State of Japan's Forests and Forest Management

— 2nd Country Report of Japan to the Montreal Process —

October, 2009

Forestry Agency,Japan

This report was prepared by the Forestry Agency, Japan to provide information on the state of its forests and forest management in accordance with the Criteria and Indicators of the Montreal Process.

Montreal process:
an international initiative formed in 1994 to develop and apply criteria and indicators for the conservation and sustainable management of temperate and boreal forests. Participating countries are Argentina, Australia, Canada, Chile, China, Japan, Republic of Korea, Mexico, New Zealand, Russia, Uruguay and United States of America, whose forests together account for 80% of the temperate and boreal forests and 50% of the world's forests.

Criteria:
aspects of forests and forest management to be addressed in assessing the sustainability of forest management

Indicators:
items on which measurements and information are collected to describe the state of forest and forest management along the criteria

FOREWORD

At the Earth Summit held in Brazil in 1992, participating countries agreed on the pursuit of sustainable forest management. In order to monitor its progress, countries also agreed on developing criteria and indicators as one of the actions to be taken. Following this agreement, twelve major temperate and boreal forest countries, including Japan, have participated in the Montréal Process to develop and implement criteria and indicators since 1994.

The Forestry Agency of Japan has actively contributed to developing and implementing criteria and indicators utilizing its wealth of expertise on forests and forestry since the inauguration of the Montréal Process. Moreover, the Forestry Agency has undertaken the Liaison Office of the Montréal Process since January, 2007, hosted meetings to revise criteria and indicators and prepare the Overview Reports, thereby has willingly coordinated and consolidated the opinion of member countries. I am highly honored that these efforts are well acknowledged by the member countries.

The Working Group of the Montréal Process agreed at its meeting in 2008, on preparing the second country reports which report on the state of forests and forest management of each member country along the agreed upon criteria and indicators. It is my great pleasure that the second country report of Japan, which has been prepared by the Forestry Agency with the cooperation of relevant institutions including the Forestry and Forest Products Research Institute and the Ministry of the Environment, is now ready to be presented on the occasion of XIII World

Forestry Congress held in Argentina in October this year. I deeply appreciate all the organizations involved for their cooperation.

This Second Country Report contains new information on the forest ecosystem types and the state of forest fragmentation based on the result of the survey newly implemented by the Forestry Agency and so on. It is my honest hope that this report will widely acquaint the world with the state of forests and forest management of Japan and contribute to the efforts of countries and international organizations to promote sustainable forest management.

Taisuke SHIMADA
Director General
Forestry Agency, Japan
October 2009

ACKNOWLEDGEMENTS

This report is a result of the efforts of many people and organizations, whose contributions are briefly described and acknowledged, as follows:

Members of the core team set up in the Forestry Agency were Takeshi Goto, Counsellor for International Forest Resource Analysis, Yuichi Sato, Policy Advisor, Shigeru Takahara, member of the Planning Division, and Akimi Yamada, member of the International Forestry Cooperation Office, who were engaged in a series of works, including collection, processing and illustration of the data and information, drafting of the report and consultations, coordination with relevant organizations, and printing and binding of the report.

Members of the relevant divisions and offices of the Forestry Agency, Japan assisted the core team by providing useful recommendations and advices, as well as necessary data and information.

Members of the Forestry and Forest Products Research Institute (FFPRI) and the Ministry Environment, Japan also provided necessary data and information and useful advices.

Members of the International Forestry Cooperation Office provided the core team with valuable support in processing and illustration of the data and information and printing and binding of the report under the supervision of Kunio Shimizu, Director for International Forestry Cooperation.

All these contributions are deeply appreciated and highly recognized as a clear indication of the intention of pursuing sustainable management of Japan’s forests.

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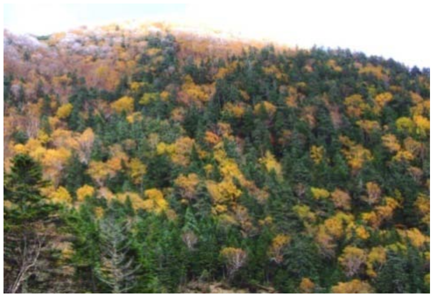
OVERVIEW

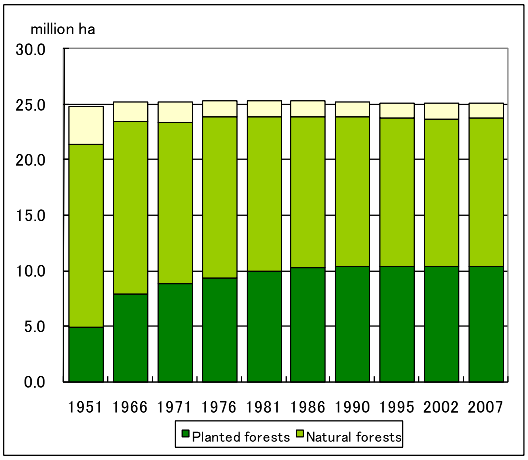
Outlook of Japan's Forests, Forestry and Wood Industry

Features of Forests



Forests cover approximately 25 million hectares, occupying about two-third of the total land area of Japan. Such high coverage of forests has been maintained for more than a half century. The sustained efforts for forest conservation and restoration, coupled by the warm and wet climate and steep terrains hindering the conversion of forestland into other uses, have contributed to such stable forest cover. The growing stock of Japan's forests, meanwhile, has constantly increasing, particularly in the plantation forests. The current volume of the growing stock of Japan's forests is approximately 44 billion cubic meters, which is more than twice as much as in 1950's.

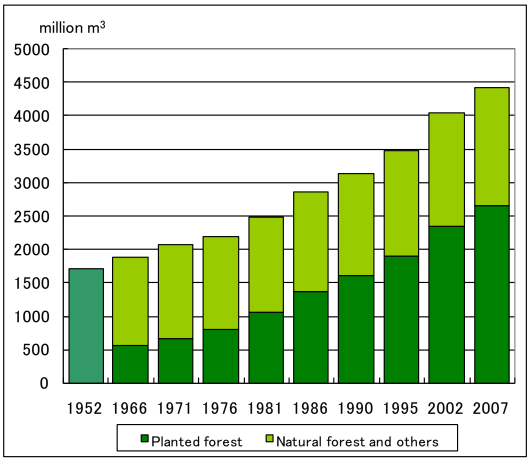
Figure1: Change in forest area of Japan



Sources: Forestry Agency. State of Forest Resources, Ministry of Agriculture, Forestry and Fisheries

See pages 4.

Figure 2: Change in growing stock of Japan

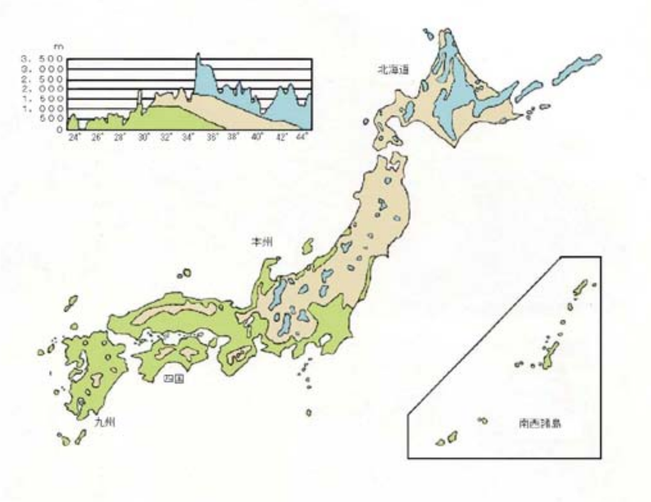


Sources: Forestry Agency. State of Forest Resources, Ministry of Agriculture, Forestry and Fisheries

See pages 29.

On the Islands of Japan stretching over 3,000 kilometers from north to south, boreal, temperate and some sub-tropical forests are distributed. Affected by the diversified natural setting, such as the distinct summer and winter monsoons and intricate geographical and geological features, as well as the human intervention, a broad range of forest ecosystem types and species are found throughout the country. Most of the 200 species of terrestrial mammals and over 40 percent of the 8,100 species of ferns and seed plants known in Japan are regarded as forest associated.

Figure 3: Distribution of forest types in Japan

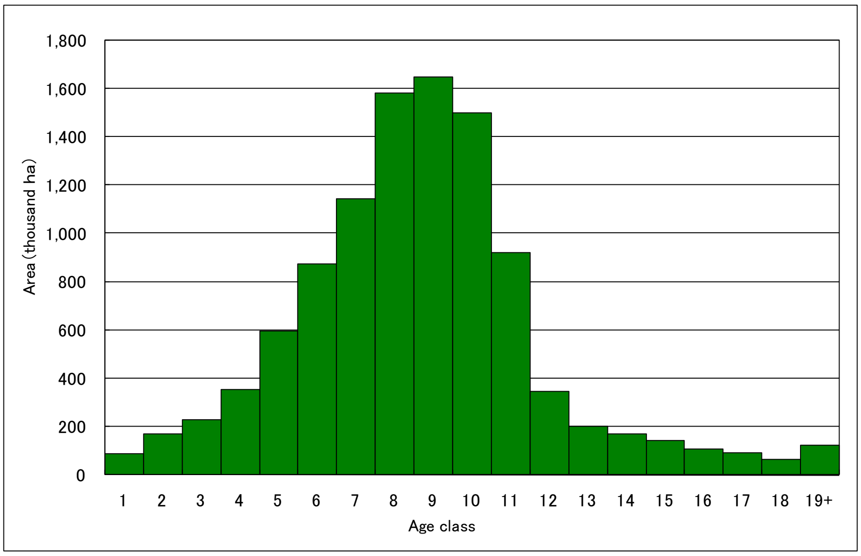


Legend	Vegetation type
	Boreal forests
	Cool temperate forests
	Warm temperate and sub-tropical forests

Sources: Forestry and Forest Products Research Institute

Approximately 53 percent of forests in Japan are classified as natural forests, 41 percent are planted forests and the remaining 5 percent are the forest land without trees, such as logged over forests and alpine and boulder areas, and bamboo forests. Some natural forests distributed in remote areas maintain unique native forest ecosystems and fauna and flora. Other natural forests have been normally affected by human activities, such as fuel wood production, commercial logging and enrichment plantation. The majority of the planted forests were established during the late 1950's to the early 1970's when the wood consumption was increasing under the rapidly growing economy. Over 60% of the planted forests are younger than 45 years as a result, and still in need of care such as thinning.

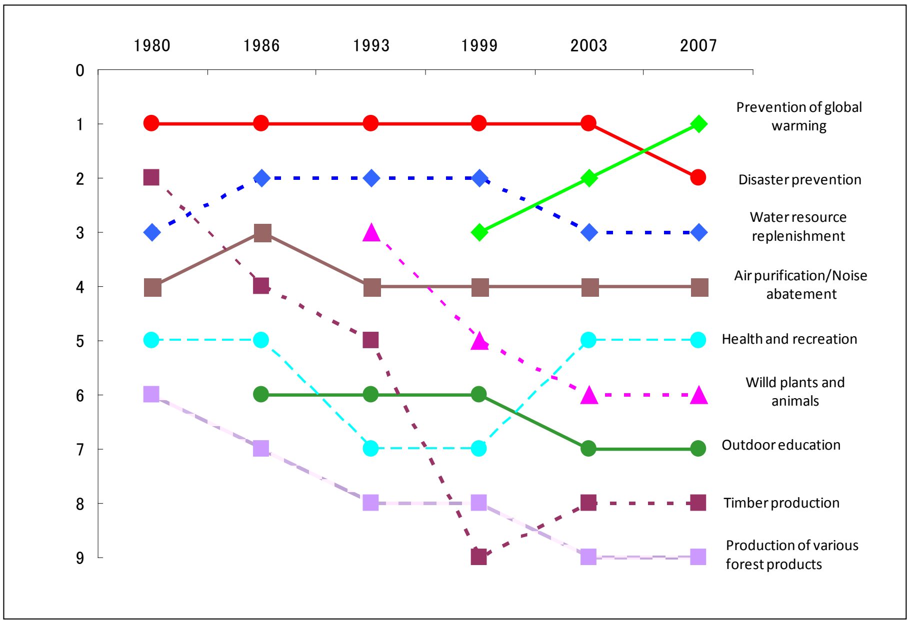
Figure 4: Distribution of age classes of planted forests of Japan



Sources: Forestry Agency. State of Forest Resources
See pages 34.

Healthy and vital forests provide us with a wide range of socioeconomic and environmental benefits. Besides the delivery of wood and non-wood forest products, the environmental benefits from forests, such as soil and water conservation, have been well recognized by the people of Japan. The growing concern about the global environment issues in recent years has further raised the public awareness of the multiple and crucial roles of forests in securing our well-being. Among those roles, carbon sequestration function of forests is particularly attracting higher attention. As a consequence, proper maintenance and sustainable use of planted forests, as well as the conservation of natural forests, is gaining the public support.

Figure 5: Change in Japanese People's Expectation to forest roles



Sources: Cabinet Office

See pages 105.

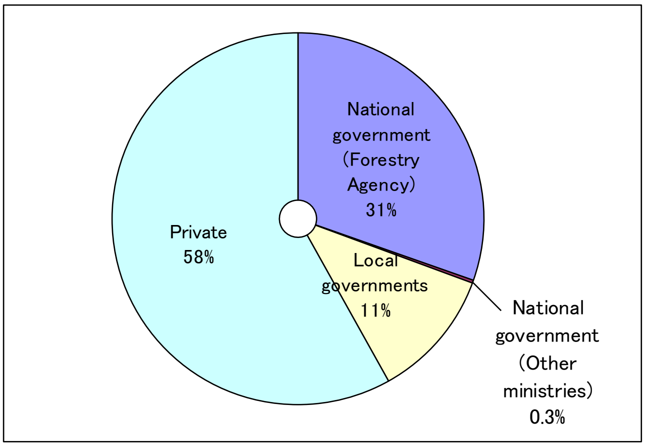
Before thinning

After thinning

State of Forestry and Wood Industry

In Japan, approximately 42 percent of forests are publicly owned and 58 percent are privately owned. About 85 percent of the publicly owned forests belong to the national government, and the remaining 15 percent belong to the local public entities, including prefectural and municipal governments and district properties. The majority of the owners of the privately owned forests, on the other hand, are households. Among 920 thousand households, which own more than 1 hectare of forests, 57 percent own less than 3 hectares of forests and only 11 percent own more than 10 hectares of forests. Such small-scale ownership pattern of the privately owned forests, coupled by the generally steep terrains, hinders efficient forest operations and active forest management.

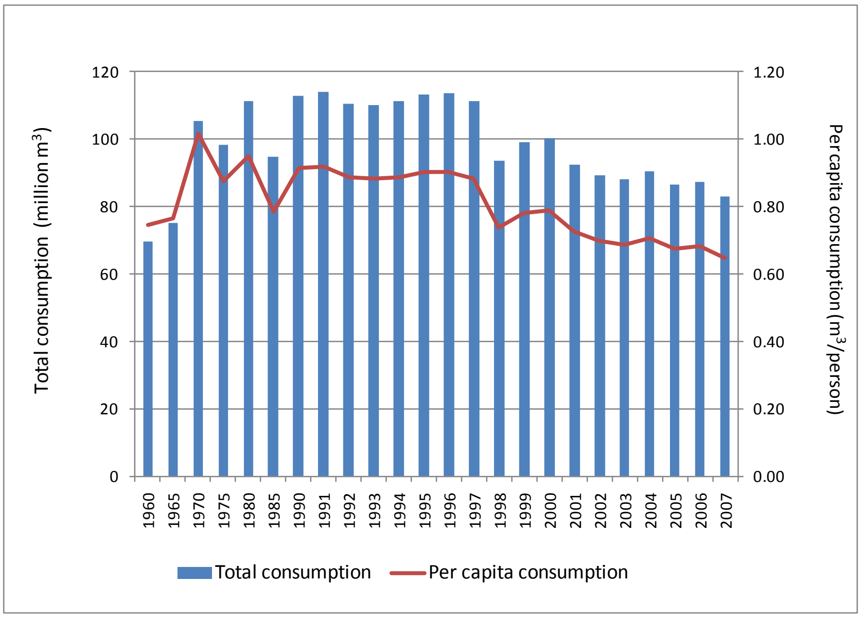
Figure 6: Share of forest ownership in Japan



Sources: Forestry Agency. State of Forest Resources
See pages 6.

Japan's wood consumption in recent years hovers below 90 million cubic meters per annum in round wood. The largest category of wood use is pulp and wood chips, which occupies over 40% of the total consumption, followed by sawn timber and plywood. The current level of wood production in Japan, on the other hand, is around 19 million cubic meters, which covers only a little over 20% of the total consumption. The balance is filled up by the imported round wood and wood products. From the global viewpoint, 7% of the internationally traded industrial round wood is imported to Japan.

Figure 7: Change in wood consumption in Japan

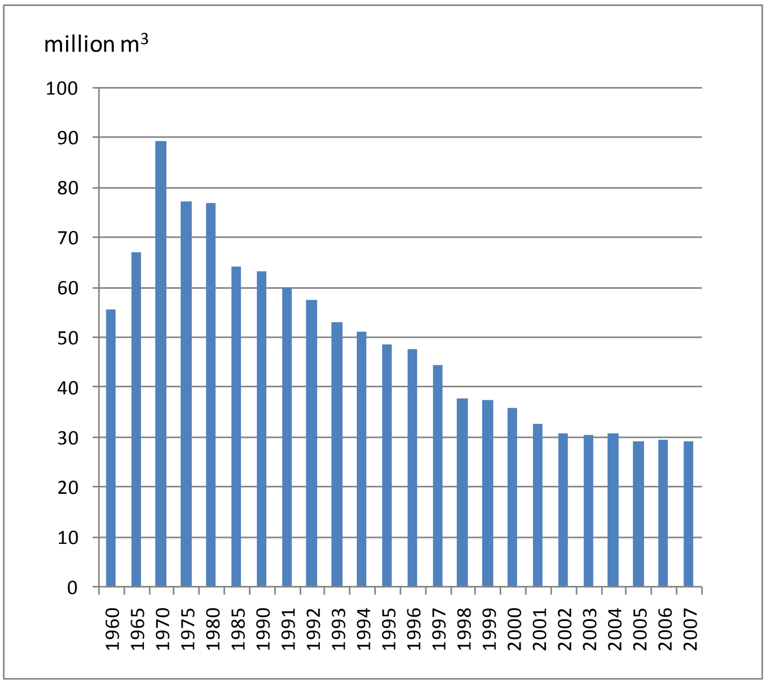


Sources: Forestry Agency, Ministry of Internal Affairs and Communication. National Census etc.

See pages 73.

Wood production in Japan has constantly declined since the 1960's in competition with the imported wood and other building materials. The use of domestically produced wood, including small diameter logs from the thinning of planted forests, however, is now regaining the attention of the wood processing industry of Japan. Such change is attributed to the increasing concern for the stable supply of imported round wood, as well as the increasing growing stock of planted forests and the improving wood processing technologies. The challenge ahead is to ensure the stable supply of wood through the collective management of smallholders' forests and the efficient forest operations while maintaining the sustainability of resource base and the environmental functions of forests.

Figure 8: Change in wood production in Japan

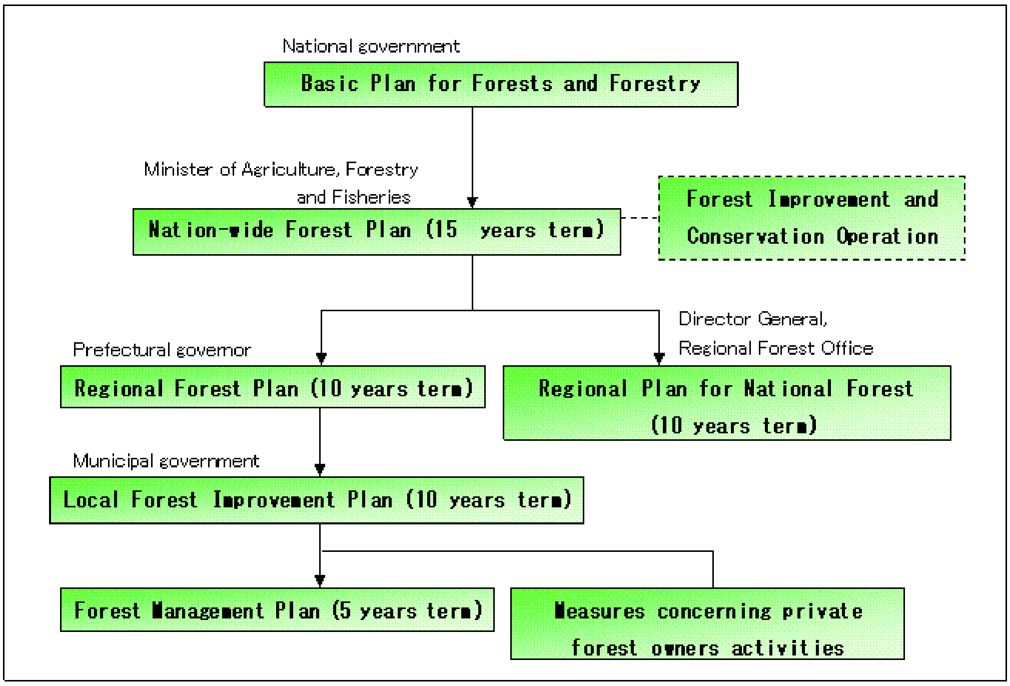


Sources: Forestry Agency, Ministry of Internal Affairs and communication,
Ministry of Economy, Trade and Industry
See pages 67.

Framework of Forest Administration

The principles of the management of Japan' forests are laid down by the Forests and Forestry Basic Act which was fully renovated in 2003 reflecting the international trends toward the sustainable forest management. The Act provides that the primary objective of the forest management is to sustain the multiple benefits from forests and defines, to this end, a range of policy measures to be implemented for the improvement and conservation of forests and the development of forestry and wood industry. In accordance with the Basic Act, Basic Plan for Forests and Forestry has been periodically formulated to identify Japan's national strategy containing long-term goals and approaches.

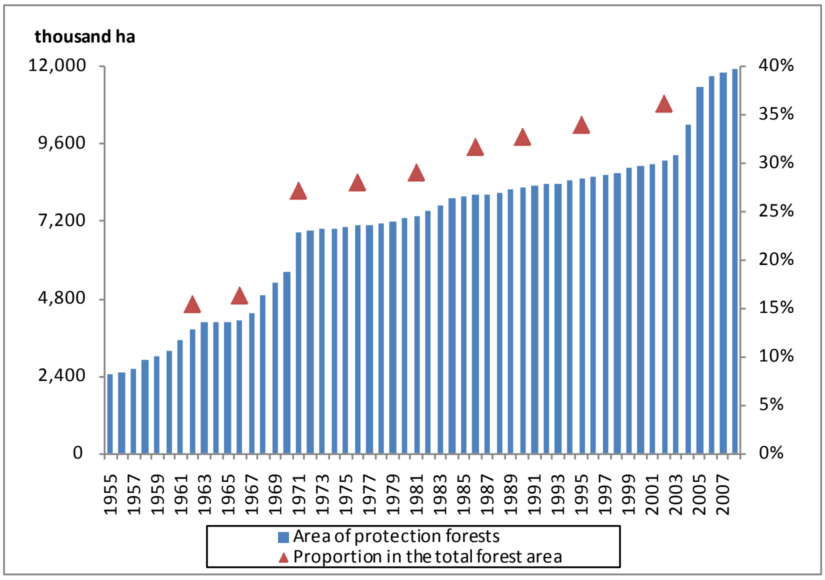
Figure 9: Structure of forest planning system of Japan



Sources: Forestry Agency
See pages 110.

In order to implement a variety of policy measures, institutional frameworks, such as those for the forest planning and forest conservation, are provided by the Forest Act. Forest management plans are formulated at national, district and municipal levels by the respective government bodies and at the management unit level by the individual forest owners, as well, to ensure the sustainability of the resource base and the multiple functions of forests. The protected forests are designated by the Minister for Agriculture, Forestry and Fisheries or the governor of prefectures for a variety of conservation needs, such as soil and water conservation and recreational opportunities. Activities, such as logging operations and earthworks, are restricted in the protected forests depending on the purpose and the required level of conservation.

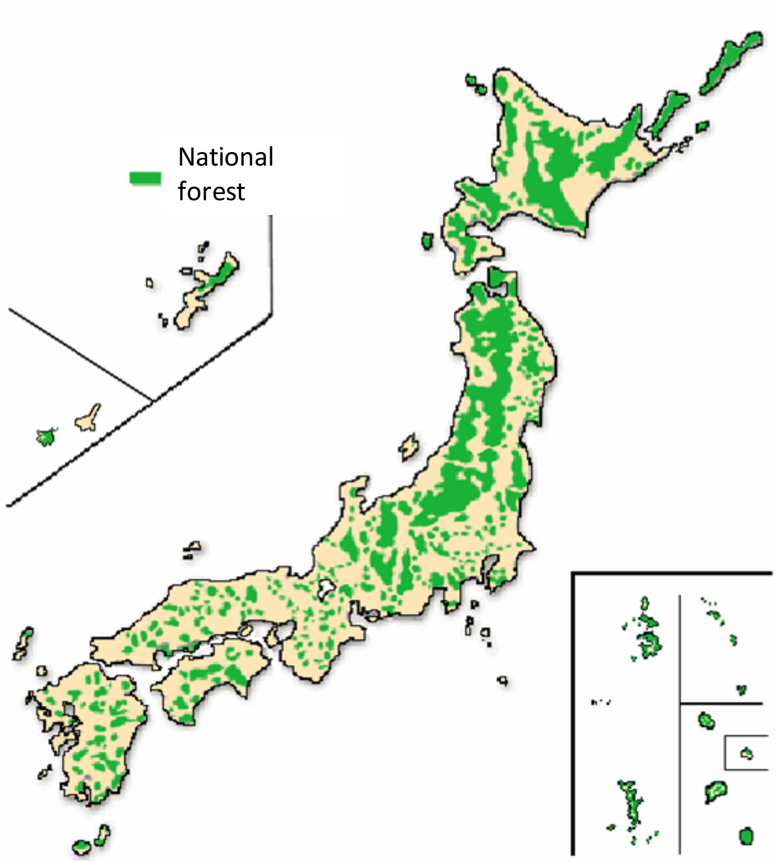
Figure 10: Change in area of protected forests of Japan



Sources: Forestry Agency

The instruction and assistance to the private forest owners and wood industry is carried out by both the national government, namely the Forestry Agency, and the prefectural and municipal governments in a coordinated manner. The management of national forests, on the other hand, is directly conducted by the Forestry Agency, under which local offices, including seven Regional Forest Offices, 98 District Forest Offices and 1,260 Forest Ranger Offices, are distributed throughout Japan. A variety of research and development activities related to forests and forest products are carried out by national, prefectural and private institutions and universities, including the Forestry and Forest Products Research Institute.

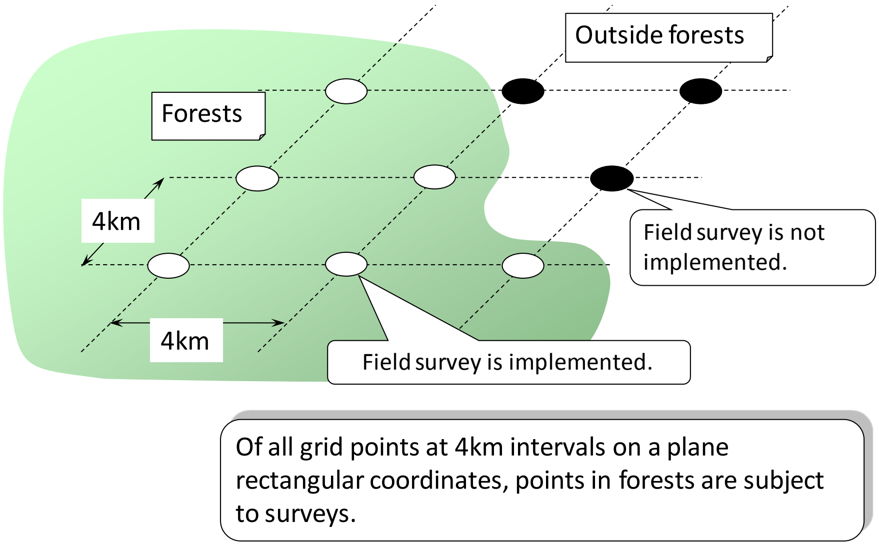
Figure 11: Distribution of national forests of Japan



Sources: Forestry Agency

The inventory data of all the privately owned forests, as well as the publicly owned forest, have been compiled by compartment and reviewed in every five years on the occasion of the revision of the district forest plans. In 1999, the Forestry Agency introduced a new forest monitoring survey with the aim of supplementing such traditional forest inventory data. A wide range of information, including the vegetation and endangered species is collected in the survey in every five years on 16 thousand spots allocated at every 4 kilometer grid. The result of the survey, which will enter the third round in 2009, is already utilized in this country report and the FRA2010 also.

Figure 12: Structure of monitoring spot of Forest Resource Monitoring Survey of Japan



Sources: Forestry Agency

INTRODUCTION

Overview of the Montreal Process and International Debates

Development of the Montreal Process

The roots of the Montreal Process are traced back to the chapter 11 of Agenda 21 adopted in the Earth Summit in 1992 in which the "formulation of scientifically sound criteria and guidelines for the conservation, management and development of all types of forests (11.23. (b))" was included as one of the activities to be carried out in pursuit of sustainable forest management. With this as a start, inauguration of a voluntary initiative to develop a set of criteria and indicators for the conservation and sustainable management of temperate and boreal forests was agreed at the expert seminar held in 1993 in Montreal, Canada, after which "the Montreal Process" was named.

Figure 13: Relevance to C&I in the documents of the Earth Summit

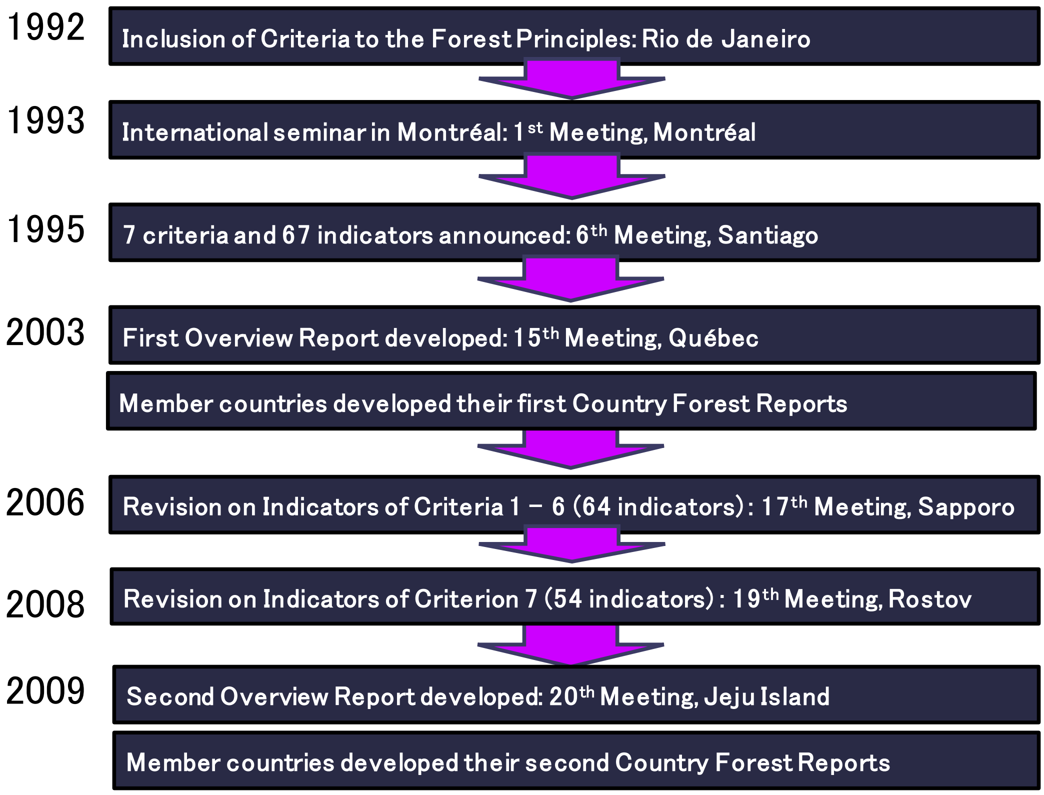
Forest Principles 8. (d) Sustainable forest management and use should be carried out in accordance with national development policies and priorities and on the basis of environmentally sound national guidelines. In the formulation of such guidelines, account should be taken, as appropriate and if applicable, of relevant internationally agreed methodologies and criteria.

Agenda 21 11.22 (b) Formulating scientifically sound criteria and guidelines for the management, conservation and sustainable development of all types of forests;

Sources: "Forest Principles", "Agenda 21"

After the intensive deliberations of fifteen months, a set of seven criteria and 67 indicators was adopted by ten countries at the 6th meeting of the Working Group held in Santiago, Chile in 1995. Those countries are Australia, Canada, Chile, China, Japan, Republic of Korea, Mexico, New Zealand, Russia and the United States of America. Japan has been proactively participated in the Montreal Process from its inauguration through the close collaboration between the Forestry Agency, Forestry and Forest Product Research Institute and the Environment Agency(FFPRI). The contribution of Japan at this stage was demonstrated by the success of the 5th meeting of the Working Group held in Tokyo in 1994, by which the road was paved to the agreement in Santiago by clearing outstanding issues.

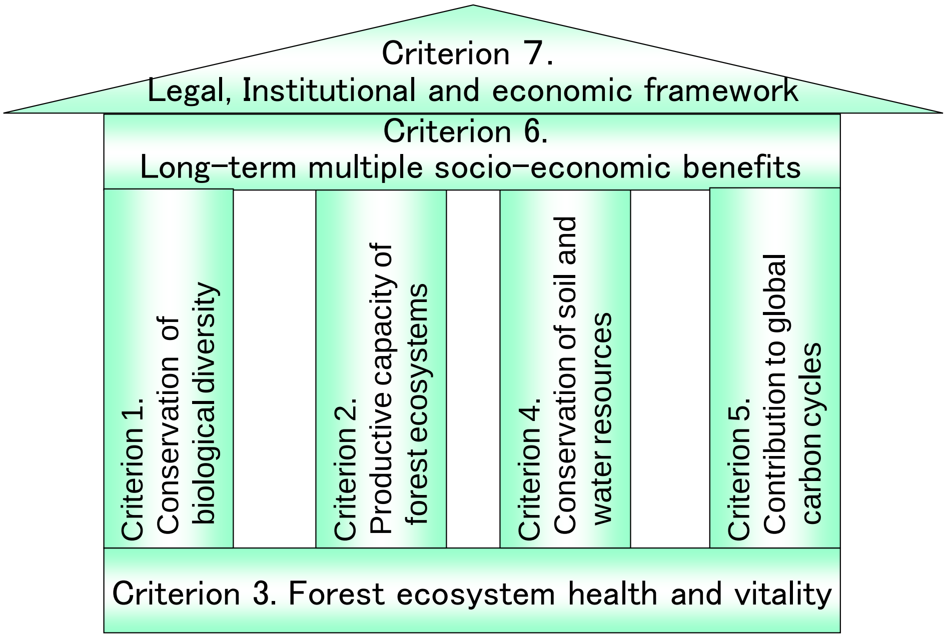
Figure 14: Progress and achievements of the Montreal Process



Sources: Forestry Agency

Criteria represent the aspects of forests, such as the major functions and values of forests, from which the sustainability of forest management is to be monitored, assessed and reported. Criteria can be viewed, in this regards, as a list of major components of sustainable forest management. Indicators, on the other hand, are specific items along which data or information are collected to describe the state of the respective functions or values represented by each criterion. As the economic indices, such as GDP growth, unemployment rate and price indices, indicators help countries monitor the conditions of their forests with respect to a range of forest functions and values.

