

Forests and Water - The Japanese Experience -

ANDO, Nobuhiro
Watershed Management Office, Forestry Agency,
Ministry of Agriculture, Forestry, and Fisheries, Japan

1. Current State of Japanese Forests

Japan is one of the most forest rich countries in the world together with Brazil, Finland, etc. However, forest area per capita is very limited compared with these countries due to the high population density.

Approximately 25 million hectares or 67% of our country is covered with forests, and of which about 32% is nationally owned. About 53% of all forests is coniferous and the rest is broad-leaved. About 80% of coniferous forests or 44% of the entire forests are artificially planted.

2. Climatic and Geological Conditions

Japan receives 1,714 mm of precipitation annually which is about twice as much as the world average of 973 mm/year. However, the per capita precipitation is only about 1/4 of the world average because of the high population density. In addition, because Japan consists of steep terrains, the slopes of major rivers are very steep compared with major rivers in the world, and rain flows out to the sea quickly. Therefore, Japan is not necessarily the country with rich water resources, and it is crucial to utilize water resources effectively.

3. Recent History of Japanese Forests

When the Meiji era came, western civilization was adapted quickly and rapid modernization took place, and demand of wood products for various uses such as construction, telegraph poles, and crossties for railroad increased drastically. Moreover, massive deforestation became serious in the second half of Meiji era as consumption of wood for the fuel for iron and salt manufacture and other industries increased. As a result, approximately ten percent of country area turned into the desolation ground, and earth flowed out of the bald mountain at the time of rain had caused successive occurrence of mountainous calamities. Based on these occurrences, the system of the protection forest which restricts felling of forests was inaugurated.

During World War II, massive deforestation again took place for munitions. Moreover, large quantity of wood products were needed for the postwar revival term, and massive deforestation and desolation of the nation's land progressed. Therefore, restoration of the devastated land by the forest conservation project and the afforestation project were applied by the government.

The "forestry basic law" was replaced in July, 2001 by the "forest and the forestry basic law", and the basic ideas were converted from timber production to the exertion of the multi-functions of forests.

4. Protection Forest System

In order to promote prompt restoration of forests devastated by large calamities occurred successively, "Temporary Measures Law for Protection Forest Consolidation" was enacted in 1953. Based on this law, the Minister of Agriculture, Forestry and Fisheries defined the "Protection Forest Improvement Plan" to designated protection forest immediately.

Protection Forest is designated by the Minister of Agriculture, Forestry and Fisheries or the prefectural governors in order to attain specific functions of the forest such as water resources conservation, disaster prevention, formation of comfortable living environment, and so on.

At protection forest, restriction of felling and the obligation of planting after cutting are imposed in compensation with tax exemption to maintain their specific functions.

As of March 2002, there are 17 types of protection forests, and 8.9 million hectares of forests or 1/3 of the nation's land area is designated as protection forest, of which 72% is for water resources conservation.

5. Valuation of the Multi-functions of forests

The public-benefit-functions which forests possess were valued by the Science Council of Japan in November, 2001. According to its report, forests possess a function of conserving global environment such as absorption of carbon dioxide, soil and land corrosion prevention, water resources conservation, and so on. The water resources conservation function can be divided into three functions, mitigation of flood, storage of water resources, and purification of water according to the report.

Moreover, the report states that functions of flood mitigation, water resources storage, and water purification are valued for the total of 30 trillion yen per year.

(1) Mitigation of Flood (6.5 trillion yen/yr)

Forest soil has many small crevices so that it absorbs and stores the rain like sponge, and slowly discharge water over time. Through this process, peak discharge corresponding to rain storms is diminished.

(2) Storage of Water Resources (8.7 trillion yen/yr)

Forest soil stores water and discharge it gradually. A stream in forests does not easily dry up even if no precipitation occurs for many days.

(3) Purification of Water (14.6 trillion yen/yr)

Forests prevent water from becoming turbid by exertion of water purification function. Moreover, while the substance which causes eutrophication contained in precipitation, such as phosphorous and nitrogen, is suspended by soil particles or is absorbed by the plant. On the other hand, mineral ingredients in soil dissolve into water.

6. Management and Conservation of "Water and Land Conservation Forests"

In "Forest and Forestry Master Plan", forests are classified into three categories, water and land conservation, symbiosis with people, cyclical use of resources. The forests for water and land conservation are expected to conserve water resources and prevent mountainous calamity. The forests for symbiosis with people are expected mainly to maintain good living and cultural environment. And the forests for cyclical use of resources focuses on the production of forest products.

Approximately 52%, 22%, 26% of the entire forests have been designated as water and land conservation, symbiosis with people, and cyclical use of resources, respectively.

Water and Land Conservation Forests are managed and conserved by protection forest system, application of erosion control projects, and head water conservation by Japan Green Resources Corporation.

(1) Protection Forest System

As mentioned earlier, protection forest system contributes to sustainable forest management by restricting felling and imposing the obligation of planting. Moreover, erosion control works or Forest Conservation Project that contribute to the restoration of devastated land can be applied only within protection forest.

(2) Examples of Forest Conservation Project

Forest Conservation Project in Ashio, Tochigi Prefecture

Deforestation for refining fuel at copper mine development and damage from smoke and forest fire had advanced desolation of forests and caused frequent flood at downstream during Meiji era in Ashio, Tochigi prefecture. For these reasons, the government has been applying erosion control works and planting trees to restore forest since 1946. Due to these projects, they succeeded in reviving forests and diminishing turbidity of rivers.

Revegetation Project at Erimo Peninsula in Hokkaido

Since Meiji era, desertification progressed at Erimo peninsula because of land development and grazing which made the sea turbid and damaged fisheries, the local key industry, seriously.

Therefore, revegetation work along deserted coastline was applied at full scale since 1953, and forests along the coast has been preventing shifting of sand and turbidity of rivers and the sea. As a result, the sea revived as a fishing place, and the amount of annual fish catch has increased by about 10 times compared with that of around 1960.

(3) Head Water Conservation by Japan Green Resources Corporation

Japan Green Resources Corporation promotes afforestation at head water area with poor forests to improve the function of water resources conservation by "Profit-sharing Afforestation System." These areas are also limited to places where private sectors cannot easily plant trees because of isolation or difficulty in access.

7. Maintenance of the Forest by Upstream and Downstream Cooperation

There are several types of upstream and downstream cooperation: forest management conducted by local governments based on a contract of profit-sharing afforestation system, establishment of foundations aiming at forest management, collection of water rates adding the expense for forest management, and forest management performed by downstream fisherman.

The city of Anjo, Aichi Prefecture and village of Neba, Nagano Prefecture are examples which conduct forest management by profit-sharing afforestation system. The system is applied according to "forest management agreement" based on the Forest Law.

As of March, 2002, 49 foundations have been established for the purpose of forest management, and the number is increasing.

The city of Toyota, Aichi Prefecture surcharged 1 yen to the water-rates for the purpose of the forest management. This charge provides the expense for the forest management at five towns and villages upstream.