PUBLIC OPINION ON BIOENERGY – ECO-MODEL CITIES' NEW STRATEGIES FOR REACHING A LOW-CARBON SOCIETY IN JAPAN

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SUMMARY: The purpose of this study was to contribute to filling the knowledge gap in public opinion and knowledge about forest and its certification in Japan, as well as to identify key elements and the possible role of public opinion within integrated bottom-up policies, bridging the sectors of forest, environment and energy. This article compares the public opinion of two rural towns in Japan, one of which is located in northern Hokkaido, whereas the other town is located on the southern Main Island Shikoku. Both municipalities had been identified as an optimal case study location and selected because of their early decision to pursue forest management certification and because both towns had been awarded the status of a Japanese "Eco-Model Cities" – to encourage the creation of low-carbon communities - in 2008 and 2009. In order to test the basic knowledge and information needs of the public, a questionnaire-based drop-off survey was conducted in early 2007 and mid 2009 respectively among all households of the two rural towns. The questionnaire was divided into 5 sections (general info, forest, forest management, bioenergy, and information needs) in each of which up to15 questions were asked with main focus on forest certification and biomass for bio-energy. The answers were made on a 4/5 point scale, or in dichotomous-choice form and analyzed by using SPSS. Gaining better knowledge about what the public thinks regarding bioenergy and the environment is seen to be crucial for the design of future policies for integrating a range of discrete and sectoral approaches such as energy supply-demand measures, energy-efficient buildings, traffic measures, waste disposal measures and forest protection. Finally, this study describes and interprets differences and similarities in the public opinion of both Eco-Model Cities in Japan where bioenergy production and forest management certification plays an important role. Forest certification and bioenergy from forest were identified as key elements for future integrated bottom-up policies that need to concentrate on facilitating the linkage between forestry and renewable energy as well as on promoting environmentally sound management and forest certification.

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1. INTRODUCTION

1.1 Overview and background

The International Energy Agency (IEA, 2008a) considers biomass for bioenergy to be essential in reducing the carbon intensity of energy production and decoupling energy use from CO2 emissions. Japan aims at increasing its domestic forest use by 25% in 2010 which would lead to a contribution of biomass-based bioenergy (incl. waste) to its total primary energy supply of about 2.8% (Kinoshita et al., 2009). During the past 3 decades, woody products from thinning or other wooden residues from forestry processes have been nearly unused in Japan (IEA, 2008b), even though more than 60% of the country's land cover is forest which can be seen as a main domestic resource for energetic biomass with large future potential (e.g. Kinoshita et al., 2009a,b). Japanese forests show an annual increment of some 100 million m3 of which only 15% is harvested due to a combination of low wood prices, high labor costs, and lack of appropriate forest infrastructure. On the other hand, about 81% of the total wood supply originates from boreal and tropical overseas, and wood export does practically not exist (MAFF, 2008a).

This wide gap between wood demand and supply from domestic sources needs urgently to be addressed by integrated policy approaches. As a first countermeasure, recent national energy and environmental policies started aiming at an increased use of domestic wood for bioenergy and other bio-fiber based products (MAFF, 2008b). Following the idea by the Japanese Ministry of Environment for achieving a "Low Carbon Society" (NIES, 2008), existing bioenergy plants could be fired with environmentally sound grown, domestic forest residues rather than with low-priced wood chips of frequently non-sustainable origin, shipped from Australia, Canada, or tropical countries such as Indonesia (FAO, 2008a).

Another two facts seem to have also major impact on the present situation of biomass use in Japan. On the one hand, only a modern and dense forest infrastructure (e.g. the forest road system or adequate harvesting systems for steep terrain) – along with the necessary supportive policies can lead to cost-effective and competitive wood production and market access. Only that most of Japanese forestry – the small-scale forestry in particular – has not seen any investment throughout the last decades (Kraxner et al., 2010a). On the other hand, the Japanese forest sector industry shows a certain reservation with respect to any kind of forest certification and wood product labeling on a large scale, which could help with assuring and promoting a responsible and sustainable forest management (SFM) and serve as a product marketing tool. Forest certification in general is seen to be successful in raising awareness and disseminating knowledge on a holistic SFM concept, embracing economic, environmental and social issues, worldwide (Rametsteiner and Simula, 2003).

1.2 Forest certification and Japan

While many European countries such as Austria or Finland - with similar or higher forest cover than Japan (both countries are also well known for their strong forest-based bioenergy sector) - have certified up to 100% of their forest area, the Japanese certification rate is only about 1%, which is even lower than that of many tropical developing countries Oliver and Kraxner, 2009).

The certification of the environmental and social characteristics of a product's production process is emerging as a significant transnational, nongovernmental, as well as market-based approach for promoting SFM, environmental regulation and development. After only a decade, environmental certification of forests has spread to cover a significant portion of the world's forests under management (e.g. Klooster 2005 and Rametsteiner and Simula, 2003). Major wood retailers increasingly require forest management or chain of custody (CoC) certification, and

international environmental organizations strongly support it (Kraxner et al., 2006). However, in Japan, where only 277,320 ha (equals to 1.1% of the total forest area) of forest is certified (FSC, 2008), forest managers, owners, as well as local authorities are required to make substantial improvements to the social and environmental aspects of forest management and its certification. On the other hand, the number of CoC certificates in Japan has increased since the early 2000s and reached 633 in early 2008, by which Japan has become the major driver on the certified forest products market in South-East Asia (e.g. Kraxner et al., 2007 and Kraxner et al., 2008).

1.3 The Eco-model city concept of Japan

The ideas and experiences with developing and establishing sustainable and environmentally friendly regions and cities go back to the late 1980s/early 1990s when e.g. cities in Germany such as Freiburg (County of Baden Württemberg) or the city of Malmö (Skåne County) in Sweden were facing raising green movements (e.g. against nuclear power stations planned in the region), often combined with social problems coming along with e.g. the decline of important local and regional (heavy) industry sectors, which made new orientations and perspectives necessary for the society.

