Japan's trial calculation of currency evaluation for forest multi-functions and effort to promote and enhance forest environmental function

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Forest Resources in Japan

Japan, 66% of its land is covered with forest, in terms of forest ratio Japan is one of the most densely-forested countries in the world. And its forest is closely linked with life style of people, culture, and tradition.



Forest Resources in Japan

Forest Resources in Japan has been recovered and matured thanks to the effort on forest improvement and conservation for long period



Evaluation for forest multi-functions (Science Council of Japan)

Multi-functions of Forests is evaluated by Science Council of Japan in 2001. Evaluated currency value of multi-functions of forest is 70 trillion yen in annual, which amount is only assessable value of multi-functions.

: Evaluated forest functions as currency value

7. Culture

1. Biodiversity Conservation

Genetic conservation Species conservation Ecosystem conservation

2. Conservation of Global Environment

Mitigation of Climate Change Sink of carbon dioxide **1,239.1 bil.Yen/yr**. Alternative energy of fossil fuel 226.1bil.Yen/yrAir spiritualization Stabilization of Global Climate System

3. Prevention of natural disasters and conservation of soil in mountain areas

Prevention of soil erosion 28,256.5bil.Yen/yr. Prevention of soil collapse **8,442.1bil.Yen/yr.** Prevention of other soil disaster Prevention of soil run-off Soil conservation (for forest production) Prevention of other natural disaster

4. Conservation of headwater

Mitigation of flood 6,468.6bil.Yen/yr. Landscape Education Preservation of water resource Provision the field for Experience of Control water quantity 8,740.7bil.Yen/yr production & employment Water purification Recognition the nature 14,636.1bil.Yen/yr. Art

5. Creation of pleasing environment

Mitigation of climate change Creation of fine living env.

6. Health and Recreation

Medical treatment Rest **2,254.6bil.Yen/yr**. Recreation

8. Production of material resources

Creation of local diversity

Religion & Festival

Traditional culture

Wood Food Fertilizer Feed Chemical Greening materials **Ornamental Plant** Craft materials

Conservation of Global Environment

Methodology by SCJ

Forest control natural environment at global level by absorbing carbon dioxide which cause global warming.



Estimated value: 1,239.1 bil. Yen/ year

Method: estimate absorption amount of carbon dioxide form the increment of forest biomass and evaluate cost of carbon dioxide collection in coal thermal power station (Replacement cost method)

Alternative energy of fossil fuel

Wooden Housing is much lower carbon emitter than steel prefabricated housing and reinforced concrete housing when energy emission for housing materials production converted to amount of carbon.



Carbon emission for primary housing materials per house (floor space 136 sm)

Estimated value: 226.1 bil. Yen/ year

Method: estimate increment carbon if wooden housing constructed in Japan was RC and/or SP housing and evaluate cost of carbon dioxide collection in coal thermal power station (Replacement cost method)

Prevention of soil erosion/soil collapse

Methodology by SCJ

Forest understory vegetation and fall of leaves and branched prevent soil erosion and forest prevent soil collapse by mainly tree roots binding and other physical process.



Estimated value(prevention of soil erosion): 28,256.5 bil. Yen/ year Method: estimate gap of soil run-off amount with forest and non-forest and evaluate cost of construction of dam (Replacement cost method)

Estimated value(prevention of soil collapse): 8,442.1 bil. Yen/ year Method: estimate gap of soil collapse area with forest and non-forest and evaluate cost of mountainside construction (Replacement cost method)

Methodology by SCJ

Soil in forest mitigate flood and stabilize water quantity running river through preservation of rainfall and equalization of water quantity into river. In the process of rainfall passage soil in forest, water are purified.



Estimated value: 8,740.7 bil. Yen/ year

Method: estimate water resource quantity preserved from gap of rainfall and its evaporation and evaluate cost of depreciation and maintenance of water utilization dam per year (Replacement cost method)

Mitigation of flood Forest preserve rainfall temporary and reduce the peak of water running in the river.

The peak of water running into the river from forest is below one tenth of one from no-vegetation area by survey in Mt. Tanakami, Shiga Prefecture.



Estimated value: 6,468.6 bil. Yen/ year

Method: estimate running water quantity against 100 years probability in comparison with ones from forest and no-vegetation area and evaluate cost of depreciation and maintenance of soil conservation dam per year (Replacement cost method)

Water purification

Water running from forest contain less nitrogen and phosphorus and richer minerals than rainfall.

