Annual Report on Forest and Forestry in Japan

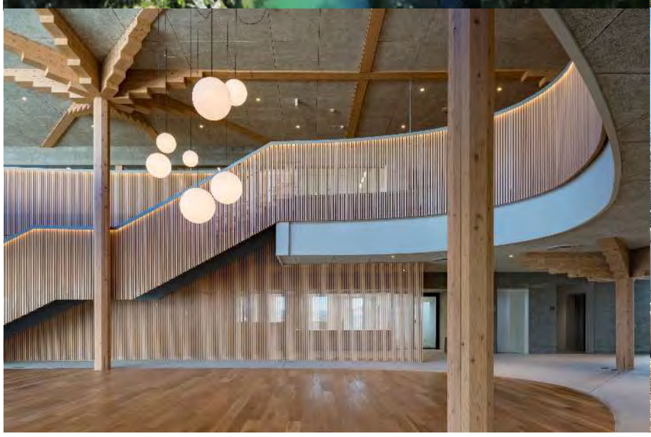
Fiscal Year 2023

(Summary)

Forestry Agency

Ministry of Agriculture, Forestry and Fisheries, Japan






The Annual Report on Forest and Forestry is a report which the Government of Japan (GOJ) submits to the Diet every year, in accordance with article 10 of the Forest and Forestry Basic Act. This document is a summary of the annual report for fiscal year (FY) 2023.

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Special Topic

Pollen and Forests

Summery

Planted forests account for about 40% of forests in Japan, many of which have now grown into well-developed forests, providing a variety of values to society. Major species of planted forests in Japan is Sugi, known as Japanese cedar (*Cryptomeria japonica*, hereinafter referred to as cedar), due to its broad adaptability to various locations and high growth rate.

On the other hand, pollen allergy has become a serious issue in Japan, with cedar pollen being the most common cause. About 40% of the population suffers from cedar pollen allergy every spring. Japanese society demands that people's health be taken into consideration in the management of planted forests.

The Government of Japan (GOJ) decided to strengthen measures to reduce pollen dispersal in 2024. These measures include improving forestry efficiency, motivating forest owners to engage in forestry and increasing seedling production, as well as improving wood utilization techniques and disseminating the significance of wood use to consumers to promote wood use.

These efforts are expected to advance the transformation of forest structure and to reduce the social problems caused by planted forests, also to enhance the forest functions, thereby providing a basis for society to take a greater interest in and be involved actively in forest benefits.

Comprehensive societal efforts by the whole society are required to aim for a more harmonious relationship between people and forests.

1. History of the Use and Development of Forest Resources

(1) Expansion of Forest Resource Use and Development of Reforestation Techniques

In prehistoric times, the Japanese archipelago was estimated to be covered widely with forests consisting of conifers such as cedar and Hinoki, known as Japanese cypress (*Chamaecyparis obtusa*, hereinafter referred to as cypress), as well as deciduous or evergreen broadleaf trees such as those in the beech family (Fig. 1). From the 7th century onwards, the use of cedar and cypress, which have excellent characteristics as building materials, increased due to large-scale national construction projects. The area of logging activities gradually expanded from ones near the capitals (Nara and Kyoto).

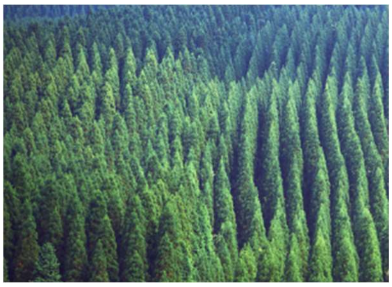
Jisho-zan protected forests
(Osaki City, Miyagi Prefecture)

Kasuga-yama Primeval forests
(Nara City, Nara Prefecture)

Fig. 1 Primeval natural cedar forests in Japan

As natural resources of cedar and cypress decreased, forestry work involving planting of cedar and other trees began to take place in various regions around the 16th century. Subsequently, forestry regions were formed to meet urban demand in areas where timber could be transported by river (Fig. 2).

Yoshino region (Nara Prefecture)



Obi region (Miyazaki Prefecture)

Fig. 2 Traditional cedar forestry areas in Japan

Cedar, in particular, has advantages in terms of management: being able to grow in a wide range of locations due to the wide variety of cultivars available, its fast growth, and its high yield per area, as well as its straight and easy-to-process timber that can be used for various purposes including buildings, ships, and daily utensils. As a result, reforestation techniques for cedar have developed throughout the country.

