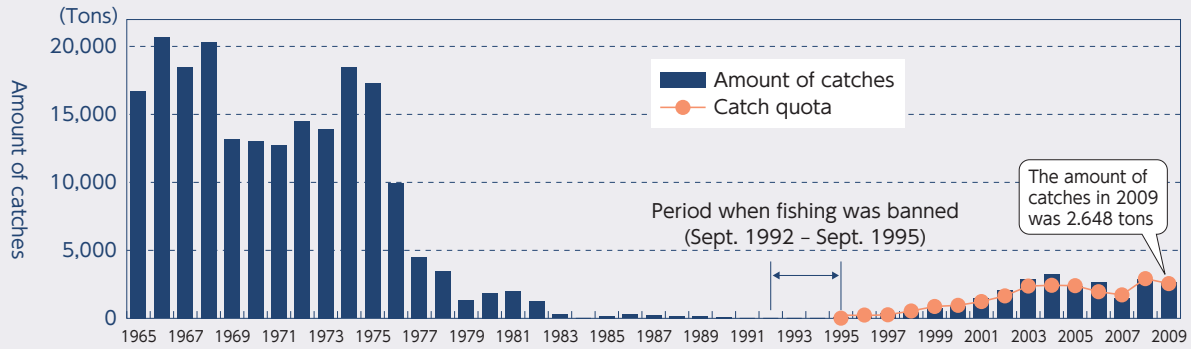
Assessment targets	States				Causes			
	Size of current losses		Trends of current losses		Degree of impact during assessment period		Current trend of degree of impact	
Legend	Not lost	□	Recovering	↗	Weak	○	Decreasing	↘
	Not significantly lost	▭	Same	→	Moderate	◔	Same	▷
	Lost	▭	Being Lost	↘	Strong	◔	Increasing	◁
	Significantly lost	■	Being rapidly lost	↓	Very strong	●	Increasing rapidly	△

Note: Dashed lines for assessment of the degree of impact indicate that the data is not sufficient.
Note: "＊" indicates that there are multiple factors and data related to the indicator in question, and that there are factors and data that show trends that differ from the current assessments of the degrees, effects, and trends of overall loss.
＊1 : The degree of impact on alpine systems has been and continues to be serious.
＊2＊3 : While the problem of chemical compounds has been mitigated to some extent, the problem of invasive alien species is serious.

declines of ecosystem services because of reduced use of agricultural land and secondary forests. The total *satochi-satoyama* area accounts for about 40% of Japan's national land, and nearly half of the land where endangered species congregate is distributed in *Satochi-satoyama* areas, making them important for the conservation of biodiversity, but the effects of such factors are extending to the living beings around us. In the 2010 Tokyo Red List (mainland version) released by the Tokyo metropolitan government in July 2010, *Cybister japonicus*, which is an aquatic insect, was listed as an extinct species. Even though it was an insect that in the past could be seen everywhere, such as in rice paddies and ponds, it was deemed extinct in the mainland area of Tokyo. Living species that used to be around us are also continuing to disappear one after another, and even killifish are now listed as endangered species on the Red List of the Ministry of the Environment. We should be aware of the changes in our living environment that have, without us realizing it, caused changes in the habitats and growing locations of living beings around us, causing extinction of species. Meanwhile, in recent years in *satochi-satoyama* a reduction of human activities has caused expansion of the distribution of wild animals such as deer and wild boars, which causes damage to agricultural and forestry industries, as well as to ecosystems, because such animals eat up rare plants and the understory vegetation of forests. It can be said that the task for working toward the future coexistence of people and nature in these regions is the question of how to proceed with conservation and management in light of changes in social conditions, such as population decrease and socio-economic changes.