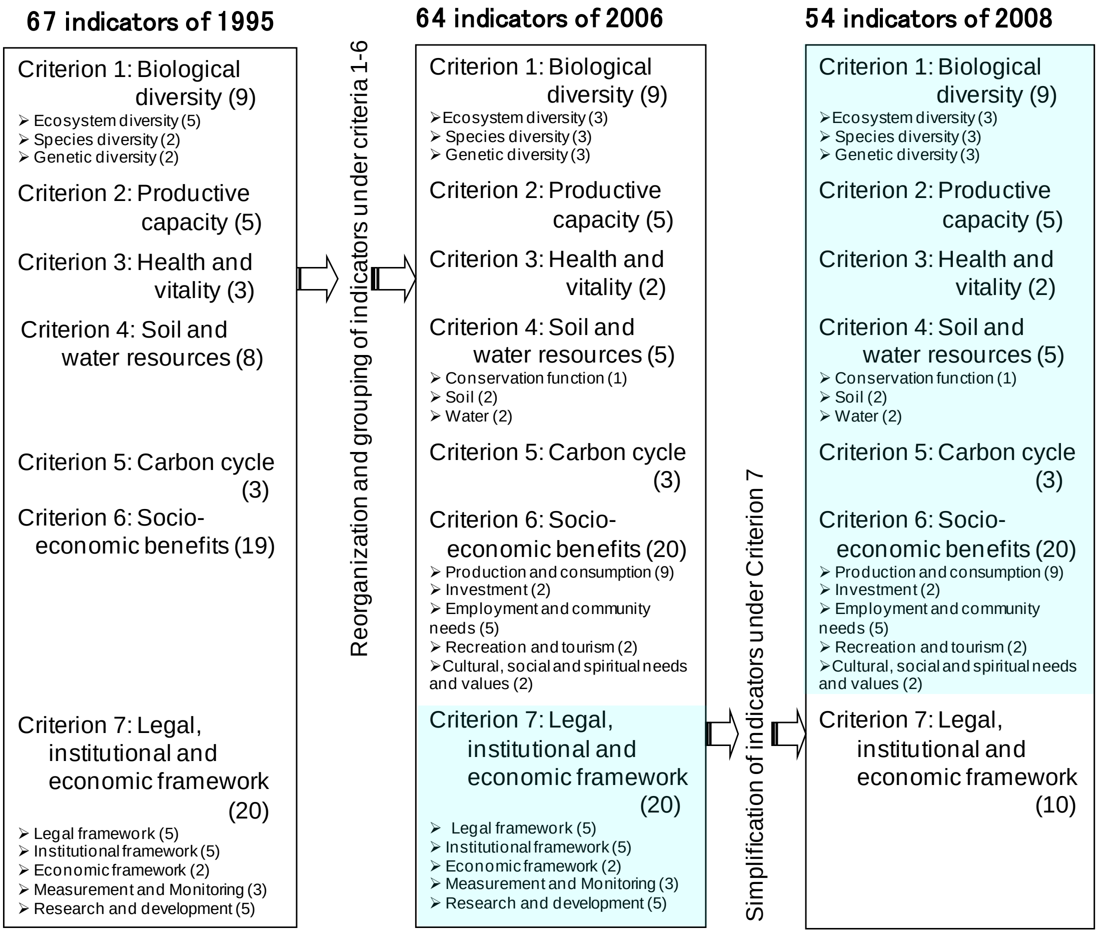
Figure 15: Conceptual structure of the Montreal Process criteria



Sources: Goto (2000)

With the participation of Argentina and Uruguay, the Montreal Process moved into the application process in 1995 for monitoring, assessing and reporting on their forest management. The first overview report of the whole Montreal Process, as well as the country reports of the respective member countries, were produced in 2003 and presented on the occasion of the XII World Forestry Congress held in Quebec City, Canada. Based on the experiences gained through the application, the Montreal Process proceeded to the review of its 67 indicators in 2004. This review process was completed in 2009 and the revised 54 indicators were adopted at the 19th meeting of the Working Group held in Rostov, Russia.

Figure 16: Change in Montreal Process indicators



Sources: Forestry Agency

For the purpose of facilitating the activities of the Montreal Process, a liaison office was set up within the Canadian Forest Service at its inauguration and subsequently moved to the Forestry Agency, Japan in 2007. A variety of services, including the coordination for the preparation and following up of the meetings and updating of the website, are provided by the liaison office. In 1996, an expert group called the Technical Advisory Committee (TAC) was established in order to provide the Working Group with advices on technical matters, such as the definitions of terms and technical notes for indicators. The duties of the TAC convener had been assumed by the US Forest Service since its establishment and succeeded by New Zealand in 2005.

A UNFF meeting

International Cooperation Office

Trends in International Debates on Forests

One of the major achievements of the Earth Summit was the launch of the concept of sustainable forest management, which has provided a the subsequent international debates on forests, as well as the policy formulation and management practices at national, local and field levels with a guiding principles. The controversial issue of the international arrangement on forests, which resulted in the adoption of the Forest Principles at the Earth Summit, has been carried over to a series of succeeding forums at the United Nations, namely the Intergovernmental Panel on Forests (IPF), the Intergovernmental Forum on Forests (IFF) and the United Nations Forum on Forests (UNFF). After the careful consideration, UNFF adopted at its 7th session held in 2007 the Non-legally Binding Instrument on All Types of Forests (NLBI) and decided to further pursue the issue at its 11th session to be held in 2015.

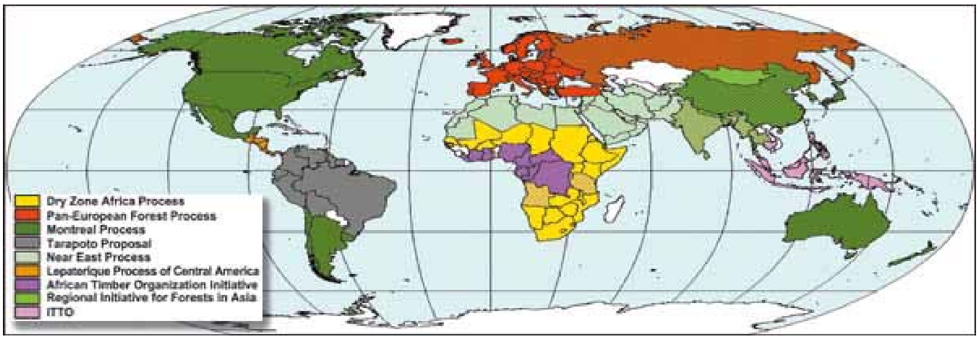
Figure 17: Flow of deliberations on forests at United Nations

1992	**Earth Summit (UNCED): Forest Principles and Agenda 21 adopted**
1995	**Commission on Sustainable Development (CSD): Decision on establishing Intergovernmental Panel on Forests (IPF)**
1995 - 1997	IPF: Proposals for Action adopted
1997	UNGASS Rio +5: Decision on establishing Intergovernmental Forum on Forests (IFF)
1997 - 2000	IFF: Proposals for Action adopted
2000	ECOSOC: Decision on establishing Forum on Forests (UNFF)
2001 -	United Nations Forum on Forests

Sources: Forestry Agency

These intergovernmental deliberations at the UN have also produced a range of useful proposals for practical actions to be taken by countries and the international community as a whole. The development and application of criteria and indicators is one of those measures which have been well recognized and encouraged internationally. Today, nine processes, including the Montreal Process, exist in the world, and about 150 countries are participating at least in one of these processes. The Montreal Process has provided them with a good model as one of the pioneering initiatives since its establishment.

Figure 18: Coverage of nine C&I processes



Sources: FAO Website

Although no clear definition of sustainable forest management exists, a common understanding of sustainable forest management has evolved and shared through the international collaborative works within and among those processes. At an international conferences held in Guatemala City in 2003, following seven common thematic areas were identified in the criteria and indicators of these processes: (1) extent of forest resources; (2) biological diversity; (3) health and vitality; (4) productive functions; (5) protective functions; (6) socio-economic functions and (7) legal, policy and institutional framework. The seven thematic areas are now reflected to a variety of activities and actions, such as the forest certification schemes and FAO's Forest Resources Assessment (FRA).

Figure 19: Outline of FRA2010 of the FAO

Chapter 1	Introduction
Chapter 2	Extent of forest resources
Chapter 3	Biological diversity
Chapter 4	Forest health and vitality
Chapter 5	Productive functions of forest resources
Chapter 6	Protective functions of forest resources
Chapter 7	Socio-economic functions
Chapter 8	Progress towards sustainable forest management
Chapter 9	Conclusions

Sources: FAO. Global Forest Resources Assessment 2005

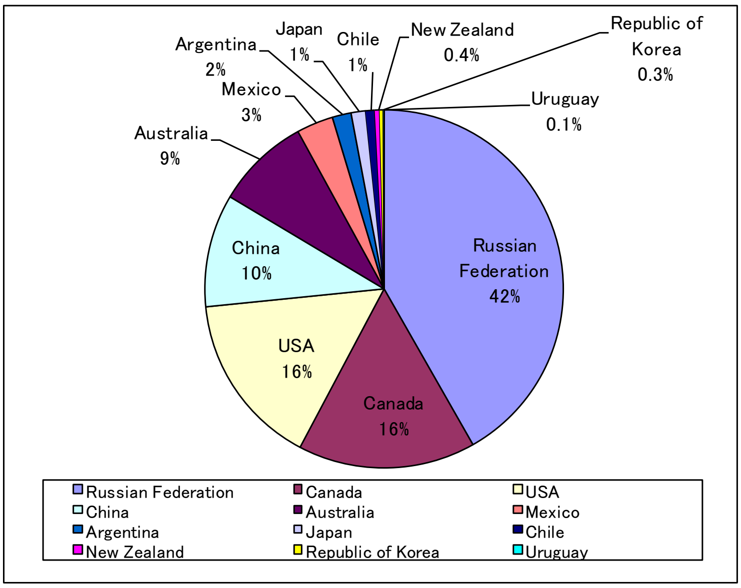
One of the most notable achievements in the tackle to the global environment issues is the delivery of the three Rio Conventions, namely the UN Framework Convention on Climate Change (UNFCCC), the Convention on Biological Diversity (CBD) and the UN Convention to Combat Desertification (UNCCD). Forests have always been a subjects in the deliberation under these conventions, particularly under the UNFCCC since the Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD) was put on the agenda of the 13th Conference of Parties (COP13) held in Bali, Indonesia in 2007. It has been increasingly recognized in the global forest community that the concept of sustainable forest management should be incorporated further into the strategies for the respective global environment issues.

Achievements and a Way Forward

Field trip at the Working Group meeting in Russia

Forests of the twelve member countries of the Montreal Process together cover approximately 80% of the temperate and boreal forests and 50% of all types of forests in the world. Besides, the twelve countries are home to 30% of the world's population and 40% of the world's wood production. Taking those facts into consideration, the individual and collective actions taken by the member countries of the Montreal Process for the achievement of sustainable forest management will certainly have a significant impact on the global economy and environment and, in consequence, the well-being of the present and future generations of the world.

Figure 20: Coverage of forests of the Montreal Process countries



Sources: FAO. Global Forest Resources Assessment 2005

At its 19th meeting held in Moscow and Rostov, Russia in 2008, the Working Group of the Montreal Process decided to produce its second report, as well as the country reports of the respective member countries, in 2009. The report, titled "A Vital Process for Addressing Global Forest Challenges" focuses how the countries have been benefitted from the Montreal Process in tackling the four global issues, namely climate change, biodiversity, bioenergy and water. One of the most notable findings obtained through the drafting work was the identification of (1) a common framework for monitoring, assessing and reporting, (2) a common understanding of sustainable forest management, (3) a common ground for collaborative actions and (4) a forum and networks for knowledge exchange as what have been built up through the Montreal Process.

After the collaboration for fifteen years since its inauguration in 1994, the member countries now share a view that the Montreal process should open up a new horizon for the further pursuit of the sustainable forest management of temperate and boreal forests and all types of forests. The Working Group agreed at its 20th meeting held in Jeju-do, Korea in 2009 to take new challenges, such as the exploration of approaches to identify and monitor forest degradation and the development of means for visualizing the full range of information collected along the indicators. The Montreal Process will keep adding new pages to its history through the close collaboration of the twelve member countries.

Guiding Principles for Drafting the 2nd Country Report

The Working Group decided at its 19th meeting that the indicators to be reported in the 2nd country report are the revised ones for Criteria 1-6 and the original ones for Criterion 7 because some member countries had already started the reporting process by November, 2008 when the revision of the indicators under Criterion 7 was completed. As the result, the number of indicators reported in this country report is 64 all together.

The reporting work, including the collection of data and information, as well as the drafting, was carried out on the principle that the report follows the aim of each indicator as closely as possible. It should be noted, in this connection, that the rationales included in the Technical Notes of the Montreal Process are repeated as “Rationale” of this report with the aim of guiding the readers in interpreting the nature of indicators properly.

The “Current State and Trend” section of this report is drafted in a way for quantitative indicators that the most recent measurements are presented first then the long-term trends are described. The background factors behind the current state and/or trend are also included as much as possible, as well as the guiding information as needed. For qualitative indicators, the report focuses on the selected activities or simple cases in order to help readers grasp the gist.

CRITERION 1

CONSERVATION OF BIOLOGICAL DIVERSITY

Forests, and particularly native forests, support a substantial proportion of the planet's biological diversity and terrestrial species. Biological diversity enables an ecosystem to respond to external influences, to recover after disturbance, and to maintain essential ecological processes.

Human activities and natural processes can impact adversely on biological diversity by altering and fragmenting habitats, introducing invasive species, or reducing the population or ranges of species. Conserving the diversity of organisms and their habitats supports forest ecosystems and their ability to function, reproduce, and remain productive.

1.1 ECOSYSTEM DIVERSITY

Maintenance of the variety and quality of forest ecosystems is necessary for the conservation of species. Without sufficient habitat size, adequate connectivity, necessary structural diversity and appropriate protection and management measures, species may decline and become vulnerable to extinction.

These indicators provide information on the area and extent of ecosystem types, forest area under formal protection and the effects of fragmentation.

INDICATOR 1.1.a

Area and percent of forest by forest ecosystem types, successional stage, age class and forest ownership or tenure

Rationale

This indicator provides information on the area and extent of forest ecosystem types, including successional[1] stage, age class[2] and the nature of tenure or ownership. The sustainability and stability of forest ecosystems may depend on their size and diversity. If these are not maintained, forests may become vulnerable habitat degradation and loss. Tenures or ownership types may have a variety of management regimes associated with them – each with a different impact on biological diversity

Current State and Trend

(Forest area)

The total area of Japan's forests is approximately 25 million ha, which corresponds to about two-third of the total land area. The coverage of forests has been maintained for more than a half century presumably by the efforts of the people, including forest owners and relevant public entities, coupled by the warm and wet climate as well as the steep terrains hindering the conversion of forest to other uses.

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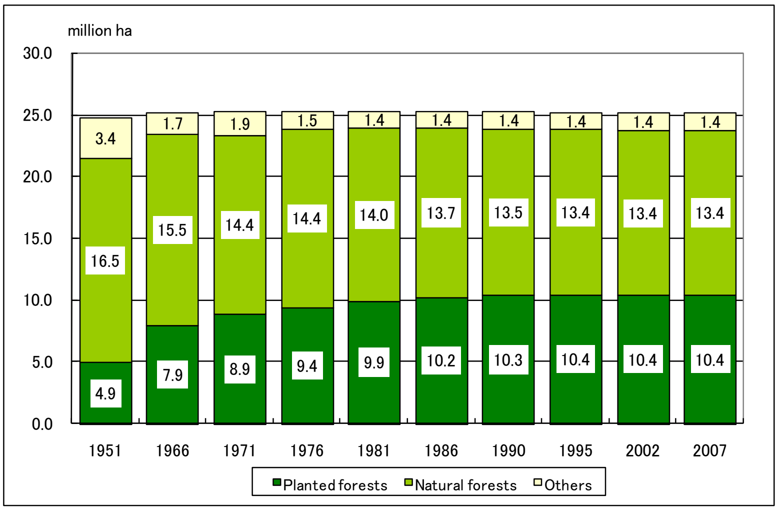
[1] ***Successional stage*** is the phase of the natural process observed in the vegetation, normally starting from bare land to matured forest.

[2] ***Age class*** is the grouped ages of stands by five years. The ages of 1-5 years are classified as the 1st age class, counting the year of plantation in the case of planted forests, the ages of 6-10 years are classified as the 2nd age class, and so on.

Figure 21: Change in forest area of Japan



Sources: Forestry Agency. State of Forest Resources

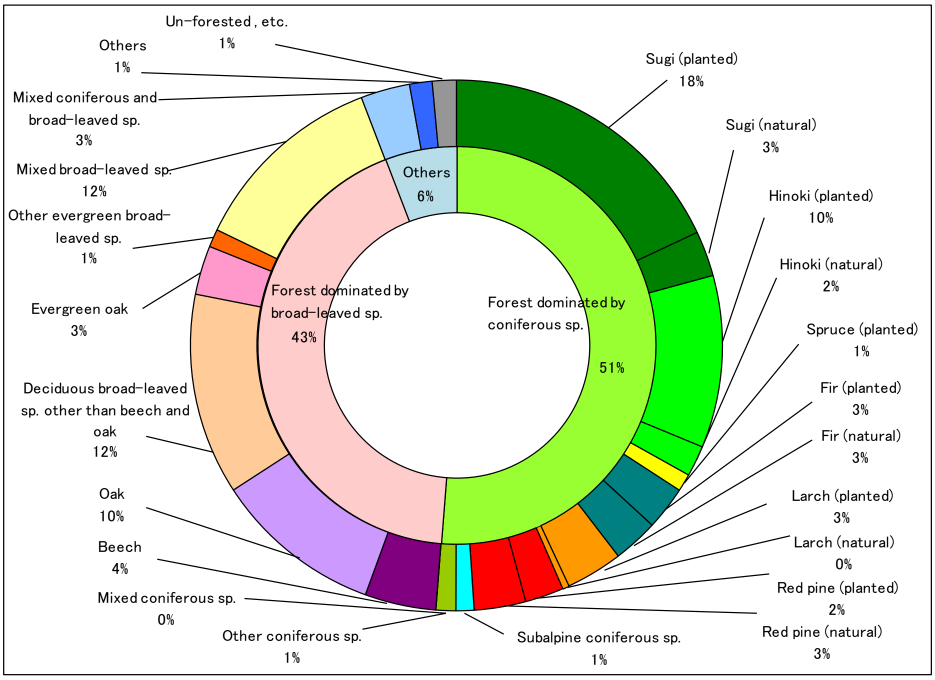
(Forest ecosystem types)

The major forest ecosystem types found in Japan are "Sugi (*Cryptomeria japonica*) plantation" and "mixed broad-leaved forest" and "forest dominated by deciduous broad-leaved tree species" each of which occupies 18%, 12% and 12% of the total forest area respectively. They are followed by "Hinoki (*Chamaecyparis obtusa*) plantation" and "Oak forest", both of which account for 10% respectively. All forest types dominated by broad-leaved species account for 42% of the total forest area.

Both distribution and share of the forest ecosystem types have been assumedly stable since 1980's when the expansion of planted forest settled down.

Forest ecosystem types are classified in this report by the dominating tree species, which is defined here as those occupying more than 30% of the total basal area, based on the results of the Forest Resource Monitoring Survey.

Figure 22: Composition of forest ecosystem types of Japan

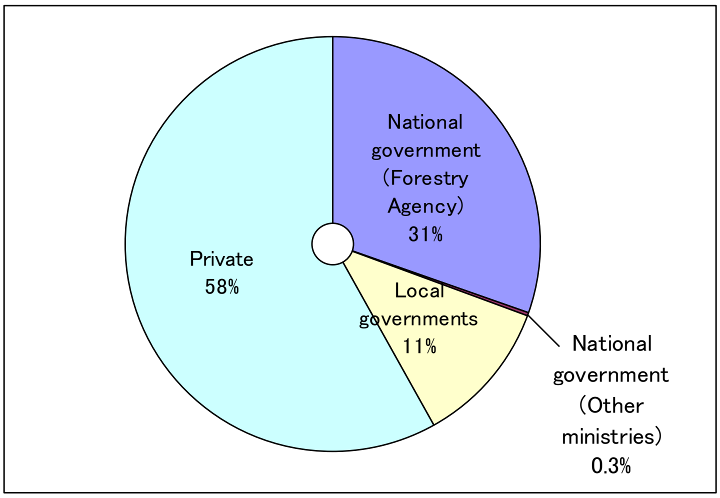


Sources: Forestry Agency. Forest Resource Monitoring Survey

(Forest ownership patterns)

In Japan, approximately 42% of forests are publicly owned and 58% are privately owned. About 73% of the publicly owned forests belong to the national government and the remaining 27% belong to the local public entities, including prefectural and municipal governments and the district properties[3]. The national forests alone occupy approximately 31% of the total forest area of Japan. The share of forest ownerships in Japan has not dramatically changed since the end of the 19th Century when the land ownership patterns established.

Figure 23: Composition of forest ownership in Japan



Sources: Forestry Agency. State of Forest Resources

[3] ***District properties*** are one of the special local public entities established under the Local Autonomy Act in order to take over the forests owned by the consolidated municipality.

INDICATOR 1.1.b

Area and percent of forest in protected areas by forest ecosystem type, and by age class or successional stage

Rationale

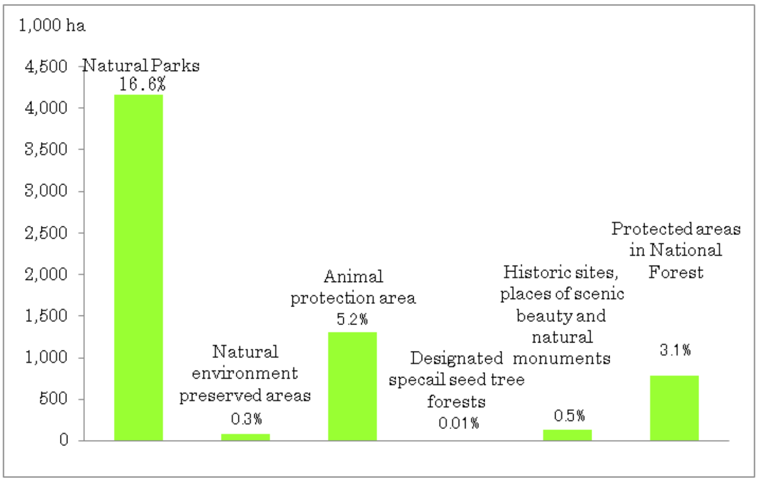
This indicator provides information on the area and extent of forest by ecosystem type, age class or successional stage protected to safeguard biological diversity and representative examples of forest ecosystem types. This indicator will also help identify forest types of conservation value that are in need of protection. The formal protection given to forests is a reflection of the importance society places on their conservation.

Current State and Trend

(Forest area in protected areas)

Forests which are protected primarily for the conservation of ecosystems in Japan include forests in the natural parks, wildlife sanctuaries and protected forests in the national forests, which occupy approximately 17%, 5% and 3% of the total forest area respectively. The area of forests in the protected areas has been increasing in recent years mainly due to the expansion of the protected forests in the national forests.

Figure 24: Area and percentage of major forests protected for the conservation of ecosystems as of 2007

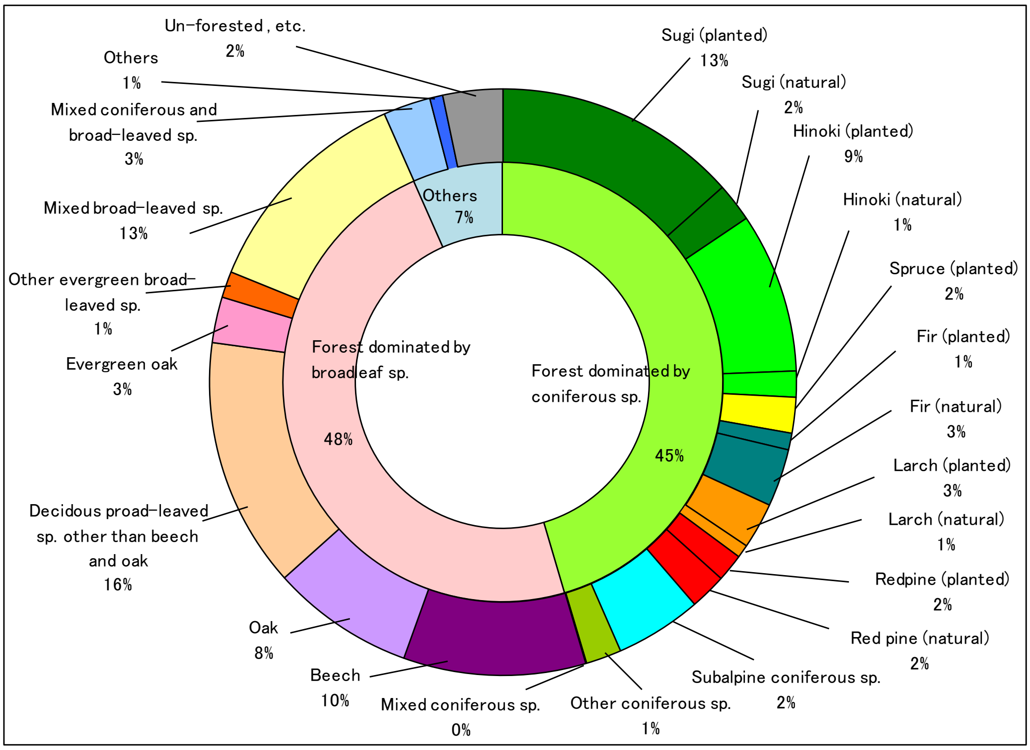


Sources: Forestry Agency

(Forest ecosystem types in protected areas)

Forests protected for the ecosystem conservation are characterized by the larger share of "Beech (*Fagus crenata*) forest" and "Mixed subalpine coniferous forests" compared with the whole forests of Japan. Because many unique and vulnerable ecosystems and species are found in forests categorized in these forest ecosystem types, about 37% of "Beech forest" and 69% of "Mixed subalpine coniferous forest" are located in those protected forests.

Figure 25: Composition of forest ecosystem types in protected areas

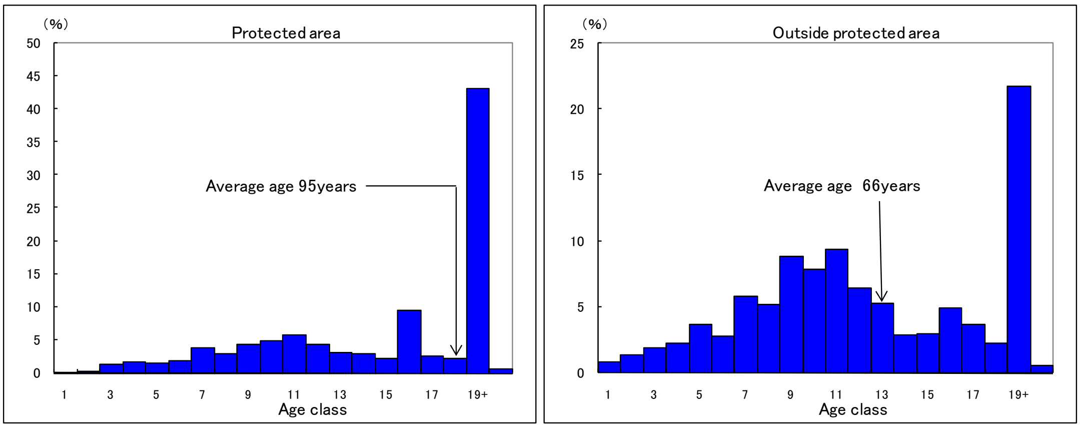


Sources: Forestry Agency. Forest Resource Monitoring Survey

(Age class distribution of forests in protected areas)

The average age of forests distributed in those protected forests is higher than that of other forests. In particular, the average age of natural forests in the protected areas, which have higher conservation values, is 95 years, and much higher than 6 years of the natural forests outside those protected areas.

Figure 26: Average age and age class distribution of natural forests in and out of protected areas



Sources: Forestry Agency. Forest Resource Monitoring Survey

INDICATOR 1.1.c

Fragmentation of forests

Rationale

This indicator provides information on the extent to which forests are being fragmented over time by human activities and other processes. Fragmentation may lead to the isolation and loss of species and gene pools, degraded habitat quality and a reduction in the forest's ability to sustain the natural processes necessary to maintain ecosystem health.

Current State and Trend

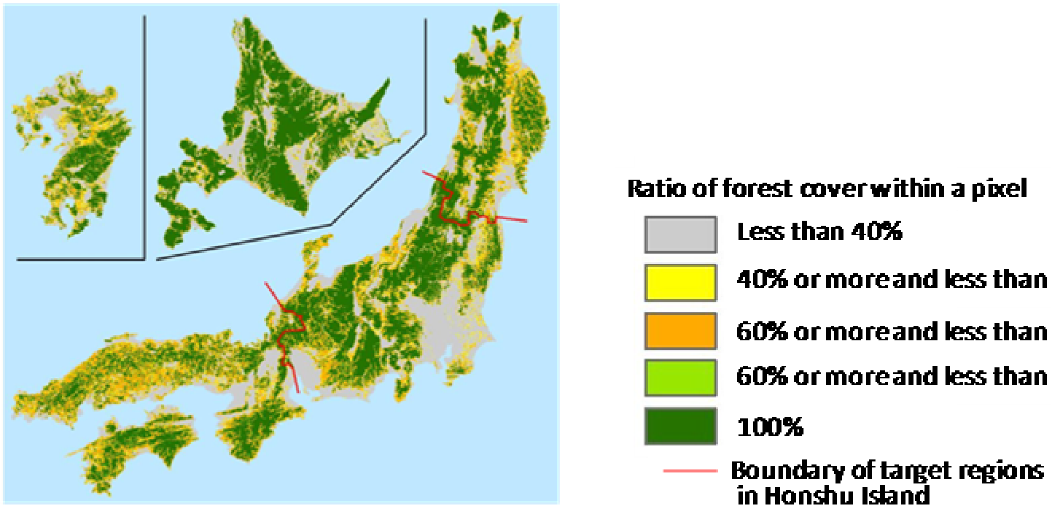
A series of maps derived from the Maps attached to Basic Land Use Plan[4] indicates that less fragmented forests are located along central ridges of the islands surrounded by more fragmented forests resulted from other land uses, such as agriculture and urbanization. Geographically, the extent of forest fragmentation is lower in the areas of Hokkaido, Tohoku, and Chubu and higher in the areas of Kansai, Chugoku and Kyusyu.

The maps were produced in a way that the whole area of Japan is divided into square blocks, called "pixels", which are colored according to the respective rate of forest cover. As the size of pixel increases, the rate of forest cover generally decreases because neighboring other land uses are to be included in pixels. In other words, if forests are less fragmented, the higher rate of forest cover maintains even the size of pixel increases.

---

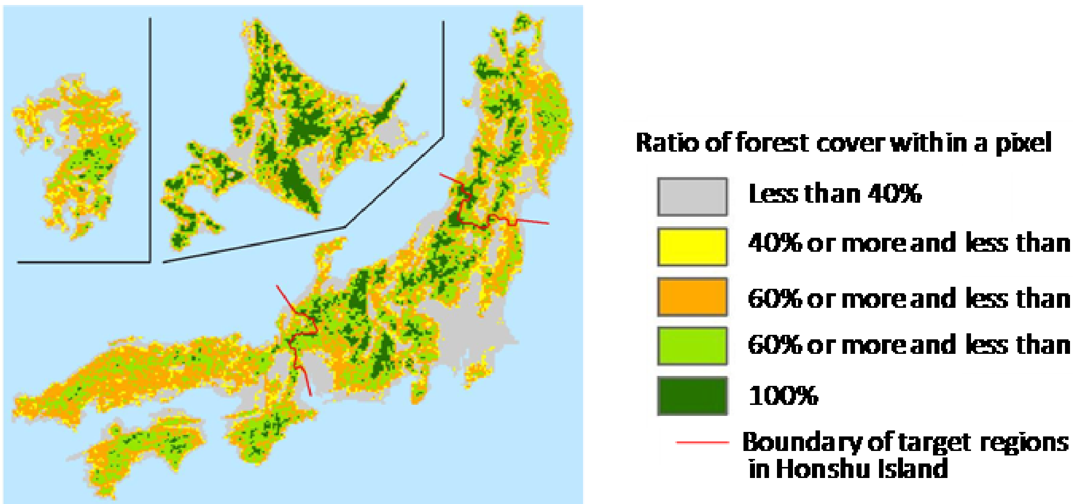
[4] ***Maps attached to the Basic Land Use Plan*** are maps produced by the prefectural governments in accordance with the National Land Use Planning Act, which illustrate the boundaries of the five land use areas, namely urban area, agriculture area, forest area, natural park area and natural conservation area, on the one-to-five-thousand maps.

Figure 27: Distribution of forest cover rate in 500 x 500 meter pixels



Sources: Forestry Agency. Report on the data analysis of forest resources survey

Figure 28: Distribution of forest cover rate in 4,000 x 4,000 meter pixels



Sources: Forestry Agency .Report on the data analysis of forest resources survey

1.2 SPECIES DIVERSITY

The greatest and most readily recognisable aspect of biological diversity is the variety of species and their population levels. A key objective for the conservation of biological diversity is slowing down the rate of population decline, and species depletion and extinction due to human factors. Changes in species population levels and distribution may also provide an early warning of changes in ecosystem stability and resilience, as will increases in the number of invasive, exotic forest-associated species.

INDICATOR 1.2.a

Number of native forest-associated species

Rationale

This indicator provides information on the health of forest ecosystems through the number of native forest-associated species[5]. Knowledge of the number of native forest- associated species highlights the importance of certain forest types in meeting conservation objectives and in understanding the relationships species have within ecosystems. The loss or addition of species in an ecosystem can provide valuable insights into the overall health and productivity of the system.

Current State and Trend

About a half of the 88 hundred species of the vascular plants[6] found in Japan are considered forest-associated based on the findings of the Forest Resource Monitoring Survey conducted during 2004-2008. As for the animals, 133 species of mammals, 214 species of birds, 74 species of reptiles and 50 species of amphibians are regarded as forest-associated as well according to the literature concerned. Information on other animal and plant species is currently limited.

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[5] ***Native forest-associated species*** are species living in close association with forests in a variety of aspects, including habitats, food, nesting and breeding, among those which originally have habitats in Japan.

[6] ***Vascular plants*** are the group of plants which have an organ known as a vascular bundle. Vascular plants, which include seed plants and ferns, are considered as a higher form compared to those which lack vascular bundle, such as bacteria, algae and moss plants.

Table 1: Forest-dependent species found in Japan

Category		Number of known species in Japan	Number of forest–associated species	Notes
Plants	Tracheophytes	about 8,800	about 4,000	Based on the Forest Monitoring Survey
	Other plant species	about 25,400	–	
	Total	about 34,200	–	
Animals	Mammals	185	133	Based on the related documents
	Birds	417	214	
	Reptiles	97	74	
	Amphibians	64	50	

Sources: Forestry Agency. Report on the data analysis of forest resources survey

INDICATOR 1.2.b

Number and status of native forest-associated species at risk, as determined by legislation or scientific assessment

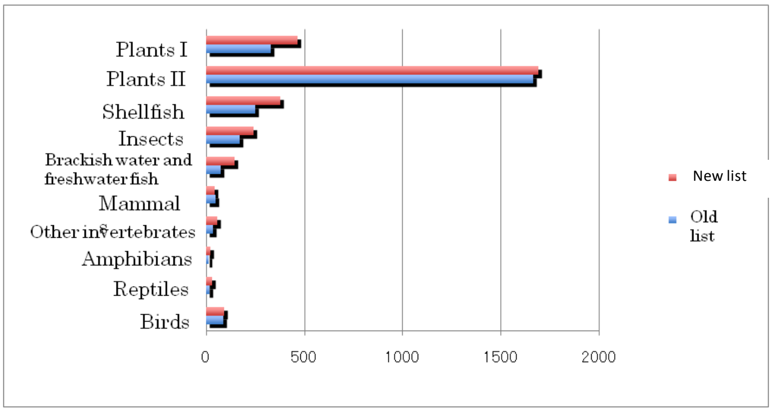
Rationale

This indicator provides information on the number and status of forest-associated species at risk or in serious decline. As a result, these species may require specific action or intervention to ensure their survival. The number of species at risk and their status is a measure of the health of forest ecosystem and their ability to support species diversity.

