Community Institutions, Sustainable Forest Management and Forest Cover Change in Southern Japan

FABUSORO, E.[1*], M. MARUYAMA[2], K. SHOYAMA[3], and A. K. BRAIMOH[4]

[1]*Department of Agricultural Extension and Rural Development, Federal University of Agriculture, Abeokuta, Nigeria*

[2]*Department of Advanced Social and International Studies, University of Tokyo, Japan*

[3]*National Institute for Environmental Studies, Tsukuba Ibaraki Japan*

[4]*Agriculture and Rural Development, The World Bank, Washington DC.*

This research explores the activities of community institutions in achieving sustainable forest management (SFM) and sustained forest cover. Three institutions representing the administrative, economic and social/traditional institutions were identified. The institutions had 30 forest management activities and satisfied about 66% of SFM Criteria and Indicators. A loss of 122ha of forests cover was estimated over the last 30 years, attributed to conversion of forests to built-up area. Cooperative culture and economic incentives among others influenced institutions' effectiveness and collective behaviour towards achieving SFM. Coordinated strategies that can increase wood demand will motivate forests owners towards SFM.

KEYWORDS. Community institutions, sustainable forest management, land use change, Japan

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BACKGROUND

The recent global attention to sustainable forest management (SFM) stems from the overarching principle of global environmental protection, which has attracted the interest of scholars, policy makers and public analysts. The direction for global environmental policy in the 21st century has been elaborated from several international treaties and summits related to forest conservation and natural resource management, which aim to promote knowledge on resource management at various scales and to encourage certain behavioural perspectives that will create sustainable human-nature relationships. Forests, which are major sources of livelihoods in many rural communities in the developing world and a form of investment in many developed countries, are important natural resources at the centre of this discourse. Apart from contributing to the economy of countries, forests are vital environmental agents for hydrological processes, landscaping and erosion control, biodiversity investment, atmospheric conditioning, wildlife habitation and socio-cultural relationships.

For forests to be useful in meeting these functions, the form of management governing their utilization becomes important. Over the past two decades, community forest management is recognized as imperative in achieving forest sustainability (Little, 1996; Pagdee, et. al, 2006). Community forest management fosters collectiveness and helps generate effective enforcement structures and facilitate the evolution of adaptive management. Effective community forest management will require institutions that are vibrant and viable and can translate community principles to governing policies and rules. Ostrom (1990, p.1) asserts that 'communities of individuals have relied on institutions resembling neither the state nor the market to govern some resource system with reasonable degrees of success over long periods of time'.

In the case of Oguni-machi in Kumamoto Prefecture, southern Japan, forest plantations

occupy about 60% of the total land area and the wood industry is a major economic sector. The plantations are composed of Japanese cedar (*Cryptomeria japonica, Sugi* in Japanese), which is a common tree in Japan. It covers about 62.4% of total forests in Oguni and 91.7% of the plantations are under private property but the management is coordinated by community institutions through several layers of arrangements, representing the administrative, economic, social and traditional institutions. These institutions include formal and informal arrangements guiding the conducts and activities of private forests owners. Three such institutional settings exist in the study location:

OGUNI FOREST MANAGEMENT UNIT (FMU)

FMU is the governing administrative unit for forests related matters in the town. The unit formulates forests policy in line with prefectural and national forest policies. It evaluates and monitors the activities of forest cooperatives, coordinates forest property rights, administers forest tax, conducts forest inventory and administers forest subsidies and other incentives among other formal activities.

OGUNI FOREST COOPERATIVES (OFC)

OFC is the main institutional outfit coordinating day-to-day management activities of forests in Oguni. At its inception in 1951, 50 forests owners established the cooperative to organize the marketing of cedar wood, which was unfavourable at the time. In addition, OFC took up responsibilities to manage forests of members for economic efficiency and to meet sustainability criteria. With changes in national forest management policy, it has taken up other responsibilities of managing forests to meet recent global trends. Of the 2,352 forests owners in the town, 702 were members of OFC as of October 2010, representing about 80% of the forests in Oguni. Apart from the day-to-day management activities and marketing of cedar wood, some other functions of OFC are:

a. arrangement for subsidy through FMU and the prefectural government
b. preparation of five year forest management plan for members
c. research on cedar wood utilization and environmental impacts
d. arrangements for eco-friendly management of forests
e. regulation of forests management activities to meet sustainable management standards

LAND UTILIZATION PLAN TEAMS (LUPT)

Six LUPTs were established in Oguni in 1991, one for each of the six areas of the town. LUPTs operate independently based on the land use needs of different areas but alongside with the policy plan of FMU. LUPTs were established to promote social-ecological relationship in Oguni, as a response to increasing need for more positive outcome of human-ecological system. LUPT have the mandate of educating the local people on forest tourism and other land use for meeting sustainability criteria.

