

Forest Management in Japan: Application Issues of Sustainable Forestry and the Potential of Improvement through Accredited Forest Certification

著者	Gain Dennis, Watanabe Tsunemi
journal or publication title	Society for Social Management Systems Internet Journal
volume	9
year	2014-12
URL	http://hdl.handle.net/10173/1237

Forest Management in Japan: Application Issues of Sustainable Forestry and the Potential of Improvement through Accredited Forest Certification

Dennis Gain, Tsunemi Watanabe
Kochi University of Technology

ABSTRACT: Forestry is, as claimed by William Street, chairman of the world's largest forest certifier PEFC, more complex than rocket science. As the effectiveness of sustainable forest management in Japan is still being criticized by researchers worldwide, the motivation of this research study was to analyze, evaluate and discuss the main issues the Japanese government is struggling with in contrast to international forestry standards and efforts. Sustainable forest management is being promoted worldwide and understood as a crucial act to preserve nature and to respond to the negative effects of global warming. Historical background information confirmed that afforestation, reafforestation and rejuvenation activities shortly after WWII are responsible for Japan's extremely uneven forest age structure. Insufficient forest care affected timber quality which decreased the overall productivity of forestry and also led to forest degradation. The majority of affected forestland is owned privately and involves natural forest and plantations. Small-scale forest ownership further complicates effective forest management. This is a real and not a constructed issue. The Japanese government promotes sustainable forest management and thinning with slight accomplishment. Especially the role of thinning as an instrument of forest care seems not be clearly addressed and could have mainly been used as a tool to increase carbon sinks for meeting the carbon emission obligations for the Kyoto Protocol. Japan sets very high future forestry goals and intends to double domestic forest production by 2020. However, without proper modernization of the wood processing infrastructure and an expansion of markets for thinned wood, reasonable success is questionable. The progress of implementing forest certification is slowing down because of little demand for certified wood and costs that further affect forestry productivity. However, it is strongly recommended to continue efforts towards proper forest certification as it has the potential to enhance forest owner management, improve forest supervision and national forest policy.

KEYWORDS: sustainable forest management, forest certification, thinning, Japan

AIMS AND OBJECTIVES

This research study targets the assessment of forest management practices in Japan in terms of sustainability with contrast to Germany. It aims to identify and discuss historic and current issues, as well as prospective future risks and chances of management strategies that have the potential to improve or idle the quality of forest management on a local and national level. To achieve this, Japan's

position and efforts within the international community on sustainable forestry will be analyzed and evaluated. Historical background information of Japanese forest management will be assessed and reflected on current and possible future forest management issues. Emphasis will be given on the importance of forest care and the management of forest owners. Potential actions for improvement will be derived and thoroughly discussed.

1. INTRODUCTION

Agriculture and silviculture are both parts of political economy. While the first targets the production of products of animal and vegetable origin on a specially cultivated area, the purpose of silviculture is the production of raw materials and the conservation of protected and recreational areas ([Graham & Jain, 2004](#)). Forests provide a variety of goods and services which people throughout the world have been making use of since the first modern human being ([Mauro, 2011](#)). Wood, however, is not a raw material with unlimited availability. Whilst it does regrow each day, compared to the production of crops, forests grow at a much slower speed. Depending on the tree species, a rather long time may be required for the tree to reach its ultimate size. Broadleaf trees usually require about 50-60 years while conifer may continue to grow for centuries if conditions allow ([Peterken, 1993](#)).

1.1 History of Forest Management in Germany

In the history of forest use, restrictions on logging were made in many parts of Europe where wood became scarce, in order to establish control of the overall wood consumption and to preserve forest services such as hunting for wild animals, protection from wind, food from forests, clear drinking water, recreation and many others ([Gain & Watanabe, 2013](#)). For instance, the city of Erfurt, Germany rationalized logging in the 14th century and put it under legal restriction. Illegal logging became a crime and was punished. In the 15th century, Peter Stromeier, councilor of Nuremberg, Germany, ordered the planting of fir trees to thwart the excessive logging that had started due to high wood demand by the public and industry ([Lohberg, 2009](#)). Later, the city introduced workers with functions similar to that of modern foresters, in German referred to *Tannensäer* (fir seeders), who were professionals in early forest management.

1.2 Early Modern Period Wood Shortage

The reason for the wood shortage during the early modern period in central Europe – in the German language often referred to as the *Holznot* (wood misery) – is a matter of debate by numerous researchers whether it was of real or constructed origin. During this time, Germany was subdivided into numerous small states which all had their own specific requirements for wood and wanted to avoid importing it from neighboring states. Transportation and taxes would have made the wood too costly for the local industry to remain productive ([Popplow, 2002](#)). In this case, a wood shortage would refer to a locally addressed constructed issue, but not a real central European issue that would affect all states in the same fashion. The iron and glass industry at the time may have been two major driving factors in creating such a real wood shortage issue as claimed by [Popplow \(2002\)](#).

