Does Resilience of the Forest Bring Prosperity to Local Regions?†

Naoto Matsumura*1

ABSTRACT

Forest resources in Japan have reached a mature stage. Since the dawn of history, Japan has never seen such rich stock, and they are proud. However, both of the forest types, plantation forest and natural forest, have their own problems. Since the earth summit in 1992, the discussion on criteria and indicators has been continued on the platform of Montreal Process at a national level to include countries in the Pacific region, such as Japan, from the aspects of resources, environment and society in order to measure sustainability and to integrally observe their sustainability. At the level of forestry entity, forest certification systems like ISO14001 or FSC have been introduced to check the status or sustainability of forest management and forest products.

The most serious issue in forest management is the inaccurate forest border. A cadastral survey has not been sufficiently conducted until now. There are plenty of areas that cannot reach an agreement among forest owners for implementing forest treatment and enhancing forest roads. In plantation forests, the age class distribution is biased to the elder classes and a few younger classes. Forest stocks are reaching a mature stage, but there are few areas available for businesses with enough profitability. Also, there is not enough man power to implement forest treatment or accessible forest to commercially attract people in a region.

To solve these problems, separation of ownership and management, sufficient matching of forest resource databases with forest user databases or market information, construction of supply chain, introducing precise forestry, standardization of forest information, and cloud services are now under discussion. Communication with forest owners and introducing efficient zoning systems are proposed under the concept of e-forest, cyber-forest, and digital-forest. Establishing a resilience of forest and forestry realizes rich forests and creates new employment opportunities in rural regions by using commercial forests effectively. Possibility of good forest management is also considered under decreasing population in a region, and especially practices and trials in Mie Prefecture will be discussed.

Keyword: e-forest, forest function, forest information system, forest zoning

INTRODUCTION

Japan is blessed with a mild and rainy climate, and most of the country is often in a favorable condition to allow certain kinds of vegetation to prosper and forests to form. The underlyng vegetation is thought to be the evergreen needle-leaved forest, such as fir and spruce, are located in Hokkaido or areas with high altitude in Honshu. Deciduous broad-leaved forests, such as beech, deciduous oak and maple, are found in the mountainous zones from Hokkaido to Kyushu. Evergreen broad-leaved forests, such as chinquapin, can be found in the lowland area in the western part to the center of Honshu. The original landscape is considered to have been such forests.

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Corresponding author: Naoto Matsumura
*1 Graduate School of Bioresources, Mie University, Tsu 514-8507, Japan
E-mail: nma@bio.mie-u.ac.jp
“resources within the immediate approach,” to “the active forestation and utilization of the artificial forests and the use of it,” in the relation between forests and human beings.

In the present day, artificial forests in Japan amount to 10 million ha, in which the forest specifically planted in the so-called expansion afforestation period after WWII entered in its maturity. The forests in Japan are seemingly in the richest state in history in both of the area and of the volume. However, some artificial forests do not receive attention or appropriate care, are not paid from their owners, and their management level is very low. Also, some are located deep in the mountains, so it is almost impossible to access even if the owner wishes to do so, leading to bad profitability. Thus, even if the forests are rich in area and volume, actually available resources are limited.

In addition, damage caused by overpopulated deer has become a serious problem for the renewal for the next-generation, regardless of the artificial forest and the natural forest. It is also problematic from the aspect of the preservation of the biodiversity, as what is left in the forest will be only the vegetation disliked by the deer.

As mentioned above, the regeneration of the forest is a challenge considering the situation where the forest is not a forest anymore (deforestation), or the forest is deteriorated in quality even if it maintains the aspect of the forest (forest degradation). When carrying out regeneration of a forest, it is necessary to prepare forest treatment (technical theory) for actually altering the forest and a mechanism (policy theory) for supporting it. It is important to tackle these problems and to foresee the changes in the forest in a timeline; here, “forest planning” is focused. “Forest planning” forms one field of “forest science” dealing with spatial distribution of the forest which changes over time. In this paper, the problem of the forest management, such as the management of the boundary, is introduced as the policy theory; as the technical theory supporting it, the applicability of the forest measurement, and the information and communication technology (ICT) represented by the forest management system (e-forest) is discussed, in view of the example in Mie Prefecture. Moreover, whether or not the regeneration of the forest will bring prosperity to the local area is also discussed, considering that the regeneration of the forest contributes to “the resilience of our land.”

**PROBLEM IN FOREST MANAGEMENT**

The basics of the forest management are a “map” which shows the location of a forest and a “register” which shows the attribute of the forest. A register is called “forest register book” in the privately-owned forest, and a common format of the register for a nation-wide use is provided from Forestry Agency, but a local government is free to add their original content. The forest book contains the information on the compartment number, the owner, the tree species, the stand age (the age of the forest), and the volume, which are considered personal information and therefore should be handled with care.

On the other hand, as for the “map,” which is another basic element, the digitization is proceeded with the boundary on the forest as a unit, and the forest information management system based on the Geographic Information System (GIS) is introduced in every prefecture (for privately-owned forests) and in each forest administrative bureau (for nationally-owned forests), and a national forest resource data base is also in operation.

It is the basics of GIS to operate the map and the attribute database, but it involves various problems as for the forest management. The problems are, for instance, the accuracy of both of them and the data update. It may be surprising, but there are some areas where a boundary is not fixed in Japan, one of the most advanced countries, and as for the forests in the mountains, the progress ratio of investigation for the register of land is still low. For fear of the boundary in a mountain area becoming ambiguous due to the generation change of the forest owners and the disappearance of so-called “mountain guards,” the ministries and agencies concerned worked hard to simplify the investigation method for the registry of land and proceeded with the digitization of a former paper maps under the slogan of “from the memory to the record,” but is still insufficient.