Current State and Trend

The number of endangered species[7] has increased in all categories except for mammals, according to the Red Lists[8] of 1997 and 2006 published by the Ministry of Environment. Although some of those endangered species are not forest-associated, many of plants and mammals are normally regarded as forest dependant.

Figure 29: Change in number of species on Red List of Japan



Sources: Ministry of Environment. Red List

[7] ***Endangered species*** are those categorized as the species in danger of extinction in the wild in the near future. Other categories include extinct, extinct in the wild and near threatened.

[8] ***Red List*** is a list of endangered species produced and published by a variety of organizations, including the International Union for Conservation of Nature (IUCN), Ministry of Environment, prefectural governments, Nature Conservation Society of Japan (NACS-J) and WWF Japan.

More than 300 tracheophytes species found on the Red List have appeared in the monitoring spots of the Forest Monitoring Survey. It is highly expected that the changes in the number and geological distribution of these endangered tracheophytes species will be identified through the Monitoring Survey.

Table 2: Number of endangered Tracheophytes species identified in the Forest Monitoring Survey

Category	1st Round Survey	2nd Round Survey
Critically Endangered	43	29
Endangered	114	65
Vulnerable	176	167
Near Threatened	41	78
Data Deficient	6	1
Total	374	340

Sources: Forestry Agency. Report on the data analysis of forest resources survey

INDICATOR 1.2.c

Status of *in situ* and *ex situ* efforts focused on conservation of species diversity

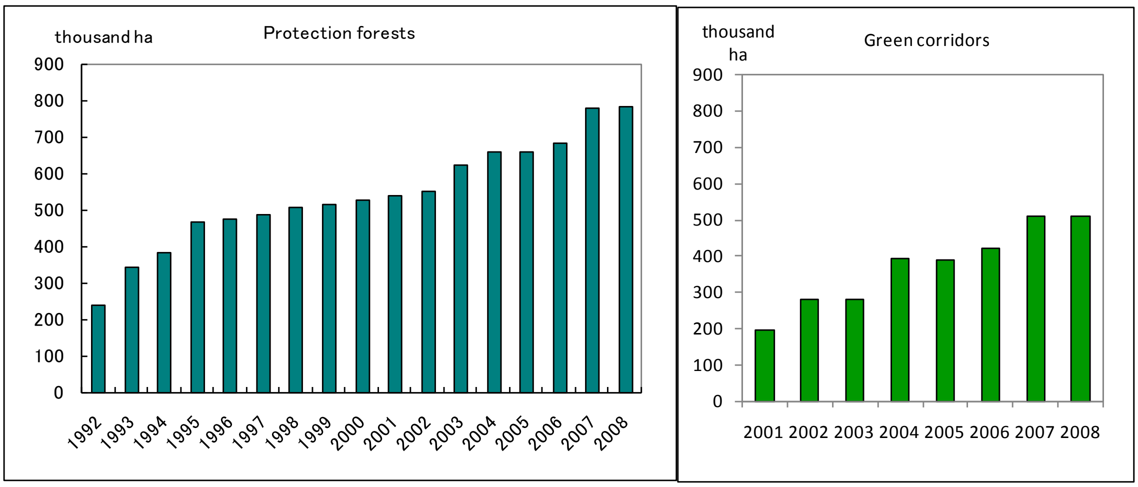
Rationale

This indicator provides information that describes *in situ*[9] and *ex situ*[10] efforts to conserve species diversity. Some forest species and habitats may have declined to such an extent that intervention is required to safeguard them for the future.

Current State and Trend

Currently, about 780 thousand ha of national forests, which account for 3 % of the total forest area of Japan, are protected for the conservation of biological diversity. The Forestry Agency has constantly expanded the protected forests and “Green corridors” in order to sustain unique native forest ecosystems, fauna and flora, habitats of endangered species and diverse genetic resources of tree species distributed in national forests.

Figure 30: Change in area of protected forests and Green Corridors in national forests



Sources: Forestry Agency

9 ***In situ*** means “within habitats”
10 ***Ex situ*** means “out of habitats”

The Green Corridors are allocated mainly along central ridges connecting protected forests with the aim of facilitating the interactions among populations of wildlife by bridging their habitats.

Figure 31: Distribution of Green Corridors in national forests

Sources: Forestry Agency

In addition to the expansion of protected forests, the National Forest Service has also carried out variety of projects to protect the endangered species through the population monitoring and habitat conservation and improvement.

A collaboration projects, so called “Alkaya Project”, in which the Regional and District Forest Offices work together with the local community and a conservation group for the protection of biological diversity and the sustainable community development, has been under way.

Box1: Akaya Project

“AKAYA Project” is a collaboration project among the Nature Conservation Society of Japan, local communities and the Kanto Regional Forest Office of National Forest Service, to sustain both biological diversity and stakeholder participation in “AKAYA Forest” of 10 thousand hectares located between Gunma and Niigata prefectures.

In the project, a variety of research and educational activities for biodiversity conservation are being carried out. The outcomes are reflected in the formulation of national forest management plan.

1.3 GENETIC DIVERSITY

Genetic diversity, or the variation of genes within populations and species, is the ultimate source of Biological Diversity at all levels and is important for the functioning of healthy forest ecosystems. Threats to gene pools come from climate change, catastrophic events, and human activities and pressures.

Loss of genetic variation reduces the ability of species to adapt to environmental change and for society to maximise the potential benefits available from forest species, for example for medicines and other bio-resources. High levels of genetic diversity within populations are usually a measure of their greater potential for survival. The loss of genetic variation within species also makes forest ecosystems less resilient to change.

INDICATOR 1.3.a

Number and geographic distribution of forest-associated species at risk of losing genetic variation and locally adapted genotypes

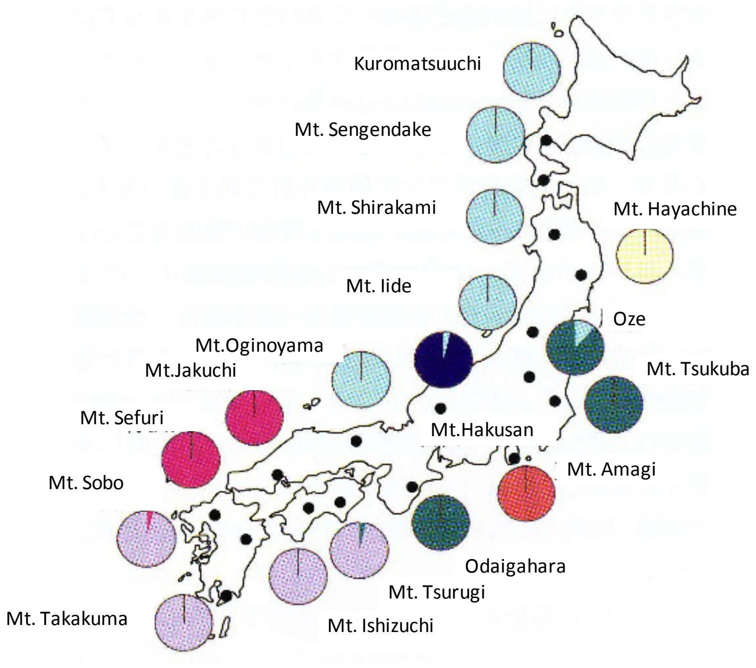
Rationale

This indicator provides information on the number and distribution of forest-associated species at risk of losing genetic variation across their population. This erosion in genetic variation makes species less able to adapt to environmental change and more vulnerable to extinction. Some local populations with unique gene pools may also risk being swamped by large populations introduced intentionally, by accident, or by natural processes.

Current State and Trend

The study on mitochondrion DNA indicates that Japanese beech, which is one of the major native species representing natural forests of Japan, maintains a wide range of genetic diversity across its population.

Figure 32: Variation of mitochondrion DNA of Japanese beech



Sources: Tsumura (2008)

Quite few studies have been conducted on the status or loss of genetic diversity of tree species in Japan, and much yet remains yet to be found. Researches on the local genetic variation, on the other hand, are now being carried out for some widely distributed tree species. Through the Forest Resource Monitoring Survey, information of some tracheophytes species appearing in the fixed plots has been compiled, as well. More information on the extent of genetic diversity and the changes in the distribution of forest- associated species is expected to be obtained through those the continuation of those researches and the Survey.

INDICATOR 1.3.b

Population levels of selected representative forest species to describe genetic diversity

Rationale

This indicator provides information on the population status of forest-associated species that are considered to reflect the genetic diversity present in forest ecosystems. Some forest species support or rely on particular forest structure, patterns, associations and processes and can therefore be used to describe the status of genetic diversity in forests as a whole.

Current State and Trend

Information enough to identify the representative forest species reflecting the genetic diversity in forest ecosystems is not currently available in Japan. Further studies are required to illustrate the state of genetic diversity in forests, as described also under Indicator 1.3.a.

INDICATOR 1.3.c

Status of *in situ* and *ex situ* efforts focused on conservation of genetic diversity

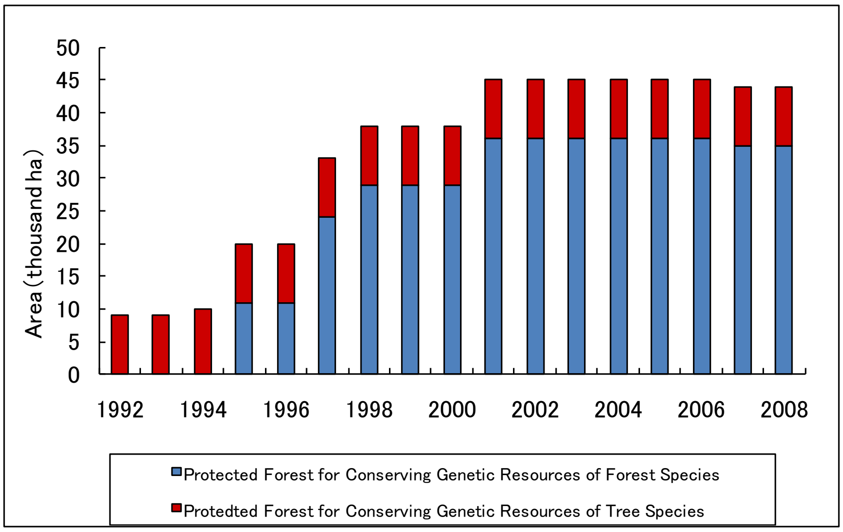
Rationale

This indicator provides information that describes *in situ* and *ex situ* efforts to conserve genetic diversity within species. Some species have suffered from a loss of genetic variability due to population decline and a reduction in their former range and distribution. Continued loss of genetic variability will threaten the viability of these species and may accelerate a decline that may lead ultimately to extinction.

Current State and Trend

Approximately 44 thousand ha of national forests are protected particularly for conserving genetic diversity of forest-associated species, including tree species. Two types of protected forests, namely "Protected Forest for Conserving Genetic Resources of Forest Species" and "Protected Forest for Conserving Genetic Resources of Tree Species", are included in this category. The former, which are to protect all species composing forest ecosystems, are distributed in 12 locations, occupying about 35 thousand ha in total. The latter, which are to conserve genetic resources of major commercial tree species and rare tree species, are distributed in 325 locations, occupying about 9 thousand ha in total.

Figure 33: Change in area of protected forest for conserving genetic resources



Sources: Forestry Agency

Regarding the *ex situ* conservation activities, Forest Tree Breeding Center (FTBC) under the Forestry and Forest Products Research Institute (FFPRI) has been conducting the collection and storage of organisms and seeds of endangered tree species and designated monumental gigantic and landmark trees at risk. The FTBC is also engaged in the development of “Gene Conservation Forest” which is generated from seeds collected from the high quality stands.

CRITERION 2

MAINTENANCE OF PRODUCTIVE CAPACITY OF FOREST ECOSYSTEMS

Many communities depend on forests directly or indirectly for a wide range of forest-based goods and services. The sustainable provision of these services is clearly linked to the productive capacity of the forest. If this capacity is exceeded there is the risk of ecosystem decline and collapse.

For forests to be sustainable it is necessary to understand the levels at which goods and services may be extracted or used without undermining the functioning of forest ecosystems and processes. The nature of goods and services provided by forests change over time due to social and economic trends, and technological developments. Change in the productive capacity of forests may be a signal of unsound forest management practices or other agents that are affecting forest ecosystems in some way.

INDICATOR 2.a

Area and percent of forest land and net area of forestland available for wood production

Rationale

This indicator measures the availability of forestland for wood production compared with the total forest area of a country. It provides information that will help assess the capacity of forests to produce wood to meet society's needs.

Current state and Trend

About 99 % of the total forest area of Japan is basically available for wood production. The total area of forests precluded from wood production is approximately 340 thousand ha, which include some protection forests[11], where logging operations are totally prohibited not to hinder the functions of forest ecosystems considerably, as well as the forests located within the Wilderness Conservation Areas[12] and Special Mother Tree Forests[13], in which logging operations are legally prohibited in principle.

Besides those banned forests, logging operations are regally restricted in the 52 % of Japan's forests, in which legal procedure, such as advanced government permit[14], is required for logging operations. Other protection forests where logging operations are not prohibited and the forests within natural parks are in this category. For other forests, notification[15] to the relevant government office is required for logging.

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11 Refer to page X for the ***Protection forests***.

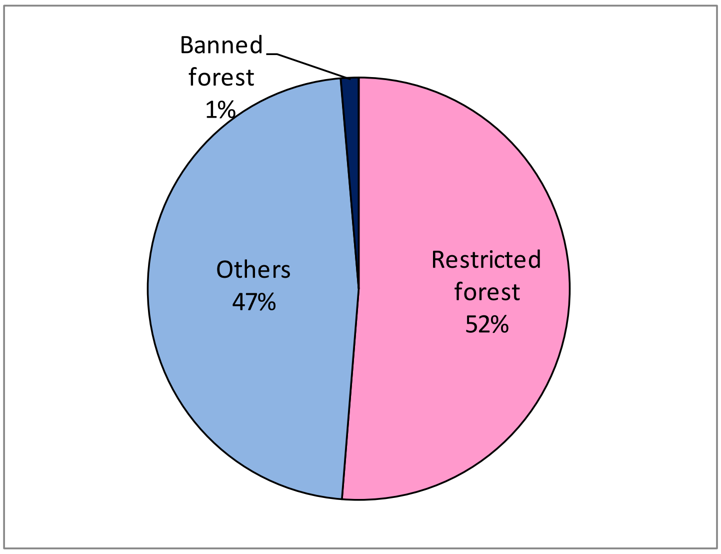
12 ***Wilderness Conservation Area*** is the designated area to be preserved under the Wilderness Conservation Act for its well maintained original natural environment without any human disturbances. Logging operations are totally prohibited within the area.

13 ***Special Mother Tree Forest*** is a designated group of trees recommended under the Forestry Seeds and Seedlings Act for the collection of good seeds and seedlings.

14 ***Advanced government permit*** is required for logging in the protection forests and the forests within the special areas of wilderness conservation and natural parks.

15 ***Notification*** is required for logging operation and plantation on logged over forests.

Figure 34: Composition of forests by extent of legal protection



Sources: Forestry Agency

INDICATOR 2.b

Total growing stock and annual increment of both merchantable and non-merchantable tree species in forests available for wood production

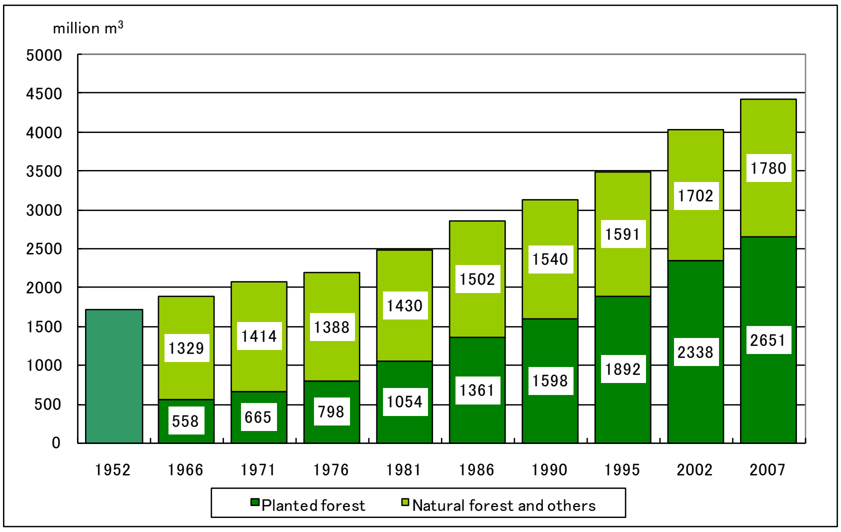
Rationale

This indicator measures the growing stock[16] and annual increment of forest area available for wood production to meet society's needs. The annual increment and growing stock can be related to the volume harvested each year to provide a means to demonstrate the sustainable management of forest resources.

Current state and trend

The total growing stock of Japan's forests in 2007 is approximately 4.7 billion m^3 and its annual increment is 80 million m^3. Planted forests occupy about 60% of the total growing stock and 80 % of the annual increment. Both the total growing stock and total annual increment have constantly increased since the 1960's owing to the rapidly growing planted forests normally composed of merchantable tree species[17].

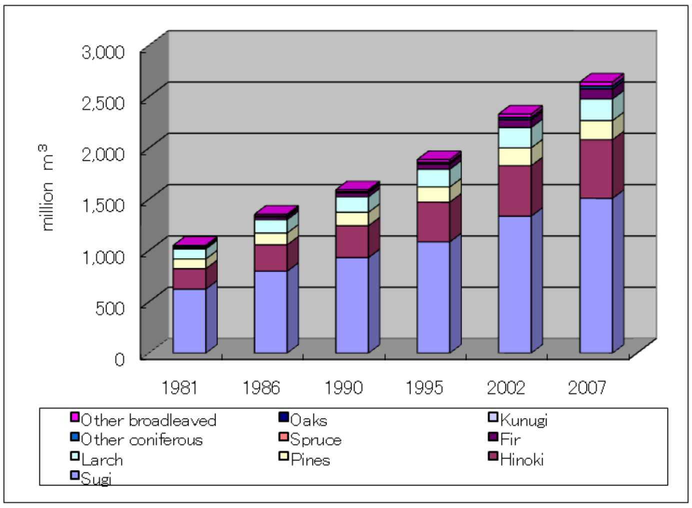
Figure 35: Change in growing stock and annual increment of Japan's forests



Sources: Forestry Agency. State of Forest Resources

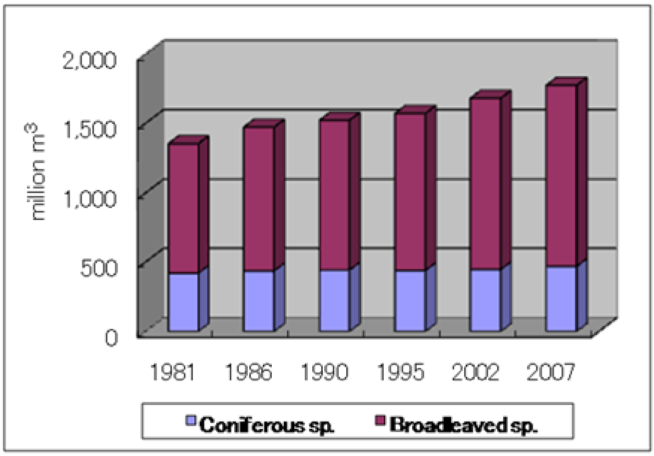
[16] ***Growing stock*** is the volume of the stem of standing trees in forests.
[17] ***Merchantable tree species*** are those from which merchantable goods, such as timber, wood chips and fuel wood, can be produced. Most of the tree species found in the planted forests in Japan are regarded as merchantable tree species.

Figure 36: Change in growing stock of planted forests



Sources: Forestry Agency. State of Forest Resources

Figure 37: Change in growing stock of natural forests

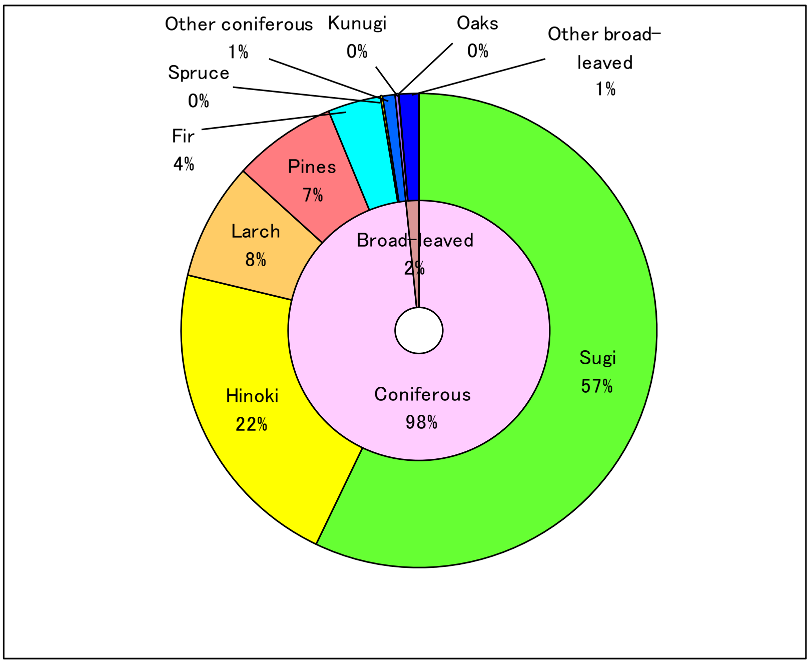


Sources: Forestry Agency. State of Forest Resources

Among planted species, Sugi holds the highest and Hinoki follows both in growing stock and in annual increment of planted forests. Both Sugi and Hinoki are popular tree species of Japan which have long history of tree breeding[18] and plantation. For natural forests, on the other hand, broadleaved species occupies about 70 % and coniferous species occupies about 30% both in the growing stock and in the annual increment.

[18] ***Tree breeding*** is an activity to improve the genetic features of trees, such as the growth and damage resistance.

Figure 38: Composition of species in growing stock of planted forests



Sources: Forestry Agency. State of Forest Resources

INDICATOR 2.c

Area, percent and growing stock of plantations of native and exotic species

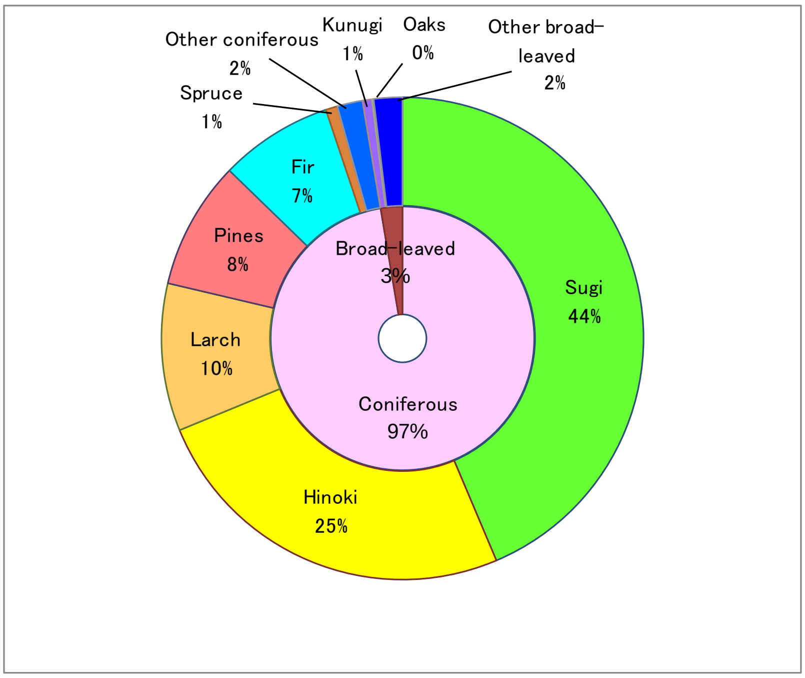
Rationale

This indicator provides information on the nature and extent of plantation forests. Changes in the area of plantation reflect society's present and future needs or the impact of competing land use on forest cover. The use of both native and exotic plantation species may enhance the range and quantity of goods and services available.

Current State and Trend

Planted forests cover approximately 10 million ha in Japan, accounting for 40 % of its total forest area. Regarding the species composition, Sugi holds the highest, occupying 43 % and followed by Hinoki and Larch, occupying 24 % and 10 % respectively. The major plantation species found in Japan are all native species.

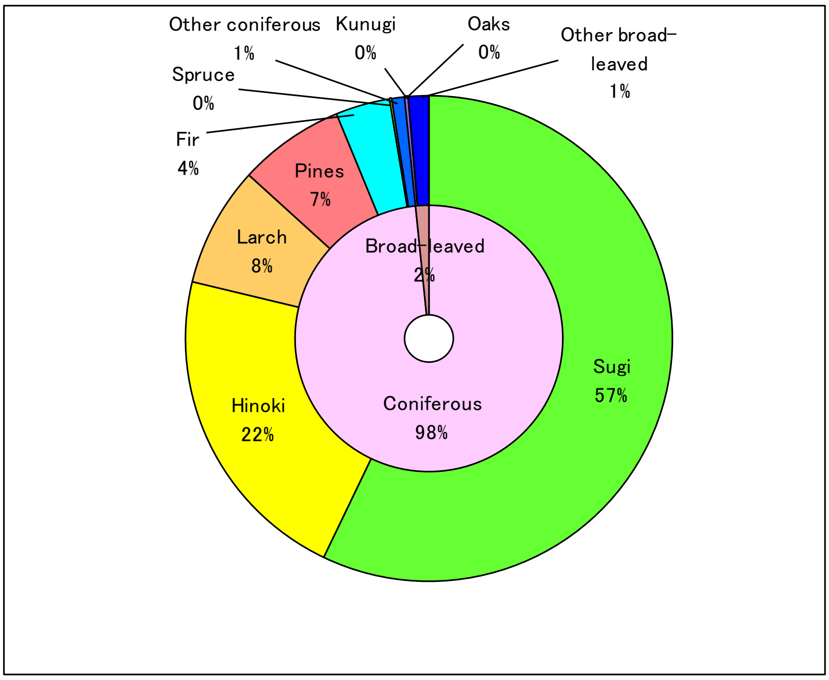
Figure 39: Composition of species in area of Japan's planted forests



Sources: Forestry Agency. State of Forest Resources

The growing stock of the planted forests in 2007 is approximately 2.9 billion m^3, accounting for about 60 % of the total growing stock of Japan. Sugi occupies 57 %, then Hinoki and Larch (*Larix leptolepis*) occupy 22 % and 8 % respectively.

Figure 40: Composition of species in growing Stock of planted forests

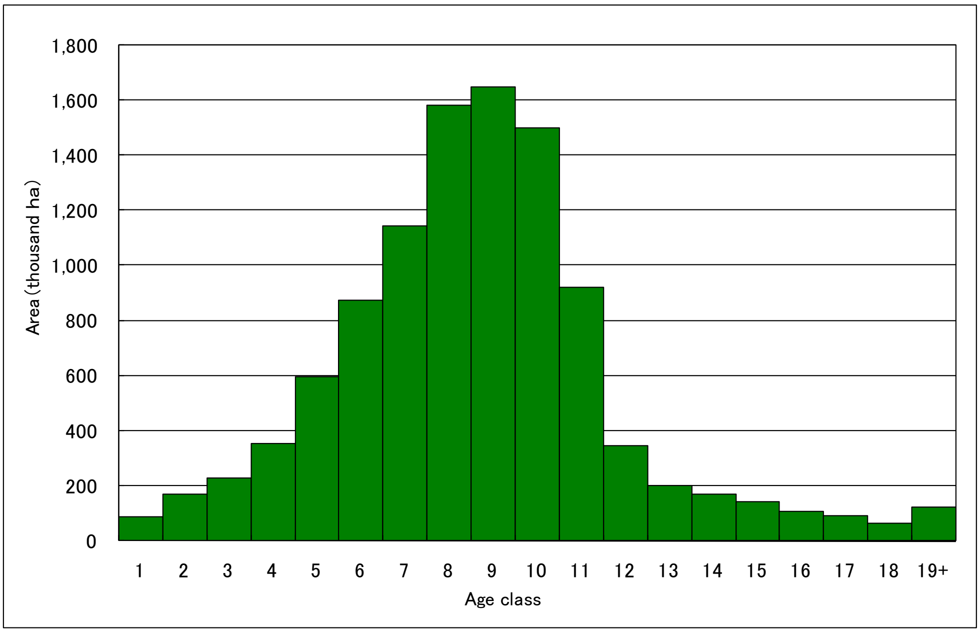


Sources: Forestry Agency. State of Forest Resources

In Japan, both area and growing stock of the planted forests of exotic species, such as European Spruce (*Picea abies*) and Strove Pine (*Pinus strobus*) is very limited due to their relatively poor performance in the field. The popularity of Sugi in the planted forests, on the other hand, is attributed to the historically developed suitable varieties and nursery techniques, as well as its original adaptability to the climate and soil of Japan.

The majority of the planted forests of Japan were established during the late 1950's through early 1960's when the consumption of wood, including construction timber and pulp wood, was increasing under the rapidly growing economy. The major part of the planted forests, therefore, still remains in a development stage which requires periodic care, such as thinning.

Figure 41: Age class distribution of Japan's planted forests



Sources: Forestry Agency. State of Forest Resources

INDICATOR 2.d

Annual harvest of wood products by volume and as a percentage of net growth or sustained yield

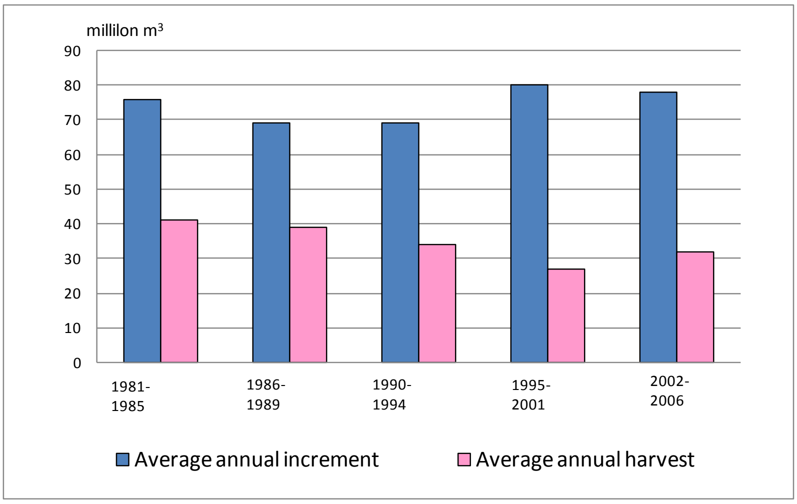
Rationale

This indicator compares actual harvest levels against what is deemed to be sustainable. The purpose is to assess whether forests are being harvested beyond their ability to renew themselves or are being under-utilised for wood products.

Current State and Trend

The average annual increment of the total growing stock of Japan's forests in the last 25 years stays around 70-80 million m³ whereas the total volume of annual harvest for the same period remains around 30-40 million m³. As a result, the growing stock of Japan's forests, particularly that of planted forests, has constantly increased, as shown in Figure X provided for Indicator 2.b.

Figure 42: Change in average annual increment and harvested volume



Sources: Forestry Agency

Such long term trend is mainly due to the higher percentage of younger planted forests which do not much contribute to the volume of harvest but the annual increment of the growing stock. The constant decline in the profitability of timber production due to the falling timber price and rising labor cost further brought the downward trend in the volume of harvest throughout the 1980's and 1990's. The upturn in the harvested volume in recent years is attributed to the increase in the volume of thinning as a result of the concerted efforts of forest owners, forest-related industries and the national and local governments.

INDICATOR 2.e

Annual harvest of non-wood forest products

Rationale

This indicator reports on the sustainability of the harvest of non-wood forest products. The well being of indigenous and other communities dependent on non-wood forest products may be closely allied to the forest's ability to maintain its productive capacity over time.

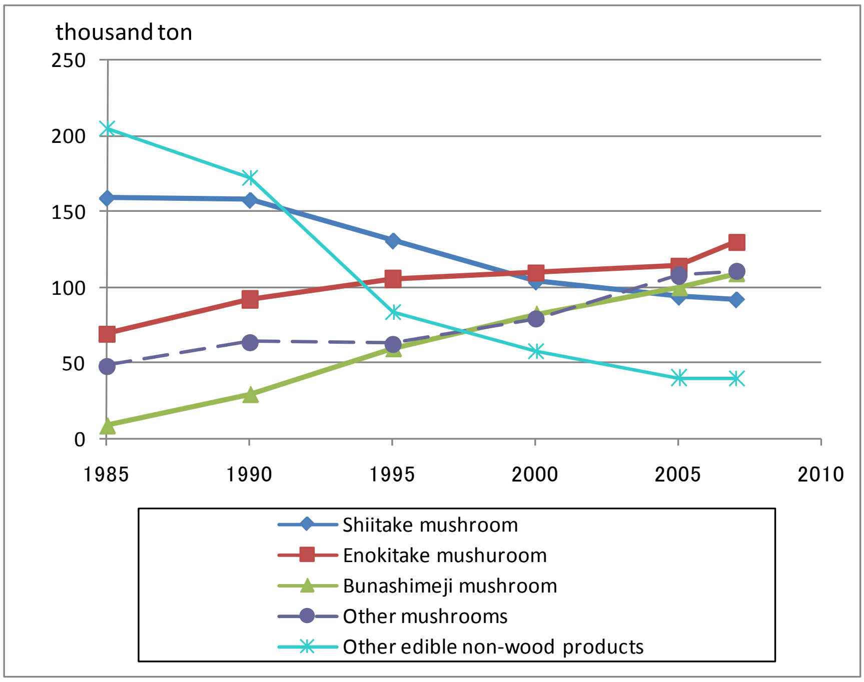
Current State and Trend

A wide variety of edible wild plants, mushrooms and nuts have been collected in forests by the people living of local communities in Japan. Because much of those non-wood forest products are collected for their own consumption or for limited distribution, no reliable statistics are available.

Responding to the diversified needs of consumers, various non-wood forest products are now cultivated and marketed by community based cooperatives and enterprises, which contribute to the household of community dwellers and local economy.

Among those commercialized non-wood forest products, edible mushrooms hold the majority of the production volume. In the category of "others", bamboo shoots and chestnuts are decreasing, whereas horse radish maintains its volume.

Figure 43: Change in volume of production of non-wood forest products



Sources: Forestry Agency

Box2: Edible Wild Plants in Japan

More than two thousand species of wild plans have been consumed in Japan in a variety of forms, such as boiled, deep-fried or preserved. Popular edible wild plants include young shoots of certain ferns, such as bracken fern and roval fern and young sprouts of trees and plants, such as angelica trees.

CRITERION 3

MAINTENANCE OF FOREST ECOSYSTEM HEALTH AND VITALITY

The maintenance of forest health and vitality is dependent upon the ability of the ecosystem's functions and processes to recover from or adapt to disturbances. While many disturbance and stress events are natural components of forest ecosystems, some may overwhelm ecosystem functions, fundamentally altering their patterns and processes and reducing ecological function.