For Japan, (Takeuchi et al., 1998) described in 1998 the designing of eco-villages with the main purpose of revitalizing Japanese rural areas and to study the possibility of establishing and developing pilot communities to encourage people to settle in agricultural and mountainous areas. An eco-village is defined as a self-supporting area in which, with the support of environmental conservation technologies, both a productive economy and the maintenance of semi-natural environmental systems can be realized. This is based on the view that ecologically sound agricultural and forestry practices can be economically viable if the external economy is incorporated (Kada, 1990).

Another effort was the attempt to create the industrial and urban symbiosis in Japan under the “Eco-Town Program” during the years 1997 and 2006. The aim of this program was twofold: to extend the life of existing landfill sites and to revitalize local industries. It was one program for the recycling oriented society focusing at the innovative recycling industries in particular in cities with ageing industrial infrastructure through voluntary initiatives and financial support from the national government. The Eco-Town program did not evolve in isolation. The Japanese Ministry of Agriculture, Forestry and Fisheries supported since 2002 centralized utilization of waste biomass in cities, towns and villages designated as “Biomass Towns” (Kuzuhara, 2005). However, mostly these pilot projects were driven by resource economics and industrial needs, developed and designed to enhance innovation and competitiveness of rural areas.

Additionally to the economic requirements of the past decades, increasingly more attention had to be paid to the issue of climate change, which also was highlighted as one of the main reasons to follow up on the idea of “Eco-Model Cities” in Japan. To transform Japan into a low-carbon society, lifestyles, urban and traffic situations and other social systems needed to undergo fundamental change. Japan’s Eco-Model Cities program was identified to pioneer such change. A “Working Group for Eco-Model Cities and Creating a Low-carbon Society” was established under the “Advisory Panel on the Problem of Global Warming” by the prime minister’s Cabinet Office to address the selection of Eco-Model Cities. Applications for Eco-Model Cities were accepted between April 11, 2008 and May 21, 2008, with responses from eighty-nine cities and municipalities from throughout Japan, ranging in size from large ordinance-designated cities down to small towns with a population of only a couple of thousand people. Of these applicants, Yokohama city of Kanagawa Prefecture and Kita-Kyushu city of Fukuoka Prefecture at the large city level, Obihiro City in Hokkaido and Toyama City of Toyama Prefecture at the regional center level and Shimokawa Town of Hokkaido and Minamata City of Kumamoto Prefecture at the small town level were selected and certified Eco-Model Cities. Seven more “cities” were

chosen as candidates for additional selection including Kyoto City, Sakai City of Osaka Prefecture, Iida City of Nagano Prefecture, Toyoda City of Aichi prefecture, Yusuhara Town of Kochi Prefecture , Miyako-jima City of Okinawa Prefecture and Chiyoda Ward of Tokyo (Chiba, 2008).

One of the special features of the Eco-model Cities policy, which aimed at promoting conversion to a Low-carbon Society, was that it requested results for and integration of a range of discrete and sectoral approaches such as energy efficient buildings, traffic measures, energy supply-demand measures, waste disposal measure and forest protection, that all local governments have been accumulating until then. The selection criteria for Eco-Model Cities were “significant reductions in greenhouse gases”, “leadership and reproducibility”, “regional suitability”, “achievability” and “sustainability”. At the same time, to bring about a more wide-ranging reduction effect, specific regions were identified and their initiatives incorporated into the socioeconomic system, so that actions evolve with a cross-sectoral “integrated approach” with autonomous action initiated based on the special characteristics of a city or region (Chiba, 2008).

The overall objective of the central government’s Eco-Model Cities policy was to encourage the creation of extremely high-quality low-carbon communities by focused application of policies and measures to municipalities that lowered the barriers between administrative authorities and would become a trigger for integrated initiatives. For example, in terms of urban issues such as residential housing, traffic, garbage collection, the environment and water, it was an ingrained habit of each responsible department to consider the issues discretely and it was a rare case when the issues were dealt with in an integrated manner. An integrated approach was required, whereby all of these initiatives and independent agents are integrated and implemented in the social economic structure within a definite area such as a “city” or “region”. An integrated approach should demonstrate concrete plans for initiatives that cut across different areas, but at the same time it should serve as a collection of initiatives that exploit local peculiarities. The method for tackling this was the development “Eco-Model Cities” program. By indicating major targets for Eco-Model Cities such as the aim to improve energy efficiency by more than 30% by 2020 or reduce greenhouse gases by more than half by 2050, the enthusiasm and incentive to apply by integrating policies and overcoming internal barriers worked through in a spontaneous manner. Another idea of the program was also that the efforts and actions of these model cities should be transmitted around the country and even overseas – with special emphasis on Southeast Asia - so that their unique approaches toward establishing the low-carbon society become widely known (Chiba, 2008).

1.4 Objective and motivation

There is growing political attention paid to issues of a “green economy” due to the present economic crises in combination with the threats by climate change. Decision makers in all fields of policies (e.g. environment, climate, energy, socio-economics etc.) realize that promoting economic activity based on improving environment and controlling climate change is not, as often argued, a constraint on the economy but an economic opportunity to steer society to a more sustainable low carbon Economy (Hanley, 2009). For example in the EU, many existing environment policies and actions have already contributed to creating a flourishing green economy with about 4.4 million jobs created in the environment sector which are contributing to the GDP by 2.3% with an annual growth rate of 8%, outperforming many other traditional industry sectors). Hence, green economy with its objective to create a Low-carbon society can be seen as central for tackling climate change and key element in economic recovery plans for future prosperity and job creation.

Similarly to and jointly with the ongoing Eco-Model Cities Program, new and innovative

tools have to be created in order to further promote green economy, such as investment into research, government expenditure (directly into e.g. public transport or renewable energy; indirectly via subsidies for relevant efforts towards a Low-Carbon Society), improved legislation (e.g. energy efficiency standards or renewable targets), and fiscal measures (such as taxes, emission trading or feed in tarifs).