In the 15th century upper Palatinate, an annual iron production of about 10,000 tons requiring nearly half a million cubic meters of wood, added to the regular wood consumption of the public which was about another half a million cubic meters. This enormous demand of wood soon exceeded the regrowing capacities of local forests, forcing the production of iron casted products to be lowered in the middle of the 16th century ([Schmidt, 2011](#)).

Whether the Small Ice-age in central Europe, ranging from the 14th to the beginning of the 19th century, could have further influenced the shortage of wood due to colder winters and therefore greater demand for wood as a source for generating heat, is still under debate. People at that time generally had a very large demand for firewood. As a result, it is difficult to determine whether the change of climate during the Small Ice-age could have been a key event in the history of forest management ([Ecomed, 1991](#)). The necessity for a sustainable use of forestland in order to maintain a constant supply of

wood as a raw material for construction and energy was, at the time, widely understood and supported by industry and people. In literature, the idea of sustainable forest management (SFM), as it is known today, was first introduced by the German chief mining administrator of Saxony, Hans Carl von Carlowitz, in 1713. He is claimed to be the inventor of this forest management approach, that whilst being old, is still applicable in these modern times ([Grober, 1999](#)).

1.3 Sustainable Forest Management

The fundamental idea of sustainability in forest use is to avoid logging more trees than are able to regrow, in order to maintain a lasting supply of wood now and in the future, while respecting biodiversity, surrounding ecosystems and society. The Food and Agriculture Organization of the United Nations defines it as follows:

“It is the stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biological diversity, productivity, regeneration capacity, vitality and their potential to fulfill, now and in the future, relevant ecological, economic and social functions, at local, national and global levels, and that does not cause damage on other ecosystems. ([FAO, 2000](#))”

SFM addresses three fundamental components of forest management; economy, ecology and society. The economic component targets the supply of wood as a raw material. Ecology aims a balanced ecosystem and the preservation of the climate by, for instance, maintaining the capability of forests to deliver clear water and clear air. As for society, forests provide a place for recreation, sports and physical comfort. All three SFM components are interrelated with each other. A manipulation of one

factor will affect the others. A decrease in forest quality with degradation and regressed biodiversity would also automatically affect the overall economic productivity of the forest and decline the value of the forest for society. It is in our interest to manage forests sustainably, because we benefit from a healthy and balanced forest the most ([BMELV, 2011](#)).

1.2.1 Criteria and Indicators for Sustainable Forest Management in International Contrast.

A clear and internationally accepted definition for sustainable forest management has yet not been developed. However, over the past two decades, international conferences on the management of forests and forestry have developed shared ideas. As listed in Table 1, the Food and Agriculture Organization of the United Nations (FAO), the Ministerial Conference on the Protection of Forests in Europe (Forest Europe) and the Montreal Process subdivide the principles of SFM into elements. While the FAO characterizes them as “Thematic Elements”, Forest Europe and the Montreal Process refer to them as “Criteria and Indicators” for SFM. Observed closely, they can be considered nearly identical, equally addressing all the three fundamental components economy, ecology and society. Sustainable forest management is achieved only when all three components are balanced uniformly. This statement is widely supported. At the Rio+20 United Nations Conference on Sustainable Development on June 18, 2012, [Street \(2012\)](#) claimed that even if two components of SFM are fulfilled but one component is not, you’d still be at zero and not two thirds towards SFM.

As apparent in Table I, Forest Europe separates indicators into quantitative and qualitative indicators. Legal, policy and institutional framework are termed as qualitative indicators ([MCPFE, 2003](#)).

Table 1. Criteria and indicators for sustainable forest management in international comparison

FAO	Forest Europe	Montreal Process
Extend of forest resources	Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles.	Maintenance of forest contribution to global carbon cycles
Biological diversity	Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems.	Conservation of biological diversity
Forest health and vitality	Maintenance of forest ecosystem's health and vitality.	Maintenance of forest ecosystem health and vitality
Productive functions of forest resources	Maintenance and encouragement of productive functions of forests.	Maintenance of productive capacity of forest ecosystems
Protective functions of forest resources	Maintenance, conservation and appropriate enhancement of protective functions in forest management	Conservation and maintenance of soil and water resources
Socio-economic functions	Maintenance of other socio-economic functions and conditions.	Maintenance and enhancement of long-term multiple socio-economic benefits
Legal, policy and institutional framework	Qualitative indicators Forest policies, institutions and instruments	Legal, institutional and economic framework

1.2.2 Promotion of Sustainable Forest Management

About one-third of the world's land area is covered with forest. Often denoted as the heart or lungs of the earth, forests play a crucial role in achieving multiple global environmental benefits; such as carbon sequestration through geoengineering, the conservation of biodiversity and the protection of surrounding ecosystems. Sustainably managed forests have the potential to enhance the quality of wood as a raw material as well as non-wood products from the forest for the world's population. Those who depend on forests for their livelihood benefit from this. But also for society in general, forests deliver an important environment for recreation. The forest ecosystem is expected to further play a key role in developed and developing countries to cope with the effects of climate change.