Decline in forest ecosystem health and vitality may have significant economic and ecological consequences for society including a loss of forest benefits and the degradation of environmental quality.

Information gained on the impacts of biotic and abiotic processes and agents may inform management strategies to minimise and mitigate risk. The maintenance of forest ecosystem health and vitality is the foundation of sustainable forest management.

INDICATOR 3.a

Areas and percent of forest affected by biotic processes and agents (e.g. insects, disease, invasive alien species) beyond reference conditions

Rationale

This indicator identifies the impact that biotic processes and agents have on forests. Where change due to these agents and processes occurs beyond a critical threshold, forest ecosystem health and vitality may be significantly altered and a forest's ability to recover could be reduced or lost. Monitoring and measuring the effects of these processes provides information helpful in the formulation of management strategies to mitigate risk.

Current State and Trend

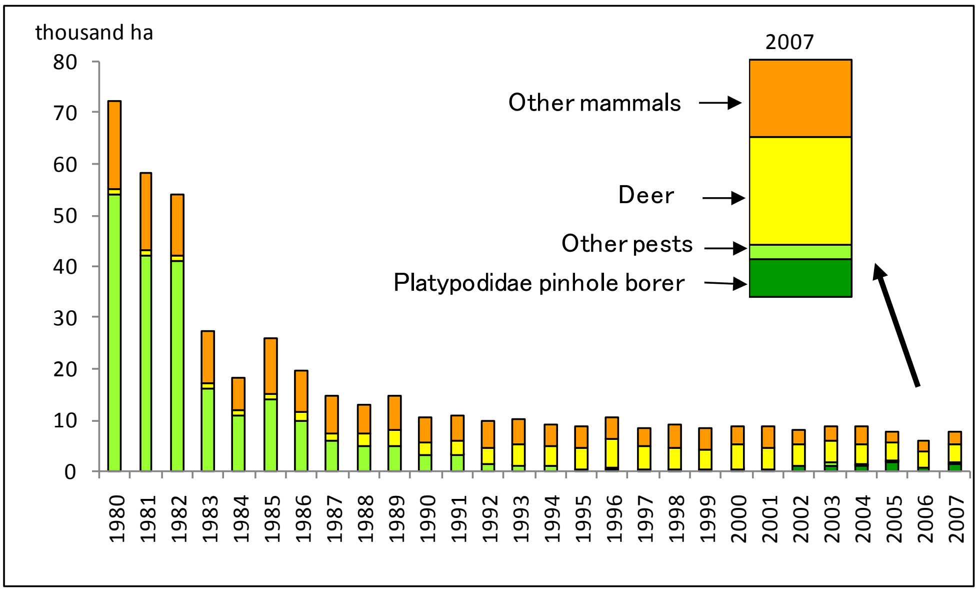
In Japan, biotic damages on forests largely decreased in the 1980's. The damages caused by deer (*Cervus nippon*), on the other hand, started to increase in the late 1980's. The damages caused by Platypodidae pinhole borer (*Platypus quercivorus*), which commonly known as "oak withering disease", is also increasing in recent years.

Among a variety of biotic damages, pine beetle syndrome[19] has caused the most significant damages to Japan's forests. The volume of damaged trees recorded the highest of about 2.4 million m^3 in 1979 after a sharp increase in 1978. Although the damage has declined since then, it is still found in 45 prefectures excluding Hokkaido and Aomori Prefecture.

The pine beetle syndrome is a highly infectious tree disease caused by exotic pine wood nematodes (*Bursaphelenchus xylophilus*). The symptom was first found in 1905 and subsequently spread out nationwide. The discovery of its infection process consequently led to the enactment of a legislation in 1977, by which an institutional arrangement for a prompt and strategic aerial chemical control was introduced. These measures have successfully kept the damage to the level around one-fourth of the peak.

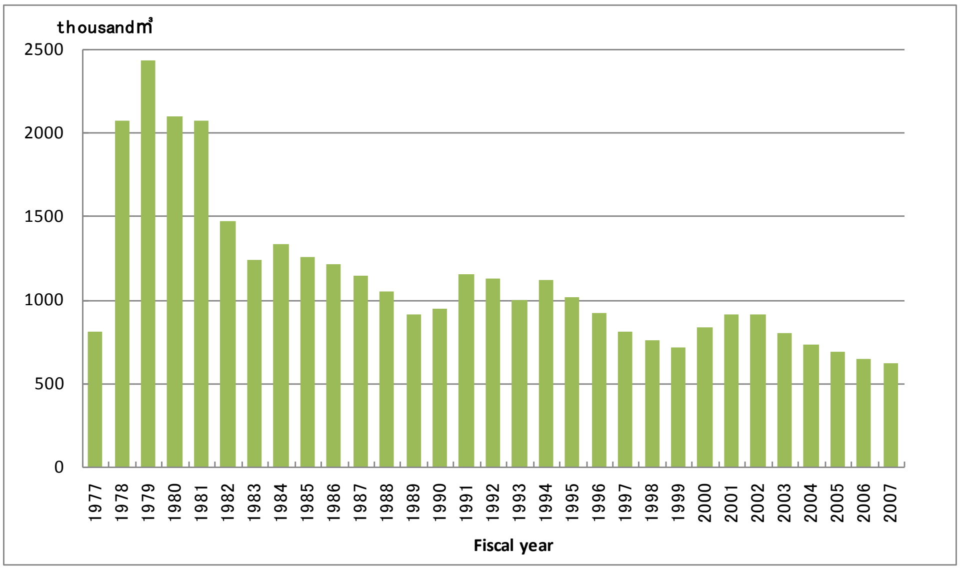
[19] ***Pine beetle syndrome*** is a physiological lesion, which may result in weakening and withering of pine trees, caused by pine wood nematodes carried by spotted pine long-horn beetles (*Monochamus alternatus*).

Figure 44: Change in area of biotic damages



Sources: Forestry Agency. Statistics on forest and forestry

Figure 45: Change in volume damaged by pine beetle syndrome



Sources: Forestry Agency. Statistics of forest and forestry, etc.

The damage on forests caused by deer started to rise in the late 1980's. Recently, around 4 thousand hectares of forests are damaged every year by deer, occupying about 60% of the total of damaged area by wild animals and birds. Young shoots of planted seedlings and bark of matured trees are mainly eaten by deer.

The rise in the damaged area is assumingly due to the increase in the population of deer and the expansion of its distribution partly resulted from the decline in the number of hunters.

INDICATOR 3.b

Area and percent of forest affected by abiotic agents (e.g. fire, storm, land clearance) beyond reference conditions

Reference

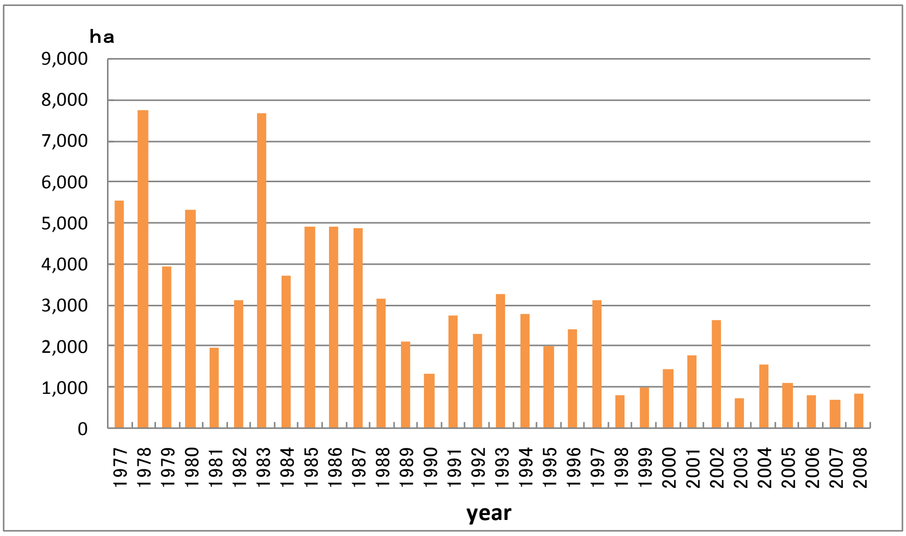
This indicator identifies the impact that abiotic agents, both natural and human-induced, have on forests. Where change occurs due to these agents and processes beyond a critical threshold, forest ecosystem health and vitality may be significantly altered and a forest's ability to recover from disturbance could be reduced or lost. Monitoring and measuring the extent of forest affected by physical agents provides information to guide the formulation of management strategies to mitigate risk.

Current State and Trend

The area of forests burnt by forest fire in Japan has shown downward trend since the 1970's. In consequence, the annual damage has declined from the level exceeding 10 thousand ha in the 1960's to the level lower than 2 thousand ha in recent years.

The causes of forest fires in Japan are mostly human-induced, such as the careless handling of bonfire and cigarettes. The declining trend of forest fire damages is a result of the awareness raising activities, including forest patrolling and nationwide campaign for forest fire prevention, institutional development for early warning and control and the encouragement of aerial fire-fighting operations with a use of helicopters.

Figure 46: Area of forests burnt by forest fires



Sources: Fire and Disaster Management Agency

CRITERION 4

PROTECTIVE FUNCTION

Soil and water underpin forest ecosystem productivity and functions. Forest ecosystems play an important role in the regulation of surface and groundwater flow and, together with associated aquatic ecosystems and clean water, they are essential to the quality of human life.

The interaction of soil, water and topography influence the character and health of streams and rivers flowing through and from forests. Monitoring change in the chemical, physical, and biological characteristics of soil, water and aquatic systems provides valuable information to support sustainable forest management.

Forest management activities can significantly alter forest soils, water quality and associated aquatic habitats. Inappropriate management may result in soil compaction, the loss of the soil A horizon, loss of riparian buffering capacity, increased sediment loads in streams, degradation and destruction of aquatic habitats and altered flow regimes. Change in water flow can also create an increased risk of flooding or the complete desiccation of streams. Both have harmful implications for human safety, property, and economies.

Soil and water resources may be protected through the allocation of land for that purpose or through appropriate management regimes and best management practices.

4.1 PROTECTIVE FUNCTION

Healthy and productive forests depend on the maintenance of the soil and water resource. Forests also regulate these resources by moderating the flow of water, controlling erosion and preventing catastrophic events such as flooding, avalanches and mudslides.

INDICATOR 4.1.a

Area and percent of forest whose designation or land management focus is the protection of soil or water resources

Rationale

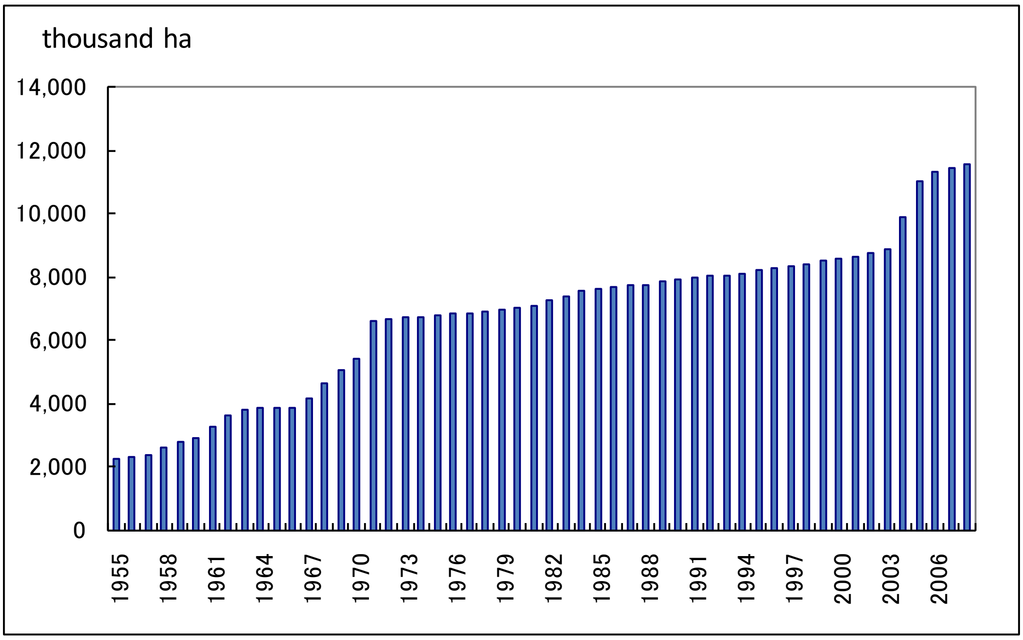
The area and percent of forest designated or managed primarily for the protection and regulation of soil and water reflects the importance of these resources to society, including the trade-offs made between other uses.

Current State and Trend

Currently, 1.2 million ha of forests, which account for 46 % of the total area of Japan's forests, are designated as the protection forest for the conservation of soil and water resources. The area of these protection forests has constantly increased since their establishment in 1897.

Protection forests are designated by the Minister for Agriculture, Forestry and Fisheries or the governors of respective prefectures in accordance with the Forest Act with a primary objective of securing environmental services provided by forests and consequently the life and property of the people. As a consequence of the repeated disasters partly resulted from the devastated forest land caused by the over-harvest during the war and post war periods, designation and restoration of protection forests was expedited from 1954 under a series of 10 year plans. In the early 2000's, the area of protection forests further expanded, in particular in national forests, in response to the enactment of the Forests and Forestry Basic Act under the rise of public concern about the multiple functions of forests.

Figure 47: Change in area of protection forests designated primarily for protecting soil and water resources



Sources: Forestry Agency

Table 3: Categories of protection forests

Category No1	Headwater conservation
2	Soil conservation
3	Erosion control
4	Shifting sand control
5	Windbreak
6	Flood control
7	Tide damage prevention
8	Drought prevention
9	Snow damage prevention
10	Mist mitigation
11	Avalanche prevention
12	Stone crumbling prevention
13	Firebreak
14	Fish trap
15	Navigation target
16	Public health provision
17	Historical and scenic site conservation

Sources: Forest Act

4.2 SOIL

Forest soils support forest productivity and other ecological and hydrological functions through their ability to hold and supply water and nutrients, store organic matter and provide habitats for plant roots and for a wide range of soil organisms. Not maintaining the soil resource may result in a decline and degradation in forest health and the provision of other environmental services.

INDICATOR 4.2.a

Proportion of forest management activities that meet best management practices or other relevant legislation to protect soil resources

Rationale

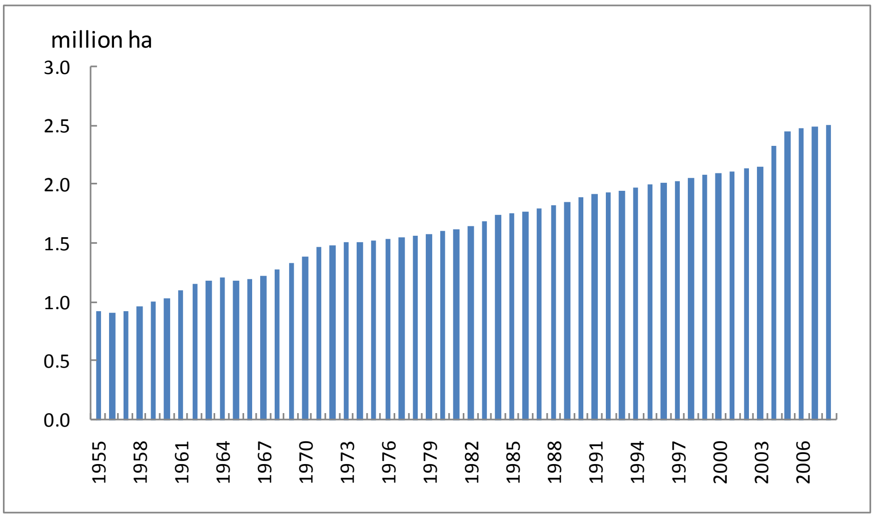
This indicator provides information about the extent to which soil resource protection, legislation and best management practices have been identified and integrated into forest management activities. Inappropriate activity may result in the loss of soil nutrients, forest productivity and other ecosystem services that soils provide.

Current State and Trend

Approximately 3 million ha of forests are managed primarily for the protection of soil resource currently under the scheme of protection forests. For the protection forest, restrictions on logging operation are imposed according to the objectives of designation. A technical guideline is also provided for the effective and efficient implementation of the forest conservation program[20] which is carried out for the restoration of devastated forests and forest land .

[20] ***Forest conservation program*** is a government program to carry out a variety of works, including forest improvement and construction works, with an objective of improving the conservation functions of forests. It is implemented mainly for the protection forests.

Figure 48: Change in area of protection forests designated for protecting soil resource



Sources: Forestry Agency

For about 43 % of the privately owned forests and forests owned by local public entities, forest management plans are currently established by forest owners and approved by the relevant local or national governments. Upon the approval of each management plan, key elements of management practices, such as rotation age, yield and regeneration scheme, are checked with qualifying criteria, which are set up for sustaining forest resource base, as well as the environmental services provided by forests, including the protection of soil and water resources.

INDICATOR 4.2.b

Area and percent of forest land with significant soil degradation

Rationale

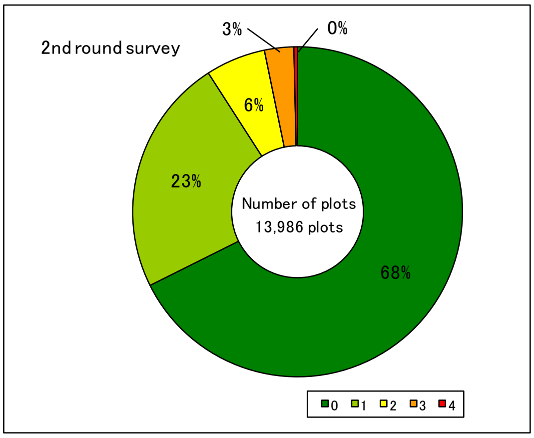
This indicator provides information on the extent of significant soil degradation in forests likely to affect productivity, hydrology, ecosystem processes or social and cultural benefits. This indicator is primarily concerned with degradation caused directly or indirectly by human activity.

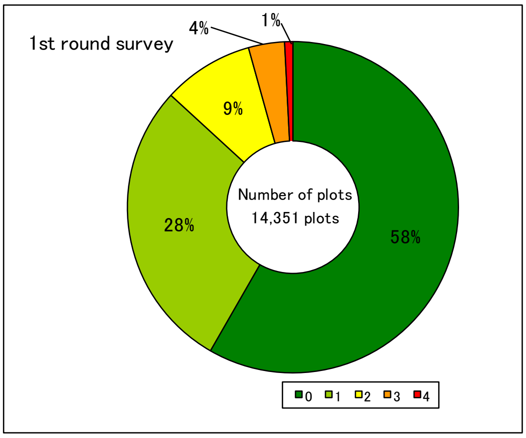
Current State and Trend

In about 3 % of the total area of Japan's forests, soil erosion is suspected according to the results of Forest Resource Monitoring Survey conducted during 2004-2008. Soil erosion is observed mainly in forests distributed in mountain areas with fragile geological features, represented by 56 monitoring spots where no tree species are found or alpine coniferous species are dominant. Among 327 monitoring spots with soil erosion, X spots are located in planted forests or along forest roads indicating possible relations to human activities.

The systematic gap observed between the results of the first and the second rounds of the Forest Monitoring Survey implies the need of objective criteria to be used on site to classify the degree of soil erosion.

Figure 49: Composition of classified degrees of soil erosion





Sources: Forestry Agency. Forest Resource Monitoring Survey

4.3 WATER

Water is one of the most valuable of forest ecosystem services. Forests and how they are managed, influence the quantity, quality and timing of surface and ground water flows. Changes to water quality and flow can have a severe impact on forest resources as well as human wellbeing. In addition, associated forest aquatic and riparian habitats are some of the most biologically diverse and productive forest ecosystems.

The quality and quantity of water flowing from forested areas is commonly regarded as an indicator of the quality of forest management. Water quality is widely understood to be a measure that captures many potential impacts on forest sustainability and a good indicator of overall ecosystem health.

INDICATOR 4.3.a

Proportion of forest management activities that meet best management practices, or other relevant legislation, to protect water related resources

Rationale

This indicator provides information about the extent to which water resources have been identified and safeguarded during forest management. This indicator is primarily concerned with activities that may affect riparian zones[21], water quality, quantity and flow rather than the designation of land for water-related conservation. The protection of the water resources and associated forest and aquatic ecosystems[22] is vital for the human populations dependent on them.

Current State and Trend

In the management of 9 million ha of forests, the protection of water resource is given the highest priority in Japan. The harvest of these forests, which are designated protection forests for the protection of water resource, is to be permitted by the prefectural governments only when the total area of logged over forests within each watershed does not exceed the pre-determined level. A technical guideline, including standard specifications, is also set up in order to ensure the effective and efficient implementation of the conservation works for the restoration of devastated forest land and forests.

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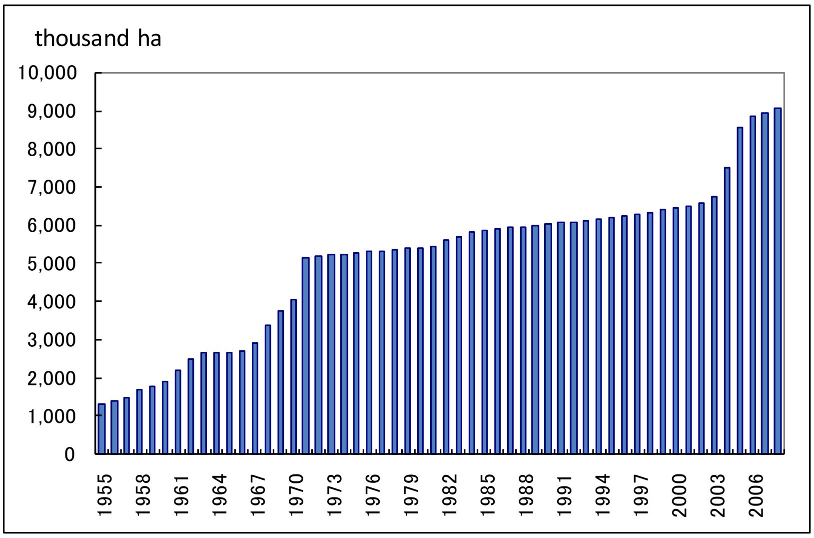
21 ***Riparian zone*** is an area along streams. Riparian zone, which occurs in a variety of forms, such as forest, grassland and wetland, plays an important role in conserving soil and biological diversity, as well as conserving water resources and aquatic ecosystems.

22 ***Aquatic ecosystem*** is an ecosystem found in water bodies, such as oceans, rivers, lakes and wetlands.

Figure 50: Change in area of protection forests designated for protecting water resources



Sources: Forestry Agency

For about 43 % of privately owned forests and forests owned by the local public entities, forest management plans are currently established by forest owners and approved by the relevant local or national governments. Upon the approval of each management plan, qualifying criteria on the key elements of management practices, including rotation age, yield and regeneration techniques, are applied taking into account the conservation of environmental benefits, including the protection of soil and water resources.

INDICATOR 4.3.b

Area and percent of water bodies, or stream length, in forest area with significant change in physical, chemical or biological properties from reference conditions

Rationale

This indicator provides information relating to water quality in forests. Significant changes in the physical, chemical or biological properties of water in forest lakes, rivers and streams may reveal the extent to which management activities or natural events are affecting water quality. Maintaining water quality is important for human use and consumption and to support healthy forest and aquatic ecosystems. Where water quality is being adversely affected by human activity, forest management practices may be adapted to protect water values.

Current State and Trend

No systematic nationwide monitoring of water quality has been conducted in Japan.

With the aim of comparing and monitoring changes in water quality in forest areas, the Forestry and Forest Product Research Institute (FFPRI) has created the “Database on Water Quality of Forest Rain Streams” based on the data collected in specific locations. According to the Database, no significant change in the water quality has been observed in streams.

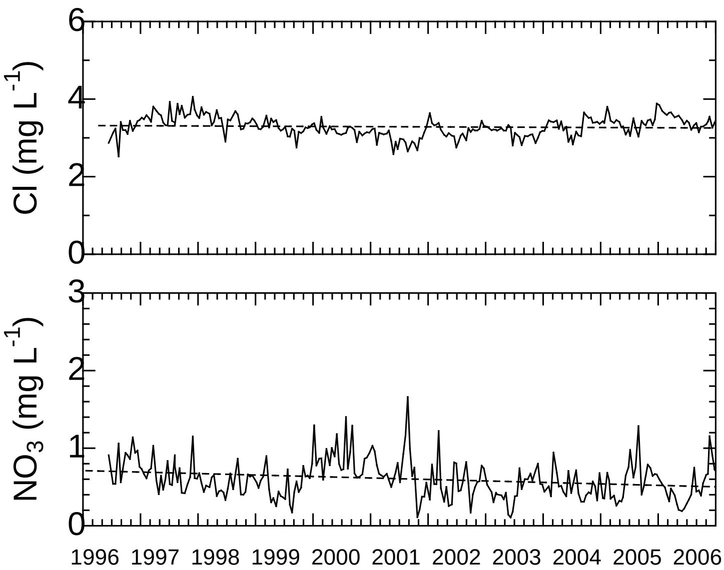
Box 3: Monitoring of Water Quality

It is known that bare lands in the watershed tends to increase the density of chlorinate ions (Cl) and nitrate ions (NO3).

An example of the results of monitoring on the quality of stream water being conducted by the Forestry and Forest Products Research Institute (FFPRI) indicates a stable trend at a lower level in the density of both Cl and NO3 in the long-run, as shown below.

It is assumed that both forest ecosystems and aquatic ecosystems in this watershed have been well maintained.

Figure 51: Change in water quality in Ichinomata National Forest managed by Shimanto District Forest Office



Sources: Forestry and Forest Products Research Institute

CRITERION 5

MAINTENANCE OF FOREST CONTRIBUTION TO GLOBAL CARBON CYCLES

Forests are renewable and one of the largest terrestrial reservoirs of biomass and soil carbon. They have an important role in global carbon cycles as sinks and sources of carbon. Carbon stocks in forests include above ground biomass, below ground biomass, dead and decaying organic matter and soil carbon. Carbon is also stored in wood products.

The biosphere has a significant influence on the chemical composition of the atmosphere. Vegetation draws CO2 from the atmosphere, through photosynthesis and returns it through respiration and the decay of organic matter. The interchange between the biosphere and atmosphere is large; approximately a seventh of total atmospheric CO2 passes into vegetation each year.

Global climate change could have significant impacts on the structure, distribution, productivity, and health of temperate and boreal forests as well as impacts on forest carbon stocks and fluxes, and the prevalence of forest fires, disease and insect outbreaks, and storm damages.

Forest management practices also affect the carbon cycle and fluxes. Deforestation has a negative impact, but management activities that maintain and enhance the carbon stored in forests and forest products over the medium to long term can make a positive contribution to mitigating atmospheric carbon dioxide levels. In addition, biomass from forests can be used as a substitute for fossil fuels thereby reducing greenhouse gas emissions.

Change in the global carbon cycle and associated climate change will have major impacts on human wellbeing, especially rural communities and indigenous peoples dependent directly on the natural environment.

INDICATOR 5.a

Total forest ecosystem carbon pools and fluxes

Rationale

This indicator provides information about the total amount of carbon stored in forest ecosystems. It also describes changes, fluxes or flows in carbon between forests and the atmosphere. A better understanding of these processes will aid the development of appropriate responses to the effects of climate change.

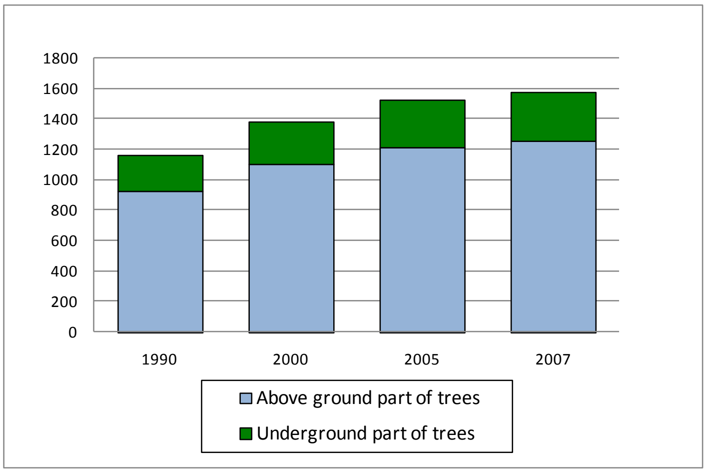
Current State and Trend

The total amount of carbon currently stored in trees in Japan is approximately 1.6 billion carbon tons. About 80% of the carbon stock is stored in the above ground part of trees[23] and the rest is stored in their underground part[24].

No nationwide data is currently available for the carbon stock contained in other components of forest ecosystems. No reliable data for the carbon fluxes is currently available either.

Regarding the carbon flux, it is estimated that Japan's forests absorbed about 23 million tons of carbon from the atmosphere in 2007.

Figure 52: Change in amount of carbon stored in trees



Sources: Forestry Agency

[23] ***Above ground part*** includes stems, bark, branches and leaves.
[24] ***Underground part*** includes living roots.

INDICATOR 5.b

Total forest product carbon pools and fluxes

Rationale

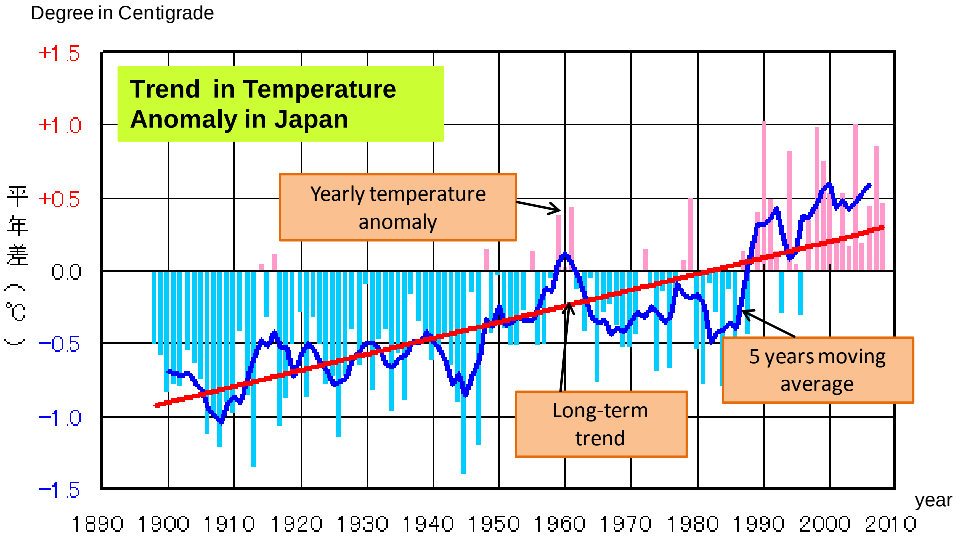
This indicator provides information on the role that forest products play in storing, cycling and releasing carbon. Forest products delay the release of carbon into the atmosphere and are more sustainable than products with manufacturing processes that have significant carbon footprints.

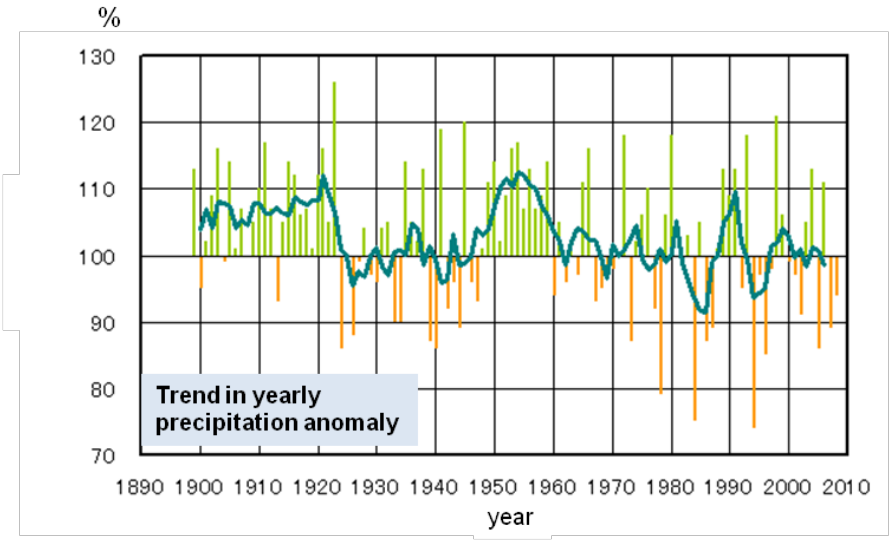
Current State and trend

No reliable data is currently available for this indicator. Appropriate set of data for this indicator will be further investigated taking account of the results of ongoing deliberations under the Framework Convention for Climate Change (UNFCCC) and the Intergovernmental Panel on Climate Change (IPCC) on carbon balance related to the harvested timber.

Box4: Changing Climate in Japan

According to the Meteorology Agency, the average annual temperature in Japan has risen at a rate of 1.11 degrees in C. per hundred years in the long run. The fluctuation in the annual precipitation has also increased since 1898 when the data started to be compiled.





INDICATOR 5.c

Avoided fossil fuel carbon emissions by using forest biomass for energy

Rationale

This indicator provides information about the amount of energy produced from forest biomass and the extent to which it offsets the need to burn fossil fuels, thereby benefitting the global carbon budget and lowering carbon emissions.

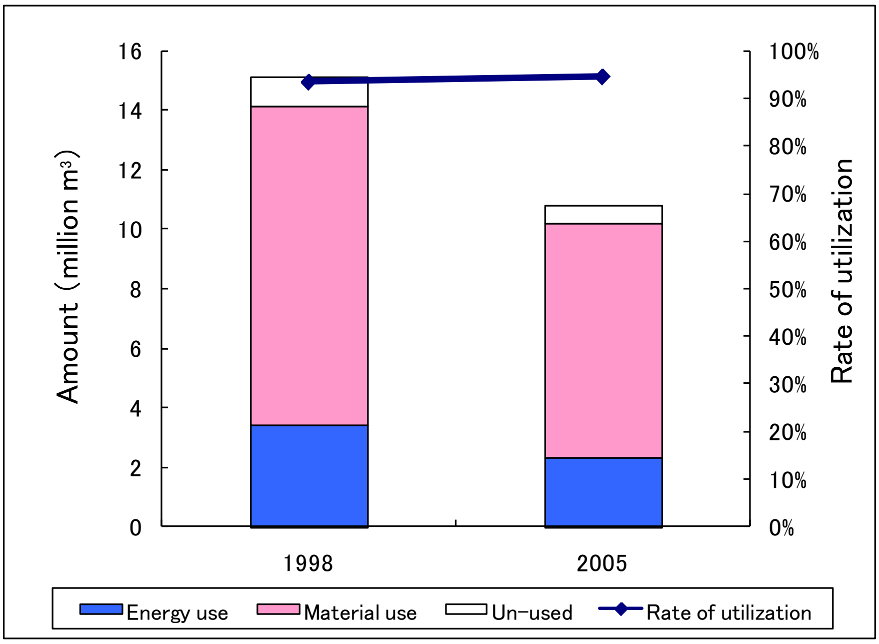
Current State and trend

More than 90% of the wood residuals generated in wood processing facilities, such as sawmills, have been utilized in Japan. The energy use of these wood residuals accounts for about 20%, which coincides approximately 2 million m^3 in 2005.

The percentage of the recycled construction wood wastes has quickly improved from about 40% in 2000 to about 70% in 2005. The percentage of the recycled wood wastes used as the energy source exceeded 50% in 2005, which amounts 6 million m^3.