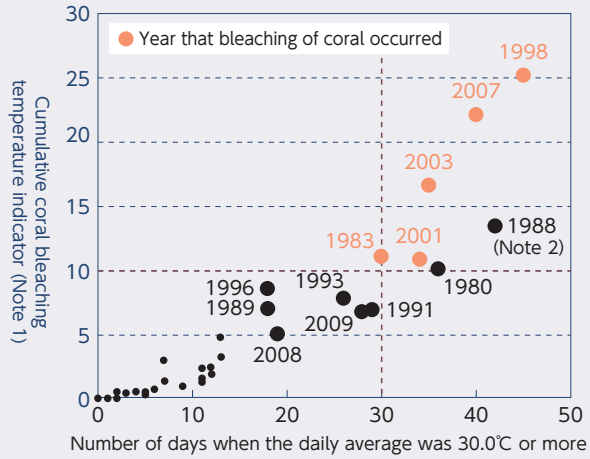
As for the "Third Crisis" due to alien species and chemical substances brought in by humans, measures such as pest control based on the Invasive Alien Species Act are proceeding, as well as efforts such as developing effective and efficient pest-control technology. However, it is expected that the trend of intentional and un-intentional invasion of alien species, and species already settled and spreading, will continue from now on. There are concerns about such effects particularly on inland water systems such as rivers and lakes, and island systems. As for alien species for which the scope of their habitats expands as the temperature rises, the risk seems to increase that they will become established and spread An extremely large amount of costs and labor are required in order to contain or eradicate alien

Figure 3-2-7 Changes of Sandfish Catches in Akita Prefecture



※Amounts of catches are from the Minister of Agriculture, Forestry and Fisheries Statistics Department's "Ocean Surface Fishing Production Statistics Survey." Amount of catches for 2009 is a preliminary figure.
Source: Akita Prefecture

Figure 3-2-8 Relationship between Coral Bleaching in Sekisei Shoko and Temperature



Bleached coral (Sekisei Shoko)

Note 1: The temperature 30.0℃is set as the coral bleaching subtraction temperature, and the total of values that exceed 30.0℃ is defined as the coral bleaching temperature indicator.
Note 2: Although 1988 is within the dangerous range, there was almost no affect by temperature on coral that year because of damage by being eaten by acanthaster.
Source: "About the Temperature Environment at Time of Coral Bleaching in Sekisei Shoko" by Okamaoto et. al (2007). Photograph: Ministry of the Environment

species once they have settled down and expanded their distribution. For that reason, it is of course necessary to strengthen monitoring systems in order to prevent alien species from newly taking root, and also to systematically and adaptively eradicate alien species that have already taken root, according to the extent of their damage and the necessity of eradicating them.

As for the "Climate Change Crisis," there is a possibility that irreversible effects may occur in fragile ecosystems such as alpine areas and coral reefs (Table 3-2-8: Relationship between Coral Bleaching in Sekisei Shoko and Temperature). It is also thought that changes in distribution, populations, and phenology that have already been identified may affect a broad scope of living beings for which some examples have already been confirmed, and may cause changes in interactions among living beings. In order to handle the climate change crisis, it is necessary to proceed with reduction of greenhouse gas emissions, but even if the best possible efforts are made such reduction may take time and it is thought that some degree of effects from warming cannot be avoided. For example, it is said that if the concentration of CO_2 in the air exceeds 350ppm, coral reefs suffer irreversible damage due to increases in water temperature and acidification of ocean water, but that level has already been exceeded. For that reason, it is necessary to proceed with adaptive measures to deal with changes in the environment and ecosystems that occur due to global warming, but in order to proceed with specific adaptive measures, it will be important to clarify, through monitoring of ecosystems that are easily affected by global warming, the vulnerabilities to global warming and the level of impact on ecosystems and our daily lives that is caused by not being able to deal with the effects of global warming.

Meanwhile, loss of biodiversity is occurring not only in ecosystems and species, but also on the level of genetic diversity. JBO found that nearly all indigenous varieties of horses and cows have disappeared, with only 8 varieties of indigenous horse varieties remaining of what used to be nearly 50 called by area of production, and only 2 indigenous varieties of cows remaining. It is thereby assessed that, "There are only a few populations of indigenous types of livestock, and genetic diversity has declined."

As for rice, which is an important living resource and the closest resource to the Japanese people, it was grown in approximately 4,000 varieties during the Meiji Period, but as of 2005 only 88 varieties (crop land area of 500 hectares or more) were grown, and the number of types of cultivated rice is declining significantly. Two-thirds of the rice currently harvested in Japan consists of *koshihikari* or the top four varieties which are of *koshihikari* lineage. An example of a problem caused by the unification of varieties is that the ratio of damage suffered by that crop will be great if a disease or pest that inflicts significant damage to a certain variety arises. As another example, in the past there was a case in which cultivation of the most representative variety of banana, called Gros Michel, suffered devastating damage from a disease caused by a fungus called Race 1. Although today the Cavendish variety, which is resistant to Race 1, is widely cultivated, there are no varieties that are resistant to the newly emerged fungus Race 4, and therefore there are concerns that bananas, with their poor genetic diversity, could suffer catastrophic damage. It is true that such concerns do not apply identically to other species, including rice, but conservation of genetic diversity of domesticated animals, cultivated plants, and fish species is a task to be dealt with.