Balance of substances contained in both of rainwater and water passed soil in forest



Estimated value: 14,636.1 bil. Yen/ year

Method: evaluate in combination of water rate and cost of depreciation and maintenance of rainwater treatment facilities per year (Replacement cost method)

Basic Principle for fulfillment of Forest Multi-Functions

Adequate efforts by the government for fulfillment of forest multi-functions is clearly stipulated in 'the Forest and Forestry Basic Act." which shows principle of forest and forestry policy in Japan.

Forest and Forestry Basic Act (Act No. 161, 1964)

Article 1 (Purpose)

The purpose of this Act is to stabilize and improve the life of the citizens and to develop the national economy through comprehensive and systematic implementation of the policies on forest and forestry by means of establishing the basic principles and basic matters for their realization, and by clarifying the responsibilities of the national and local governments.

Article 2 (Fulfillment of Multifunctional Roles Forests)

In consideration of the indispensableness of sustainable fulfillment of the multiple roles that forests play through preservation of national land, water resources, natural environment, public health, prevention of global warming and supply of forest products (hereinafter referred to as the "multifunctional role") in maintaining the stable life of the citizens and the national economy, adequate efforts shall be given for the development and preservation of forests for the future.

Article 3 (Sustainable and Sound Forestry Development)

In consideration of the fact that forestry plays an important role in the fulfillment of forests' multifunctional role, sustainable and sound forestry development shall be promoted by securing the workforce, improving the productivity, and establishing a desirable forestry structure.

Article 4 (Responsibility of the National Government)

The national government is responsible for formulating and implementing comprehensive policies for forest and forestry, pursuant to the basic principles for forest and forestry prescribed in the preceding two articles.

People's expectations for Forest Multi-Functions



- Prevention of global warming
- Headwaters conservation
- $\xrightarrow{}$ Air purification and noise mitigation
- Healthcare and recreation
- Wood production
- Area habited by wild life and plants
 - Field education
- Production of non-timber forestry products

Scheme for fulfillment of Forest Multi-Functions

In compliance with the Forest and Forestry Basic Act., the scheme as below is established to ensure improvement and conservation of forest and fulfill forest multi-functions sustainably.



1. The Intention

Under the Forest Law, conservation forest system is one of forest which are needed to fulfill forest multi-functions such as headwater conservation and disaster prevention, are to be designated by minister or governor and restricted certain timber production and/or conversion of land use to maintain and improve forest environment function.

2. Purpose of designation of conservation forest

- (1) Headwater conservation (8) Facilitating fish breeding
- (2) Prevention of soil run-off (9) Conservation of navigational landmarks
- (3) Prevention of soil collapse (10) Promotion public health
- (4) Prevention of blowing sand damage
- (5) Prevention of wind, flood, tidal, drought, snow and fog damage
- (6) Prevention of avalanches and dangers from rockfall
- (7) Prevention of fire damage (11) Conservation of the landscape in tourist and historic sites

3. Type of restriction

- (1) Permit by governor required for harvest (Notification for thinning and selective cut in planted forest) Permit condition: to meet certain condition in means, area and volume of harvest
- (2) Permit by governor required for alteration of land surface
- Permit condition: not to threaten for fulfillment of purpose of designation of protection forest
- (3) Require restoration measure for forest in devastated area

4. Area of conservation forest

around 12.02 million ha (as of end of FY 2010) *Ratio of conservation forest in all of Japan's forest (around 25.1 million ha) around 48

Measures for fulfillment of Forest Multi-Functions

Main measures for fulfillment of forest multi-functions

Forest Improvement Project

Projects support forest owners to make forestry practices such as planting trees, cleaning cutting, brush cutting, thinning and so on, and improve road network for it.

(Thinning Area: about 550 thou ha) (Silviculture Are: about 20 thou ha) (at FY 2010))



Forest Conservation Project

Restoring forest which are damaged and/or conserving forest which are threatened to be damaged by Intensive rainfalls

Recovery of forest by hillside work

Others







10 years after (2007)

Supporting for disinfestation, treatment of damaged wood by insects, forest management by local people and forest environment education and so on

Measures for fulfillment of Forest Multi-Functions

Purpose of the survey

Forest Ecosystem Diversity Basic Survey

To grasp forest ecosystem information appropriately for promoting sustainable forest management and taking Japan's international responsibility including prevention global warming and conservation biodiversity

Summary of the survey

Establishing 11 thousand plots in private forest for the fixed point observation and conducting survey of vegetation and so on for the consideration of forest policy measure to conserve forest diversity through statistic data processing and analyzing



- damage by insects, animals and climate event
- Record of forest practice

- understory vegetation
- (i.e. plant species, dominance) and so on

(Ref.) Prefectures establishing Forest Environment Tax for SFM

33 prefectures out in total 47 prefectures established their own forest environment tax and are addressing to improvement and conservation of forest for fulfillment of forest multi-functions.



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