From the Meiji period in the 19th century onwards, the demand for timber as a material for modern industry increased further, leading to expansion of forestry areas.

Pollen analysis has revealed that Japan's forests have undergone many changes over the past 500,000 years. During cold glacial periods, subarctic conifers from the pine family increased, while temperate conifers such as cedars and broadleaf trees were confined to a small area in the south. During warm interglacial periods, temperate conifers and broadleaf trees became dominant.

MIS	10,000 years ago	Glacial/Interglacial periods	Climate	Vegetation (Kamiyoshi Basin, Lake Biwa)
1	Present～1	Postglacial	Warm	Temperate conifers and evergreen broad-leaved trees
2	1～3	Last Glacial Maximum	Cold	Pine family conifers
3	3～6	Subinterglacial	Slightly warm	Temperate conifers
4	6～7	Subglacial	Cold	Pine family conifers
5a-5d	7～11	Subinterglacial	Slightly warm	Temperate conifers
5e	11～12	Last interglacial	Warm	Temperate conifers and evergreen broad-leaved trees
6	12～19	Glacial	Cold	Pine family conifers
7	19～24	Interglacial	Warm	Temperate conifers
8	24～30	Glacial	Cold	Pine family conifers
9	30～34	Interglacial	Warm	Temperate conifers
10	34～37	Glacial	Cold	Pine family conifers
11	37～42	Interglacial	Warm	Temperate conifers and evergreen broad-leaved trees
12	42～48	Glacial	Cold	Pine family conifers

Source: Yumoto, Takakazu (2011) *35,000 Years of the Japanese Archipelago; An Environmental History between Humanity and Nature, 6, Technique for environmental history,* Bun-ichi Sogo Shuppan

Vegetation change in Western Japan (Kamiyoshi Basin, Lake Biwa)

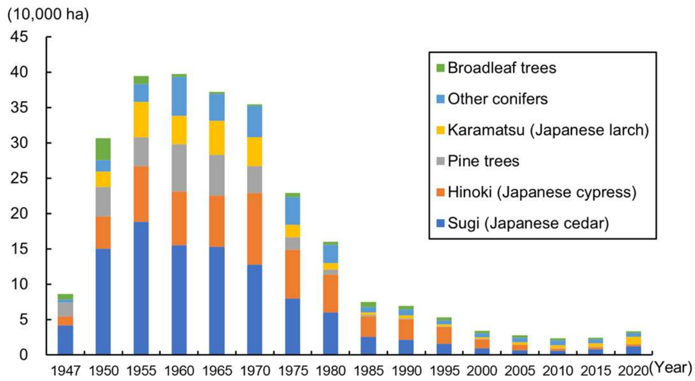
(2) Expansion of Planted Forests After World War II

Large amounts of timber were needed for military supplies during World War II and for reconstruction materials after the war, which led to extensive logging.

A strong social demand for rapid forest recovery in logged areas led to the progress of reforestation with conifers such as cedar, for which reforestation techniques were well established. Abandoned logged areas were almost reforested within about 10 years after the war.

Furthermore, rapid economic growth rose the demand for building timber and its prices. Broadleaf forests were converted into coniferous plantation due to decrease of the demand of broadleaf trees as fuel and fertilizer. Later, the conversion rate decreased due to a shortage of suitable areas for forestry and uncertainties about the future of wood prices caused by reduced tariffs.

Thus, planted forests such as cedar forests were intensively established from the 1950s to the 1970s (Fig. 3). As a result, the area of planted forests increased from about 5 million hectares in 1949 to about 10 million hectares at present, with cedar becoming the main forestry species, accounting for 40% of that total.



Source: Survey by Forestry Agency

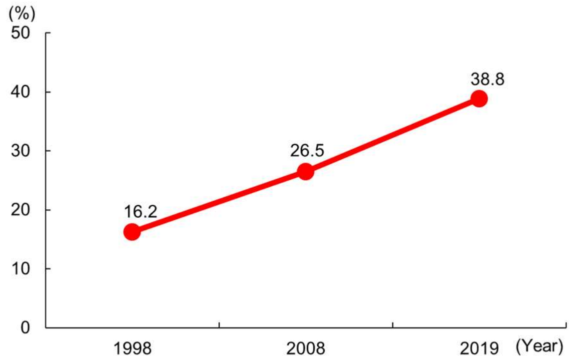
Fig. 3 Area of forestation by species after World War Ⅱ

2. Emergence of Pollen Allergy Caused by Japanese Cedar and Policy Responses

(1) Emergence of Hay Fever Caused by Cedar and Others

In the 19th century, hay fever caused by grass in the UK and by ragweed in the US were known, but there were no reports in Japan.