Apart from these three, there is also the informal institutional setting that recognizes the role of culture and tradition in enhancing forest preservation behaviour among forests owners. Japanese belief in forest preservation and management stems from this statement: *chisan chisui*, meaning "gathering mountain, gathering water". This belief implies that rice production on well-watered lowlands depends on the hydrological processes of the mountains, which is enhanced by forest plantations. Another traditional belief system supporting forest management and preservation is the traditional nature-based religious system of Japan (Shinto). The Japanese believe that "god lives in every nature", such as the mountain that produces the forest, hence they have a strong traditional attachment to forest management.

The objectives of this study were to examine the role of these community institutions in promoting SFM and sustaining forest cover in Oguni-machi, southern Japan, and to investigate

what social, economic and traditional factors influenced institutions' effectiveness in forest management as well as private forest owners' collective behaviour towards SFM. Kittredge (2005) reveals that private forests owners in similar institutions in the United State and Europe work with other like-minded owners for conservation of natural resources, to sustain ecological processes as well as the flow of renewable natural resources. They pursue some form of green certification and share an interest in contributing to their local economy through the supply of wood products and look for improved methods to share information and experiences that will enhance their collective voice in the policy arena.

THEORETICAL EXPLANATIONS OF INSTITUTIONS

There are many schools of thoughts on the meaning of institutions and their performance in natural resource management, forests in this case. The discussion in this paper follows the concept of the 'rule of the game' (Bromley, 1989; North, 1990; Scott, 1995; Ostrom, 2005), which defines institutions according to their forms, roles, the reason behind their existence, and the kind of problem they are a response to (Vatn, 2005). North (1990, p.3) defines institutions as 'rule of the game' in a society, or more formally, the socially devised constraints that shape human interaction. Following North, we define institutions as man-made regulative structures for moderating human behaviours and relationships and coordinating decisions towards a desired goal. This means that institutions are formally sanctioned rules of a society, which provide expectations, stability and meaning to human relationship (Vatn, 2005).

In terms of forms, institutions may be formal or informal depending on legal relations (Bromley, 1989); their evolution and functions (North, 1990); and the grammar of institutions (Crawford and Ostrom, 1995). According to North, formal institutions underlie informal ones;

informal institutions (constraints in the language of North) are 'extensions, elaborations and modifications of formal rules' and that both co-evolve through the operation of organizations (informal and formal social groups, from households and villages to networks, firms, parties, and governments) (p. 40). Extending this point, Casson, Giusta and Kambhampati (2010) argue that the 'moral and ethical behavioural norms' in North's theory are often embodied in informal institutions like religion and caste, and these determine the quality and sustainability of formal institutions like schools, labor markets, and the rules and regulations governing economic activity. Thus, formal institutions include political and economic rules and contract that are readily observable through written documents or rules that are determined and executed through formal position, such as authority or ownership. The informal institutions include social norms, routines, and political processes based on implicit understandings, being in most part socially derived and therefore not accessible through written documents or necessarily sanctioned through formal position (Zenger, Lazzarini, and Poppo, 2002).

With this basic understanding, institutions are important in directing the affairs of a society to facilitate choice and achieve higher efficiency. "Institutions are the prescriptions that humans use to organize all forms of repetitive and structured interaction," (Ostrom 2005, p.3). Be it political, economic or social, at global, national or local scales, many scholars agree that institutions matter for achieving sustainability and evolving progress and development (Ophul, 1973; Bromley, 1989; Ostrom, 1990; Scoot, 1995; Agrawal, 2000; Casson, Giusta and Kambhampati, 2010). Local or community institutions are particularly useful because of their indigenous nature as they represent 'home-grown' solutions to problems, based on collective understanding (Shivakumar, 2003; Dixon and Woods, 2007).