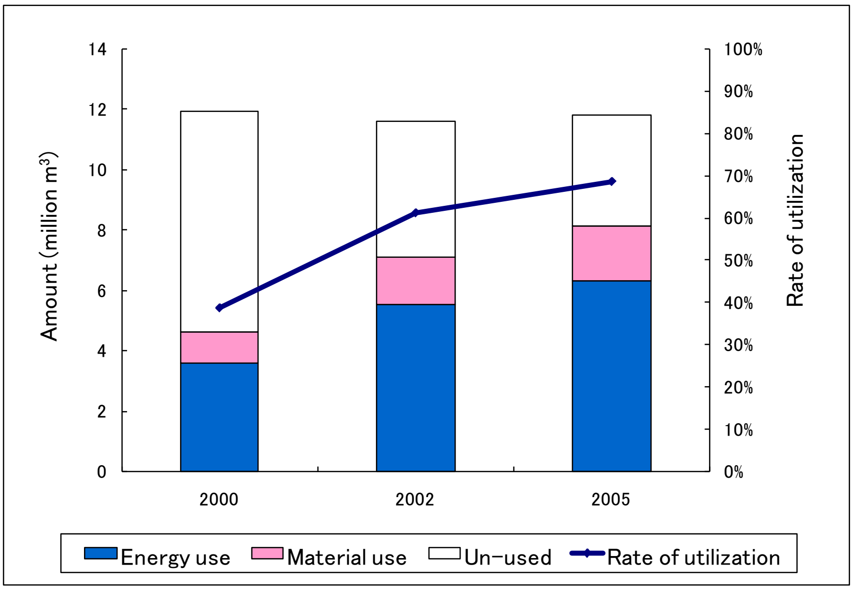
It is estimated that the carbon emission from fossil fuel equivalent to about one million carbon tons was avoided in 2005 by the energy use of wood residuals and construction wood wastes.

Figure 53: Change in percentage and volume of used wood residuals



Sources: Ministry of Agriculture, Forestry and Fisheries, Forestry Agency

Figure 54: Change in percentage and volume of recycled construction wood wastes



Sources: Ministry of Land, Infrastructure, Transport and Tourism

CRITERION 6

MAINTAINANCE AND ENHANCEMENT OF LONG TERM MULTIPLE SOCIO-ECONOMIC BENEFITS TO MEET THE NEED OF SOCIETY

Forests provide a wide variety of social, cultural and economic goods, services and other benefits that contribute to meeting the needs of society. Many people and communities, including indigenous peoples, are dependent on forests for their livelihood and well being. Information on the production and consumption of forest products, investment and employment in the forest sector, forest-based recreation and tourism, and other social and cultural forest values illustrate the many benefits forests provide.

6.1 PRODUCTION AND CONSUMPTION

These indicators provide information on the contribution of wood and non-wood products, and environmental services, to national and local economies. The value, volume and revenues associated with domestic production and consumption of forest products and services, including through international trade, demonstrates the type and scale of the contribution of forests to domestic economies. They also provide information about market conditions relevant to forest management and the forest sector.

INDICATOR 6.1.a

Value and volume of production of wood and wood products, including primary and secondary processing

Rationale

This indicator provides information on the value and volume of wood and wood products at various stages of processing. It reflects the importance of forests and the wood processing sector to domestic economies.

Current State and Trend

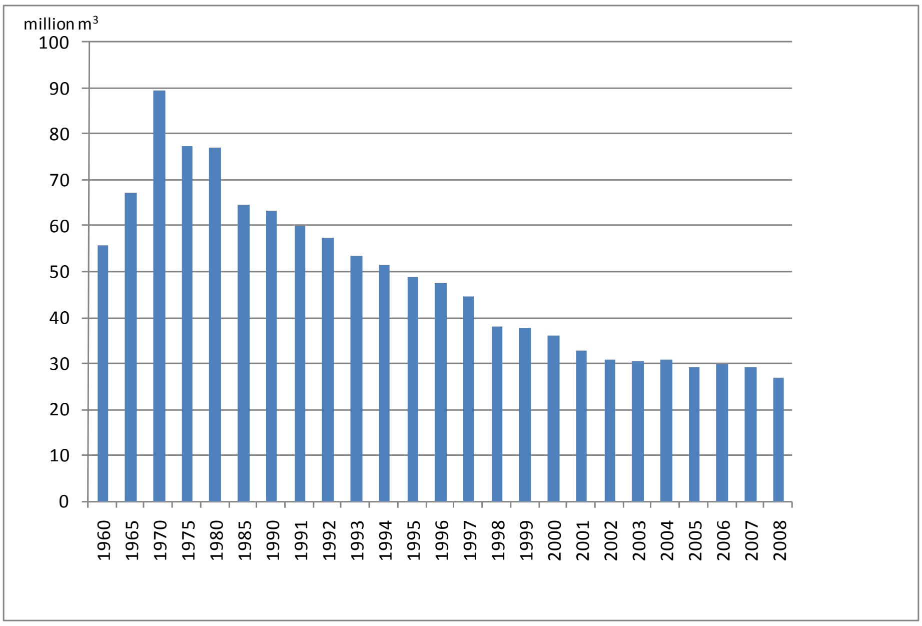
The total volume of wood products produced in Japan, including those produced from the imported round wood, is estimated approximately 27 million m^3 in 2008 in round wood equivalents. The total volume of production has been declining since the late 1990's after a sharp increase in the 1960's followed by the hovering period in the 1970's through 1990's.

The total volume of ex-factory delivery of major wood products, including sawn timber, plywood and wood panels, is around 12 million m^3 in 2008. It has been in a declining trend similar to the total volume of wood production in round wood equivalents.

The total value of the ex-factory delivery of major wood products, on the other hand, is around 2.6 trillion Japanese yen in 2008. It has been declining since the beginning of the 1980's.

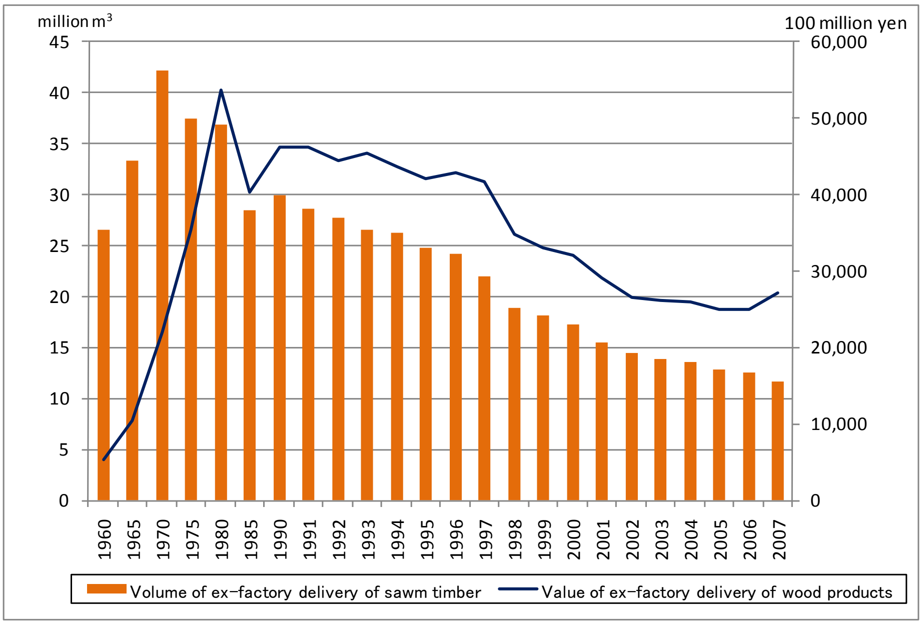
The gap observed between the peaks of the volume and the value is presumably due to the sharp increase in the prices caused by the oil crisis in 1973.

Figure 55: Change in wood production in roundwood equivalents



Sources: Forestry Agency

Figure 56: Volume change in ex-factory delivery of sawn timber and total value of ex-factory delivery of major wood products



Sources: Ministry of Agriculture, Forestry and Fisheries,
Ministry of Economy, Trade and Industry

INDICATOR 6.1.b

Value of non-wood forest products produced of collected

Rationale

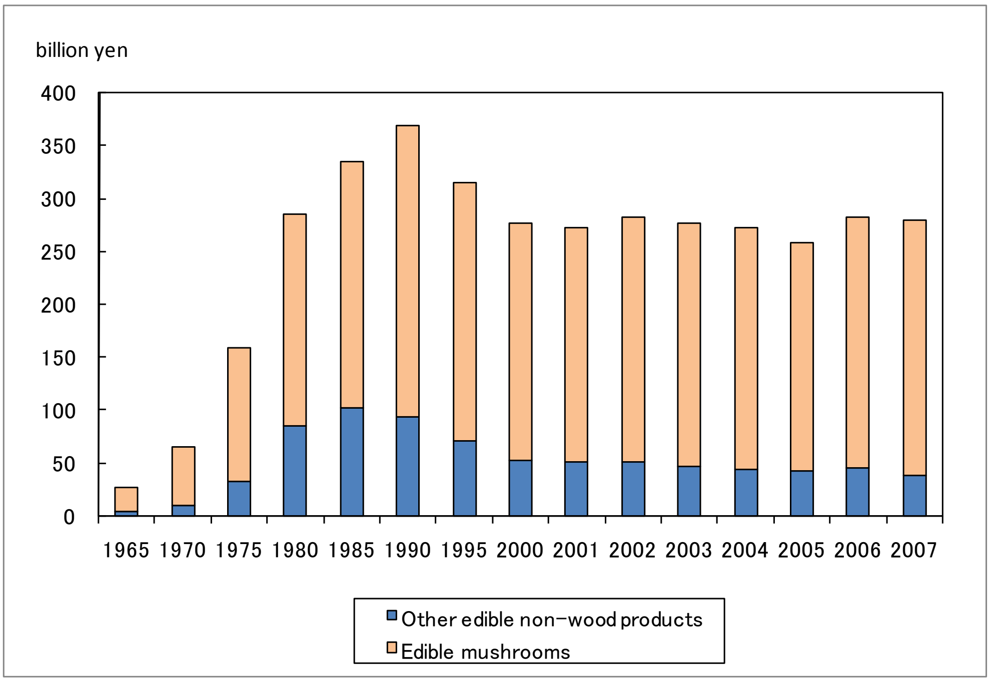
This indicator provides information on the value of non-wood forest products. The collection, processing and use of non-wood forest products are important dimensions of the economic value of forests. In some countries, non-wood forest products are vital to the livelihoods and lifestyles of indigenous and other rural communities.

Current State and Trend

There is no complete information on the amount and value of non-wood forest products collected or produced in forests, as mentioned in the section for the Indicator 2.e. The available information on the major edible non-wood forest products indicates that the values of a variety of wild plants and bamboo shoots collected or produced in forests stay around 7 billion yen and 5-6 billion yen respectively in recent three years.

The total value of the edible non-wood forest products produced in Japan, which are mostly grown by private firms, cooperatives, farmers and small forest owners, has been stable around 250-300 billion Japanese yen since the beginning of the 1990's. Responding to the diversifying needs of consumers, the value of the production of edible non-wood forest products, particularly edible mushrooms, continued to increase throughout the 1970's and 1980's. The hovering trend of the production value in recent years is resulted from the constant increase in the imported non-wood forest products, including Shitake mushroom and bamboo shoots.

Figure 57: Change in the total production value of edible non-wood forest products



Sources: Forestry Agency

INDICATOT 6.1.c

Revenue from forest-based environmental services

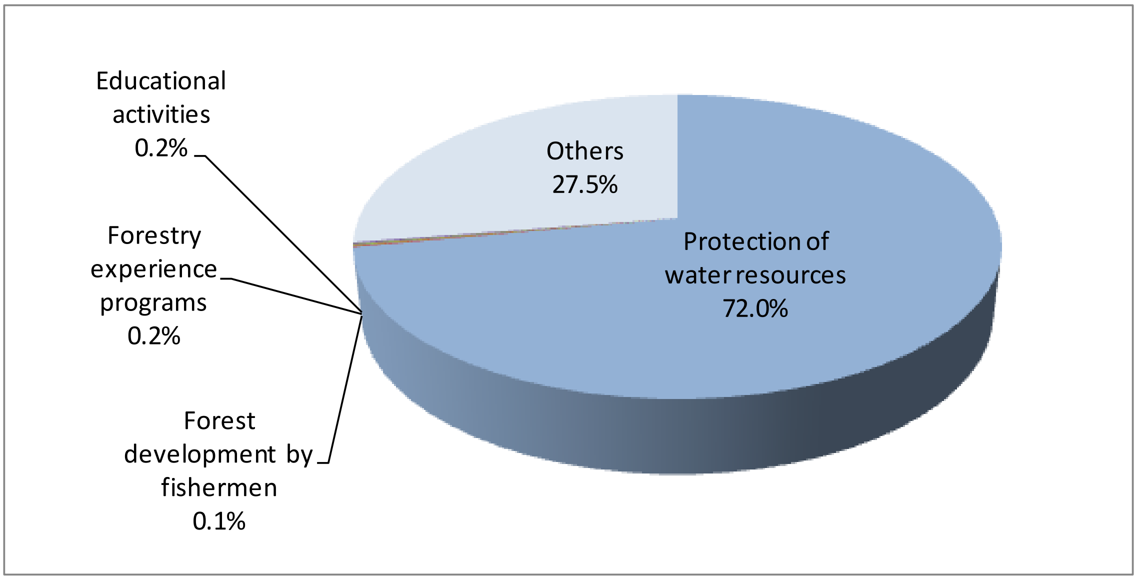
Rationale

This indicator provides information about forest-based environmental services for which markets and revenues are emerging or currently exist. Forest-based environmental services are or may become an important component of the economic value of forests.

Current State and Trend

In Japan, 630 local governments are contributing to the improvement of about 240 thousand ha of forests located out of their administrative boundaries in 2005. For more than 70 % of such forests, the main objective of the effort of the local governments is to protect the water resource, which their citizens are relying on, in more than 70 % of those forests. The forms of contribution vary from the subsidization of forest operations to the direct management through the purchase of forests.

Figure 58: Composition of objectives of upstream forest improvement



Sources: Ministry of Agriculture, Forestry and Fisheries. Census of Agriculture and Forestry

By 2008, twenty nine prefectural governments have introduced local taxation related to forests, such as forest environment tax. In most cases, the objective of the taxation is to create additional revenue to be used to improve, restore or protect forests with higher conservation values and to promote the public awareness of the environmental services provided by forests. The rate is normally fixed to 500-1,000 Japanese yen *per annum* per resident with a certain level of income, and levied on the top of the resident tax. The total amount of the newly generated revenue is estimated around 20 billion Japanese yen in 2008.

Table 4: List of prefectures which introduced new local taxation for forests

Year of introduction	Name of prefecture
2003	Kochi
2004	Okayama
2005	Tottori, Shimane, Yamaguchi, Ehime, Kumamoto, Kagoshima
2006	Iwate, Fukushima, Shizuoka, Shiga, Hyougo, Nara, Oita, Miyazaki
2007	Yamagata, Kanagawa, Toyama, Ishikawa, Wakayama, Hiroshima, Nagasaki
2008	Akita, Ibaragi, Tochigi, Nagano, Fukuoka, Saga
2009	Aichi

Sources: Forestry Agency
Note: Produced by the hearing from the prefecture governments.

INDICATOR 6.1.d

Total and *per capita* consumption of wood and wood products in round wood equivalents

Rationale

This indicator provides information on consumption, including consumption *per capita*, of wood and wood products. The quantity consumed illustrates society's dependence on forests as a source of raw materials.

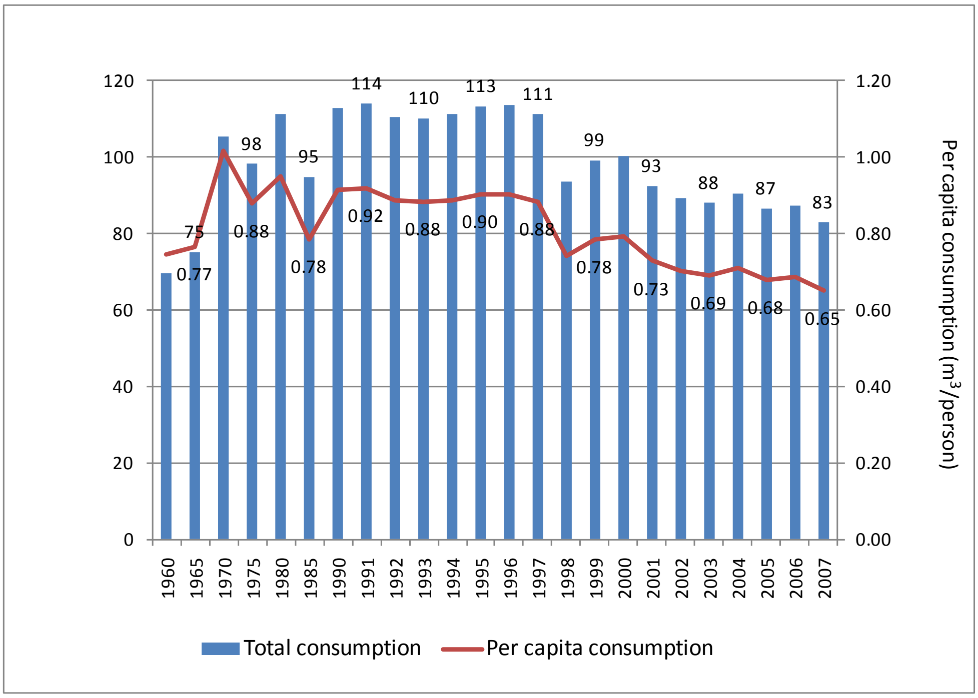
Current State and Trend

About 7.9 million m^3 of wood and wood products in round wood equivalents was consumed in Japan in 2008. The total consumption of wood and wood products has been in a declining trend since the late 1990's following the constant increase in the 1960's and 1970's and the leveling off in the 1980's and 1990's.

The consumption of wood products is normally affected by the level of housing starts as well as the development of substitutes and the consumption patterns, including the unit use of wood in housing construction in the long run.

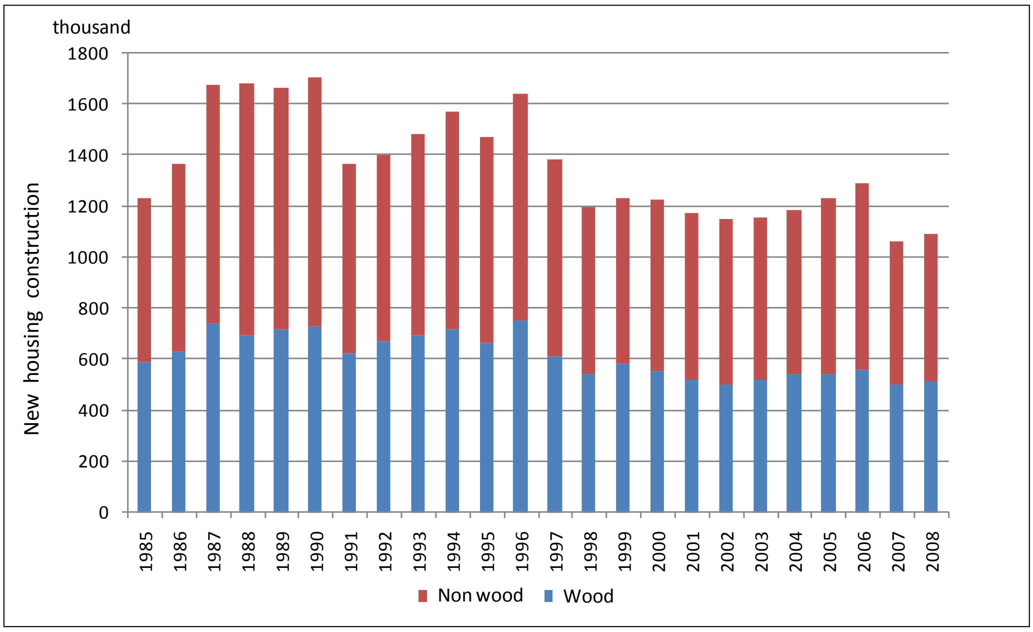
The *per capita* consumption of wood and wood products has also declined since the late 1990's as the total consumption decreased.

Figure 59: Change in total and *per capita* consumption of wood and wood products



Sources: Forestry Agency,
Ministry of Internal Affairs and Communication. National Census, etc.

Figure 60: Change in new housing construction



Sources: Ministry of Land, Infrastructure, Transport and Tourism

INDICATOR 6.1.e

Total and *per capita* consumption of non-wood forest products

Rationale

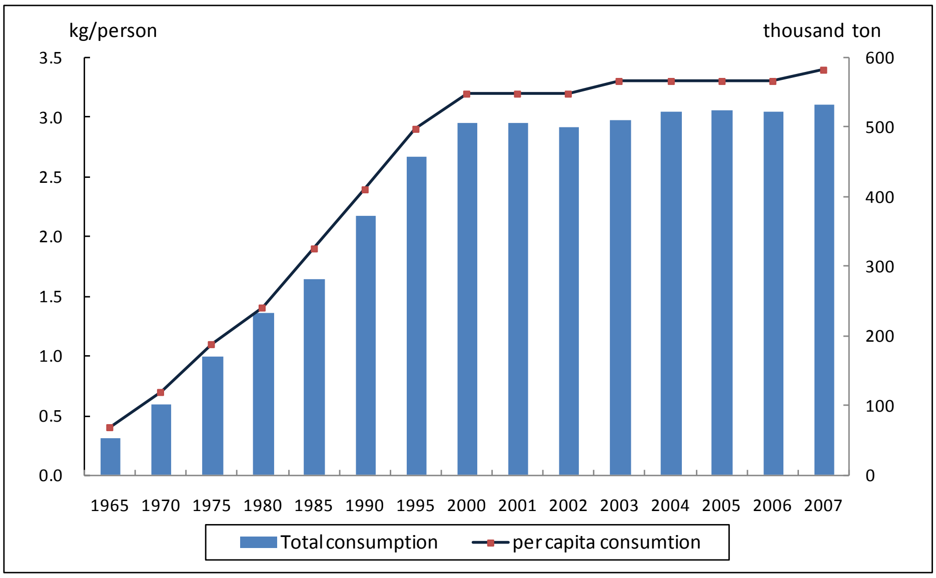
This indicator provides information on the consumption of non-wood forest products. The quantity consumed illustrates society's dependence on forests as a source of these products.

Current State and Trend

Currently, more the 500 thousand tons of edible mushrooms, which is equivalent to around 3.3 kilograms *per capita*, are consumed every year in Japan. Both the total amount and *per capita* consumption of edible mushrooms, one of the major non-wood forest products produced in Japan, has constantly increased.

Introduction of new items, such as Maitake (*Grifola frondosa*) and Bunashimeji (*Hypsizigus marmoreus*), in response to the diversifying consumers' needs, as well as the increasing less expensive imports have contributed to the expansion of the consumption. The level of domestic production of the edible mushrooms, on the other hand, has been hovering since the late 1990's, as described under 6.1.b.

Figure 61: Change in total and *per capita* consumption of edible mushrooms



Sources: Forestry Agency

INDICATOR 6.1.f

Value and volume in round wood equivalents of exports and imports of wood products

Rationale

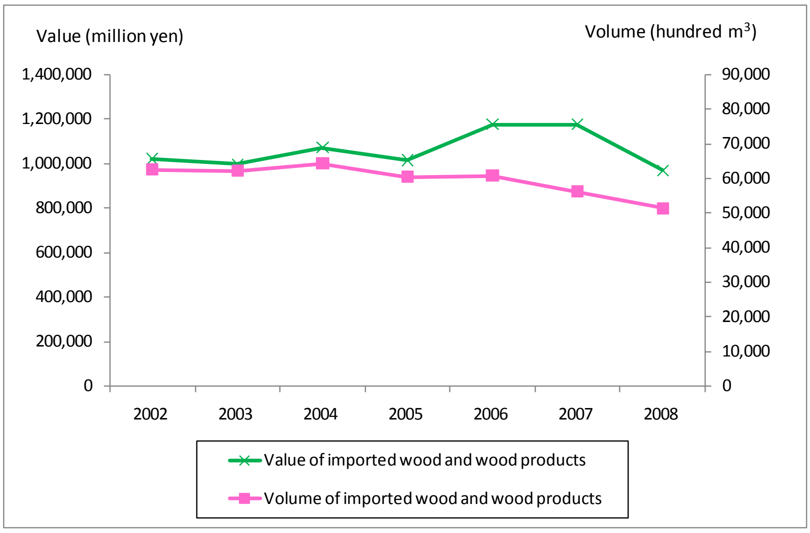
This indicator provides information about the value and size of a country's exports and imports in wood and wood products and their contribution to the domestic economy. International trade in wood products may be a significant factor in the management, commercial use and economic value of forests.

Current State and Trend

About 5 million m³ of wood and wood products with the value of approximately one trillion Japanese yen were imported to Japan in 2008. Both the value and volume of the imported wood products are in a declining trend in recent years as the total consumption decreases.

Wood chips hold the highest in both value and volume followed by sown timber.

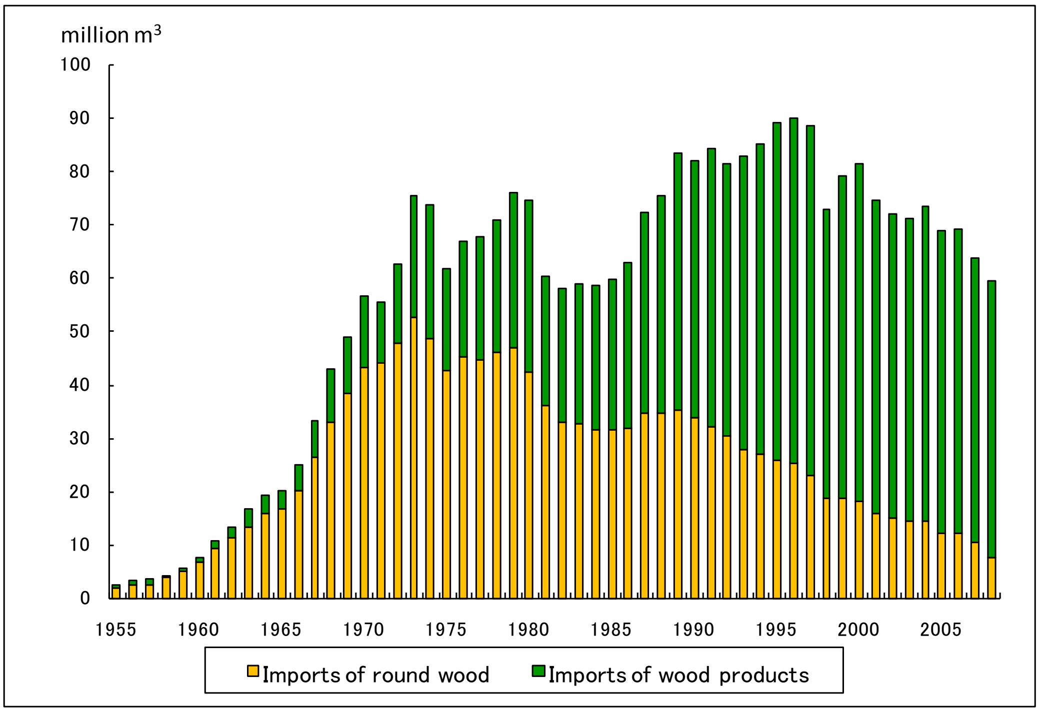
Figure 62: Change in the value and volume of imported wood and wood products into Japan



Sources: Forestry Agency,
Ministry of Economy. Trade and Industry, Ministry of Finance. Statistics of Industry,
Ministry of Finance. Statistics of Foreign Trade

Import of wood and wood products to Japan has escalated both in quantity and share in the total wood consumption since the removal of import duties on round wood in the late 1950's. Wood and wood products were in short supply during the periods of post war recovery and the beginning of the succeeding economic growth in the 1950's and early 1960's. The imported round wood, which dominated the market in the earlier stage, was gradually replaced by the imports of wood products, such as plywood and sown timber. The share of round wood in the total volume of wood import is around 13 % in 2008 in round wood equivalents.

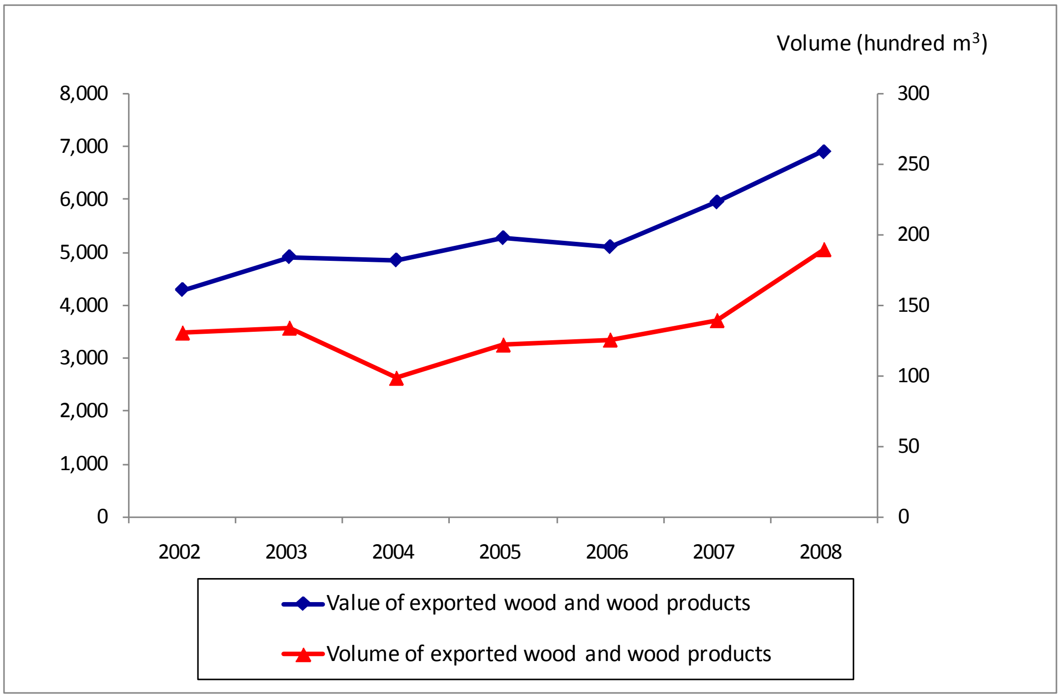
Figure 63: Change in volume of import and total consumption of wood and wood products in round wood equivalents



Sources: Forestry Agency

About 20 thousand m³ of wood and wood products, with the value of about seven billion Japanese yen, were exported in 2008 from Japan. In recent years, the export of wood and wood products from Japan is expanding both in value and volume, as a result of the concerted efforts of the concerned in the forestry and wood industry sectors. The major item of the export is sawn timber.

Figure 64: Change in value and volume of exported wood and wood products from Japan



Sources: Forestry Agency,
Ministry of Economy, Trade and Industry. Statistics of Industry,
Ministry of Finance, Statistics of Foreign Trade

INDICATOT 6.1.g

Value of exports and imports of non-wood forest products

Rationale

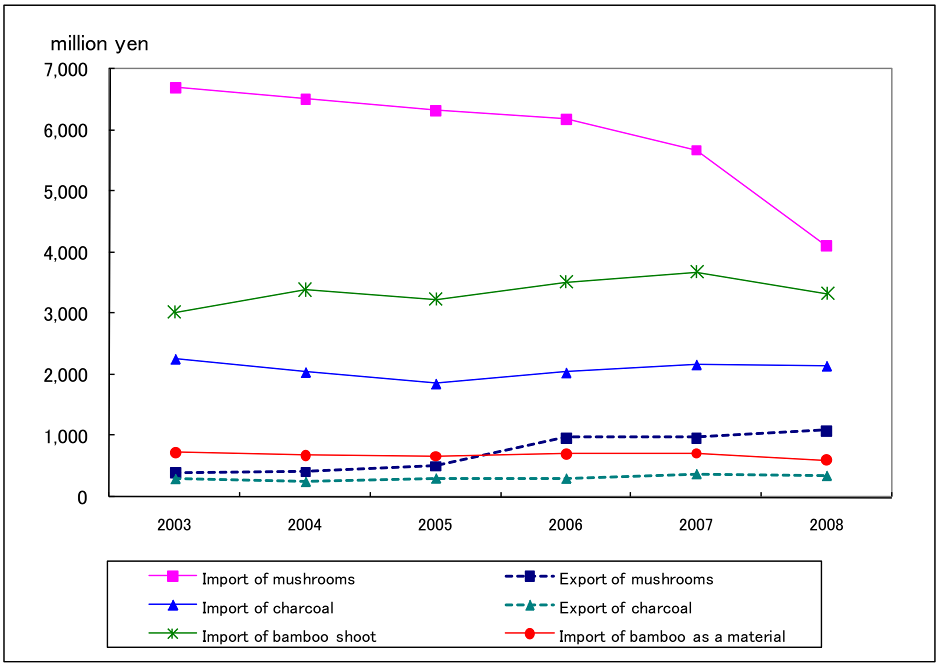
This indicator provides information about the value of a country's exports and imports of non-wood forest products and their contribution to the domestic economy. International trade in non-wood products may be a significant factor in the management, commercial use and economic value of forests.

Current State and Trend

The total value of the non-wood forest products imported to Japan is about 39 billion Japanese yen in 2008. Among the imported non-forest products, edible mushrooms hold the highest in the value, followed by bamboo shoots and charcoal. The import of edible mushrooms is in a declining trend recently due to the growing public concern for the safe and reliable food, as well as the increasing consumption in exporting countries.

The export of edible mushrooms, on the other hand, is in an upward trend as a result of the efforts of producers and the organizations concerned.

Figure 65: Change in import and export of non-wood forest products



Sources: Forestry Agency

INDICATOR 6.1.h

Export as a share of wood and wood products production and imports as a share of wood and wood products consumption

Rationale

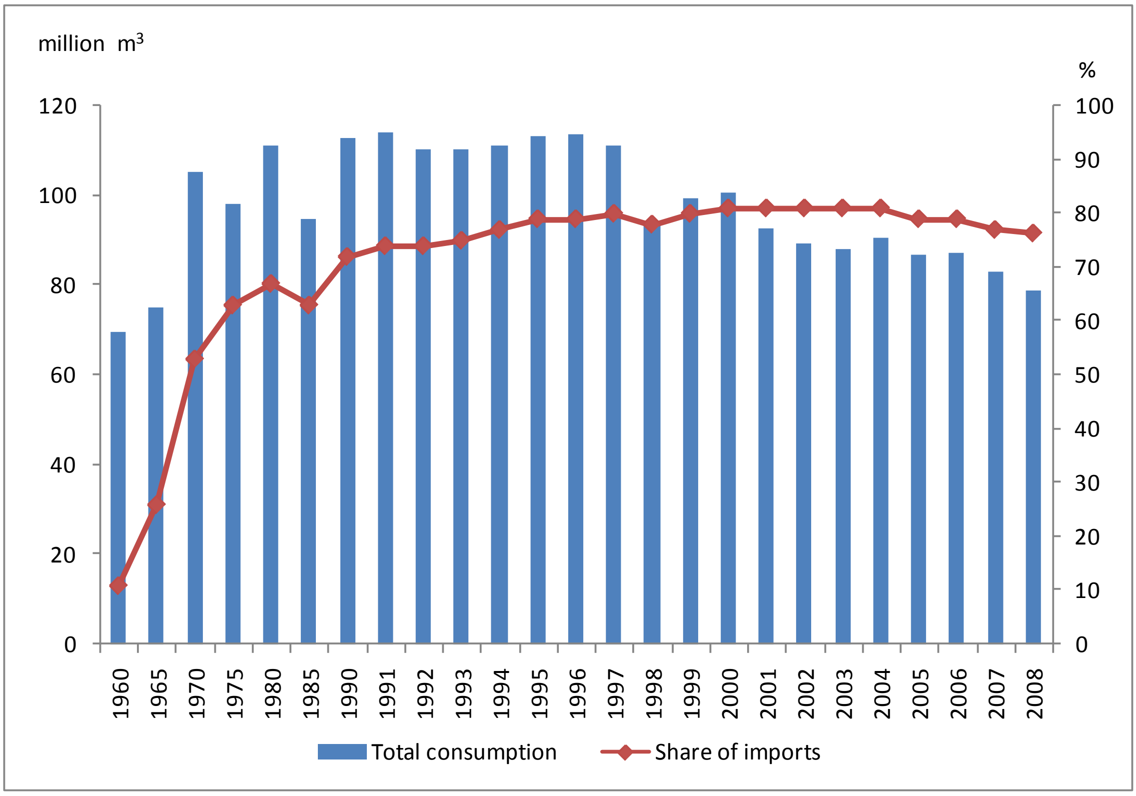
This indicator provides information on the relative importance of international trade in wood and wood products to domestic production. Wood and wood product exports can be a significant source of revenue for domestic economies. Imports may supplement or substitute for production from domestic forest sources.