3. The Relationship between Biodiversity and Our Daily Lives

Our daily lives heavily rely on ecosystem services. Ecosystem services include not only supply services such as food, but also regulating services related to modulation of air quality and protection against natural disasters, cultural services related to cultural diversity and traditional and customary knowledge, and support services related to soil formation and water circulation. The "Japan *Satoyama-Satoumi* Assessment (JSSA)," which analyzed changes in *satoyama-satoumi* ecosystems in Japan over the last fifty years, found that there are many services, ranging from services of broad foundation to cultural services (Table 3-2-1: Changes in Ecosystem Services and Direct Drivers). In *satoyama* and *satoumi* we have used a wide variety of services since long ago through humans coexisting with nature, but in order to continue to use such ecosystem services in a sustainable manner, it is essential to conserve biodiversity into the future. In order to do so, it is important to use such services in a way that does not exceed ecosystems' resilience and resistance. The "ecological footprint" is one indicator that measures the impact that our daily lives have on biodiversity. The ecological footprint is an indicator that shows the environmental load caused by human activities in the land area required for such activities. The ecological footprint is increasing every year due mainly to the carbon footprint (the land area necessary to absorb carbon dioxide caused by consumption of fossil fuels.). At present, a planet 1.5 times the size of the Earth is necessary to support our daily lives, and by the mid-2030s it is predicted that 2 times the size of the Earth will be required. In other words, it can be said that our current daily lives are barely viable by eating up all of the future's resources (assets) (Figure 3-2-9: Shifts in the World's Ecological Footprint).

Although in recent years Japan's ecological footprint has been in a trend of decline, Japan's 2006 ecological footprint was approximately 1.5 times the global average, and if all of the world's people lived the same lifestyle as the people of Japan, a planet 2.3 times the size of the Earth would be required (Figure 3-2-10: Ecological Footprint in Japan). A characteristic of Japan is that the ecological footprint is large in comparison with its biological productivity (Figure 3-2-11: Ecological Creditor- Debtor Status by Country, including the Ecological Footprint to Bio-capacity Ratio). That means that many of the resources consumed in Japan rely on imports from other countries, causing impacts on ecosystem services in other countries.

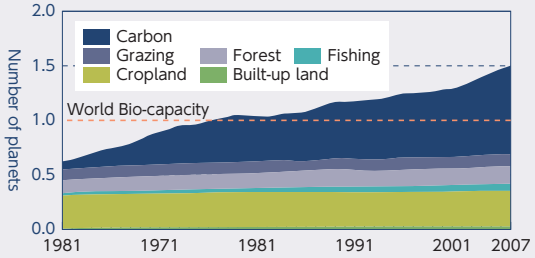
Table 3-2-1 Changes in Ecosystem Services and Direct causes