2. FOREST MANAGEMENT IN JAPAN

Japan is covered about two-thirds with forest, approximately 25 million hectares of Japan's entire land area. The main tree species are Hinoki (*Chamaecyparis obtusa*), Sugi (*Cryptomeria japonica*) and Larch (*Larix kaempferi*). Forest ownership is distributed to about 60% private, 30% national and 10% prefectural. Similar to the period of wood shortage in central Europe at the end of the late Middle Ages and during the early modern period, Japan experienced a similar shortage after World War II, mainly due to the enormous wood use by the military. Nearly 10 million hectares of land were recultivated in only 25 years between 1950 and 1975 to rebuild Japanese forests. Perhaps the biggest drawback of this approach was the amount and pace of the recultivation that resulted into an unbalanced forest age structure as evident in Figure I. Care of

the newly recultivated forestland through periodic thinning was widely not performed. A gradually increasing forest density slowed down the entire forest growth leading to degraded forestland, as criticized by [Matsushita, Xu, Onda, Otsuki, & Toyota \(2010\)](#), who blame inadequate forest management for degraded forestland across Japan.

2.1 Forest Age and Ownership Management

Japan's forest age structure is unfavorable in comparison to other developed nations in the world. The problem with this condition in terms of sustainability is the difficulty to ensure a long-term constant supply of timber for future generations. In a future where fossil fuels have become scarce and where people mainly need to rely on regrowing energy sources as highlighted by researchers worldwide, the import of wood may become more difficult. Not a constructed, but a real problem the nation could face in the future.

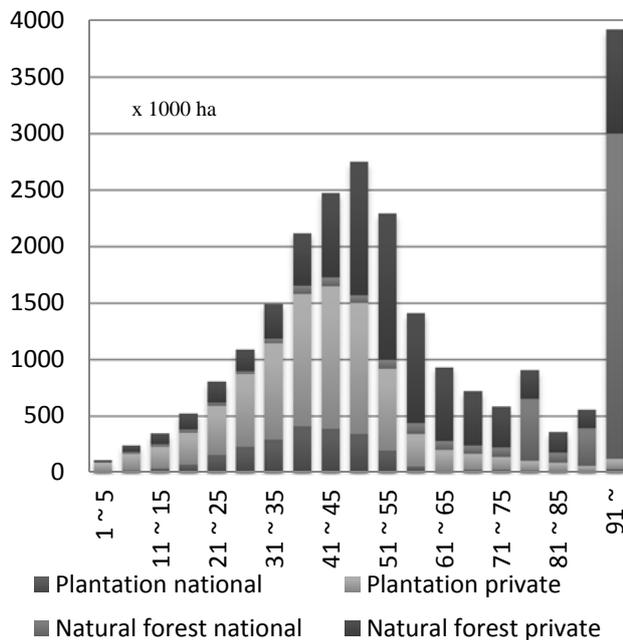


Figure I. Forest age and ownership (Source: MAFF)

Japan is in need of a proper rejuvenation strategy in order to remain flexible and to avoid potential shortages in the future. Another crucial issue is the large proportion of small-scale private forest owners.

80% of the economically used forest plantations are privately owned. Forestland in Japan is highly fragmented in terms of area per owner. Of the approximately 2.5 million private forest owners, 1.5 million owners hold each less than 1 hectare of forestland ([Ota, 2007](#)). 90% of all private owners hold less than 10 hectares per person. In 2012, the Japan Forest Act introduced a new management plan (Collective Forest Management Plan System) that is supposed to target the coordination and consolidation of small-scale forest owners to ensure SFM. However, only owners holding a forest area of larger than 100 hectares, therefore not the majority of private owners with less than 1 hectare, qualify for this 5-year plan. Successful applicants receive special income and tax treatment, favorable conditions, government financing and promotion in other subsidy programs ([MAFF, 2013](#)). However, this program further increases the problem of policy fragmentation as criticized by [Street \(2012\)](#) by providing special treatment and funding for only a specific group of forest owners.

The growing age structure of private forest owners is of large concern in Japan. A considerable number of people who recently became forest owners through inheritance from a past generation left their birthplace and are difficult to be identified which further complicates forest management. Japan will face the challenge to effectively incorporate private forest owners, especially small-scale owners holding less than 1ha of forestland and to balance interests in order to reach a management situation that can be considered effective sustainable forest management.