In Japan, both the transportation sector and the industrial sector are showing good progress in terms of reducing greenhouse gas emissions and contributing to a Low-carbon society – mainly due to Japan's extremely high energy efficiency. But in the civic sector, on the contrary, emissions have risen by about 20% since 1999. In our research we concentrated on the civic sector which is directly connected to the lifestyles of people and hence is a sector where it is difficult for the government to put policy into effect.

Further information from empirical social sciences and related evaluation research need to be provided to, and integrated by, local and regional policy makers - especially with respect to successfully tackle the pressing problem of a small share in bioenergy and little use of the domestic forest resource. Despite its relevance for forest-, environmental-, energy- and social politics, relatively little is known about the attitudes of the Japanese public towards the topics of forests and biomass, their sustainable management and certification, or the use of this renewable resource for energy. Only a few surveys including forest related questions have been carried out by governmental or research institutions (e.g. Owari and Sawanobori, 2006, MAFF, 2007a and Kraxner et al., 2009). Hereby, special emphasis needs to be put on investigating the public opinion in Eco-Model Cities since these cities fulfill best the role of "visualizing" past and future policy efforts as well as civic movements, and if, in the future, local governments continue to share information and approaches that work well, it will be possible to increase activities toward a low-carbon Society in all municipalities in Japan.

Thus, the main objectives of this study were i) to contribute to filling the knowledge gap in public attitudes and knowledge about forest, forestry, biomass and its certification, and ii) to identify effective ways of how the obtained knowledge of public opinion could contribute to integrated bottom-up policies for an enhanced use of domestic forest resources of rural Eco-Model Cities in Japan, complementary to the top-down policies established recently in the area of bioenergy.

1.5 Study sites

The first questionnaire-based drop-off survey was conducted in early 2007 among all households of Yusuhara Town which had been identified as an optimal case study location and selected because of its forest owners' cooperative. The town, located in the Kochi Prefecture on Shikoku Island, is a representative Japanese rural mountain community, offering a wide range of biomass resources for energy use e.g. wooden resources from thinning and the sawmill industry. Yusuhara Town has an area of 236.5 km2, 91% forest coverage (of which 80% is privately owned) and a population of 4,625 people in 1,930 households (as of 2007). Forestry is the main economic activity in the town, with an annual turn over of about 600 million Yen in 2004 (Ota, 2006). Many of the local households are also members of the Yusuhara Forest Owners' Cooperative (YFOC). The cooperative achieved the first owner group forest management certification of international standard in Japan (in 2000) by the Forest Stewardship Council (FSC) for its 11,371 ha forest. This ambitious project had been mainly driven by an expected price premium and improved market access for its products. Yusuhara Town has been elected as Japanese Eco-Model City in 2009.

The second study site was Shimokawa Town located in the Kamikawa (Teshio) District of Hokkaidō, the most northern main island of Japan. The town is a representative Japanese rural mountain community with 90% forest coverage on a total area of 644.20 km² and a population of

3,866 people (July 2009) in 1,950 households. Shimokawa was originally a mining town, extracting copper and gold. The mines are now exhausted and the primary industries are forestry and farming. Since the acquisition of national forests in 1953, the town has extending its forest area and has implemented a broad variety of forestry activities, mostly in a profit-sharing agreement with the national forest. The local forest association established so called "Recycling Forest Management" which equals the idea of SFM. In this way, the local government tried to supply resources to local communities on a sustainable basis and secure employment opportunities. The Shimokawa Forest Owners' Cooperative achieved FSC certification of its mixed ownership (national/town/private) forest area (6,480 ha) as the first town in Hokkaido in August 2003, hoping for an improved market access for its products (Ota, 2002). The Cooperative manages semi natural forest and natural forest and the accumulated forest biomass of Shimokawa forest is some 700,000 m^3. Given Shimokawa's northern latitude, the local tree species primarily comprise oak, white birch, larch, and pine trees. There are 5 saw mills in Shimokawa which produce a total of 60,000 m^3 of lumber in a year. The lumber is used both in Japan and exported to Canada, Finland, New Zealand and other places. Some examples for FSC certified products are housing timber ("Born and raised in Shimokawa") and chopsticks. Additionally to Forest Management (FM) Certification, Shimokawa holds also 7 Chain-of-Custody (COC) certificates for the management of wood processing and its distribution. Also a Forest Therapy Association was established in 2005.

Shimokawa Town came somewhat into the spotlight due to the fact that the associated industries are formed organically, with forestry at their base. The town organized an industrial cluster research group, in which business owners, housewives, forestry association workers, retailers, forestry administration officers and people from numerous other professions participate as individuals to develop a comprehensive regional economic system that pursues sustainable regional industries. In this way, the comprehensive design for creating a "Low-carbon Model Society in Symbiosis with the Northern Forest" was developed. These activities have also formed the basis for applying to receive the status of a Eco-Model City in 2008.

Mountain communities such as Shimokawa Town and Yusuhara Town cover 50% of Japan's total land area and own 60% of Japan's forest area (Hanley, 2009). Mountain villages have various biomass feedstocks as potential alternative energy sources to fossil fuel, including forest residues from thinning, branches and leaves or agriculture. According to Japan's Forest Agency, especially in mountain villages it is possible to form a society where the local resources are effectively and sustainably utilized at multi–stages, which is an optimal precondition for a Low Carbon Society (e.g. MAFF, 2008b and NIES, 2008).

2. METHODOLOGY

In both towns, a questionnaire-based drop-off survey were among all households. The first survey has been carried out in Yusuhara Town in early 2007 and the second survey took place in Shimokawa Town during August 2009. The questionnaires were divided into 4/5 sections (general info, forest, forestry, biomass and bioenergy) in each of which 4-16 questions were asked with main focus on forest, forest certification and biomass for bio-energy. The answers were made on a 4/5 point scale or in dichotomous-choice form and analyzed by using SPSS.

While in Yusuhara Town the valid response rate was 40% (from a total sample number of 1,930), for Shimokawa Town, the valid response rate of the total sample number (1,847) was 27%. This difference in the response rate was due to different dropp-off and re-collection of the questionnaires in both the towns. In order to facilitate an evaluation and improve the interpretation of the perceptions and attitudes derived from the statistical analysis, results were compared with other national surveys where appropriate.