Ecosystem services			Human use	Enhanced or degraded	Indicator and criteria	Direct causes: Urbanization	Loss of mosaic	Underuse	Over-exploitation	Global/ Regional warming	Increase of invasive alien species	Pollution
Supply services	Food	Rice	↘	→	Crop yield, cultivated area, yield per 10a	✓		✓		✓	✓	
		Livestock	NA	NA	–							
		Matsutake mushrooms	↘	↘	Yield			✓				
		Marine fishery	↘	↘	Catch	✓		✓	✓	✓		✓
		Aquaculture	↗	NA	Catch	✓						✓
	Fiber	Timber	↘		Forestry production index, standing tree store	✓		✓			✓	
		Firewood & charcoal	↘	NA	Forestry production index	✓		✓				
		Sericulture	↘	↘	Cocoon harvest, mulberry grown area			✓				
Regulating services	Air quality regulation		+/−	+/−	NOx/SOx concentration, amount of yellow dust and endocrine-disrupting chemicals	✓		✓				✓
	Climate regulation		+/−	+/−	Changes or fluctuations of temperature and precipitation	✓		✓		✓		
	Water regulation, flood control		+/−	+/−	Area of paddy fields, number of reservoirs	✓	✓	✓				
	Water purification		+/−	+/−	Forest area, amount of chemical fertilizer and pesticide use, percentage of population with sewage systems	✓	✓	✓				✓
	Soil erosion regulation	Cultivated land / Forest	+/−	+/−	Area of abandoned cultivated land, changes in forest type	✓	✓	✓			✓	
		Coast	+/−	+/−	Sediment supply	✓		✓				
	Pest regulation and pollination		↘	↘	Amount of pesticide use, area of abandoned cultivated land, changes in forest type	✓	✓	✓				
Cultural services	Spiritual	Religion (shrines and temples, ceremonies)	NA		Number of temples and shrines, area of sacred groves	✓						
		Festivals	↘		Variety (number) of festivals, use of plants for flower dedication	✓						
		Scenery	↘		Number of applications for '100 best Satoyama selection'	✓						
	Recreation	Education (environmental education, outdoor observations, outdoor play)	→		Number of participants, number of NGOs working for satoyama conservation, area of activities, time children spend outdoors	✓						
		Game-hunting and fishing, Gathering clams and wild vegetables	↘		Number of participants (described in leisure white paper), number of facilities	✓						
		Mountain climbing/ Travel/Green tourism	↗		Number of participants (described in leisure white paper), number of facilities	✓						
	Art	Traditional art (music, dance, fine art, literature, craftwork)	↘		Number of professionals, production, average age (in terms of education of successors)	✓						
		Contemporary art (music, dance, fine art, literature, craftwork)	NA		Number of professionals, production, average age (in terms of education of successors)							
Basic services	Forest Primary production	Double count (reference information)	→	Area		✓		✓	✓	✓	✓	
	Grassland Primary production		↘			✓		✓			✓	
	Wetland Primary production		↘			✓	✓					
	Farmland Primary production		→			✓		✓			✓	✓
	Rivers/Lakes Primary production		↘			✓	✓				✓	✓
	Tideland Primary production		↘			✓	✓	✓	✓	✓	✓	✓
	Sea Primary production		↘			✓	✓	✓		✓	✓	✓

Backed by data	Without supporting data	KEY		
↗	↗	A monotone increase (for human use column) or enhanced (for enhanced or degraded column) for the last 50 years	+/−	Mixed (trend increases and decreases) over the past 50 years, or some components/regions increase while others decrease
↘	↘	A monotone decrease (for human use column) or enhanced (for enhanced or degraded column) for the last 50 years	NA	Not assessed (insufficient data, not reviewed)
→	→	No change (for both columns) for the last 50 years	✓	The direct causes that have influenced ecosystem services

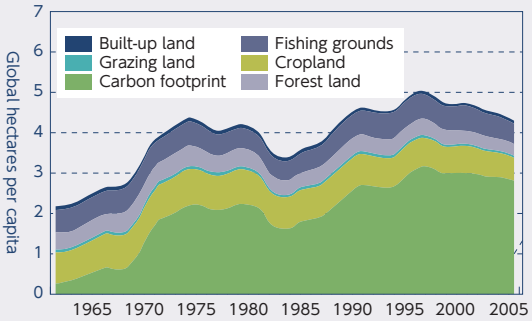
Source: United Nations University's "Japan Satoyama-Satoumi Assessment (JSSA)"