Cedar pollen allergy in Japan was first reported in 1964. Subsequent nationwide epidemiological surveys estimated that the prevalence rate increased from 16% in 1998 to 39% in 2019 (Fig. 4). The primary reason for this long-term increase in prevalence is that symptoms rarely disappear naturally once hay fever develops and the number of sufferers accumulates. Other factors that are pointed out include an increase in pollen



Source: Matsubara, Atsushi, et al. (2019) “Epidemiological Survey of Allergic Rhinitis in Japan 2019” *Nippon Jibiinkoka Gakkai Kaiho*, 123(6)

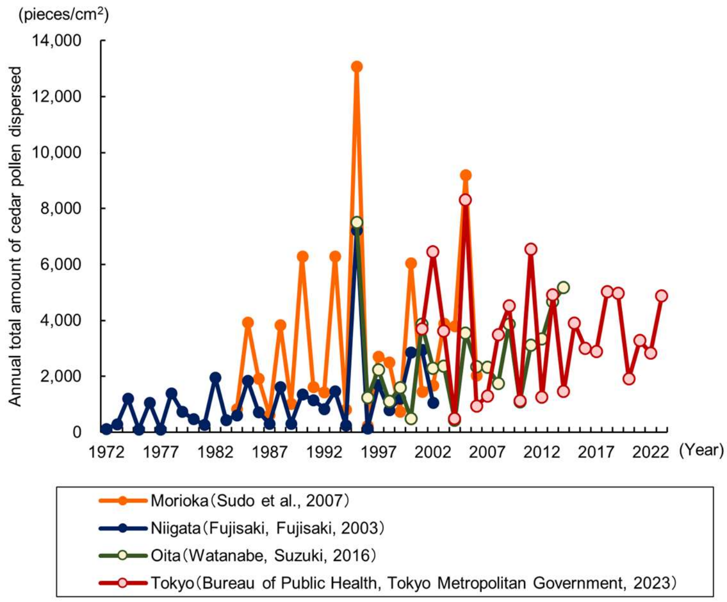
Fig. 4 Prevalence of cedar pollen allergy

dispersion during this period (Fig. 5), changes in diet, and a decrease in infectious diseases. Additionally, factors that may worsen symptoms include air pollutants, stress, and dry circumstances in urban areas.

One possible reason for the increase in pollen dispersion is that the area of cedar forests aged 20 years and above, which start producing male cone, has been increasing with the growth of planted cedar forests since 1970 (Fig. 6).

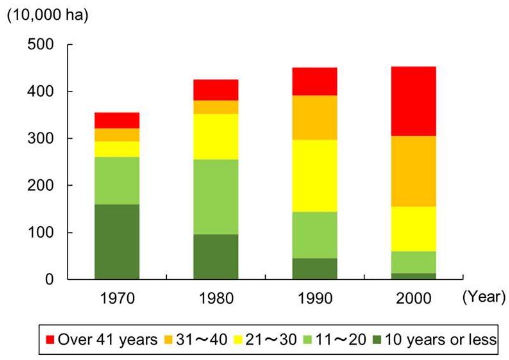
Cypress often causes cypress pollen allergies to occur alongside cedar pollen allergies because both species are in the same family and their pollen has similar allergens. Cypress is commonly planted in western Japan.

In Hokkaido, many people suffer from pollen allergy caused by birch and grass as there are few cedar trees due to the cold climate.



Source: Kuramoto, Shigeo (2017) "Climate Change and Pollinosis" *Environmental information science, 50 (1)*

Fig. 5 Total number of cedar pollen dispersal



Source: FAO "The FAO World Programme for the Census of Agriculture"

Fig. 6 Area of planted cedar forests by forest age

(2) Previous Measures Against Hay Fever and Pollen Sources

The Forestry Agency has been surveying the male cone formation status in cedar forests across the country since FY1987.

In 1990, a liaison meeting of relevant ministries and agencies was established.