We assumed that i) people who are forest owners have different perceptions on and attitudes towards forest management and the increased use of biomass, than people who do not own forests. We further assumed that ii) people who have a better knowledge on forest management, certification, and bioenergy have also different perceptions on and show different attitudes towards forest management and an increased use of forest biomass. Additionally, we compare the changes in perception before and after providing information on SFM and forest certification.

3. RESULTS

3.1 General results

As for the general questionnaire results of Yusuhara Town, the majority (70%) of the respondents were older than 50 years old. Since Yusuhara Town is a typical Japanese rural town suffering from weak or stagnating development, the findings indicated an aging problem. Along with over-aging, the town is facing certain depopulation, having lost more than half of its citizens since the late fifties. 15% of the local people stated to be retired or unemployed. 80% of the respondents declared to be forest owners.

In Shimokawa Town, the majority (75%) of the respondents were older than 50 years old and 39% of the local people stated to be retired or unemployed. There was 1 student among the respondents and about 45% declared to work for a company, the local administration, or were running their own business. 8% stated to work in the agricultural sector and only 2.5% indicated the forest itself as their working place. But 12.5% were working in the forest sector industry such as sawmills or other wood processing companies. However, one quarter (25.6%) of the respondents declared to be forest owners, out of which some 15% indicated to also manage their own forest. Almost all forest owners were also identified as member of the local forest cooperative, while only some 3% of the respondents stated to be a member of a forest-related non-governmental organization.

3.2 Forest functions

Reflecting the importance of forest industry in both the areas, the forest industry sector was thought to be especially important for Japan by the majority (86%) of the respondents in Yusuhara Town and by the vast majority (92%) of the respondents in Shimokawa Town respectively. This clear statement of highly valuing the local key industry turned into a somewhat different view when asking about various forest functions.

Here the perception among the public in Yusuhara Town as well as in Shimokawa Town shifted from a more product-oriented view when talking about the importance of the forest industry, towards the preference of ecosystem services as the most important forest functions. To be more precise, for Yusuhara Town this meant that 82% of the respondents stated that the protective functions such as protection from disasters (e.g. soil erosion, flooding, avalanches), the provision of clean water, as well as the carbon storage function were most essential. On the other hand, the classical forest function of wood production was judged less important by only 55% of the respondents. Moreover, also the opinion that forest was a source for employment and job opportunities was rather weak (47%).

The results with respect to forest functions were quite similar in Shimokawa Town. Here, 84% of the respondents stated that the protective and conservation functions such as the forest as a natural living space for animals and plants, or the protection from disasters (e.g. flooding, landslides, avalanches), the carbon storage function, as well as the provision of clean water were also here most essential.

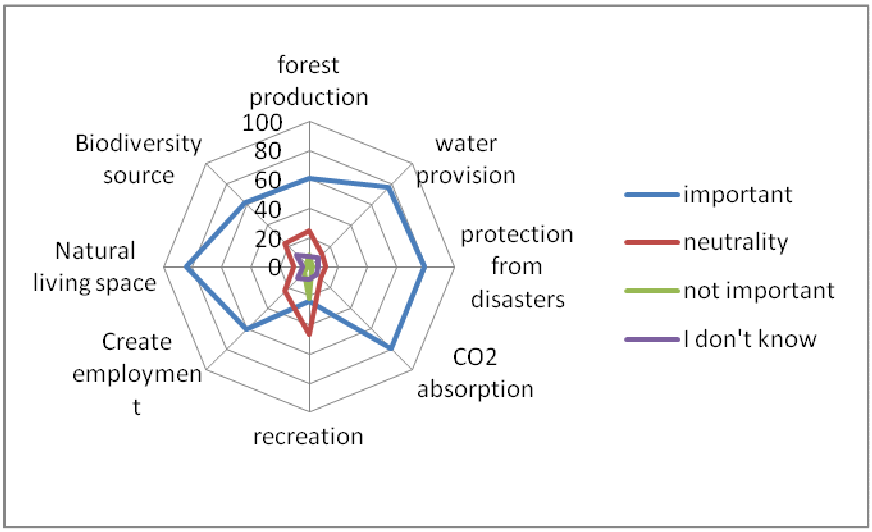

Figure 1. Ranking of forest functions in Shimokawa Town by their perceived importance in Shimokawa Town (after Kraxner et al., 2010).

Again, the classical forest function of wood production was judged less important by only 60% of the respondents and also the opinion that forest was a source for employment and job opportunities was rather weak at61% (Figure 1).

Figure 1 clearly shows that the highest agreement among all respondents as to what constituted the most important role of forest was found for natural-biophysical functions such as forest as important ecosystem and living space (77-85%). The lowest importance was attributed to forest's role as place for wood and biomass production and for creating jobs (60%) and especially as a place for recreation (23%). The other way round, the recreation function was rated highest among the neutral statements and peaked also with the not important notion.

These similar findings for both towns seem peculiar, especially in regions which are dependent to a large extent on the forest as a resource for the production of biomass and timber, as well as work and income - directly or indirectly - to many local households. The fact that such kind of finding was not only a local exception, is supported by the results of a survey undertaken by the Japanese Cabinet Office on a national basis (MAFF, 2007b). Respondents to this governmental questionnaire explained that they primarily expected high carbon sequestration capacity and disaster protection from the forest rather than wood production or the possibility for mushroom picking or other non-wood forest products.

Such impressions and expectations can be perceived as symptomatic for a threatened industry sector that is facing difficult times and has been abandoned for a long period already. It may also mean that people do not see their personal or regional future made up from income from forest products. A certain paradigm shift from production towards protection and the increased environmental role for forests being e.g. a pool of biodiversity, is identified when analyzing the results regarding forest functions.

For Yusuhara Town, the answers obtained from the forest function questions of the survey were also analyzed by different job groups. A cross-analysis illustrated a specific pattern similar to the trends derived from the total sample, though with subtle differences between job groups. Farmers and foresters showed quite similar attitudes towards forest functions, whereas company workers or unemployed (including retired) people indicated different thoughts (Figure 2).