Figure 3-2-9 Ecological Footprint by Component 1961-2007



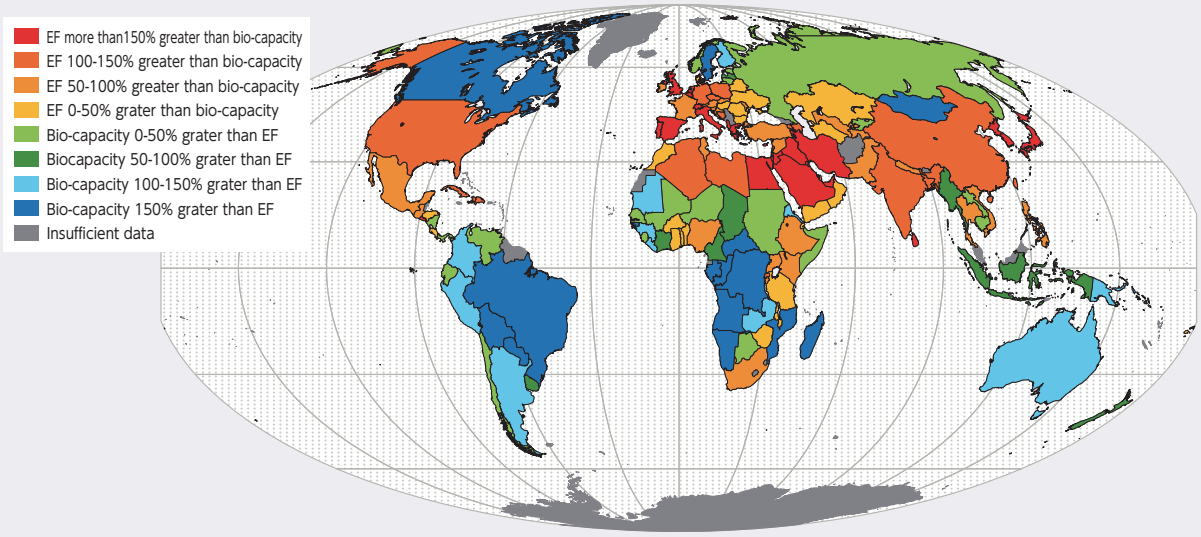
Source: WWF, "2010 Living Planet Report"

Figure 3-2-10 Japan's Ecological Footprint of Consumption



Source: WWF Japan, Global Footprint Network, "Ecological Footprint Report Japan 2009"

Figure 3-2-11 The Ecological Footprint of Countries and Ecological Creditor-Debtor Status, Indicating the Ecological Footprint to Bio-capacity Ratio



Source: WWF Japan and Global Footprint Network's "*Ecological Footprint Report Japan 2009*"

4. The Impact that Japan has on the World's Biodiversity

Japan's population is approximately 130 million people, and its ratio of the world's population of approximately 6.9 billion people is less than 2%. However, looking at resource consumption, compared to population-ratio Japan in general consumes a large ratio of the resources produced in the world. Depending on the use of those resources, there is also a risk that such use will impact the world's biodiversity.

Japan is one of the world's leading consumers of fishing resources, and tuna is an example of one of those fishing resources. Because tuna migrate through the vast ocean, countries related to the tuna fishing industry have established regional fishing management organizations for each type of tuna and each of their migration ocean areas, and the countries are working to manage the resources they are responsible for and use them in a sustainable manner by managing resources according to the state of such resources. However, southern bluefin tuna and some other types of tuna have been put on the Red List by the IUCN. At the Conference of the Parties to CITES that was held in Doha, Qatar in 2010, it was proposed that Atlantic bluefin tuna should be listed in Appendices I, thereby prohibiting international transactions for commercial purposes. Japan consumes more than 20% of the amount of tuna consumed in the world, and approximately 80% of the world's catches of the high-end food bluefin tuna. Although it is part of Japanese culture to consume many kinds of fish, it can also be said that this is an example that shows that there is a risk that Japan is affecting natural resources for which there are concerns about their continued global existence. As the world's largest consumer of tuna, Japan will aim to thoroughly manage and sustainably use resources and exhibit even greater international leadership in the future.

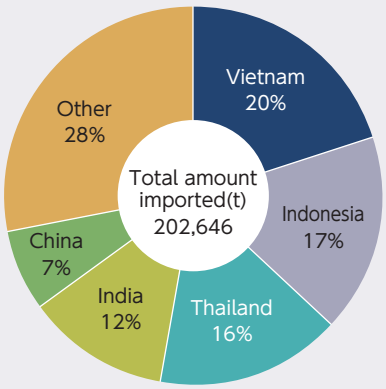
Japan is also known as an importer and consumer of shrimp, and countries in Asia, mainly Southeast Asian countries such as Vietnam, Indonesia, and Thailand, make up a large ratio of the sources of such imports (Figure 3-2-12: Suppliers of Shrimp to Japan). Many living

beings inhabit mangrove forests that broadly line the coast of the sea, and because such forests are effective for regenerating resources since they serve as a place for fish to lay eggs and as habitats for young fish, they are referred to as "cradles of life." In addition, because they have effects such as protecting places of residence on land from high ocean waves, it is said that the very existence of mangrove forests has significant public benefit. However, in Southeast Asia many mangrove forests have disappeared due to development of shrimp farms, and because many living beings that rely on mangrove forests have been lost, this has created a vicious circle in which various public benefits are also being lost.