2.2 Forest Thinning

Forests need continuous care in all growing stages for ideal forest development and thinning is an essential action to achieve this. It is one of the most important measures in forest care. It provides

more room for proper root and crown development, makes more water and light available for optimal tree growth, maintains biodiversity to sustain the forest as an ecosystem and it arranges room for other important tree species to mix in-between. A tree needs a good surrounding environment in order to develop properly. A high tree density will delay or impede trees ability to develop a natural breast-height diameter ratio which negatively affects both, the ecological and the economic factors of sustainable forest management. The primary aim for thinning is to increase income, but it is a necessary consideration for forest design ([Neumann, 2003](#)). Thinned forests are healthier, have a higher vitality and are more productive. It creates economic and ecological advantages, e.g. improved timber growth and the elimination of ecological risks that negatively affect surrounding ecosystems. The greater the gap between harvesting cost and the price for wood, the higher the importance of the economic role of thinning becomes. The [Austrian Cooperation Agreement FHP \(2000\)](#) suggests a basic rule for forest thinning: Early, moderately and frequently in order to achieve the full economic and ecological benefits. The [German Study Group of Silvicultural Landscape Conservation, Ecomed \(1991\)](#), however, adds that thinning should not be practiced uniformly and must be adapted to every forest's own unique characteristics.

2.2.1 Thinning for the Kyoto Protocol

Japan promotes sustainable forest management and encourages thinning nationwide. However, the question arises whether thinning is mainly promoted in order to achieve the full economic and ecologic benefits of forests, or to meet the climate protection directives of the Kyoto Protocol which anticipate a reduction of carbon emissions to tackle global warming. Japan's emission reduction commitment is 6% compared to the base year 1990. The first

commitment period was from 2008 to 2012 ([MAFF, 2011](#)). One way to accomplish a reduction of carbon emissions is to reduce the nation's annual emissions generated by the industry, motorized vehicles and other sources that produce carbon dioxide. However, for industrialized nations such as Japan where, at the time being, carbon emissions cannot be reduced radically, the creation of additional carbon sinks is encouraged. Since trees are capable of storing CO₂, increasing the amount of annually regrowing wood cannot reduce carbon emissions but it can increase carbon sinks to store more CO₂. Japan's annual forests regrowth is approximately 80 million cubic meters, an increase of about 10 million cubic meters within the past decade. Only for comparison, Germany, a leading nation with highly effective, well developed forest management and with a forest area only 45% as large as that of Japan has a timber regrowth of far more than 120 million cubic meters per year ([Holzabsatzfonds, 2009](#)). Japanese forests regrow relatively slow. A faster growth would increase Japan's carbon sinks and help to fulfill the obligations of the Kyoto Protocol and thinning is the key forest management action to achieve this. However, it is not a long-term measure of forest management as thinning is not a one-time action.

According to the [Annual Report on Forest and Forestry in Japan \(2012\)](#), figures for 2011 show that Japan is momentarily fulfilling the requirements of the first commitment of the Kyoto Protocol and thinning took a major role in this achievement.

Still, it can be argued whether Japan encouraged thinning mainly for meeting the goals of the Kyoto Protocol, instead of practicing it as a basic measure of forest care as forest reports did not promote it as such. In order to accomplish nationwide SFM, as promoted by the Ministry of Agriculture, Forestry and Fisheries, the true principles of thinning must be practiced by all forest owners as a self-evident action of forest care.

2.2.2 Thinned Wood for Renewable Energy

Japan is a nation that is highly dependent on fossil fuels for energy production. Approximately just 5% of energy being consumed is actually produced inside the country. Thinned wood may have the potential to decrease Japan's dependency on fossil fuels. It is estimated that about 20 million cubic meters of thinned roundwood is left unused in forests each year. Much more forestland is supposed to be thinned annually as a measure of forest care, but is not performed; as a large number of forest owners avoid expensive thinning costs. Recent price drops for Hinoki and Sugi (Table 2) further complicate reasonable forest care actions. Unused thinned wood can be used as a source of renewable energy. In July 2012 the Japanese government launched the its Feed-in Tariff (FIT) program aiming at the construction of biomass power plants to produce electricity at a fixed price throughout Japan. Numerous power plants are currently under construction (MAFF, 2013).

This development can have a very positive impact on Japanese sustainable forestry. Creating new markets for thinned wood or wood in general has the potential to increase the motivation of forest owners to take care of their forests or even encourage others to become new forest owners.

A good example where renewable energy is now very well implemented in national energy production is Germany. It is Europe's largest producer of energy from solid biomass, with an annual volume of approximately 12,000 Mtoe (Megatonne of oil equivalent). As for electricity; in 2011, 16.3 billion kWh were generated from solid biomass in Germany (EurObserv'ER, 2012).