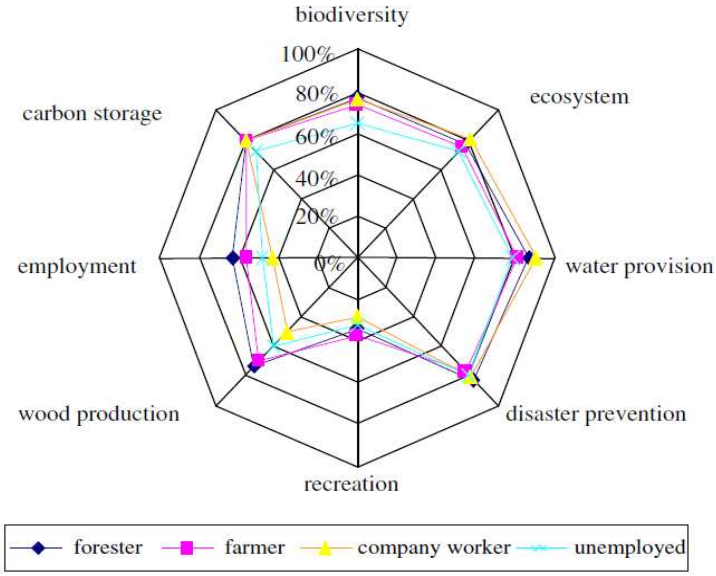

Figure 2. Importance of forest functions by different job groups in Yusuhara Town (after Kraxner et al., 2009).

Figure 2 shows that in Yusuhara Town the highest agreement among all job groups as to what constituted the most important role of forest was found for technical and natural functions such as forest as an important ecosystem (80%) and water provision (80-90%), as well as for protective functions such as disaster prevention. The lowest importance (30-40%) was attributed to forest's role as a place for recreation. The highest discrepancy was identified between job groups with regard to forest's role as a place for wood production and job provider. Whereas foresters and farmers considered these functions to be relatively important – even though other functions were estimated more important – company workers and unemployed (including retired) people rated these production functions not very much higher than recreation (40-60%). Generally, these job-specific findings might be interpreted such that the closer the work to the topic of forest, the clearer becomes the positive attitude towards seeing forest as the traditional provider for timber, biomass and other wooden products. The further a job is placed from the topic of forest – e.g. company worker – the more the service-oriented function dominate the way of thinking. Additionally, these findings supported the results of the total sample analysis, indicating that even in the opinion of forest and agricultural workers, the classical forest functions seemed to be outdated, and that – under the present conditions of forest industry – nature protection and ecosystem services seemed to be considered as future functions.

As to agreement or disagreement on certain statements regarding the forest and its meaning to people, it turned out that there was a similar trend as with the forest functions in both towns (Figure 3).

Figure 3 indicates that in Shimokawa Town highest agreement was stated for the notions forest being good for the environment and climate (91%), that forest should be protected and that forest was a symbol of nature. As soon as the production function is included to the statements – such as that forests should be used by man through forest management and harvesting, the agreement level goes down by some 30%.

In Yusuhara Town there was also an agreement among the job groups with respect to forest being good for the environment and climate, and that forest was a symbol of nature (Figure 4). However, Figure 4 demonstrates that the situation was not this coherent with respect to the statements aiming at an increased use of forest, that – e.g. in the form of biomass – could be used energetically for bioenergy.

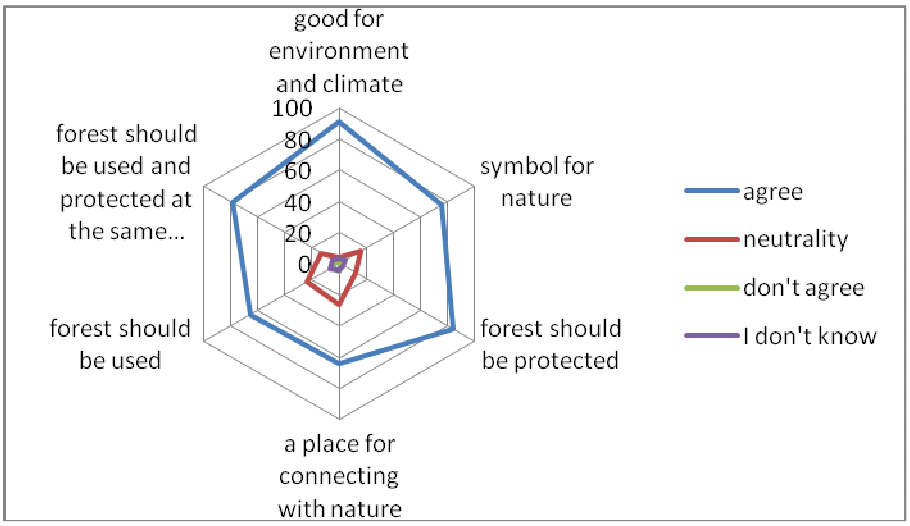

Figure 3. Public perception of forest in Shimokawa Town (after Kraxner et al., 2010).

Foresters clearly agreed (80%) with the idea of "using" the forest (in terms of harvesting and thinning for e.g. biomass) and also with the statement of "using the forest and protecting it" at the same time (80%), but did not agree so much with solely "protection" (60%).

On the contrary, company workers strongly agree with the solely "protection" statement (70%) and agreed much less with the "use" (50%), as well as the combined "use and protect" notion (70%). Thus it can be noticed that there was a common understanding that the forest needed to be protected and that forest was a symbol for nature which was good for environment and climate. Nonetheless, the use of forest was perceived controversially within different job categories, showing that the acceptance to use forest decreased again with the distance of a job from the forest, e.g. only a minor share of company workers and unemployed (retired) people agreed to using the forest for harvesting actions.