In 1991, the Forestry Agency began investigating the selection of cedars with lower pollen production, which have been made available for practical use since 1996. These cedar varieties were developed from first generation plus-trees and include varieties with low amounts of male cones (low-pollen cedar varieties) (Fig. 7), and varieties that produce male cones with no pollen due to genetic mutations (pollen-free cedar varieties) (Fig. 8). The Ministry of Agriculture, Forestry and Fisheries (MAFF) requires low pollen production as a condition when designating mother trees that should be especially promoted from the second generation plus-trees (elite trees).

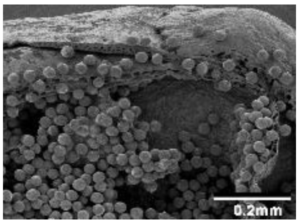
Common Cedar

Low-pollen cedar varieties

(Kanzaki No.15)

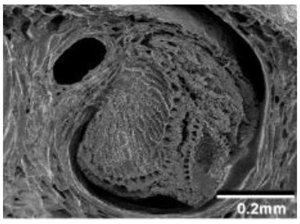
(© Forest Tree Breeding Center)

Fig. 7 Examples of low-pollen cedar varieties



Inside of male cone of common cedar

Pollen is formed.



Inside of male cone of pollen-free cedar varieties

Pollen is not formed.

(© Forest Tree Breeding Center)

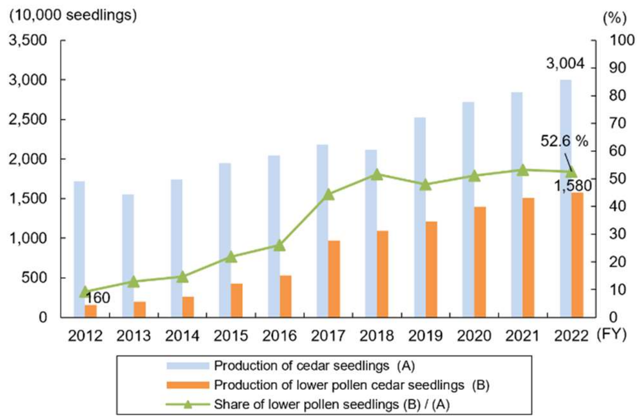
Fig. 8 Examples of pollen-free cedar varieties

In 2001, the GOJ clearly stated the promotion of measures against pollen allergy in the Basic Plan for Forest and Forestry, which was launched in that year under a new law.

The GOJ has supported efforts by log producers to encourage forest owners to replant with lower-pollen trees since 2016.

In particular, the production of lower pollen cedar seedlings is currently progressing, reached at 50% of cedar seedlings produced being lower pollen varieties (Fig. 9).

Allergen immunotherapy has been developed, and pharmaceutical companies are using cedar pollen as raw materials for treatment drugs.



Source: Survey by Forestry Agency

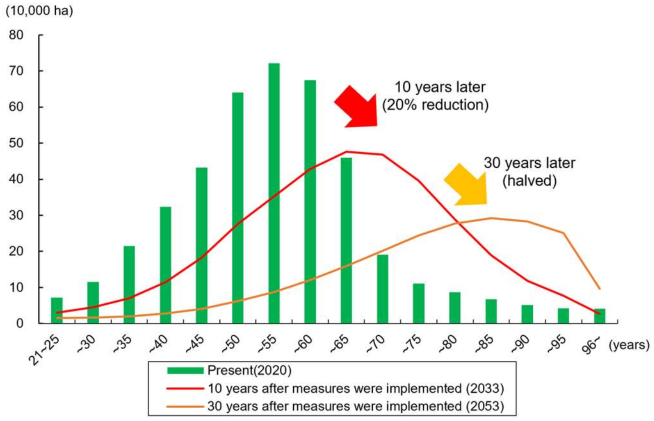
Note: The production of lower pollen cedar seedlings includes the seedlings of low-pollen cedar varieties and pollen-free cedar varieties.

Fig. 9 Production of lower pollen cedar seedlings

3. Acceleration of Countermeasures against Pollen Sources and Challenges

(1) Future Countermeasures against Pollen Sources

As the conventional pollen allergy countermeasures have not successfully reduced the number of patients or alleviated symptoms, the GOJ established a ministerial meeting of pollen allergy in April 2023, and in May, it decided on "Overall Picture of the Measures Against Pollen Allergy" to implement more effective measures. In this plan, the GOJ set a goal of reducing the area of cedar forests which are sources of pollen, by 20% in 10 years through measures to reduce pollen sources. Achieving this goal is expected to reduce pollen levels, even in high-pollen years, to the average level of the past decade. Additionally, the goal is to halve the pollen emission in about 30 years (Fig. 10). The following comprehensive measures will be implemented to reduce pollen sources: 1) accelerating logging and replanting, 2) expanding demand for cedar wood, 3) increasing production of lower pollen cedar seedlings, 4) improving forestry productivity and securing workforce (Fig. 11).