2.3 Optimistic Prognosis for Future Roundwood Production in Japan

In order to improve SFM, the Japanese government sets high future goals for the production

of domestic roundwood. It expects an increase of more than twice the volume of the current annual common production, from approximately 18 million cubic meters to 39 million cubic meters, while also expecting an overall national increase of wood demand of approximately 10% by 2020. Obviously, Japan is eager to promote the use of domestic wood to decrease its dependency on imports.

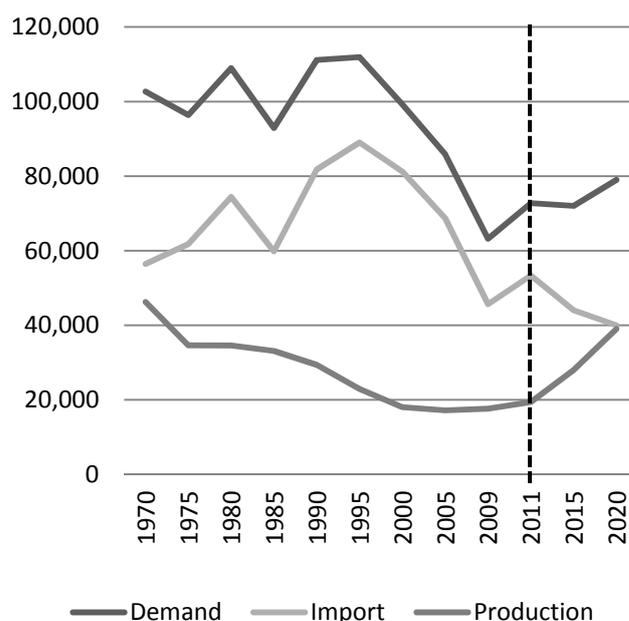


Figure II. Japan Wood Demand, Import and Domestic Production Development and future prognosis

As evident in Figure II, domestic roundwood production has been slightly increasing after decades of continuous regression. However, Japan's goals for 2020 may look very optimistic when taking into account the fact that the domestic wood industry has degenerated as well. For instance, the number of sawmills and workers has been gradually decreasing for decades. About 40% of all consumed industrial wood is sawnwood. More than half of that is imported.

Plantations are starting to reach an age that qualifies them for harvest, however, 80% of all tree plantations are privately owned and prices for Hinoki and Sugi have dropped significantly in the past 30 years (Table 2).

Table 2. Development of roundwood prices in Japan

¥/m ³	1980	2001	2012
Hinoki	76,400	37,800	18,500
Sugi	39,600	15,700	11,400

This price disadvantage, challenges forest managers to stay productive and may negatively affect Japan's optimistic 2020 production goals. Also, it can be argued whether the Japanese industry is capable of processing 39 million cubic meters of roundwood by that year. The major wood processing industries, sawmills, chip mills, plywood mills and laminated wood mills as well as the number of workers have been shrinking (MAFF, 2013).

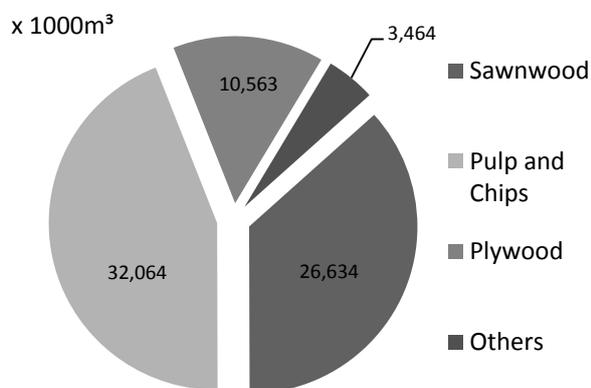


Figure III. Wood consumption Japan 2012

About 60% of sawnwood, 70% of plywood and 80% of pulp and chip is imported. A demand for more domestic wood is evident, but only an increase of capacities of the wood producing and processing industry, as well as improving the management of small-scale forest owners, will make it possible for Japan to reach the 2020 goals. In particular, the 80% of private tree plantation owners may want to consider waiting for better wood prices.

3. FOREST CERTIFICATION

300 years ago, the vision of sustainable forest management was born with the work of Carl von Carlowitz in Germany and has been constantly evolving since then. In Germany and its federal

states, these principles are laid down in forest laws that obligate forest owners to treat their forests with care. This attitude towards the necessity of healthy forests enabled a widely supported forest management in Germany that is close to nature. However, the reality in many parts of the world is different. Forests are being abused and the global forest area is further decreasing through deforestation which affects the world's climate. Germany imported approximately 120 million cubic meters of primary and secondary wood products in 2009 of which 2.4 to 5.2 million cubic meters came out of illegal sources (BMELV, 2013).