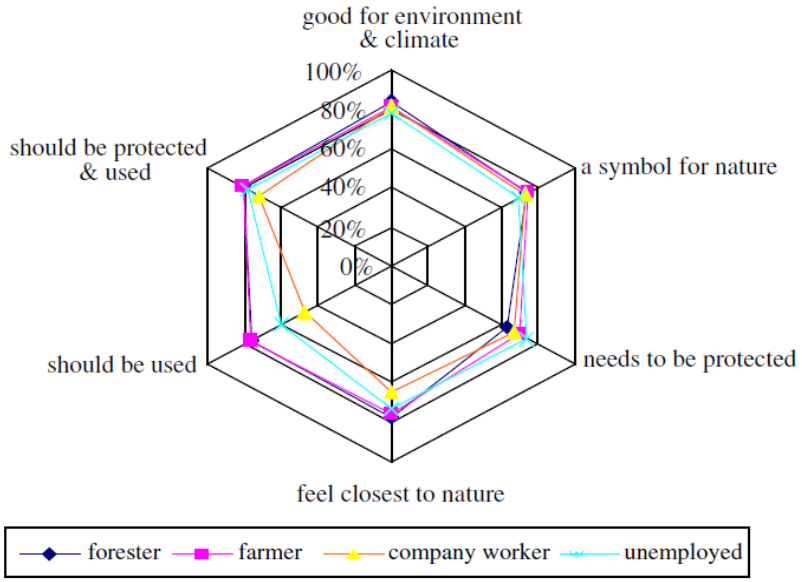

Figure 4. Agreement to statements on the meaning and use of forest by different job groups in Yusuhara Town (after Kraxner et al., 2009).

So far we might say that such kind of attitudes and perceptions also reflect the raising environmental awareness in Japan during the past two decades (Barrett, 2005). This also incorporates a certain distance that has been growing between people and forest in Japan. Especially younger people believe – and this is obviously also proven by Japanese reality - that timber and wood products are simple commodities – similarly to steel or petroleum - that need to be imported while resources at home need to be protected, and for that, left untouched.

3.3 Forest management and bioenergy

In this part, the recognition of different ways of using the resource forest – i.e. SFM and forest certification - was tested. These management-related issues are considered key-factors for public opinion integration into relevant bottom-up policies to increase the use of forest bioenergy and turn towards a Low-Carbon Society.

In Shimokawa Town, only slightly more than one third of the respondents indicated to know that some 80% of the total wood consumption in Japan is imported from abroad. This result again might be typical for a remote area far in the north of Hokkaido surrounded by abundant forest resources.

On the direct question whether the amount of harvested wood should have been increased, decreased or remain the same in the region, there was a clear tendency that if the harvesting is "only" done without any specific target, meaning that the wood might be used for any kind of products, people were rather reluctant to increase the harvesting. The other way round, if the wood would have been used for bioenergy production, the same amount of people was willing to increase the harvesting activities than those who preferred to decrease it. In any case, the majority of the people seemed to be not willing to change the harvesting activities and opted for keeping the actual harvesting amount stable. From this kind of answers, two messages could be derived: first of all, the respondents were willing to see a more of harvesting if the wood goes into the bioenergy production. Secondly, people would like to protect their forests and fear that a more of harvesting would disturb the balanced system that was carried out in Shimokawa Town.

Finally, the recognition of the terms renewable energy, forest biomass for bioenergy, forest certification, and sustainable forest management (SFM) were tested.

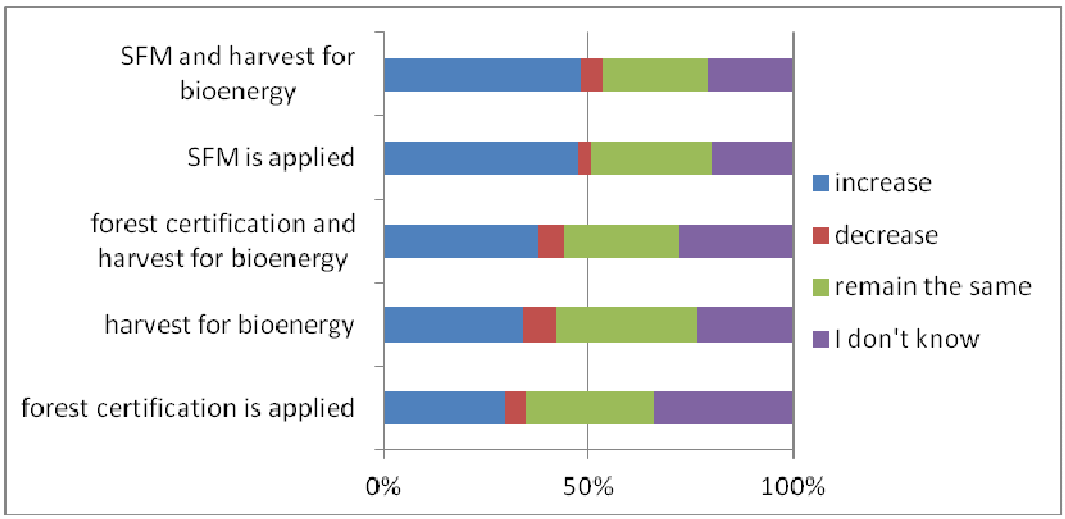

Figure 5. Pre-conditions under which harvesting intensity might change in Shimokawa Town (after Kraxner et al., 2010).

Results indicated that more than 62% of the respondents were aware of forest biomass for bioenergy , and still more than half (55%) knew the term forest certification, but only slightly more than one third (38%) stated to have heard about SFM. The term renewable energy was recognized by only one quarter (26%) of the respondents. The relatively high recognition of forest certification can be explained by the fact that the local forest cooperation had been first in Hokkaido to certify their forest, which attracted a great deal of media covering. On the other hand, SFM did not seem to be recognized as directly related to forest certification which confirmed that forest certification had been communicated more as an economic market tool for achieving a price premium or better market access, rather than an assurance for ecologically responsible forest management which would have been an asset in order to improve the outreach – considering that people are increasingly concerned about "green" issues.

In order to learn more details about the effects of certification, and SFM in combination with bioenergy use on the public perception, a short explanation of the terms was provided and the respondents' attitudes were tested (Figure 5).