Source: "Overall Picture of the Measures Against Pollen Allergy" (Decision of the ministerial meeting of hay fever on May 30, 2023)

Fig. 10 Future of planted cedar forests as a source of pollen

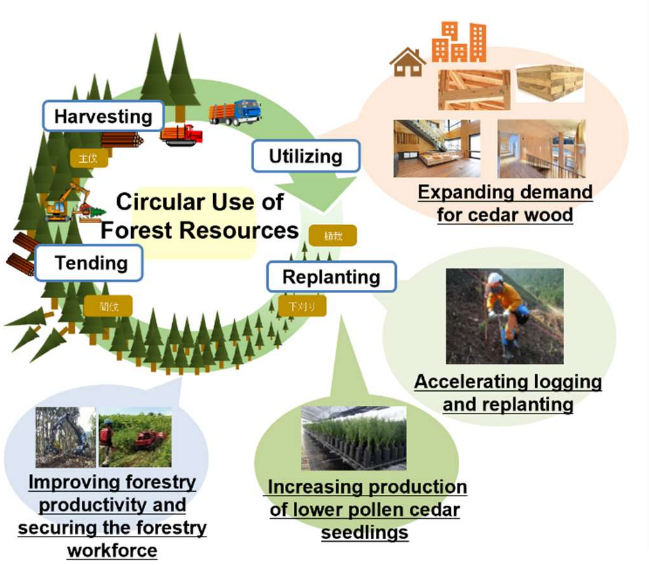


Fig. 11 Efforts to reduce pollen sources

(2) Efforts for Countermeasures against Pollen Source

1) Accelerating logging and replanting

The GOJ and prefectures will promote the consolidation of forestry operations, the development of forestry road systems and the integrated logging and replanting activities in areas with clusters of planted cedar forests near densely populated regions.

In addition, they will promote the transition of planted cedar forests, which are located in conditions unsuitable for forestry, to mixed forests.

2) Expanding demand for cedar wood

The "Overall Picture of the Measures Against Pollen Allergy" aims to expand the demand for cedar wood from the current 12.4 million m^3 to 17.1 million m^3 over the next 10 years by promoting a shift to cedar wood products in the wooden housing sector, which currently accounts for the majority of demand for wood products for construction, and by doubling the number of constructions for large buildings using wood.

To achieve this, the Forestry Agency supports efforts in wood industry, such as enhancing the performance of wooden materials and optimizing the production systems. Additionally, the Forestry Agency and other related ministries support the establishment of a labeling system that visualizes the amount of wood used in buildings in the housing sector to enhance appeal to home buyers.

In the large building sector, they promote the development of high-strength and fire-resistant wooden materials that meet building standards, the dissemination of the cost and time-saving advantages of wooden construction to building owners, and the display of carbon storage amounts.

Additionally, it is expected that cedar wood will see an expansion of its use in building interiors and exteriors, as well as furniture, and an increase in exports, leveraging its characteristics: lightweight, shock-absorbing, thermally insulating, moisture-regulating, and having a unique pleasant aroma (Fig. 12).

Solid cedar wood with cushioning properties for the floor of the children's play area

(© NPO Association for the Arts, Toy and Playing Activities (Tokyo Toy Museum))

Fireproof construction using thick cedar boards to realize exposed wood exterior

Horikiri House

(© TEAMSAKURA)

Fig. 12 Examples of utilizing cedar wood products for interior and exterior

3) Increasing production of lower pollen cedar seedlings

The "Overall Picture of the Measures Against Pollen Allergy" sets a goal to increase the production rate of lower pollen cedar seedlings from the current 50% to over 90% in 10 years.

The Forestry Agency is promoting the development of facilities to reproduce the original seedlings at the Forest Tree Breeding Center, seed and hedge orchards at prefectures, and containerized seedling production facilities at private seedling producers.

The development of high-growth and pollen-free cedar is expected to become easier as DNA markers to identify the presence of pollen-free genes have been developed.

4) Improving forestry productivity and securing the forestry workforce

The Forestry Agency promotes efforts over the next 10 years to improve productivity and secure the current level of the workforce in response to increase of logging and replanting.