Forest certification is a civil-societal method to label forests that are sustainably managed in order to ensure industry and consumers that the wood comes from a responsible source and to protect worldwide forests with their benefits on nature and climate. The principles and criteria of forest certifiers have been shaped by hundreds of independent stakeholders on forests such as environmental and consumer groups. The world's largest forest certifiers in the world are the Forest Stewardship Council (FSC) and the Programme for Endorsement of Forest Certification Schemes (PEFC).

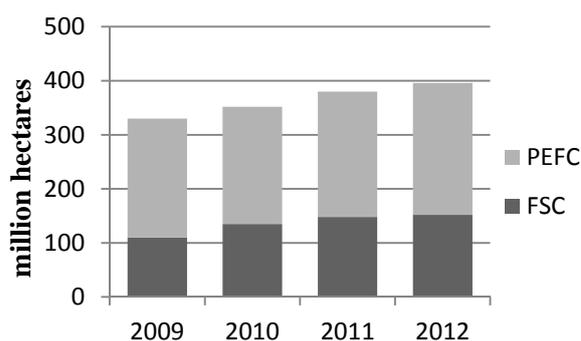


Figure IV. Certified forest area by main certifiers

All over the world, nearly 400 million hectares of forestland are certified (Figure IV). The WWF (2010) describes forest certification as the most important initiative of the last decade to promote better forest management.

3.1 Forest Certification Development in Japan

The first forest certification in Japan was issued in the year 2000. Since then the number of certifications and the total certified forest area has increased but the annual progress has decelerated since 2009 (Figure V).

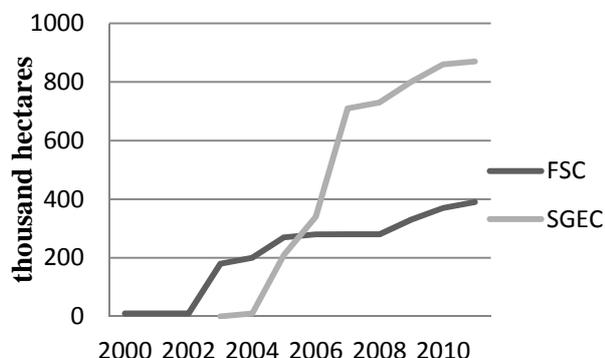


Figure V. Development of forest certification in Japan.

In 2003, the Sustainable Green Ecosystem Council (SGEC) was established through talks and in agreement with forestry and non-forestry organizations as a competitor to FSC, as a unique forest certification system, suited to the Japanese forest environment. The number of its certifications increased sharply within the first four years. However, with all the success in early years, SGEC has also earned criticism. [Shiraishi \(2011\)](#) claims that SGEC was established by an anti-FSC group to make forest certification free and independent in Japan. Management reliability in terms of establishing and maintaining SFM is said to be insufficient as it neither shows clear guidelines for independent forest assessment nor point out processes to review SFM standards similar to the major certifiers FSC and PEFC. To overcome these issues, SGEC was invited to join PEFC but talks have stagnated. Future expansion of certification is difficult to predict, as the market situation for certified wood is badly developed in Japan. Better public understanding for the necessity of protecting forests, and how forest certification contributes to it, is needed.

Only about 400,000 hectares or 1.5% of Japan's entire forest area is certified by a reliable certifier. In comparison, almost 70% of Germany's forests, approximately 7.5 million hectares are certified by FSC, PEFC or are even dual certified by both.

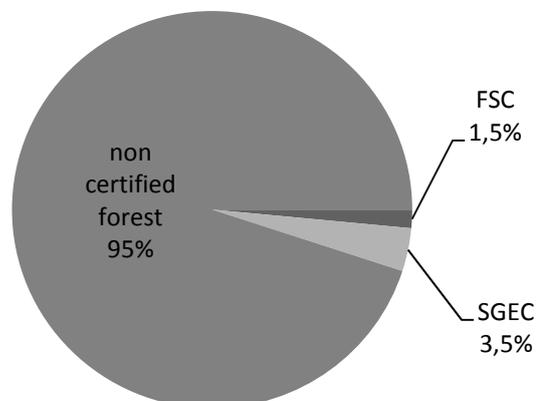


Figure VI. Share of certified forest area in Japan in 2012.