Figure 5 clearly indicates that there were certain combinations that might favor or hinder the acceptance of increased harvesting in Shimokawa-Town. Unlike the expectations - based on the experiences gathered e.g. from a survey carried out in Yusuhara Town (Shikoku Island) by Kraxner et al. (2009) - the pure aspect of certification did not fully convince people to accept an increase of harvesting. Also an increase of harvest that directly goes into bioenergy did not convince many more people to accept it. The situation changes, once a combination of e.g. certification or SFM with the objective of bioenergy production is introduced. In these cases, up to half of the respondents would have agreed with increased harvesting activities. It is further remarkable, that SFM - in combination with a bioenergy objective and alone standing – was evaluated better than certification. Such results again might reflect the concern of the people about the forest health and that certification was considered to be an economic lever and tool only. Most of the people (45%) also indicated that they did not really know, whether SFM was applied in their region or not. However, about the same amount of people (40%) were of the opinion that SFM was definitely applied.

A further cross-analysis revealed that people who were aware of the term forest certification, were also more likely to accept an increased harvesting for bioenergy under SFM conditions. Those who did not know forest certification, were more likely to keep the status quo with respect to harvesting activities. Such results might be interpreted in a way that it turns out to be crucial to provide appropriate information to the public, especially with respect to SFM and Forest Certification. However, people, when directly asked for certain information needs, did not mention forest certification to be of special importance. But they would have preferred to receive more information on SFM, the local forestry, biomass for bioenergy, tourism and forest and especially with respect to climate change. For all these issues, the respondents considered newspapers and magazines to be the best media to learn more about the themes, followed by radio, TV, education in the school, leaflets and direct information by staff of the forest companies.

The results indicated for Yusuhar Town that more than 60% of the respondents were aware of forest certification, but less than 50% stated to have heard about SFM. The term renewable energy was recognized by slightly more than 50% of the respondents. The relatively high recognition of forest certification can be explained by the fact that the YFOC had been first in Japan to certify their forest, which attracted a great deal of media covering. On the other hand, SFM did not seem to be recognized as directly related to forest certification which confirmed that forest certification had been communicated more as an economic market tool for achieving a price premium or better market access, rather than an assurance for ecologically responsible forest management which would have been an asset in order to improve the outreach – considering that people are increasingly concerned about "green" issues.

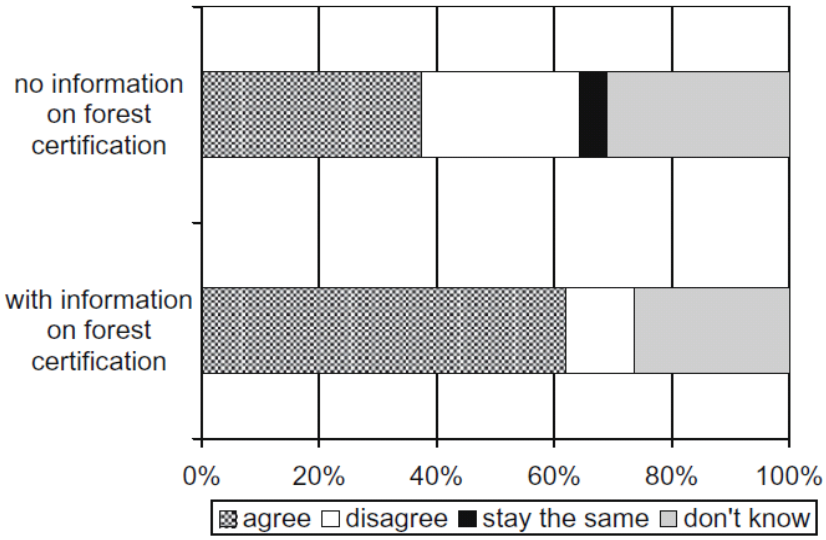

Figure 6. Forest owners' attitudes towards increased harvesting and domestic forest use with and without prior information on forest certification (significant, N=589/567) in Yusuhara Town (after Kraxner et al., 2009).

In order to learn more details about the effects of certification on the public attitude, forest owner's opinion regarding harvesting – which again might ideally be used for bioenergy production – before and after a short and neutral explanation on forest certification was tested (Figure 6).

The results from the t-test-analysis, as shown in Figure 6, revealed that before receiving information on certification, slightly more than one-third of forest owners wanted to increase harvest in domestic forests rather than stop or stay with the same harvesting intensity. After having read the brief information on certification the opinion almost turned upside-down. Nearly two-thirds wanted to increase forest use and intensify harvesting after learning of certification. These findings can be interpreted such that forest owners, who were used to thinking in long term profitability (forest management is a long-term issue considering rotation periods of 50-100 years), on the one hand perceived the information regarding certification as a "green light" to immediately increase – in a controlled and standardized manner - both their harvest in a sustainable way and also their benefit (in terms of price premium or improved market access). On the other hand, forest owners might consider certification as a long-term investment and insurance for: 1) economic security - such as profit in terms of certified timber sales or biomass for bioenergy; harvesting actions under improved acceptance or even support from the public; 2) ecological benefits - need to be provided as services such as carbon sequestration and are assured in the form of a certified responsible forest management; as well as 3) social services - in terms of continuous and sustainable forest management which consequently leads to a stable forest structure and ensures public protection from e.g. flooding and soil erosion, or the provision of clean water.

4. DISCUSSION

Japanese forests show a growing increment rate and also the total forest area is increasing (FAO, 2005), whereas at the same time the forest area certified is very low and stagnating, (e.g. Kraxner et al., 2008 and Purbawiyatna and Simula, 2008). On the other hand, Japan is importing more

than 80% of its wood consumption, the forestry sector is facing high competition from close-by tropical countries as well as from far-away Canada (FAO, 2008b), and - simultaneously - Japan is driving the market for CFP in the Asian region (Kraxner et al., 2008). These facts might point us to an unrealized economic potential for domestic forest certification in close linkage to an increased forest use for bioenergy.