Current State and Trend

In 2008, the imported wood and wood products accounts for 76 % in the total volume of consumption in Japan in round wood equivalents. The share of imports has been falling since the highest of 8 % recorded during 2000-2004. Such trend is partly attributed to the increasing use of growing domestic resources in the wood industry, coupled by the shrinking total wood consumption caused by the current economic downturn.

The share of imports had continuously risen until the early 2000's since the round wood market was opened in the late 1950's responding to the rapidly growing needs for wood and wood products, as described in the section for the Indicated 6.1.f.

Figure 66: Change in share of imports and total consumption of wood and wood products



Sources: Forestry Agency

The share of exports in the total volume of produced wood and wood products, on the other hand, is still negligible on the %age although foreign markets are starting to develop.

INDICATOR 6.1.i

Recovery of recycling of forest products as a percent of total forest products consumption

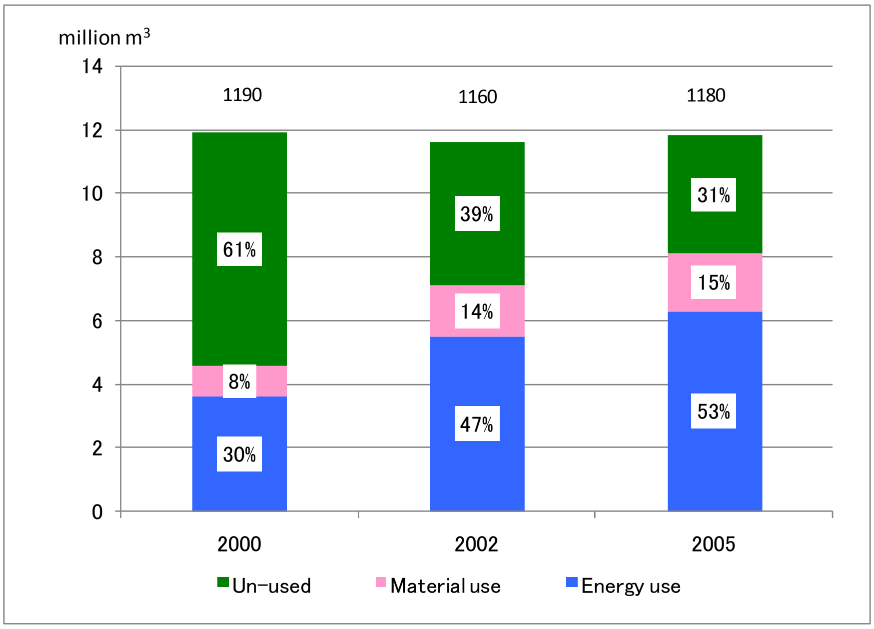
Rationale

This indicator provides information on the extent to which forest products are recycled or recovered. Recycled and recovered products are an important source of wood fiber for many industries and may compete with or substitute for harvested wood. Such products can help meet the demand for forest products without increasing harvest levels.

Current State and Trend

The percentage of recycled wood wastes generated in the construction sector, such as the wood parts of deconstructed houses, boosted from about 40% in 2000 to 70% in 2005. The energy use of the recycled wood wastes is particularly increasing. Such dramatic progress in the utilization of construction wood wastes is attributed to the legislations enacted to encourage the reuse and recycling of resources.

Figure 67: Change in the use of construction wood wastes



Sources: Ministry of Land, Infrastructure, Transport and Tourism

6.2 INVESTMENT IN THE FOREST SECTOR

These indicators provide information on long-term and annual expenditures to enhance forest management, forest-base enterprises, and the knowledge and skills of people who are engaged in the forest sector. Maintaining and enhancing the long-term multiple socio-economic benefits derived from forests depends in part on investment in the forest sector, including both long-term capital investments and annual operating expenditures.

INDICATOR 6.2.a

Value of capital investment and annual expenditure in forest management, wood and non-wood forest product industries, forest-based environmental services and recreation and tourism

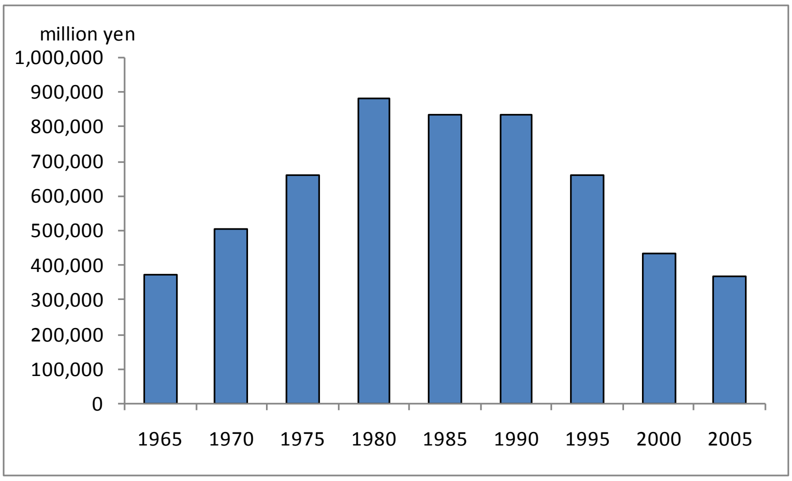
Rationale

This indicator quantifies investment and expenditure in developing, maintaining and obtaining goods and services from forests. Maintaining and enhancing forests and their benefits often depends on regular investments in restoration, protection and management, as well as in operations, forest industry and forest-based environmental services. When the capacity to protect, manage and use forests is eroded through lack of funding, the benefits that forests provide may decline or be lost.

Current State and Trend

The total value of the annual capital investment in forestry in 2005 is estimated approximately 370 billion Japanese yen. The capital investment in the forest sector has continuously dropped since the 1980's due to the constant unfavorable management conditions, such as the successive decline in wood prices and the worsening profitability of wood production.

Figure 68: Change in the value of capital investment in forest sector

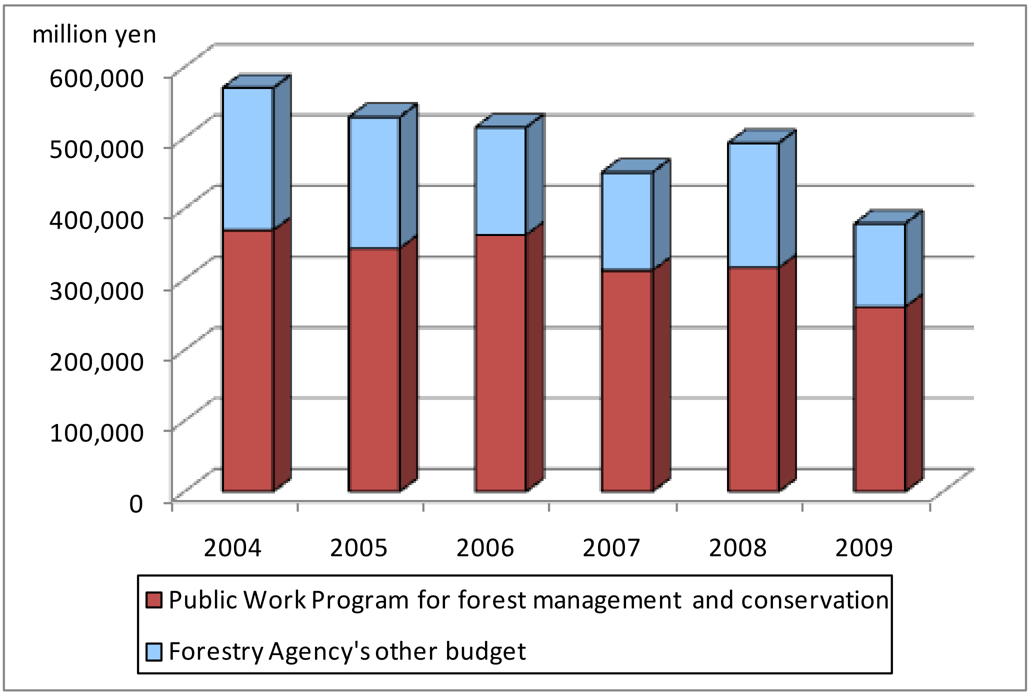


Sources: Ministry of Internal Affairs and Communication

The level of the annual expenditure of the Forestry Agency on the Public Work Program implemented specifically for the improvement and conservation of forests stays around 300 billion Japanese yen in recent years. The expenditure on forests occupies around 4-5 % of the total expenditure of the national government on the Public Work Program, which covers a broad range of the development of infrastructure including forests.

The total expenditure on the Public Work Program is in a declining trend in recent years under the government's budgetary policy to strictly restrain the whole expenditure through the exhaustive review throughout the overall spending. The recovery in the expenditure on forests in 2009 resulted from the allocation of the supplementary budget prepared against the current economic downturn.

Figure 69: Change in Forestry Agency's budget for the forest-related Public Work Program



Sources: Forestry Agency

INDICATOR 6.2.b

Annual investment and expenditure in forest-related research, extension and development, and education

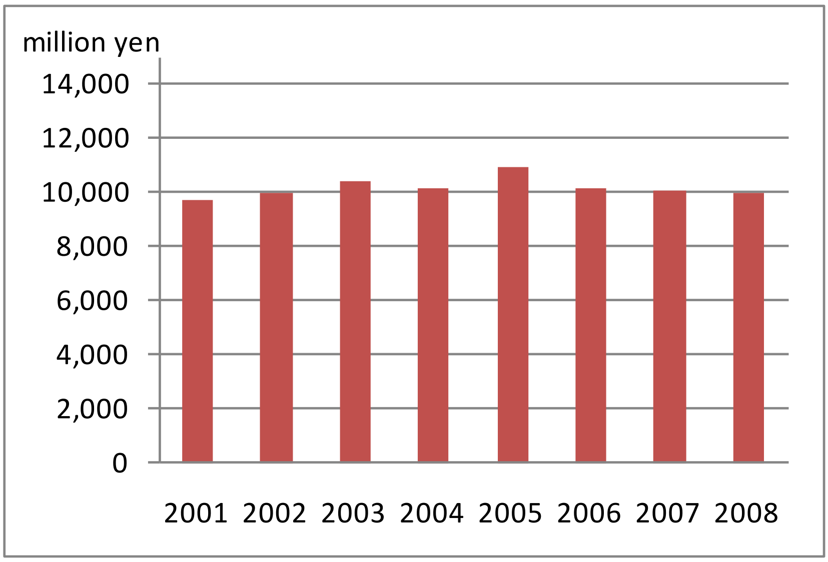
Rationale

This indicator provides information on annual investment and expenditure in forest-related research, extension and development, and education. Research underpins scientific understanding, including the ability to practice improved forest management and to develop and apply new technologies. Education, including extension activities, increases public awareness of the multiple benefits provided by forests.

Current State and Trend

The total expenditure of the Forestry and Forest Product Research Institute (FFPRI) in the research activities, including personnel expenses, stays around 10 billion yen in recent years. Although forest-related research activities are carried out by other public and private research institutes, no information is currently available due to the difficulties in separating the research expenditure on forest from other expenses.

Figure 70: Change in the total expenditure of the FFPRI in research activities



Sources: Forestry and Forest Products Research Institute,
Forest Tree Breeding Center. Annual Report

6.3 EMPLOYMENT AND COMMUNITY NEEDS

Forest-based and forest-related employment is a useful measure of the social economic importance of forests at the national and local level. Wage and income rates and injury rates are indicators of employment quality. Communities whose economies are concentrated in forest industry, or who rely on forests for subsistence purposes, may be vulnerable to the short or long-term effects of economic or policy changes in the forest sector. These indicators provide information on levels and quality of forest employment, community resilience to change, use of forests for subsistence purposes and social equity through the distribution of financial benefits from forests.

INDICATOR 6.3.a

Employment in the forest sector

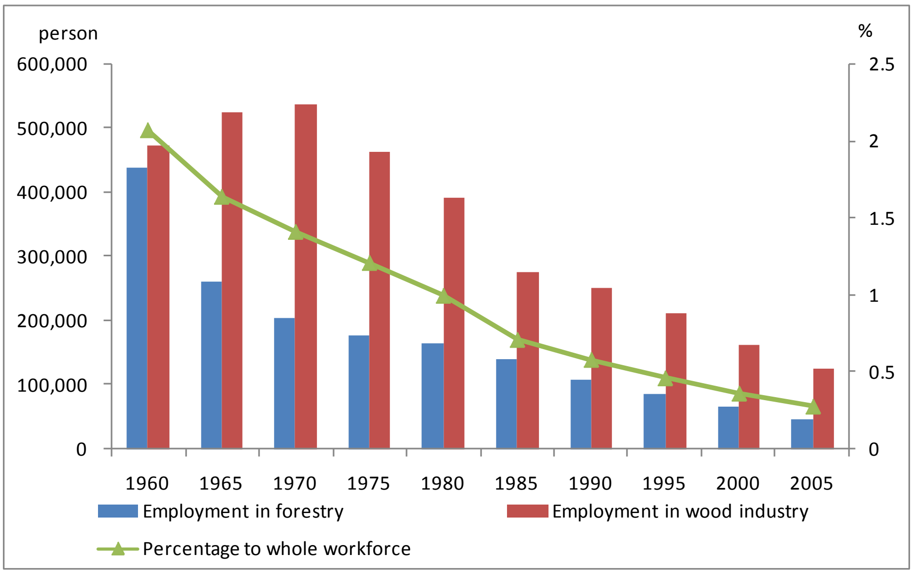
Rationale

This indicator provides information on the level of direct and indirect employment in the forest sector. Employment is a widely understood measure of economic, social and community wellbeing.

Current State and Trend

Around 170 thousand persons are working in the forest sector in Japan in 2005, including about 50 thousand persons engaged in forestry and about 130 thousand persons working in the wood industry. Reflecting the prevailing difficult circumstances in forestry and wood industry, the size of the workforce in the forest sector has constantly shrunk since the 1970's. The number of new comers into forestry, on the other hand, has increased since 2003 when the program for the "Green Employment"[25] started.

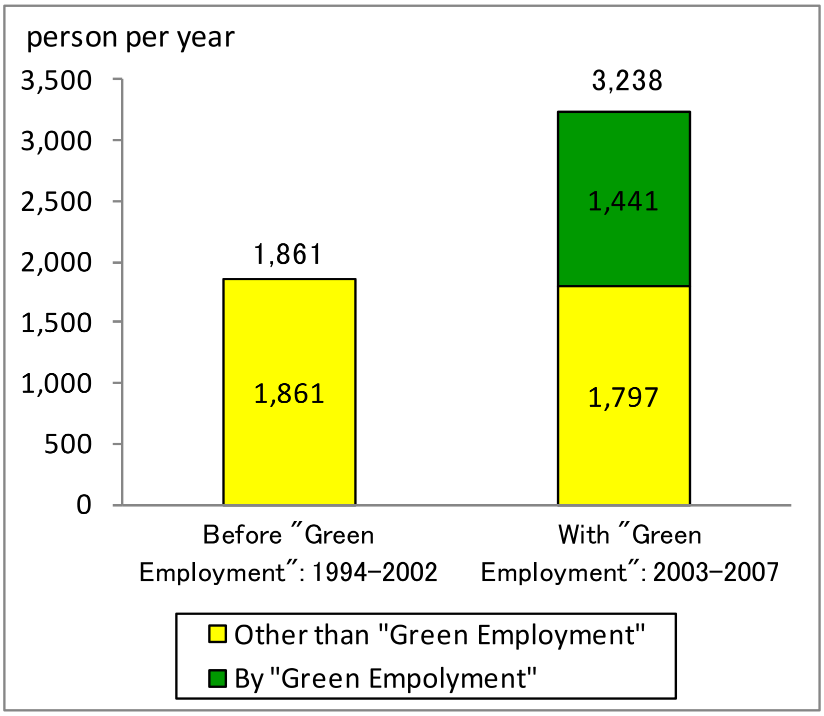
Figure 71: Change in employment and percentage of recruit in forest sector



Sources: Ministry of Internal Affairs and Communication. National Census
Forestry Agency

[25] ***Program for the "Green Employment"*** is a government program to give technical trainings to the new comers into forestry.

Figure 72: New recruitment to forestry sector



Sources: Forestry Agency. White Paper on Forest and Forestry

Box:5 International Cooperation for C&I Development and Application

For the purpose of sharing the knowledge acquired through the Montreal Process, Japan International Cooperation Agency (JICA) has organized an international training course every year since 2007 inviting officers from developing countries on the Pacific Rim to Japan. During the forty-day training course, participants are given opportunities to learn the basics and to experience the application of the criteria and indicators.

INDICATOR 6.3.b

Average wage rates, annual average income and annual injury rates in major forest employment categories

Rationale

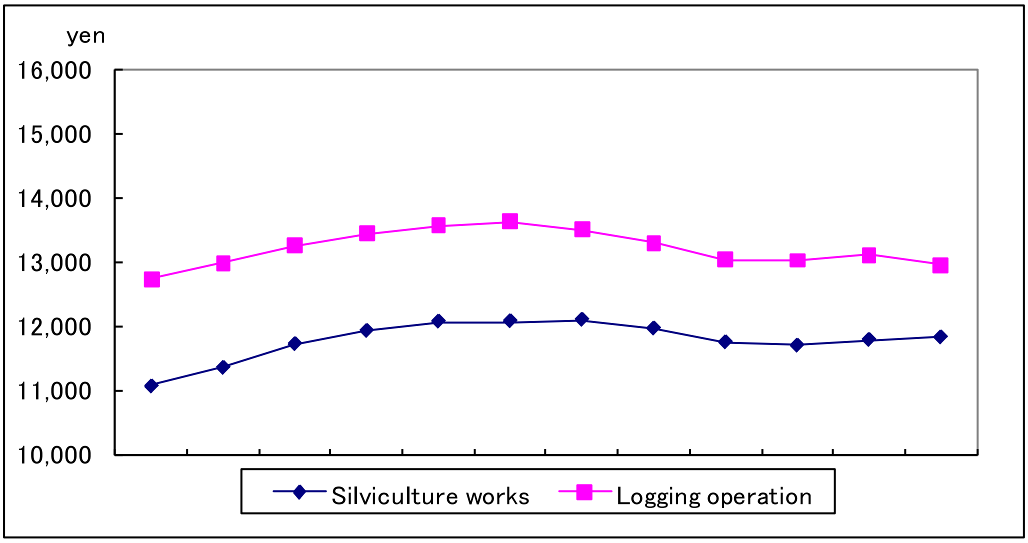
This indicator provides information on average wage and income rates, and injury rates. These are important aspects of employment quality and may influence the ability of the forest sector to recruit and retain its workforce.

Current State and Trend

The average daily wage of forest workers in 2007 is around 12 thousand Japanese yen for sylviculture works and 13 thousand Japanese yen for logging operations. In the real term, the wage level of forest workers has been relatively stable in recent years.

Among the forest workers hired by the forest cooperatives, one of the major contractors in the forest sector, about 70 % are working on a daily basis and 20 % are salary workers.

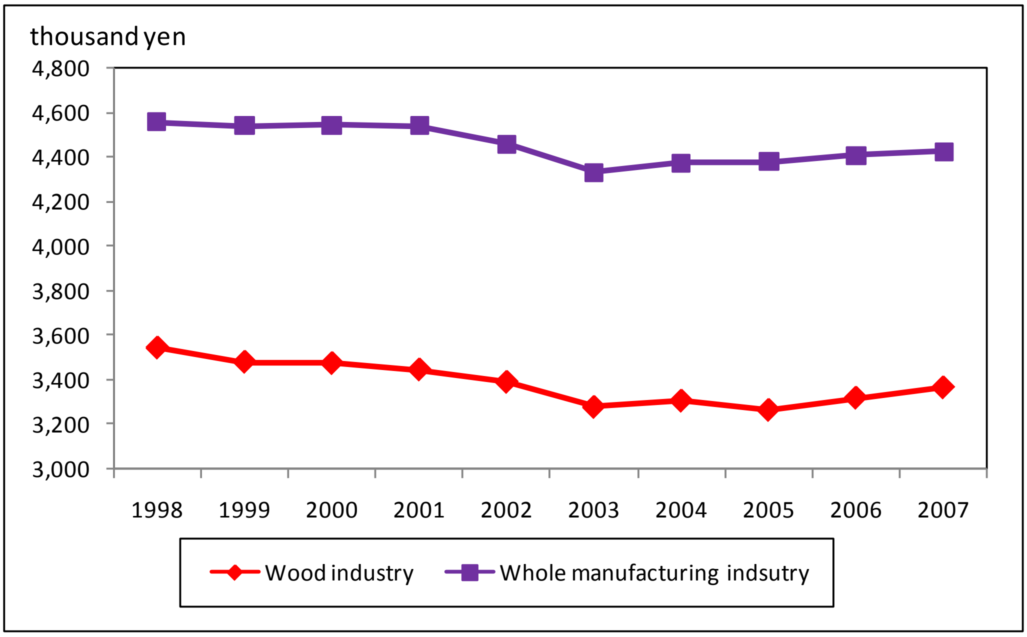
Figure 73: Change in average wage of forest workers



Sources: National Chamber of Agriculture

The current level of the average annual income of wood industry employees is around 3.4 million Japanese yen, which is equivalent to 75 % of the average income in all manufacturing industries. The level of the income of wood industry employees is rather improving in recent years after the downward trend since the late 1990's.

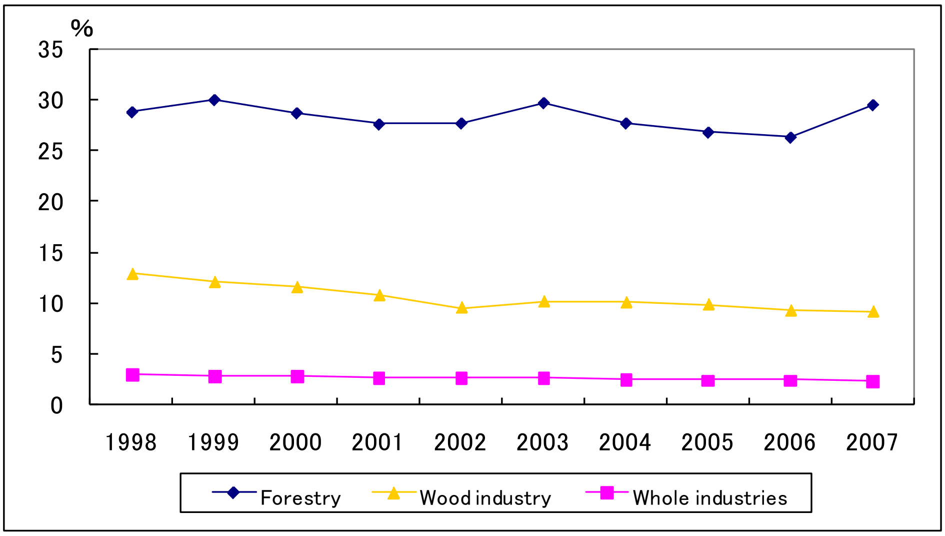
Figure 74: Change in average income rate of wood industry employees



Sources: Ministry of Economy, Trade and Industry. Statistics of Industry

Because of the nature of works which frequently require the handling of massive objects on steep slopes, the *par annum per thousand* injury rate of forest workers is about 13 times as high as the average of all industries.

Figure 75: Change in injury rate in forestry and wood industry



Sources: Forestry Agency

INDICATOR 6.3.c

Resilience of forest-dependent communities

Rationale

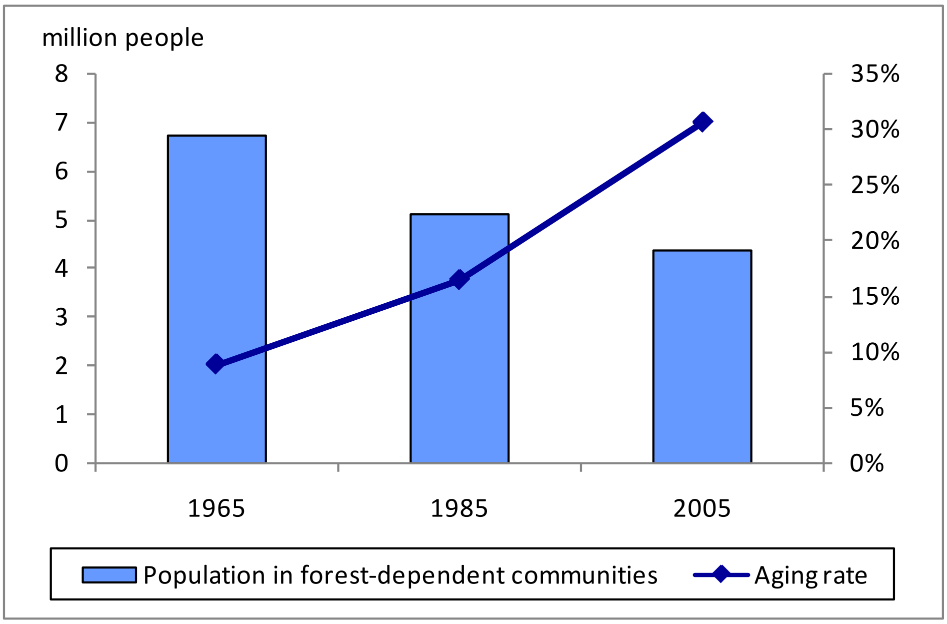
This indicator provides information on the extent to which communities dependent on forests for their wellbeing, livelihoods, subsistence, quality of life or cultural identity are able to respond and adapt to social and economic change.

Current State and Trend

The population of the forest-dependent communities has decreased in the last forty years while the total population of Japan has expanded. The aging is rapidly in progress as well in the forest-dependent communities compared with the national average. Various indices on the living conditions, such as the infrastructure development and medical access, show the inferiority of the forest-dependent communities.

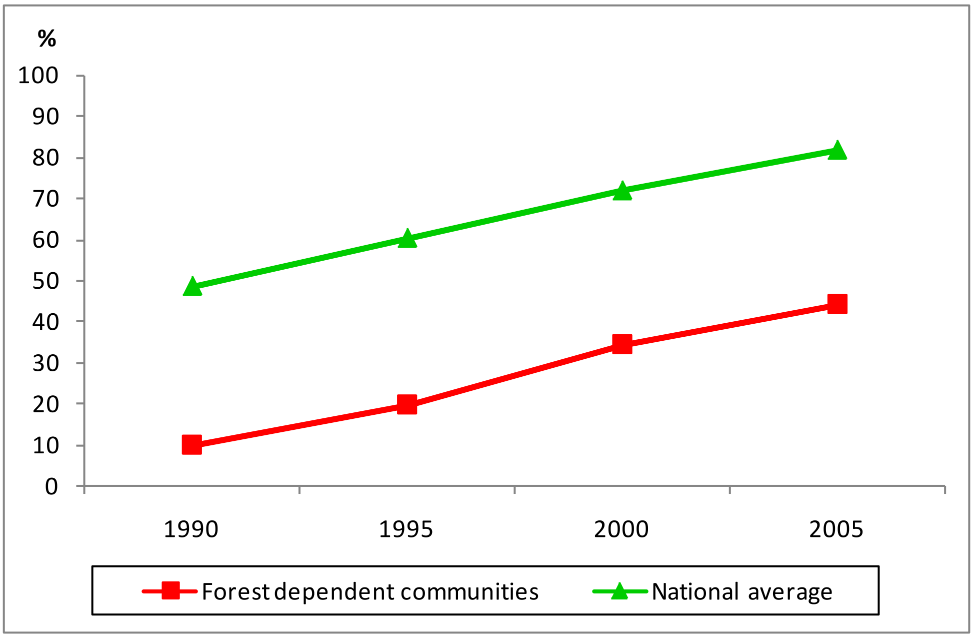
It is considered that all these figures demonstrate the declining resilience of forest-dependent communities.

Figure 76: Change in population and aging rate of forest-dependent communities



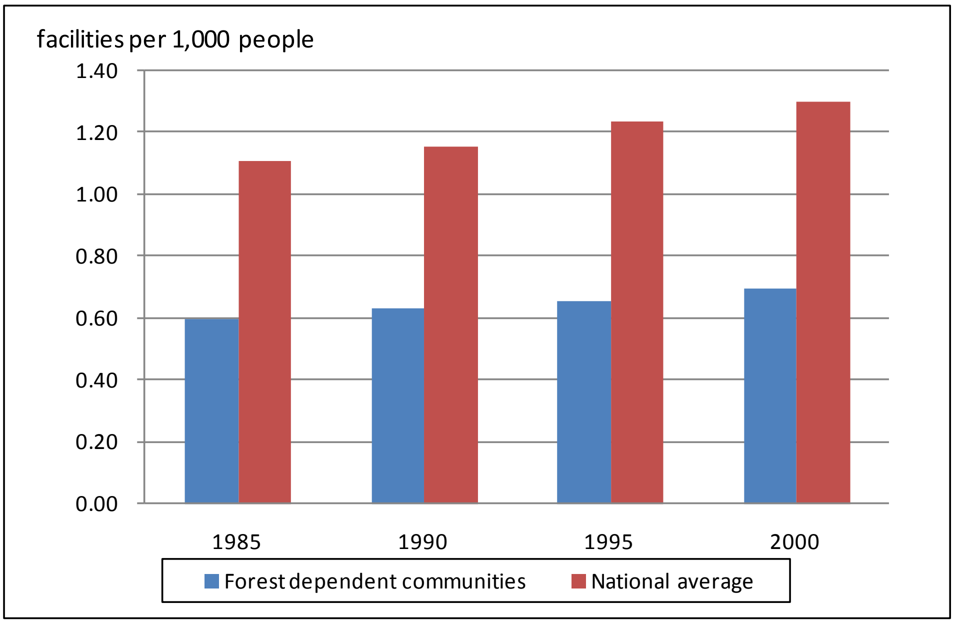
Sources: Ministry of Agriculture, Forestry and Fisheries

Figure 77: Change in the rate of flush lavatory



Sources: Ministry of Internal Affairs and Communication,
Ministry of Agriculture, Forestry and Fisheries

Figure 78: Change in the average number of medical facilities per thousand people



Sources: Ministry of Agriculture, Forestry and Fisheries,
Ministry of Health, Labor and Welfare

INDICATOR 6.3.d

Area and percent of forests used for subsistence purposes

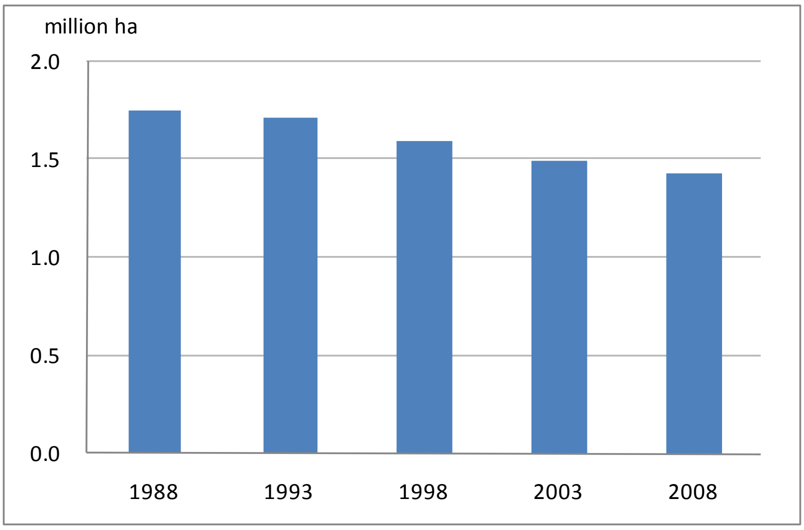
Rationale

This indicator provides information on the extent to which indigenous and other communities rely on forests as a source of basic commodities, such as food, shelter and medical plants. In some countries, the survival of cultural identity and the practice of forest-based subsistence livelihoods may be closely linked.

Current State and Trend

About 1.4 million ha of national forests, which are called common forests, are reserved for the customary use of local communities. By contract with the district forest office concerned, members of the community based groups can collect commodities for daily consumption, such as fuel wood and edible wild plants and mushrooms, for a limited amount of payment. Although the use of national forests is limited to the public undertakings, local communities are given exceptional status for such customary use. The total area of the reserved forests has constantly decreased because of the decline in local communities resulted from the diminishing and ageing population.

Figure 79: Change in the area of community use in the national forests



Sources: Forestry Agency

INDICATOR 6.3.e

Distribution of revenues derived from forest management

Rationale

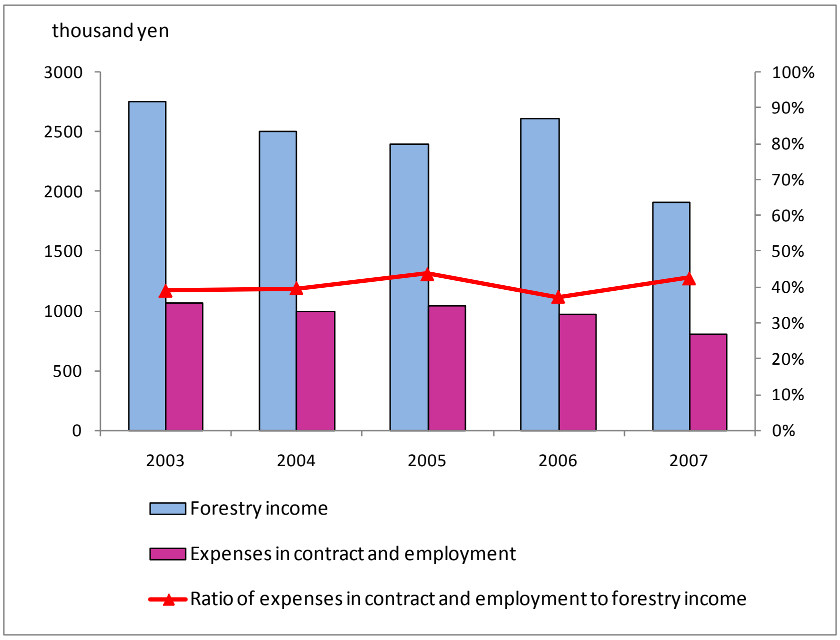
This indicator provides information about the flow and distribution of revenues from forest services, management and use back into forest-based communities, wider society and the forest sector. The way in which revenues and financial benefits arising from forests are distributed provides a measure of social equity.

Current State and Trend

The per house hold annual forestry income, including timber sales, and annual expenses in contracts and labor for forest management and profit of forest owners are 2 million Japanese yen and 800 thousand Japanese yen respectively in 2007. It is considered, therefore, that due to the diminishing profit rate resulted from the falling prices of wood and wood products, the conditions of forest management has been declining in Japan.

About 40 % of the revenue generated from forest resources was directly distributed to the local community.