Japan is also one of the world's leading importers of timber, which is an important biological resource. When timber imports were fully liberalized in 1964, timber imports from around the world, mainly Southeast Asia, North America, and Russia, increased drastically to meet the robust demand for timber due to rapid economic growth. Currently the main sources of imports are diversifying due to an increase of imports from places such as Australia and Europe, but it can also be said that countries such as Japan that import timber depend on logging and conversion of the world's forests, which are treasuries of natural resources (Figure 3-2-13: Breakdown of Supplies of Timber to Japan, Figure 3-2-14: Shifts in Amount of Timber Supplied).

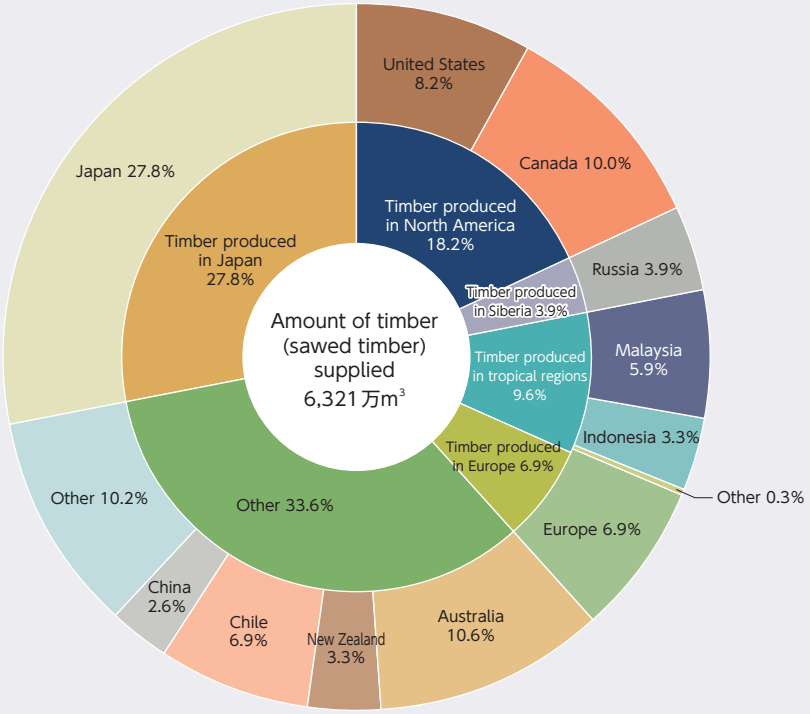
In terms of impact on biodiversity, efforts in the field of minerals are also important. This is because the mining industry sometimes conducts large-scale development in regions that have rich ecosystems, resulting in many cases in which there is a large impact on biodiversity. Rivers and other water systems are affected not only by direct development but also by the effects of development of infrastructure such as road construction and chemical substances. For example, nickel is used in materials such as metal plating and stainless steel, and Japan relies on imports from other countries for all of its nickel. Japan imports some of its nickel from New Caledonia, which has abundant nickel reserves (Figure 3-2-15: Suppliers of Nickel to Japan), but as a result of evolution of unique plants and animals, New Caledonia is known as a region that many unique species inhabit and as a region that is important for the conservation of biodiversity. Japan also must rely on regions that have rich biodiversity, such as the South Pacific Ocean, Central and South America, and Africa, for many mineral resources other than nickel, and it can be said that development of mineral resources and conservation of biodiversity are tasks that are two sides of the same coin. For that reason, corporations in