The Agency supports the introduction of advanced forestry machinery suitable for Japan's steep terrain to improve productivity (Fig. 13). Moreover, the Agency enhances the development of new forestry workers, improvement of worker conditions by increasing the profitability of forestry contractors, improvement of worker safety, acceptance of foreign skilled workers, and the promotion of dual employment by workers in other industries to secure the workforce.

Advanced forestry machinery capable of logging to timber processing (Harvester)

Remote-controlled skyline logging cable winche

Fig. 13 Technologies contributing to the improvement of forestry productivity

4. Toward a More Harmonious Relationship Between People and Forests

(1) The Ideal State of Forests as Directed by the Basic Plan for Forest and Forestry

Forests are "Green social capital", which brings various benefits to the people. Long-term efforts are necessary to create a balanced variety of forests that prioritize functions relevant to each location to ensure the multiple functions of forests to realize the multiple functions of forests effectively and sustainably. The Basic Plan for Forest and Forestry, since its formulation in 2001, has set forth the following policy: Forests that are suitable for forestry, such as being fertile, highly productive, with gentle slopes, and close to roads, should be maintained as forests that promote the circular use of resources through logging and replanting. Planted forests in conditions unsuitable for forestry should be gradually converted to mixed forests of conifers and broadleaf trees through repeated light logging and natural regeneration to bring them closer to natural forests. Natural forests should be conserved properly (Fig. 14).

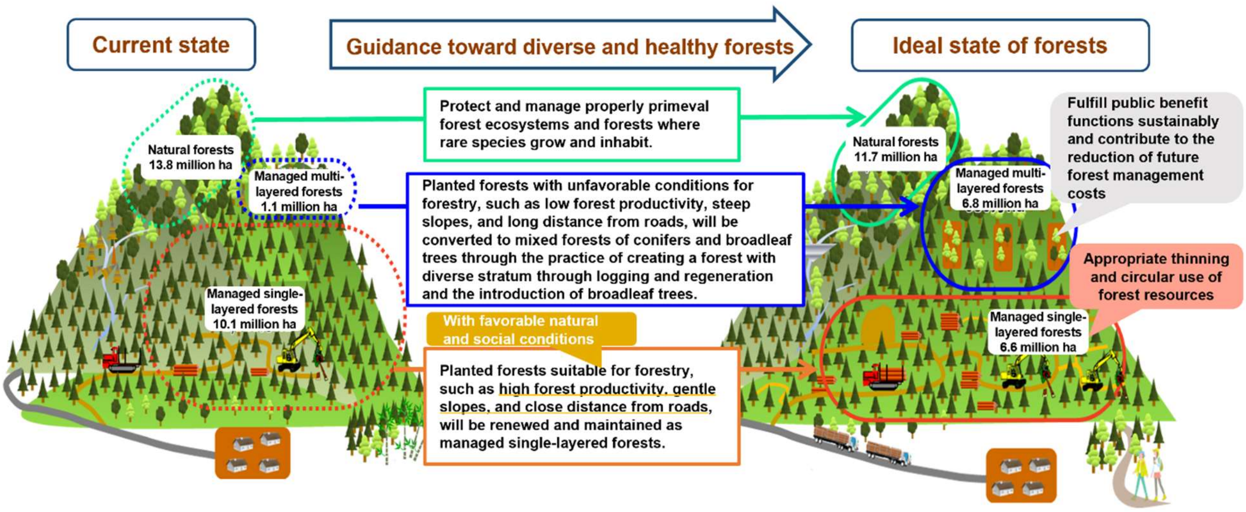


Fig. 14 Ideal state of forests as directed by the Basic Plan for Forest and Forestry

(2) Forest Management Responding to Diverse Public Needs, including Countermeasures against Pollen Sources

Countermeasures against pollen sources are consistent with the forest management envisioned by the Basic Plan for Forest and Forestry. The promotion of logging and the planting of developed seedlings, in areas where planted cedar forests are to be maintained as planted forests, contributes to reducing pollen levels and enhancing capacity of carbon sink, as well as revitalizing forestry.

For planted forests that should be converted closer to natural forests, reducing the number of cedar trees can lead to pollen reduction and the sustained realization of public benefits.

Accelerating this transformation of forest structure is expected to reduce negative impact on society caused by pollen and to enhance forest functions. This also provides a basis for the public to become more interested in and more actively involved in the benefits of forests.

These comprehensive societal efforts by the whole society are required to aim for a more harmonious relationship between people and forests.