3.2 Forest Certification, a Potential Tool towards Effective Sustainable Forest Management

Japan's insufficient forest management has been criticized greatly. Although Japan's efforts towards proper SFM have been increasing greatly over the past years, the progress in the development of forest policy, which also obligates forest owners of proper forest management, is still insufficient ([Gain & Watanabe, 2013](#)). Most Japanese forests are owned on a small-scale and therefore require complex multi-party management. It can be argued that Japan is, for the time being, not able to pass a strict forest law similar to that of Germany or other countries with strict SFM regulations. This is where the strengths of forest certification come in. A local-level promoted step-by-step implementation of accredited certification, which is based on internationally recognized SFM principles and is frequently supervised by independent assessment, will successively increase the amount of sustainably managed forest area in Japan. Combined improving national awareness on the importance of healthy forests, it can become a more effective substitute to deficient national forest policy.

SUMMARY AND DISCUSSION

The principles of SFM were born in Europe about 300 years ago to react to a wood shortage due to high wood demands by the public and industry. Whether this issue was of real or constructed nature is still under debate. However, the threat of global warming and climate change through uncontrolled logging and deforestation, in many parts of the world today, can be considered a real global issue, which directs large attention on the benefits of sustainable forest use. SFM has become a hot topic in forestry over the past two decades and is being promoted worldwide to create an optimal balance between economic use, nature conservation and societal demands. For global uniformity, international organizations have set similar criteria and indicators for the characterization of SFM.

Japan's forest management activities; as wide areas show signs of degradation, mainly due to insufficient forest care such as thinning, have been largely criticized. Japan's rather imbalanced forest age structure shows that reforestation has not been practiced with a clear long term forest management plan.

The Japanese government promotes thinning in its annual forest reports, however, it does not give the impression that the basic principles of thinning, as a frequent but non-systematic instrument of forest care, are fully understood and respected. Instead, it gives the impression that it is mainly used as a tool to increase carbon sinks to support and achieve the requirements of the first commitment of the Kyoto Protocol.

It is logical to say that frequent thinning is difficult to perform if there is no well-established market for thinned wood and wood prices are gradually decreasing. However, only proper forest care will provide all the benefits of SFM including economic benefits. Today, the majority of Japan's trees show improper breast-height diameter ratios

which increases harvesting costs and decreases log value. These undesirable characteristics should have been taken more deeply into consideration at the time of reforestation, as it puts Japan's forestry in an uncompetitive situation.

75% of wood consumed in Japan is imported and the domestic forest industry has been declining. Although Japan is making strong efforts to overcome this issue, the forest and market infrastructure needs to be improved and modernized.

Another issue that makes forest management difficult in Japan is high small-scale private forest ownership, the increasing number of ageing forest owners and untraceable forest owners. Without a binding national forest policy, building consensus among small-scale forest owners towards sustainable forest use, as promoted by the Japanese government, is complicated. Forming forest unions to combine forest area can help to reduce the total costs for care and harvesting, and will enable forest owners to deal timber in larger quantities to reach more potential markets.

The majority of forest management is executed by privately operated local forest associations. It is out of the question that their knowledge on sustainable forestry may be insufficient, but being a privately operated organization, it can be argued whether all three factors of SFM are treated equally. Local governments must take more responsibility to equally balance public and private interest on forests. Active support for small-scale private forest owners in the form of education, advice on management and forest unions is crucial to assist the national government's efforts to promote sustainable forestry. Similar structures have been present since the beginning of the 18th century in various parts of Germany with excellent success. With the reliance on foresters and their local and national support, Germany's healthy forests have become famous around the world.

Forest certification has been present in Japan since 2003, but compared to other developed nations it does not cover a large area. FSC is for the time being, the only internationally accredited forest certifier in Japan. SGEN was found as a competitor to make forest certification independent from international providers but assessment criteria are not clearly stated and are lacking transparency.

However, accredited forest certification can become a significant management utility in the future to improve forest management on a local and even a national level in Japan. With every new local certification, another piece of forestland becomes sustainably managed and properly supervised based on international standards.