Figure 80: Change in forestry income and expenses in contract and employment for forest management



Sources: Ministry of Agriculture, Forestry and Fisheries

Note: Forestry income and expenses in contract and employment are per house hold

6.4 RECREATION AND TURISM

Forests have long been used as a place for recreation and other leisure activities. These activities provide local employment, generate income and contribute to the quality of life of urban and rural communities. Environmental quality, location, availability of on-site services and accessibility are important to forest-based recreation and tourism. Levels of use are an indication of the extent to which forests are valued by society for these uses.

INDICATOR 6.4.a

Area and percent of forests available and/or managed for public recreation and tourism

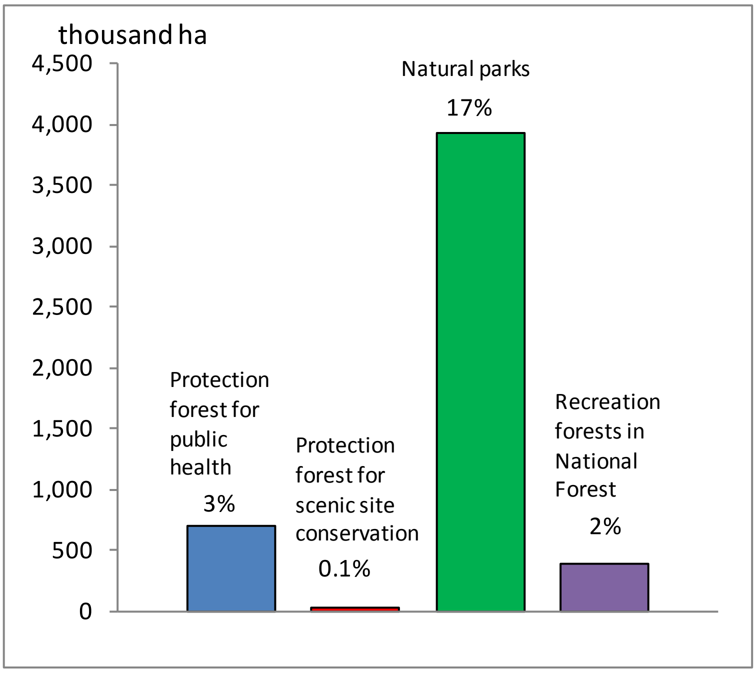
Rationale

This indicator provides information on the area and extent of forests available and/or managed for recreation and tourism activities. The pressure and demands placed on forests and associated facilities reflect their importance as a location for a wide range of recreation and tourism uses.

Current State and Trend

Forests primarily available for the public recreation include about 4 million ha of forests distributed in natural parks, about 0.4 million ha of protection forests designated for recreation and scenery and 0.4 million ha of national forests managed for recreational use and scenic conservation.

Figure 81: Area and share of forests managed for recreational and tourism purposes



Sources: Forestry Agency

INDICATOR 6.4.b

Number, type, and geographic distribution of visits attributed to recreation and tourism and related to facilities available

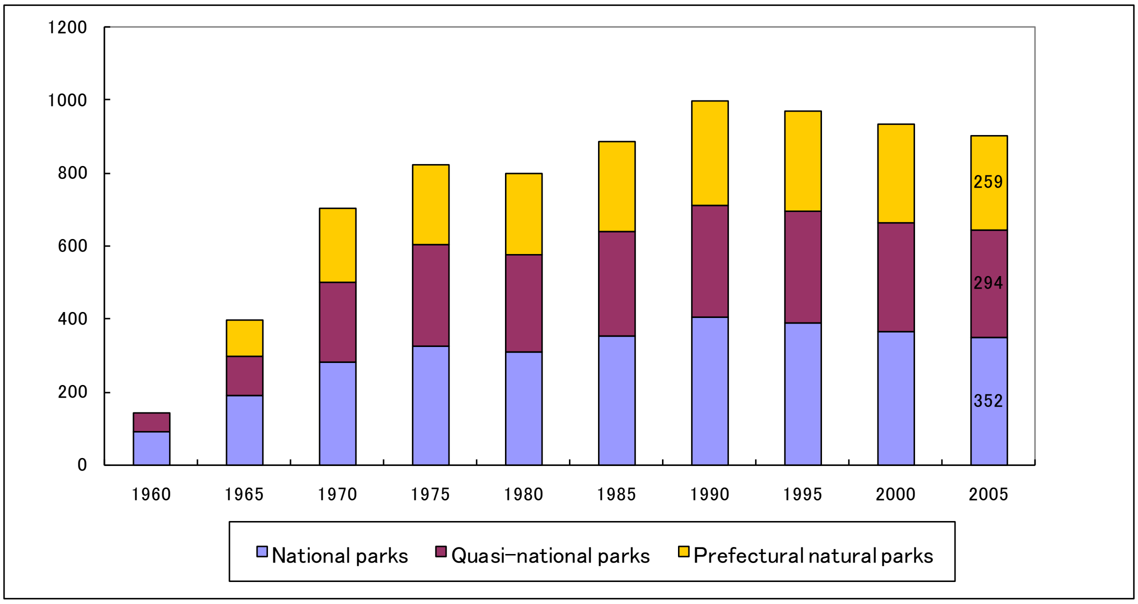
Rationale

This indicator provides a measure of the level and type of recreation and tourism use in forests, the distribution of recreational pressure and the facilities available to meet demand. The extent to which people participate in forest-based leisure activities reflects the importance of forests for recreation and tourism and the need for appropriate infrastructure.

Current State and Trend

Every year, about one million people visit natural parks in Japan. The number of visitors has been relatively stable in the last thirty years. The sharp increase in the 1960's and 1970's is attributed to the improved public awareness of natural parks and outdoor activities as a result of the enactment of Natural Park Act in 1957.

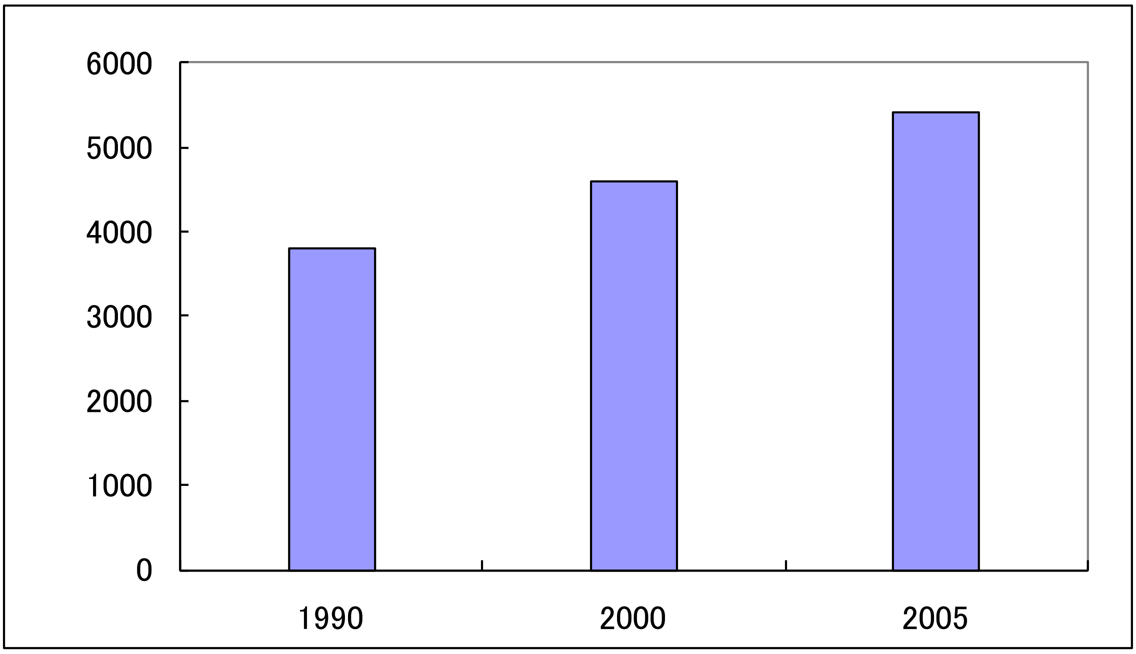
Figure 82: Change in the number of visitors to natural parks



Sources: Ministry of Environment

More than five thousand facilities are currently available for recreational and tourism activities in and around forests in Japan. Such facilities include camping grounds, ski slopes, field athletic and orienteering courses, as well as cycling roads and horse riding courses surrounded by forests. Responding to the expanding needs for forest-based recreation and tourism, the number of available facilities increased in the 1960's, through the 1980's.

Figure 83: Change in the number of facilities for forest recreation and tourism



Sources: Ministry of Agriculture, Forestry and Fisheries. Census of Agriculture and Forestry

About 400 thousand ha of national forests in total are currently reserved as the "forests for recreation" in 11 hundred separate locations. The recreational forests with suitable natural environment for in-forest activities provide a broad range of citizens and citizen groups with a variety of opportunities, such as forest wanderings, nature observation, forest education and forestry practicing.

6.5 CULTUAL, SOCIAL AND SPIRITUAL NEEDS AND VALUES

There are many social, cultural and spiritual connections between forests and people. These values may be deeply held and may influence attitudes to forests and their management.

Spiritual and cultural associations between indigenous people and forests often form part of their identity and livelihood. Beliefs, values, traditions and knowledge may have shaped forest management for many generations.

Other forest-dependent and local communities will have developed their own associations with forests and bring different approaches and attitudes to forest management. Urban populations also have needs to be met by forests and bring a different perspective to forest management.

INDICATOR 6.5.a

Area and percent of forests managed primarily to protect the range of cultural, social and spiritual needs and values

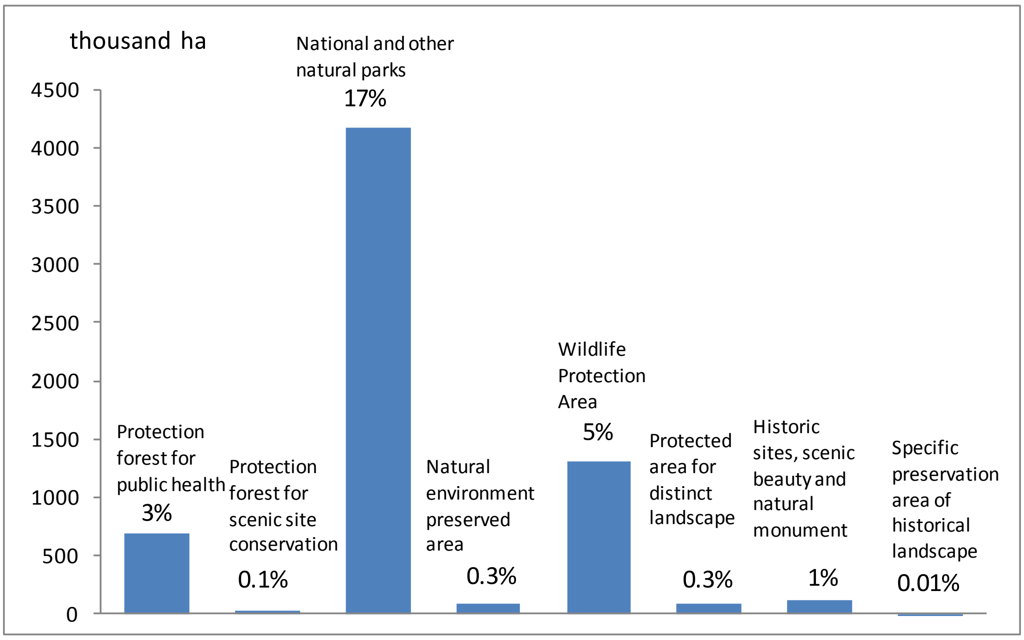
Rationale

This indicator measures the extent of forests managed primarily for cultural, social and spiritual needs and values. The protection of these qualities is important to the identity and quality of life of indigenous people and all other communities with strong ties to forests and is a reflection of the extent to which these values and needs are recognized by society.

Current State and Trend

Forests legally protected and managed primarily for the protection of a variety of cultural and spiritual needs and values include about 4 million ha of forests distributed in natural parks, X million ha of wildlife reserves, X thousand ha of protection forests designated for recreational use and X thousand ha of forests designated as cultural assets, natural monuments and cultural heritages. Besides these legally protected forests, some national forests are managed for such purposes.

Figure 84: Area and percentage of forests legally protected for cultural, social and spiritual needs and values



Sources: Forestry Agency

INDICATOR 6.5.b

The importance of forests to people

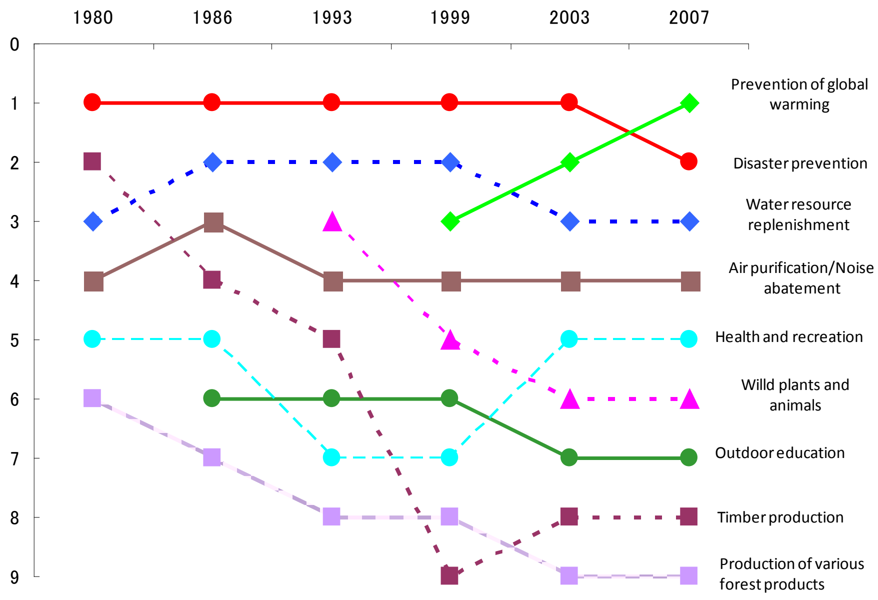
Rationale

This indicator provides information on the range of values that communities and individuals hold for forests. These values shape the way people view forests, including their behaviors and attitudes to all aspects of forest management

Current State and Trend

Currently, “prevention of climate change” is on the top of the public expectation among a variety of services provided by forests, according to the results of a series of public surveys conducted by the Ministry of Cabinet. The “prevention of disasters” and the “conservation of water resource” have maintained the higher ranking from the beginning of the surveys. The “wood production”, on the other hand, has declined over time to hold the second from the bottom currently.

Figure 85: Change in public expectations on forest



Sources: Cabinet Office. Opinion polls on forest and livelihood

CRITERION 7

LEGAL, INSTITUTIONAL AND ECONOMIC FRAMEWORK FOR FOREST CONSERVATION AND SUSTAINABLE MANAGEMENT

Criterion Seven relates to the overall economic, legal, institutional, and policy environment of a country. This Criterion provides a context for the consideration of Criteria One to Six.

Legislation, institutional capacity and economic arrangements, with associated policy measures at both national and sub-national levels, create an enabling environment for the sustainable management of forests. Reporting against these indicators contributes to raising public and political awareness of issues affecting forests and builds support for their sustainable management.

7.1 LEGAL FRAMEWORK

All countries possess a legal framework, which includes the body of laws and customary rules that direct the actions of their citizens. In some countries there are also sub-national levels of government that contribute to this legal framework. The conservation and sustainable management of forests can be greatly assisted if the national, or appropriate sub-national, legal framework includes elements relating to forests and their use. This criterion lists five areas where indicators, relevant to the legal system, can be established to demonstrate their contribution to sustainable forest management.

Extent to which the legal framework (laws, regulations and guidelines) supports the conservation and sustainable management of forests, including the extent to which it:

INDICATOR 7.1.a

Clarifies property rights, provides for appropriate land tenure arrangements, recognizes customary and traditional rights of indigenous people, and provides means of resolving property disputes by due process

Rationale

This indicator measures the extent to which the legal system addresses the issues relating to property rights and land tenure to forested land, including those of indigenous people. Stable property rights, security and certainty of ownership, and the assurance that these rights can be protected or disputed through due process are important for sustainable forest management. People or communities with secure land tenure or property rights are likelier to promote long-term sustainable forest management. In addition, people or communities who are dependent on or have a long association with particular forest areas often assume a higher level of stewardship for forests.

Current State and Trend

The property rights are fully secured under the Constitutions in Japan. In order to clarify the principles of the ownership of land, including forests are the Civil Code is provided. The process to resolve the dispute over ownership is stipulated in the procedure laws, including the Civil Procedure Act. A legal framework to secure the ownership and the process to resolve property disputes, which constitute a basis of forest management, exists in Japan.

INDICATOR 7.1.b

Provides for periodic forest-related planning, assessment, and policy review that recognizes the range of forest values, including co-ordination with relevant sectors

Rationale

This indicator addresses whether there is a legal framework that provides for forest-related planning, assessment and policy review. Forests are affected by a wide variety of influences, including many beyond the forest sector such as agriculture, transportation, energy, pollution, trade, and fiscal policies. Sustainable forest management is dependent on societies having the means to:

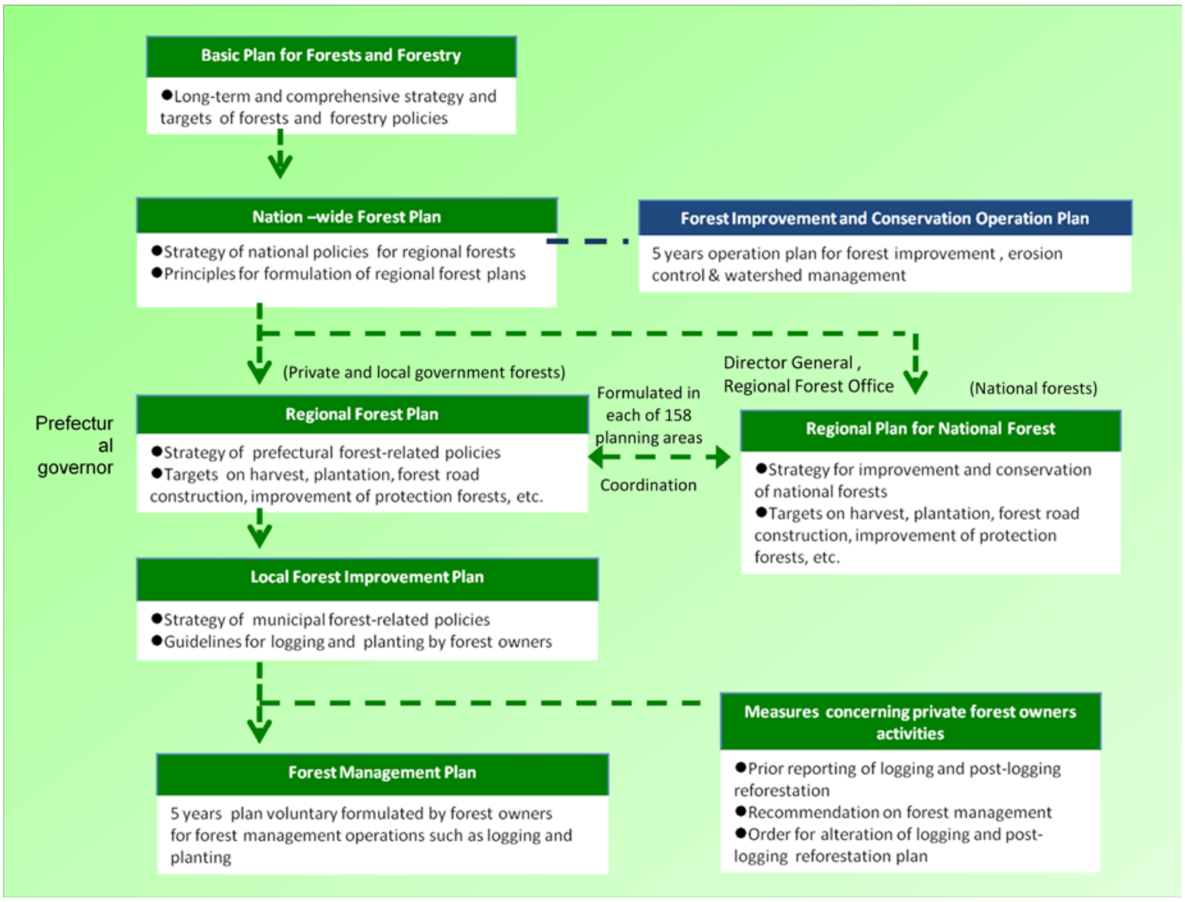
- Recognize environmental, social and economic conditions;
- Identify trends within and outside the forest sector that affect forests;
- Plan for the effective management of the full range forest values; and
- respond to needed change.

Current State and Trend

The principles of the Japan's policies on forests and forestry are laid down by the Forests and Forestry Basic Act which was fully renovated in 2001 in light of the international trends in pursuit of the sustainable forest management. In accordance with the Act, the Basic Plan for Forests and Forestry is formulated by the national government in order to ensure the concerted and progressive implementation of the policy measures for sustaining the multiple benefits from forests and steady and sound development of forestry.

Based on the Basic Plan, forest management plans are formulated at the national, district, municipal and management unit levels in a consistent manner the national and local governments and forest owners respectively in accordance with in the Forest Act. In each forest management plan, goals and management principles for the improvement and conservation of forests are identified.

Figure 86: Structure of forest management planning system



Sources: Forestry Agency

INDICATOR 7.1.c

Provides opportunities for public participation in public policy and decision-making related to forests and public access to information

Rationale

Forests may be managed more sustainably if citizens and communities have the responsibility and opportunity to actively influence and contribute to policies and programs for sound forest management. Public participation can in turn foster practical and political support for sustainable management. Timely public access to accurate information will enhance this participatory process.

Current State and Trend

The Forest Act stipulates that the national and local governments publicly open the draft of forest management plans and submit them to their respective advisory councils comprising the representatives of stakeholders for their recommendations. In the case of district and municipal forest management plans, which have closer link to the livelihood of local people and communities, the Forest Act further requires the local governments to publicize the draft for citizens' opinions and to report the advisory council on how the submitted opinions are reflected.

The Forest Act also provides a procedure for the interest citizens to appeal to the concerned national or prefectured governments for the designation or cancellation of protection forests. Once forests are designated as protection forests, certain forest operations such as logging are restricted for the protection of environmental benefits to the public.

Table 5: Legal arrangements for public information access and opinions

Category of plans	Related arrangements
Basic plan for forests and forestry	* Consultation with the Forestry Administration Coucil comprised of authorities in related areas when formulating the plan
	* Report to the Parliament and public release of the formulated plan
Nation-wide forest plan	* Consultation with the Forestry Administration Coucil and invitation of opinions from prefectural governors when formulating or amending the plan
	* Public release of the formulated or amended plan
Regional forest plan	* Public release of the draft and invitation of public opinions when formulating or amending the plan
	* Consultation of the draft with the prefectural forestry administration council
	* Public release of the formulated or amended plan
Local forest improvement plan	* Public release of the draft and invitation of public opinions when formulating or amending the plan
	* Public release of the formulated or amended plan as well as the contents of public opinions and the responses to them
Protection forests	* Invitation of opinions and holding of hearings from stakeholders when designating or canceling protection forests

Sources: Forest Act

INDICATOR 7.1.d

Encourages best practice codes for forest management

Rationale

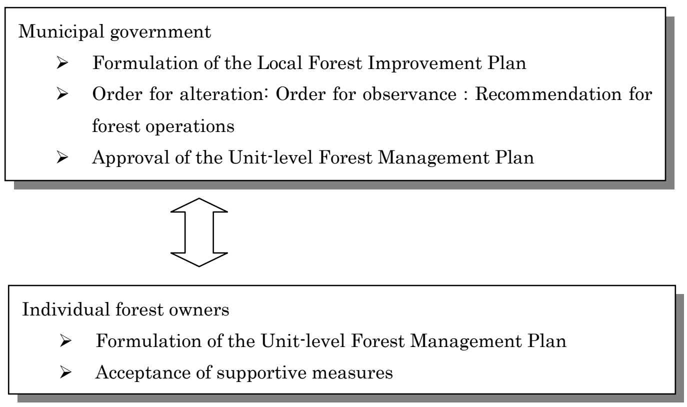
Best management codes of practice set standards and stipulations governing forest planning, management and operational activities on the ground. The presence of, and adherence to, such codes is integral to achieving forest sustainability.

Current State and Trend

The norms of the forest management practices to be observed by forest owners are laid down by the municipal forest management plans in accordance with the Forest Act. In case the notified logging or post-logging reforestation practices are regarded as inappropriate in light of the norms, the municipal government can issue an order for alternation. The municipal government can also issue a recommendation to the forest owner for necessary forest operations if the principles provided by the municipal forest management plan are not observed and, as a result, the achievement of the municipal forest management plan is to be hindered.

The unit level forest management plans, which are voluntary formulated by individual forest owners are approved by the municipal governments if the plans satisfy the principles set out by the respective municipal forest management plans. A variety of supportive measures are provided for encouraging the implementation of the planned forest management practices.

Figure 87: Legal framework for encouraging forest management practices



Sources: Forest Act

INDICATOR 7.1.e

Provides for the management of forests to conserve special environmental, cultural, social and/or scientific values

Rationale

In order to help conserve unique or otherwise special social, cultural, ecological, scientific and environmental values, formal legal mechanisms may be needed. Legal mechanisms appropriate for the conservation of special values are diverse. The absence, however, of any legal framework supporting the management of special forest values and their long-term sustainability may result in their loss.

Current State and Trend

Based on a variety of legislations, such as the Forest Act, Natural Park Act and Wildlife Protection and Hunting Act, a range of specific legal mechanisms, including protection forests, natural parks and wildlife reserves, has been developed in Japan in order to provide appropriate land management practices in response to the society's diversified needs for conserving the environmental, cultural, social and scientific values of forests.

For the protection of the environmental and conservation values of forests, in particular, protection forests are designated and the forest operations are restricted to some extent in accordance with the Forest Act.

Table 6: Legal mechanisms to conserve special environmental, cultural, social and scientific values of forests

Category	Item
Protection forest	Headwater conservation
	Soil conservation
	Erosion control
	Shifting sand control
	Windbreak
	Flood control
	Tide damage prevention
	Drought prevention
	Snow damage prevention
	Mist mitigation
	Avalanche prevention
	Stone crumbling prevention
	Firebreak
	Fish trap
	Navigation target
	Public health provision
	Historical and scenic site conservation
Area of protection works	Area of protection works

Category	Item
Forestry seeds and seedlings	Special seed tree, Special seed tree forest
Nature conservation	Wilderness area
	Special area
Nature park	Special area
Wildlife protection	Special protection area
Conservation of endangered species	Restricted area
Cultural properties protection	Historic sites, scenic spots and natural monuments
Scenic beauty	Scenic zone
Greenbelt	Conservation area of greenbelt
	Special conservation area of greenbelt
Historic scenery	Special conservation area of historic scenery
Erosion control and watershed management	Designated area for erosion control
Landslide prevention	Slagheap-landslide prevention area
Prevention of steep slope failure	Steep slope failure danger zone
Landmark for fisheries	Landmark stand for fisheries

Sources: Forest Act etc.

Table 7: Legal restriction on logging operation

Restriction	Item
Prohibition of logging	◆ Protection forest (only forest whose function may be seriously hindered by logging)
	◆ Special seed tree, special seed tree forest
	◆ Widerness area
	◆ Special protection area and 1st category special area of national and quase-national park
	◆ Designated tree and tree within wildlife protection facilities in special protection area of wildlife protection area
Advance permission of logging	◆ Protection forest (except for forest where logging is prohibited or where advance notification of logging is required)
	◆ Special area within nature conservation area
	◆ special area within national or quase-national park
	◆ Special protection area within wildlife protection area
	◆ Special conservation area of greenbelt
	◆ Historic sites, scenic spots and natural monuments
	◆ Special conservation area of historic scenery
	◆ Designated area for erosion control
	◆ Slagheap-landslide prevention area
Advance notification of logging	◆ Protection forest (in case of only thinning or selective cutting within planted forest where these operations are allowed by regulation)
	◆ Conservation area of greenbelt

Sources: Forest Act etc.

7.2 INSTITUTIONAL FRAMEWORK

Within the overall legal framework, countries possess a diversity of national and sub-national institutions that have responsibility for implementing government and private policies and programs that can promote sustainable forest management. These institutions can integrate public needs and aspirations into the policy-making process and should be encouraged on an ongoing basis. Individuals within these institutions need the skills and the means to ensure that policies and programs are implemented. A wide variety of skills are needed within institutions if they are to meet the diversity of needs of societies from forests. On-going development and maintenance of these skills are also required if institutions are to be effective. Planning, implementation, and enforcement activities should be open and transparent to provide evidence of a country's commitment to sustainability. The degree to which institutions are in place and functioning on a continuous basis can also indicate their potential to promote sustainability.

Extent to which the institutional framework supports the conservation and sustainable management of forests, including the capacity to:

INDICATOR 7.2.a

Provide for public involvement activities and public education, awareness and extension programs, and make available forest-related information

Rationale

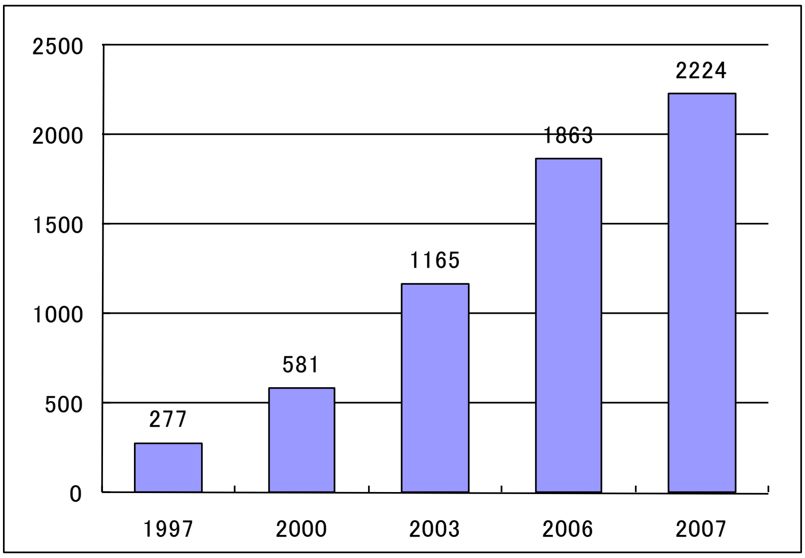
A well-informed and knowledgeable public promotes civic participation in forest activities, contributes valuable ideas and information, and is a foundation of support for sustainable forest management.

Current State and Trend

More than two thousand groups of volunteers are involved in a variety of forest-related activities, such as the improvement and conservation of neighboring forests, environmental education and the interchange between local communities and cities in 2007. The number of such voluntary group has constantly increased reflecting the uplifting public interests in forest development.

The Basic Plan for Forests and Forestry adopted by the Cabinet in 2001 encourages the public involvement in the activities related to the improvement, conservation and use of forests, as well as the further pursuit of the publicly informed forest management. Based on the Plan, supportive measures to provide the forest volunteer groups with planting field and materials have been prepared. Certification of experts, including forest instructors, that provide the recreational users with useful information, and tree doctors, has been carried out as well.

Figure 88: Change in the number of volunteer groups



Sources: Forestry Agency, White Paper on Forest and Forestry

INDICATOR 7.2.b

Undertake and implement periodic forest-related planning, assessment and policy review, including cross-sectoral planning and co-ordination

Rationale

This indicator measures the capacity of institutions to undertake planning and reviews and to co-ordinate these with other relevant sectoral activities. Effective sustainable forest management requires both the existence and application of formal procedures for planning forest activities, assessing the effectiveness of forest management activities, reviewing forest policies ensuring that forest policies and plans are co-ordinated with other sectors, and the implementation of needed changes.

Current State and Trend

The Basic Plan for Forests and Forestry is revised in every five years, by the natural government in principle taking into account the conditions surrounding forests and forestry, as well as the results of the assessment of policy measures implemented under the preceding plan. A series of forest management plans are also formulated in every five years based on the Basic Plan, and revised whenever required, even within the duration of current plans, according to the changes in circumstances.

The national forest management plan, which is formulated by the Minister for Agriculture, Forestry and Fisheries, is finalized by the adaption of the Cabinet followed by the consultations with the relevant ministries and agencies. To formulate or revise district and municipal forest management plans governors or mayors consult with the government offices in charge of the related sectors, such as environment, land use and erosion control, in accordance with the Forest Act.

Figure 89: List of government offices to be consulted in prior to the formulation or revision of national forest plan

- Consultation with port administration authority (in case of waterfront area)
- Coordination with local government offices in charge of environment, land-use, road, labor and public safety
- Opinion hearing from Regional Bureau of Economy, Trade and Industry

Sources: Forestry Agency

INDICATOR 7.2.c

Develop and maintain human resource skills across relevant disciplines

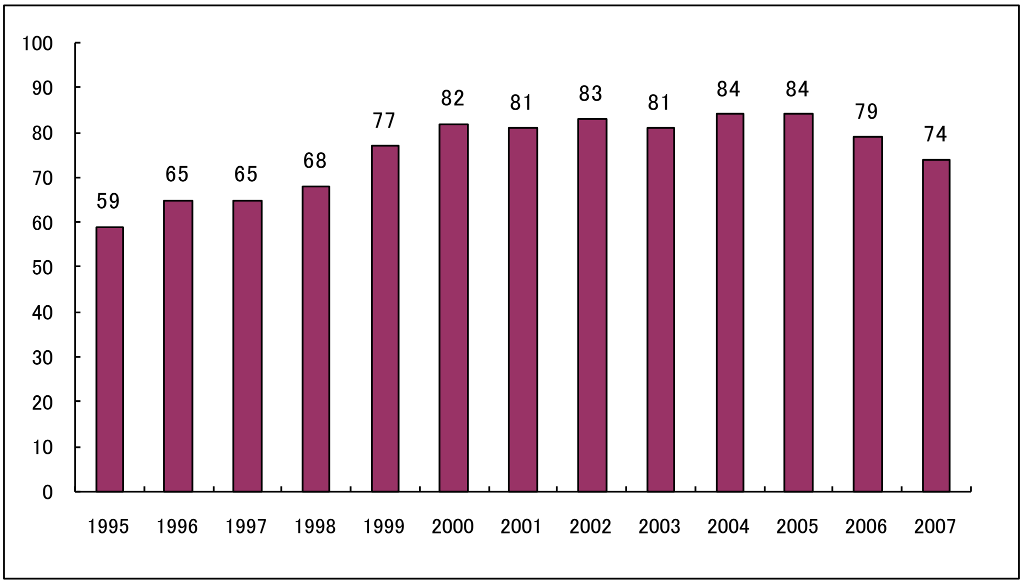
Rationale

This indicator measures the extent to which institutions demonstrate the capacity and commitment to develop and maintain the essential skills of their staff. A broad range of disciplines and skills is necessary to achieve the goals of sustainable forest management, including research, management, protection, education, recreation and tourism, as well as in the wood and non-wood forest products industries. Skills are developed through formal experience as well as through professional certification and licensing requirements, professional societies, continuing education programs, extension landowner outreach programs, and technical and trade training and assistance programs. The indicator recognizes that to maintain institutional capacity in the evolving approaches to sustainable forest management, staff needs access to ongoing developments for the maintenance of their special skills.

Current State and Trend

The Forest Training Institute (FTI) of the Forestry Agency organizes around 70-80 training courses every year to develop human resource in the public sector, including the prefecture governments as well as the Forestry Agency. The major fields of the training include forest planning, forestry mechanization and forest conservation. The coverage is being expanded in recent years, by adding new courses on the wood biomass and low-cost track system.