Domestic forest-based bioenergy is needed to reach Japan's climate mitigation targets and energy security, and it is beginning to find support by the upcoming policies that aim at bridging different climate-relevant sectors such as energy, environment and forest. Findings by (e.g. Kinoshita et al., 2009b and Rokityanskiy et al., 2007) indicate that there is a sufficient biomass potential in Japan. Consequently, a stronger connection between local forestry and renewable energy seems to be a first step towards an increased use of the domestic forest under a Low Carbon Society, providing multiple benefits such as employment or other socio-economic aspects, GHG mitigation etc. (e.g. Domac et al., 2005 and Kraxner et al. 2002).

In our study we could show that there seems to be a certain paradigm shift from production towards protection and the increased environmental role for forests being e.g. a pool of biodiversity, is identified when analyzing the results regarding forest functions. However, such a trend cannot be seen as a local and isolated phenomenon. Also in other rural parts of Japan (e.g. Yusuhara Town on Shikoku Island or Shimokawa Town in Hokkaido) these tendencies could be identified (e.g. Kraxner et al., 2009 and Kraxner et al., 2010). Moreover, these tendencies have been found also for Europe already during the 1990s (EC, 2009). Consequently, the perceived importance of forests was constantly reduced till the point where also in extremely forested areas the local forest industry sector is not seen to be of any importance to the well-being of society anymore. Such impressions and expectations can be perceived as symptomatic for a threatened industry sector that is facing difficult times and has been abandoned for a long period already. It may also mean that people do not see their personal or regional future made up from income from forest products. Additionally, one might say that such kind of attitudes and perceptions also reflect the raising environmental awareness in Japan during the past two decades (Barrett, 2005). This also incorporates a certain distance that has been growing between people and forest in Japan. Especially younger people believe – and this is obviously also proven by Japanese reality - that timber and wood products are simple commodities – similarly to steel or petroleum - that need to be imported while resources at home need to be protected, and for that, left untouched.

Where results between European and Japanese surveys (e.g. Shimokawa Town or Yusuhara Town) differ most was the way how the public perceives the recreation function of their forests. Whereas Japanese respondents do not consider forests to be important for their recreation, in Europe this function often is considered to be particularly important (Rametsteiner and Kraxner, 2003). This huge difference might have its reason in cultural issues as well as in biological reasons with respect to the forest type and respective suitability for recreation, but also in a different concept of tourism. In Europe, tourism in mountainous and forested areas is common and even receives a certain boom due to increasingly hot summers which bring more tourists in higher areas where the forest also contributes to a more comfortable micro-climate. Tourism in forested areas also requires special attention to forest management and carefully carrying out of thinning and harvesting activities, the continuous construction of forest roads e.g. for mountain biking and their maintenance etc. All these issues and necessary investment on the other hand would be highly beneficial to the forest sector and increase their competitiveness by enabling forest management at reduced costs and with special focus on sustainable forest management and forest certification. Increased forestry activity would on the other hand also contribute to a better provision with local forest biomass from thinning which would then directly affect the bioenergy sector.

Bioenergy heating systems on the other hand might drive the local demand for wood and consequently contribute to lower harvesting costs by putting a price on forest residues. An

additional cross-benefit might be seen in motivating the forest owners to carry out vital forest management operation such as thinnings in order to improve and maintain the forest stand stability and increase the wood quality. Similar tendencies might then consequently be supported by subsidies or tax incentives for forest infrastructure in order to generate local economic growth (Kennedy et al., 2001) and overcome the barrier of a non-competitive forestry sector in Japan causing high costs of biomass for bioenergy.

Harvesting operations in the forests are somehow perceived as not good for the forest which needs to be protected in the view of the public. With this respect, the local policy and decision makers might also consider to switch to modern "low-impact" harvesting methods which prefer cable-yarding and might find better understanding among the public and consequently might lead to public support for intensified, sustainable thinning and harvesting operations.

In our study we explain that people – and especially rural forest owners - who are aware of SFM and forest certification, tend to be positive towards an increased use of their local forests for biomass - particularly, if SFM and forest certification is also applied in the local forests. These findings might provide a solid starting point for local rural policy makers to consider and establish a close relation between forest, energy and certification as well as building a bridge to local rural "eco tourism".

Future rural bottom-up policies that ought to tackle the problems of low forestry activities and climate change issues, might need to aim at increasing local people's knowledge and positive attitudes towards an increased use of domestic forests by explicitly communicating and promoting SFM and forest certification as a necessary driver. Especially when considering that certification procedures that are currently used for certifying timber products could also help to solve some of the sustainability questions and site-specific issues related to biomass production for bioenergy (Obersteiner et al., 2001). Targeted information campaigns and other communication channels need to be set off by policy makers, taking into account that the new ways in which forests are used have diversified, such as in the form of forest therapy, which uses forests to improve health, and forest environmental education (MAFF, 2006).

Enhanced and diversified public opinion research is suggested for Japan – with special focus put on the development in the Eco-Model Cities - in order to further increase the comparability and applicability of local survey results as valuable contribution to an integrated bottom-up policy design at the local level.

5. CONCLUSIONS

With the need of climate change mitigation, forest policy, environmental policy and energy policy have to converge in Japan. Complementary bottom-up policies that integrate public opinion are useful in bridging different sectors. This study provides insights into the public's opinion and knowledge about forest and biomass and identifies SFM and certification as key elements that could – together with forest-based bioenergy, local "green tourism" and targeted communication and promotion – provide multiple co-benefits. Bioenergy might be seen as on crucial link between the forest, environment, and the energy sector which opens new markets to forest owners. SFM and forest certification can help reactivating forest use by providing the needed economic long-term perspectives to the forest owners and promoting positive aspects of an environmentally sound forest use. The latter is particularly important in an increasingly environmentally sensitive society. Future bottom-up policies need to consider the public opinion and aim at tackling the problems of low forestry activities and climate change issues by concentrating on fostering people's knowledge and positive attitudes towards an environmentally sound use of domestic forests by promoting sustainable forest management, (domestic) forest-based bioenergy and forest certification as necessary drivers.

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