REFERENCES

- BMELV. (2013). *Illegaler Holzeinschlag*. Bonn.
- Ecomed. (1991). *Waldlandschaftspflege - Hinweise und Empfehlungen für Gestaltung und Pflege des Waldes in der Landschaft*. Landsberg: Ecomed Verlagsgesellschaft .
- EurObserv'ER. (2012). *Baromètre Biomasse Solide. le journal des énergies renouvelables*(212).
- FAO. (2000). *Asia-Pacific Forestry Commission: Development of National-Level Criteria and Indicators for the Sustainable Management of Dry Forests of Asia: Workshop Report*. Bangkok, Thailand: United Nations.
- Fernholz, K., & Kraxner, F. (2012). 10 Certified forest products markets, 2011 - 2012. (U. N. Europe, Ed.) *UNECE/FAO Forest Products Annual Market Review*, pp. 107-116.
- FHP. (2000). *Forst Holz Papier*. Retrieved July 31, 2013, from Publikationen/Durchforstung: http://www.forsthholzpapier.at/index.php?option=com_virtuemart&page=shop.browse&category_id=7&Itemid=59
- Gain, D., & Watanabe, T. (2013). The Contribution of Forest Regulations on the Realization of Sustainable Forest Management: A Comparative Law Study of Japan and Germany. *Symposium on Social Management Systems*.
- Graham, R., & Jain, T. (2004). Past, present, and future role of silviculture in forest management. (R. M. US Department of Agriculture, Ed.) *Silviculture in Special Places: Proceedings of the 2003 National Silviculture Workshop*, pp. 1-14.
- Grober, U. (1999, November 25). *The Inventor of Sustainability*. Retrieved July 22, 2013, from Die Zeit Online: http://www.zeit.de/1999/48/Der_Erfinder_der_Nachhaltigkeit
- Holzabsatzfonds. (2009). *Natürlich Holz - Forst- und Holzwirtschaft in Deutschland*. Bonn: Absatzförderungsfonds der deutschen Holz- und Forstwirtschaft.
- JATAN. (2010). *Japan Tropical Forest Action Network*. Retrieved July 13, 2013, from Japan's Timber Trade and Forestry: <http://www.jatan.org/eng/japan-e.html>
- Kaul, W. (2011). *Wälder für Menschen - Naturerbe und Wirtschaftsfaktor in Deutschland*. Germany.
- Lohberg, R. (2009). *Die Geschichte der Forstwirtschaft*. Retrieved July 21, 2013, from [wald.lauftext.de:](http://wald.lauftext.de/) <http://wald.lauftext.de/vom-wald-zum-forst/geschichte-der-forstwirtschaft/index.html>
- MAFF. (2011). *Annual report on forest and forestry in Japan for FY2010*. Tokyo: Ministry of Agriculture, Forestry and Fisheries, Japan.
- MAFF. (2012). *Annual report on forest and forestry in Japan for FY2011*. Tokyo: Forestry Agency, Policy Planning Division.
- MAFF. (2013). *Annual report on forest and forestry in Japan for FY2012*. Tokyo: Forestry Agency, Policy Planning Division.

- MAFF. (2013). *The official homepage of the Ministry of Agriculture, Forestry and Fisheries of Japan*. Retrieved from Tree species by age class and area: <http://www.rinya.maff.go.jp/j/keikaku/genkyou/h24/4.html>
- Matsushita, B., Xu, M., Onda, Y., Otsuki, Y., & Toyota, M. (2010). Detecting forest degradation in Kochi, Japan: ground-based measurements versus satellite (Terra/ASTER) remote sensing. *HYDROLOGICAL PROCESSES*(24), 588-595.
- Mauro, F. (2011). Forests and Humans Throughout History. In E. a. Italian National Agency for New Technologies (Ed.), *Speciale Forest: a millenary heritage that guarantees us life*, (pp. 6-14).
- MCPFE. (2003). Improved Pan-European Indicators for Sustainable Forest Management. *Ministerial Conference on the Protection of Forests in Europe* (p. 6). Vienna: MCPFE Liaison Unit Vienna.
- Neumann, M. (2003, November). Durchforstung: gestern, heute und morgen? (B. u. Wald, Ed.) *BFW-Praxisinformation*(2), pp. 3-4.
- Ota, I. (2007). A forest owners' cooperative in Japan: obtaining benefits of certification for small-scale forests. (F. a. Nations, Hrsg.) *Unasylva*, 228(58).
- Peterken, P. (1993). *Woodland Conservation and Management* (2nd Edition ed.). London, UK: Chapman & Hall.
- Popplow, M. (2002, June). *Abholzung und Aufklärung - Holzangel im 18. Jahrhundert*. (D. R. Hohls, Ed.) Retrieved July 22, 2013, from H-Soz-u-Kult c/o Humboldt-Universität zu Berlin: www.hsozkult.geschichte.hu-berlin.de/tagungsberichte/id=58
- Schmidt, A. (2011). *Der Wald in der Geschichte der Oberpfalz*. Retrieved July 22, 2013, from Oberpfälzer Kulturbund e.v.: www.oberpfaelzerkulturbund.de/cms/pages/kultur-der-oberpfalz/einleitung/geschichte/wald.php
- Shiraishi, N. (2011). International Workshop on Forest Certification. *The Progress of Forest Certification in Japan*. China: China Forest Certification Scheme.
- Street, W. (2012, June 18). PEFC chairman at Forests: the heart of a green economy. *Rio+20 side event*. Rio de Janeiro.
- WWF. (2010, April). *WWF position on forest certification*. Retrieved August 4, 2013, from [wwf.panda.org: http://awsassets.panda.org/downloads/wwf_forest_certification_pp_oct07.pdf](http://awsassets.panda.org/downloads/wwf_forest_certification_pp_oct07.pdf)