Figure 90: Change in the number of training courses organized by the Forest Training Center



Sources: Forestry Agency

INDICATOR 7.2.d

Develop and maintain efficient physical infrastructure to facilitate the supply of forest products and services and support forest management

Rationale

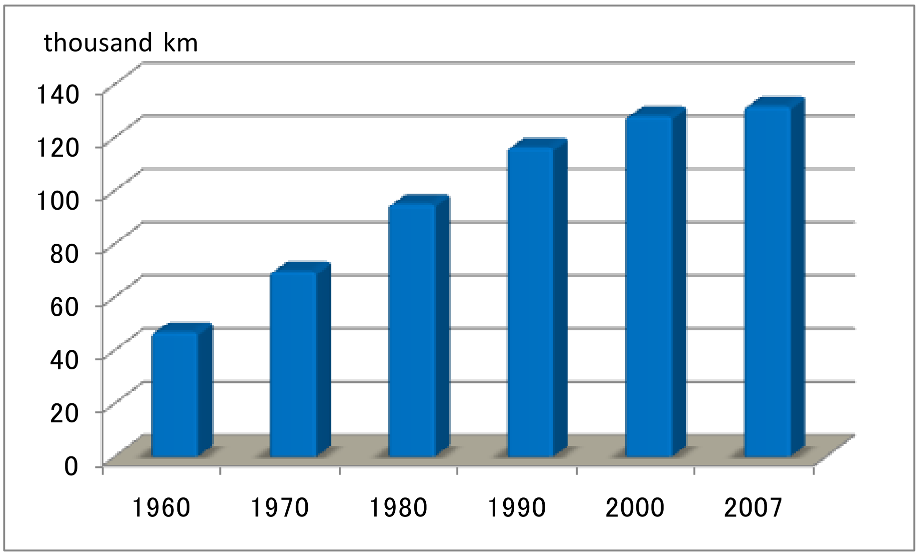
This indicator measures the capacity of institutions to provide the necessary infrastructure that permits access to the forest needed for sustainable management activities (for example, for inventory and assessment, monitoring, research, enforcement, fire management and resource protection, recreation, and efficient harvesting and transportation of products). Appropriate infrastructure is essential to the sustainable supply of forest products and services.

Current State and Trend

The total mileage of forest road, which is an important infrastructures for the forest management, has reached about 130 thousand kilometers currently. Although the total mileage has constantly increased, the annual extension rate is declining in recent years due to the rising cost of construction resulted from the adaption of environmentally friendly construction methods as well as the worsening accessibility of the construction sites.

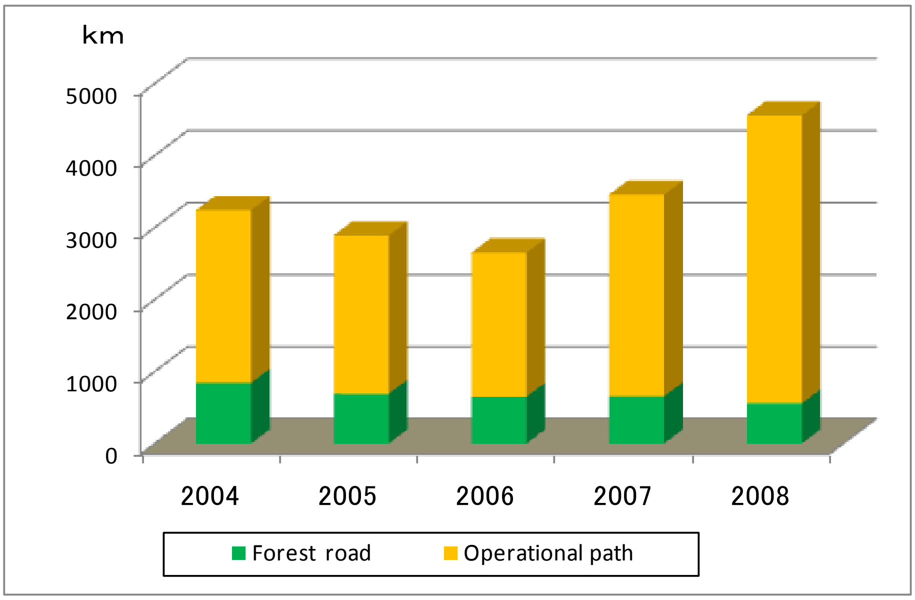
The construction of low-cost operational tracks, on the other hand, which contribute to the efficient use of high-performance forestry machineries, is increasing in its total mileage. In order to ensure the access to forests and efficient forest operations, and to facilitate the improvement and conservation of forests, it is vitally important to develop networks of forest roads and low-cost operational tracks.

Figure 91: Change in total mileage of forest road



Sources: Forestry Agency

Figure 92: Change in mileage of newly constructed forest roads and low-cost operational tracks

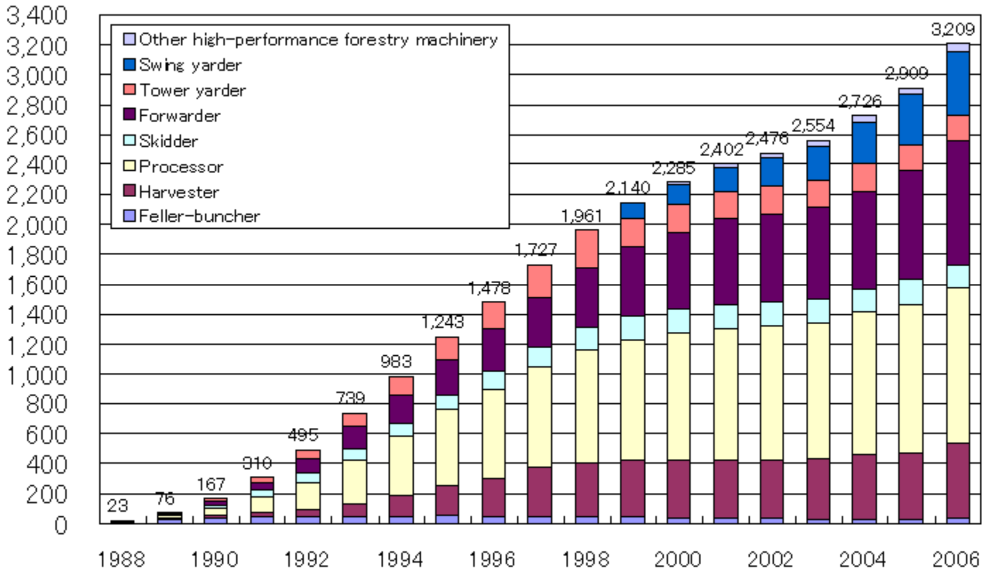


Sources: Forestry Agency

A significant progress has been observed in the last two decades in the use of high-performance forestry machineries in Japan. The number of high-performance forestry machineries existing in 2007 is about 35 thousand, which is seven times as much as the number in fifteen year ago. The major machineries include processors, harvesters and forwarders which together occupies about 70% of the total.

It is highly expected that the operation system comprising road networks and high-performance forestry machineries will contribute to implementation of the low-cost and efficient forest operations and the progress in thinning of planted forests.

Figure 93: Change in the number of existing heavy forest machineries



Sources: Forestry Agency Website

INDICATOR 7.2.e

Enforce laws, regulations and guidelines

Rationale

The effectiveness of laws and regulations that are intended to promote forest conservation and sustainable management will be increased with adequate oversight and enforcement

Current State and Trend

A variety of operational measures have been taken in Japan in order to ensure that the logging and post logging reforestation operations are appropriately implemented by forest owners in accordance with the legislations and regulations concerned.

In preparation for the cases where these forest operations are not properly implemented, in particular, necessary arrangements which enable the concerned mayors to submit recommendations and orders to the forest owners. In addition, operational manuals which interpret legal measures and procedures are prepared for municipal governments, and forest patrolling is reinforced with the assistance of local communities.

7.3 ECONOMIC FRAMEWORK

Forests provide good and services that contribute to a nation's gross domestic product. It is important that government policies which influence the economic behavior of producers and consumers of forest goods and services encourage the maintenance or development rather than degradation or depletion of forests.

INDICATOR 7.3.a

Investment and taxation policies and a regulatory environment which recognize the long-term nature of investments and permit the flow of capital in and out of the forest sector in response to market signals, non-market economic valuations, and public policy decisions in order to meet long-term demands for forest products and services

Rationale

There are many ways in which investment and taxation policies may cause the stock of forest capital to be maintained and/or development in the long term. Taxation policies, for example, are critical to whether forestland is maintained, degraded or converted to other uses. Different types of taxation could provide different incentives to maintain forests as long-term investments.

Taxation policies should recognize forest investment is long-term, and often characterized by irregular income, and should avoid penalizing forest owners for these conditions.

Full and fair accounting for the economic and environmental services from forests for example water quality, carbon stores, recreation, wildlife and biodiversity, is important for the sustainable management of forests.

Current State and trend

With the aim of encouraging sustained and proper management of forests, exceptional arrangements are provided for forest owners in the taxation, as well as the loan and credit schemes, in Japan. In consideration of the long-term nature of forest investment, which normally generates revenue after decades, payment is reduced for some tax items, such as income tax, corporation tax, and inheritance tax, in the case of forest owners.

As a part of the local taxation, forest environment tax is levied in 29 prefectures in 2008 in order to generate necessary funding for a variety of forest-related activities. The total income generated from this tax is around 18 billion Japanese yen, about 80% of which is used in the forest development and improvement.

Figure 94: List of institutional arrangements for forest owners

National government
◇Exceptional arrangement in forestry-related taxation
(Income tax, Corporation tax, Inheritance tax, etc.)
◇Forestry-related finance
(Forest management fostering loan fund)
◇Credit guarantee system for forestry

Prefectural government
◇Forest environment tax
(Inhabitants tax, Corporation tax)

Sources: Forestry Agency

INDICATOR 7.3.b

Non-discriminatory trade policies for forest products

Rationale

Discriminatory trade policies that distort market signals can affect sustainable forest management. On the other hand, trade liberalization can have both positive and negative impacts on sustainable forest management depending on environmental, economic, and social policies that accompany it. Policies should not provide market signals that inadvertently work against sustainable forest management.

Discriminatory trade policies may include quotas, tariff and non-tariff barriers, export subsidies, subsidies on inputs (such as power, transportation, or processing), and domestic price support. Obvious distorting measures are quantitative restrictions such as import and export quotas that block market signals. Another example is “escalating tariffs” where countries impose relatively low import duties on less processed forest products such as logs, but progressively higher duties on more processed products.

Current State and Trend

Japan has adapted non-discriminatory trade policies in accordance with GATT or WTO. The current rate of import duties on forest products is 2.0% in average after the repeated cuts resulted from a series of trade negotiations.

In consideration of the possible negative effects of trade liberalization, which may cause a decline in the incentive to forest management in importing countries, as well as the depletion of forest resource in exporting countries, Japan believes that an international framework to improve the governance of forests ensuring the sustainable use of forest resource is to be established.

Table 8: List of import duties on major forest products

Logs (wood in the rough) except *Paulownia* spp. (Kiri)	Free	Plywood (other broadleaved)	6.0 %
Wood in chips	Free	Plywood (coniferous)	6.0 %
Sawn wood (Hemlock, Douglas Fir)	Free	Laminated lumber	6.0 %
Sawn wood (*Pinus, Abies*, and *Picea* spp.)	4.8 %	Structural laminated lumber	3.9 %
Plywood (tropical wood)	6.0 – 10.0 %	Average of bound rates (2008)	2.0 %

Sources: Forestry Agency

7.4 MEASURE AND MONITOR

The conservation and sustainable management of forests depends on the capacity to measure and monitor, in a continuous, reliable and agreed fashion, forest related biological, social and economic conditions. These can then be reported to management and stakeholders. An open and transparent measuring and monitoring system should support the generation of policies and investment promoting sustainability.

INDICATOR 7.4.a

Availability and extent to up-to-date data, statistics and other information important to measuring and describing indicators associated with criteria 1-7

Rationale

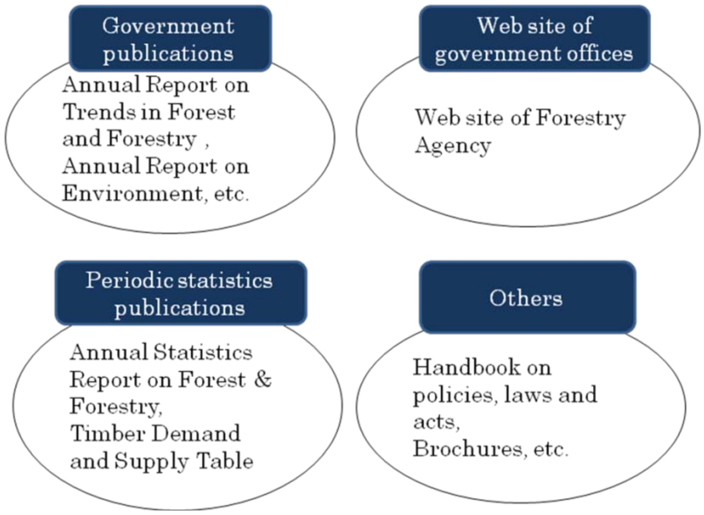
Widespread, accessible, and up-to-date information covering criteria 1-7 is important for timely and effective decision-making.

Current State and Trend

A broad range of forest-related information, such as the forest inventory data and the statistics on forestry, wood industry, forest products, as well as the information on forest-related legislation, institutions, plans, programs and projects, are periodically collected, compiled and publicized mainly by the relevant government offices, including the Forestry Agency and the Ministry of Agriculture, Forestry and Fisheries. The indicators of the Montreal Process are mostly covered by the existing information, as described in this report.

The majority of the collected and compiled information is made available to the public through the formal reports, including the annual reports, a variety of publications, including bulletins, booklets and pamphlets, and web sites, as well as the press releases.

Figure 95: Information sources related to forest and forestry



Sources: Forestry Agency

INDICATOR 7.4.b

Scope, frequency and statistical reliability of forest inventories, assessments, monitoring and other relevant information

Rationale

Released information and decision-making should be based on comprehensive, current and sound data.

Current State and Trend

In formulating district forest management plans, established in every 5 years to each of the 158 river basins, forest inventory data are revised and forest planning maps are adjusted by the prefecture government for the concerning forest planning district divided on a basis of major river basins. Based on the revised forest inventory data, forest management plan is formulated and forest maps are subsequently revised in every five years.

Nationwide data on the area and the growing stock of forests are collected and compiled with the use of the inventory data upon the formulation of management plan.

With the intention of contributing to the progress in sustainable forest management, Forest Resource Monitoring Survey has been carried out since 1999 in order to closely monitor the state of forest located at each of the 16 thousand monitoring spots allocated at every 4 kilometer grid at five year intervals. The compiled data, which contain detailed information of forest ecosystems, including the composition of species, ground vegetation, state of dead trees and barked trees and the composition of soil, are well utilized in this report.

Table 9: Details of major forest surveys

Title	Objective	Frequency	Major properties inspected
Forest survey for establishing forest management plan	To provide basic reference for establishing regional and local level forest plan.	Every five years in each forest planning area	Forested area, geology, soil, forest type, tree species, growing stock, designation by laws, applied type of forest operation
National Forest Inventory	To provide basic reference for establishing Nation-Wide Forest Plan	Every 5 years	As above
Forest Resource Monitoring Survey	To collect data on forest ecosystems including biological diversity that are not grasped by above two surveys and provide basic information to the regional and local level forest plans	Five year rolling base. Ground survey on one fifth of the total plots every year.	Stand structure, stumps, deadwood, floor vegetation, degree of soil erosion

Sources: Forestry Agency

INDICATOR 7.4.c

Compatibility with other countries in measuring, monitoring and reporting on indicators

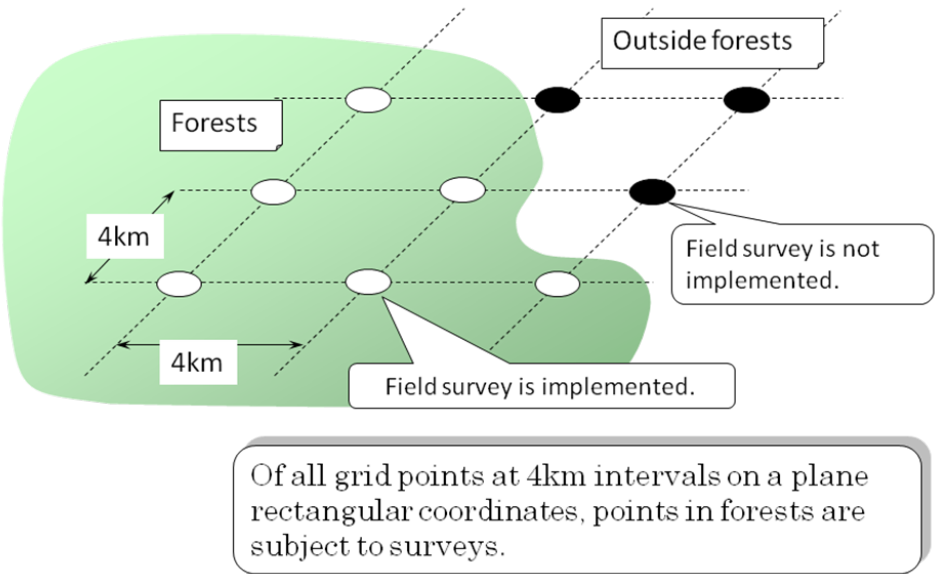
Rationale

Compatible protocols for measuring and reporting can provide for enhanced co-operation and collaboration, thus increasing the efficiency of data gathering. Compatibility also enhances the accuracy and usefulness of global assessments and improves global dialogue. Further, similar data sets allow for adjacent countries to assess their shared ecosystems.

Current State and Trend

The Forest Resource Monitoring Survey, which has been carried out in Japan since 1999, employs a sampling method in collecting the detailed information on forests. Because the sampling method is popularly used in the forest surveys in many of the temperate and boreal forest countries, including member countries of the Montreal Process, it is expected that the introduction of the monitoring survey enables Japan to increase the comparability of the forest-related information with those countries.

Figure 96: Structure of monitoring spot of Forest Resources Monitoring Survey of Japan



Sources: Forestry Agency

7.5 RESEARCH AND DEVELOPMENT

Countries rely upon a base of knowledge to support the conservation and sustainable management of forests. New methods, approaches, concepts, and techniques to enhance this knowledge base should be developed and integrated within decision-making frameworks if full benefits from forests are to be realized. Goals of sustainability can be achieved by enhancing the capacity to conduct research and development.

INDICATOR 7.5.a

Development of scientific understanding of forest ecosystem characteristics and functions

Rationale

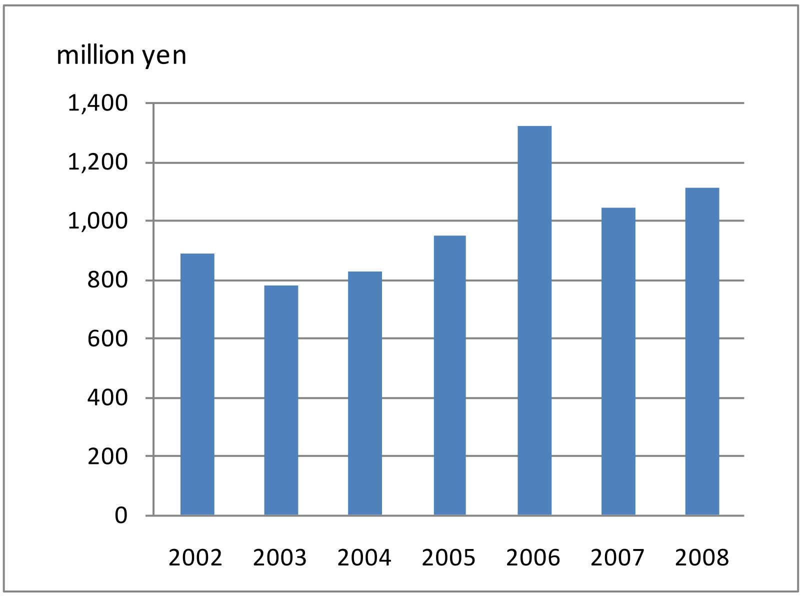
A good understanding of forest ecosystems is essential to the conservation and sustainable management of those ecosystems.

Current State and Trend

The Forestry and Forest Products Research Institute (FFPRI), which is one of the major research organizations in the forest sector in Japan, currently invests more than one billion Japanese yen in the research activities related to forest ecology. The expenditure of the FFPRI is in a upward trend in recent years.

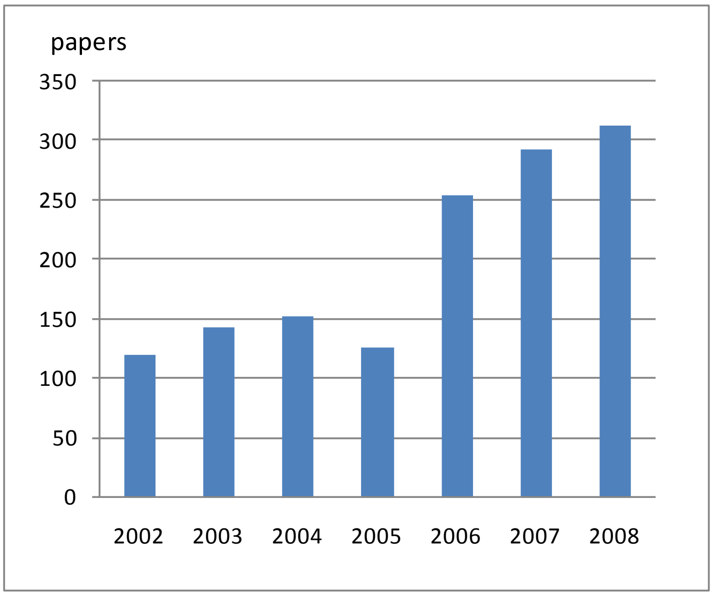
Based on the findings of those research activities, about three hundred papers, which occupies 60-70% of the total number of papers published by the FFPRI, have been written in the last three years, The number of papers are rapidly increasing in this field.

Figure 97: Change in budget allocation for research activities related to forest ecology research at FFPRI



Sources: Forestry and Forest Products Research Institute

Figure 98: Change in the number of papers related to forest ecology at FFPRI



Sources: Forestry and Forest Products Research Institute

INDICATOT 7.5.b

Development of methodologies to measure and integrate environmental and social costs and benefits into market and public policies, and to reflect forest-related resources depletion or replenishment in national accounting systems

Rationale

This indicator describes national emphasis being given to developing methods that integrate forest-related resources and environmental and social values into market and public decision-making. In the past, decision-making have generally been unable to quantify many important social and environmental values of forests. Therefore, decisions were often based primarily on traditional economic measurements of forest market values. The indicator also shows progress in the development of methods that incorporate forest resource, environmental and social data into national accounting systems.

Current State and Trend

Methodologies to measure the environmental and social values include the Contingent Valuation Method (CVM)[26]X and the Substitution Method[27], which have been used in the estimation of a variety of non-marketable values, including those of forests and agriculture in Japan.

Although studies have been conducted, no methodology has been developed yet to integrate the estimated environmental and social values of forests into public policies or to reflect them into the national accounting systems.

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[26] ***Contingent Valuation Method (CVM)*** is a method to measure non-marketable values by carrying out a questionnaire to estimate how much money citizens are willing to pay to keep the values.

[27] ***Substitution Method*** is a method to measure non-marketable values from the costs of constructing facilities or purchasing articles which generate equivalent values.

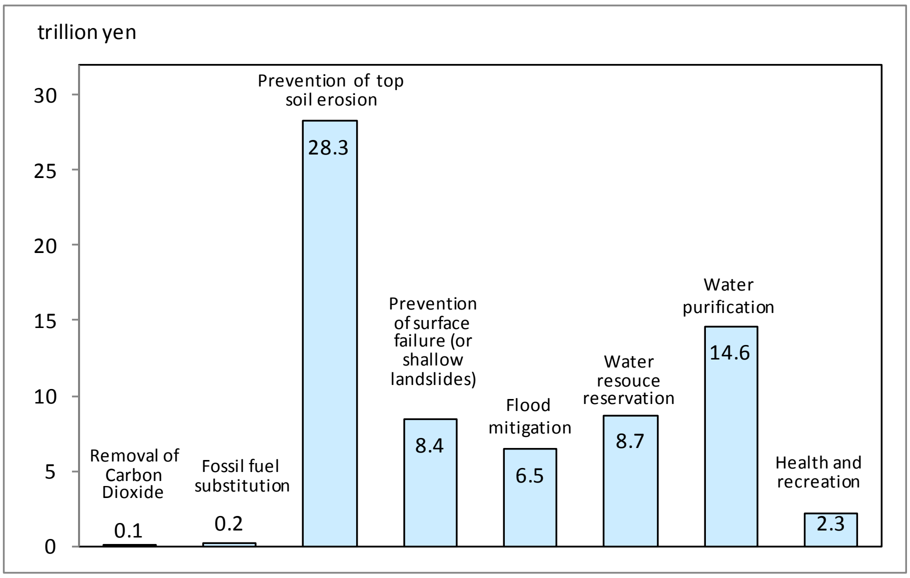
Box6: The Environmental and social benefits from forests

The Science Council of Japan estimated the values of the environmental and conservation benefits generated from forests in 2001 with the use of Substitution Method responding to the consultation by the Minister for Agriculture, Forestry and Fisheries.

According to the estimates, the total of the values amounted to 70 trillion Japanese yen only for those estimated.

It clearly demonstrates that we are enjoying enormous benefits from forests.

Figure 99: Value estimation of forest functions



Sources: Science Council of Japan. Report to the Minister of Agriculture, Forestry and Fisheries

INDICATOR 7.5.c

New technologies and the capacity to assess the socio-economic consequences associated with the introduction of new technologies

Rationale

The forest sector should be broadly defined to include not only the wood and non-wood forest products industries, but also forest research, management, protection, education, recreation, and tourism. New technologies can have positive or negative effects on the forest sector. It is important to assess these potential effects, in order to determine whether to promote or discourage new technologies.

Current State and Trend

In order to avoid the negative impact of the new methods or technologies, such as the soil erosion by the construction of low-cost operational tracks and the soil compaction by the use of high-performance forestry machineries, technical studies or assessment by expert groups, if necessary, are conducted in prior to their introduction. Through these measures, improvement of the method or selection of alternative technologies is further considered.

Wood is an environmentally friendly material which consumes less energy and emissions less CO_2 in the manufacturing process compared with other materials. With the intention of making such advantage of wood be conveyed to consumers, development of methodologies to “visualize” the CO_2 emissions in the manufacturing process is now being conducted.

INDICATOR 7.5.d

Enhancement of ability to predict impacts of human intervention on forests

Rationale

Effective public decision-making on sustainable forest management requires the accurate prediction of impacts of forest-based activities. This indicator aims to demonstrate the current capacity of research to predict the impact of human intervention on forests.

Current State and Trend

With the aim of contributing to the protection of endangered bird species, such as Blakiston's Fish Owl (*Keputa blakiston*), Black Woodpecker (*Dryocopus martius*) and some raptorial birds, the Regional Forest Offices have developed guidelines to be applied to the forest operations in their respective national forests. Based on the guidelines, some forest operations, such as logging, are suspended. Research findings on the ecology of those species have been fully reflected to the respective guidelines through the consultations to the researchers concerned.

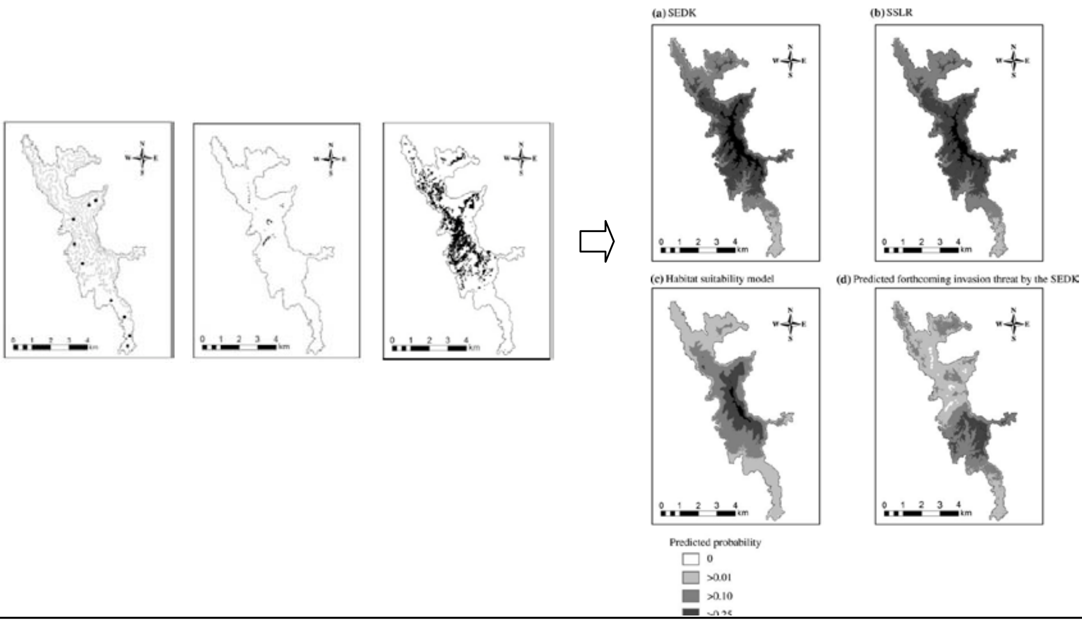
Box7: The spread of exotic species

On the Ogasawara Islands, which is one of a few oceanic islands in Japan, unique ecosystems with a high rate of endemic species are maintained. Such highly valuable nature on the islands have been eroded by the spread of exotic species.

Akagi (*Bischofia javanica*) is one of such exotic species, which has rapidly expanded its distribution area since its introduction in 1930 displacing the indigenous species mainly in gaps in forests, including those with high conservation values.

With the aim of assisting the consideration of effective countermeasures, a study to identify the potential distribution areas has been carried out by the Forestry and Forest Products Research Institute (FFPRI). Eradication project has also been conducted by the Forestry Agency since 2002. As a result of these efforts, Akagi was completely eradicated on some islands and yang trees of indigenous species have significantly increased also on other islands.

Figure 100: Expansion of distribution of Akagi (*Bischofia javanica*) on the Ogasawara Islands



INDICATOR 7.5.e

Ability to predict impacts on forests of possible climate change

Rationale

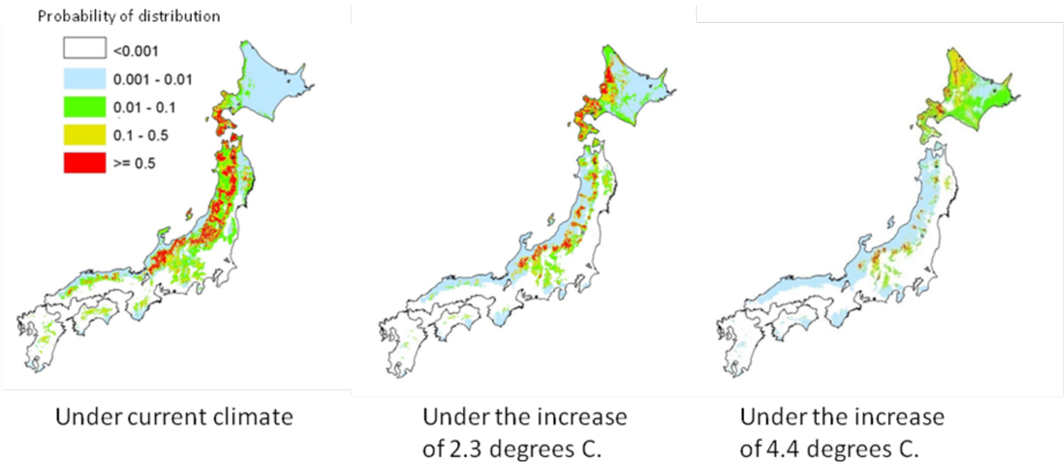
This indicator measures the ability to predict potentially significant impact on forests from climate change. An improved ability to predict such impacts should enable early mitigating actions, thus improving the likelihood for sustainable management.

Current State and Trend

Research organizations in Japan, including the Forestry and Forest Product Research Institute (FFPRI), are currently engaged in a variety of studies to predict the possible impact of climate change on forests. The research findings indicate that the potential distribution range of beech forests and sub-alpine forests, may be marginalized due to the rising temperature and changing precipitation and the damages by the pine beetle syndrome may expand to the northern end of Honsyu Island due to increasing damage risks.

In the case of beech forest, which is one of the major deciduous broadleaved forests in Japan, it is predicted that the suitable growing area may shrink to the 56% and the 21% of the current level respectively if the average temperature rises by 2.3℃ and 4.4℃ respectively.

Figure 101: Prediction of the suitable habitats for beech (*Fagus crenata*) forests under climate warming



Sources: Matsui et al. (2009)

POSTSCRIPT

Improvement in the Information Collection

In this second country report of Japan, information is provided for 62 indicators which account for 97% of the 64 indicators subject to report. The percentage of the reported indicators has increased compared with the 91% reported in the first country report published in 2003. The newly covered indicators include Indicator 1.2.c (Efforts focused on conservation of species diversity), Indicator 1.3.c (Efforts focused on conservation of genetic diversity) and Indicator 6.1.c (Revenue from forest-based environmental services).

Improvement was observed also in the quality of the provided information as well. For example, more detailed or inclusive information is provided for Indicator 6.3.c (Resilience of forest-dependent communities) and Indicator 7.2.d (Physical infrastructure for forest management). More relevant information is identified and provided for some indicators, such as Indicator 1.1.c (Fragmentation of forests) and Indicator 6.2.a (Capital investment in forest management, etc.), with respect to the aims of these indicators respectively.

Such improvement is largely attributed to the implementation of Forest Resource Monitoring Survey, in which key components of forest ecosystems, such as the state of all plant species, including tree species, and the condition of soil, are closely monitored. Combination of the plot data newly collected at the 16 thousand fixed monitoring spots with the blanket data compiled in the traditional forest inventory system provides us with extremely useful information on forests on the national scale, as demonstrated by the results for Indicator 1.1.a (Forest ecosystem types) and Indicator 4.2.b (Soil degradation). For the better understanding and assessment of forests, further improvement in the accuracy of measurements, as well as the better use of data obtained through the Monitoring Survey, is highly valuable.

Challenges by the Montreal Process

Areas for future challenges by the Montreal Process have been also recognized through the works to produce this second country report, as well as the discussions in the Montreal process. The revision of indicators in the past three years, which considerably improved their operability, has made it rather clear what breakthrough is to be made for the further progress of the Montreal Process.

One of such areas is a possible expansion of the scope of indicators under Criterion 3, which currently cover only biotic and abiotic damages on forests. Because the multiple benefits of forest are generated through the functions of forest ecosystems, the sustainability of forest management is primarily conditioned on the healthy and vital forest ecosystems. In spite of all difficulties, therefore, efforts should be continued for finding an appropriate way to capture the health and vitality of forest ecosystems. It should be noted, in this connection, that the Working Group of the Montreal Process decided to assign a task to the Technical Advisory Committee (TAC) to "recommend how Montreal process indicators can assist in identifying and monitoring forest degradation trends" in its 20th meeting held in the Republic of Korea in 2009. This new challenge is expected to contribute not only to the further progress of the Montreal Process itself but also to the global efforts toward the reducing emissions from deforestation and forest degradation in developing countries (REDD) under the United Nations Convention on Climate Change (UNFCCC).

Another area for future challenges is related to the traditional issue of how the measurements of indicators are to be assessed collectively in the context of the sustainability of forest management. With the recognized supportive and trade-off relations existing among indicators, it is presumably possible to develop some useful methodology to effectively analyze and present the results of the application of indicators. In this respect, it is fully welcomed that the Technical Advisory Committee (TAC) will soon set out on its work to "develop a synthesis of member countries' work undertaken to improve communicating indicator data" based on the decision made by the Working Group at its 20th meeting.

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