However, when the boundary is not definite, it is difficult to introduce an integrated operation such as thinning efficiently to the forests in the vicinity together, as the agreement of the owners is difficult to obtain. Extension of a forest road is also difficult due to the impossibility of the agreement of the owners. This is the problem called the “small-scale distribution” forests present in Japan, the structural problem where the small-scale forest-owners possess forests in the mountains, in a dispersing manner in each location.

Artificial forests increased after WWII as a result of the so-called expansion afforestation, have matured at present, and are reaching harvest time. The forest of this generation causes the “disproportion of the age composition,” and, just like the population constitution of Japan, is facing the aging.

Moreover, the realistic estimation of the available forest, as well, is problematic. If a forest is not expected to be economically profitable, the forest-owner in general cannot execute forest operations, such as thinning or clear cutting. In a case of the forest under private ownership, the forest service could be implemented, without the burden of the forest-owner, with subsidies of various kinds or as a public project. However, under the situation where the timber price flounders, there is a limit only in the cost performance principle to proceed with the forest service.

Furthermore, the forestry technical experts who perform actual forest work have been aging, and the securing of the future workers is in peril; however, these days, the number of new entries of the young workers is increasing, giving a bright topic to the forestry world for the first time in a long
RESILIENCE AND REGENERATION OF THE FOREST AND THE FORESTRY

As mentioned above, much of the artificial forests are reaching felling time. However, due to the decreasing forestry profitability in recent years, a large part of the thinning in the artificial forest is the cutting-off thinning, and is not implemented in the appropriate timing and there can be observed of the forest-stand behind the thinning timing. In order to solve such problems, it is essential to manage the forest integrally by a unit of river basin, aiming at improving forestry productivity, and to utilize the thinned wood currently discarded as resources.

Specifically, it is necessary to grasp and classify the present state of the forest resources in the river basin correctly, clarify the target forest type, determine a forest management policy according to the present state of the forest, set up an administrative plan for the forest resources including the effective use of non-use woody resources such as the cutting-off thinned wood per river basin unit, and appropriately operate the so-called PDCA cycle.

When drafting such a forest management plan, the planner should take into account various forest management plans focusing on the present state of the forest resources, then estimate the amount of growth and the management costs of the forest resources in the future by each management plan, compare the plans, and set up the most favorable plan.

Although a register and a system which separately provides such information necessary when drafting a management plan (e.g., the present state of the forest resources, the estimate of the management costs and the growth, the maps) exists, the so-called “forest management support system,” which is a system for integrating pieces of information and providing them to support drafting of a forest management plan, is not currently found. Thus, development-proofing the integrated forest management support system is an urgent task.

In designing a forest management support system, utilizing the developing information and communications technology (ICT) is an important precondition and also serves as a base technology. In order to consider the forest resource management by the units of country, prefecture, town and village, or river basin, the indispensable information infrastructure is utilization of the Geographic Information System (GIS), including the operation and the use of data bases such as searches, queries and extractions, based on databases used by the digitization of forest resource data on the target forest for the vast management target forest, and moreover, making an object forest an electronic map. A smart system capable of drawing, from the database, forest information and characteristics is needed to enable decision support, and is proposed to generically call this “e-forest” (Matsumura and Nonoda, 2015). This research is conducted as a part of a project which developed and verified forest management systems, e-forests, for supporting the promotion of the reforestation and the utilization of non-use forest resources (FY2010-2014) supported by the Ministry of Agriculture, Forestry and Fisheries, involving eight agencies until FY2014, and the measurement in forest by OWL (2018), which will discuss one of the results later.

EXPECTATION FOR THE FOREST MANAGEMENT SYSTEM (e-forest)

The ideal forest information management system “e-forest” is defined as composed of a “core part” consisting of a basic data group and an application software group. The basic data includes the present state of the forest resources, forest book, zoning information and image information, and the application software includes the optional parts, such as the forest-stand diagnostic system, growth forecast system, and cost analyses (Matsumura et al., 2013).

Moreover, the supposed end user is the staff of the local government, forestry cooperatives, forest business entities, and support system function of “diagnosis, estimate, the evaluation,” which will be provided. Moreover, the interface part is divided into the “Web type” using the Internet via desktop PCs, and the “application type” using the communications lines via tablet PCs or smart phones. Now, the software for the diagnosis and forecast is being developed in advance, but the desired function is summarized as “4-S,” featuring measurement, forecast, planning, and management (Figs. 1 and 2).

CONCLUSION

The forest in Japan has reached the largest volume in history and has matured; however, there have been complications in the qualitative maturation value, and both artificial and natural forests need proper forest management. Under this condition, it is our task to pass down a rich forest to the next generation and to practice “sustainable forest management.”

For that purpose, more accurate information on forest resources must be obtained using 3D ground-scanners, such as OWL, and the latest monitoring tools, such as LiDAR and UAV. Furthermore, PDCA cycles must be operated accurately. In Japan, a country with numerous natural disasters, a resilient forest is needed. With the population decrease, timber is necessary to promote new industries in regions, along with the preservation of the forest. To realize these objectives, it is
important to build a stronger relationship between the forest resource information and the timber industry, as it is a supply and demand chain which may bring profit to the upstream and downstream of timber supply and will contribute to the rebirth of local regions.

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