Figure 3-2-12 Suppliers of Shrimp to Japan



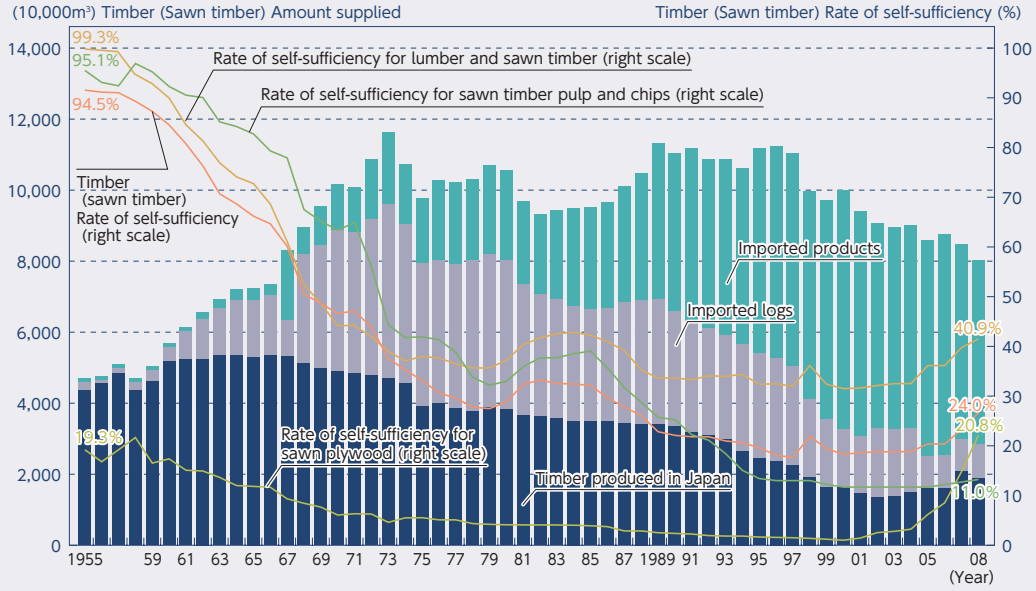
Source: Created by the Ministry of the Environment, using Ministry of Finance trade statistics (2009)

Figure 3-2-13 Breakdown of Suppliers of Timber to Japan (2009)



Source: Created by the Forestry Agency, using information from the Forestry Agency's "Table of Timber Supply and Demand" and the Ministry of Finance's "Trade Statistics"

Figure 3-2-14 Shifts in Amount of Timber Supplied

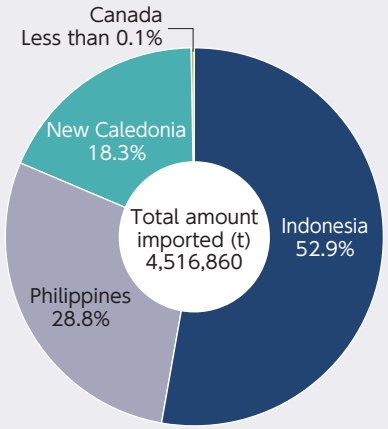


Source: The Forestry Agency's "Table of Timber Supply and Demand"

fields of the mining industry are also making efforts for biodiversity. For example, "contribution to conservation of biodiversity and integrated approaches to land-use planning" is one of the ten principles promised by member companies of the International Council on Mining and Metals (ICMM). If we look at only products manufactured using mining resources as materials, it would be difficult to identify the effects on biodiversity such as biological resources and ecosystems, but if we look at the mine sites, it can be seen that they are related to biodiversity in terms of the effects of our daily lives on living resources and ecosystems.

Meanwhile, in addition to impacts caused by using resources, it is also reported that alien species carried overseas unintentionally are affecting other countries. For example, there are reports that seaweed produced in Japan is spreading in other countries and causing damage. As an example of direct effects on human health and well-being, it is said that the Asian tiger mosquito has settled down in the United States by slipping itself into goods exported from Japan. The mosquito is one of the routes of human infection of West Nile fever in the United States. When the topic of alien species is brought up, there is a tendency to focus on plants and animals brought into Japan from other countries, such as black bass and bluegill, raccoons, and mongoose, but as with the examples of seaweed and the Asian tiger mosquito, we must not forget that plants and animals thought to be coming from Japan also have negative effects on ecosystems in other countries. With increasing economic globalization, Japan will continue to be involved with many countries around the world through imports and exports. In doing so, it is necessary to keep in mind that there are unintentional effects or possible effects on ecosystems.

Figure 3-2-15 Suppliers of Nickel to Japan



Source: Created by the Ministry of the Environment, using Ministry of Finance trade statistics (2010)