Forest management may fall under different property regimes: private, common, state/public, or open access. The property regime is a form of institution that determines the structure of rights and duties characterizing the relationships among individuals with respect to a specific good or benefit stream (Vatn, 2005). Within this is the regime governing the use and transfer of the resource (property rights) and the rules and norms that govern the transactions governing the products made from the resource (product transfer) (Vatn, 2007). While the rights holder in the case of private property is normally an individual, common property could be private property for a group of co-owners with private title (Bromley, 1991) or owned by a group of people with no one holding private title (Vatn, 2005).

Garret Hardin's 'tragedy of the commons' makes the case why private ownership is preferable to the common property: 'ruin is the destination towards which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons' (Hardin, 1968, cited from Ostrom, 1990, p.2). Private property owners have higher incentives to use resources efficiently and sustainably (Demsetz, 1967; Tucker, 1999), however private property does not guarantee efficient and sustainable resource management because owners may act with poor judgment, or depending on their circumstances, they may not place importance on a resource's future value (Brouwer, 1995). The possibility of a private owner to act in poor judgement with respect to sustainability of natural resources is founded on the rational choice theory within the neo-classical economics (Vatn, 2005). The theory is based on the individualism methodology, which views the individual as an autonomous utility maximizer. North (1990) posits that in this perspective, institutions are external constraints on the individuals' utility maximization drive.

Within existing theoretical and empirical positions for governing natural resources, either on a common or private property, the solution to unsustainable behaviour (avoiding a 'tragedy of the commons' or 'free rider situation') is either through imposition of regulation by the government following Hobbes's solution of the imposition of a leviathan (Ophuls, 1973) or a self-organized community institution (Ostrom, 1990). The latter is based on principle of cooperation, a way through which cooperative solutions could be devised to problems without the intervention of a coercive state. In this case, private forests owners will make a binding contract (an institution) to commit themselves to a cooperative strategy that they themselves will work out (Ostrom, 1990). However, the will to cooperate and act as 'we' terms will depend on cultural experience and traditional values (Etzioni, 1988; Vatn, 2005). It will also depend on different social and economic factors within and across societies. This means that institutions offer meaning and frame communication; they define whether it is acceptable for individuals to act in a self-regarding way or if they are expected to take the interests of others into account. Institutions are therefore 'rationality contexts, solving coordination problems by emphasizing common goals and facilitating peoples' willingness to share and cooperate (Vatn, 2005, 2007).

The interest of this paper is to examine the role of community institutions organized by the people of Japan through cooperation, for forest management. The property regime for forest ownership is private but day-to-day management is coordinated and influenced by formal and informal community institutions, influencing decision and directing affairs of private forests owners. The implication of theory on institution and cooperative behaviour in this paper is to understand the motivation behind the institutions and how their involvement helped in achieving SFM. This will contribute more knowledge to theoretical positions on role of community institutions in natural resource management and their influence on private forest owners to act in

a way to achieve sustainability.

SFM Criteria and Indicators

SFM is defined as 'the process of managing permanent forest land to achieve one or more clearly specified objectives of management with regard to the production of a continuous flow of desired forest products and services without undue reduction of its inherent values and future productivity and without undesirable effects on the physical and social environment' (International Tropical Timber Organization, ITTO, 1992). SFM criteria represent the aspects of forests, such as the major functions and values of forests, from which the sustainability of forest management is monitored, assessed and reported. Indicators, on the other hand, are specific items along which data are collected to describe the state of the respective functions or values represented by each criterion (Forestry Agencies, 2009). Japan's efforts at developing a national framework for SFM are based on the Montreal Process. Criteria and indicators (C&I) of the Montreal Process were established in 1995, comprising seven criteria and 67 indicators. The indicators were reduced in 2006 to 64 and 54 in 2008. The discussion in this paper is based on the 2006 set of indicators, and used for examining the activities of the institutions in meeting the 64 indicators. The criteria are:

a. Ecosystem diversity (9 indicators)

b. Maintenance of productive capacity of forest ecosystems (5 indicators)

c. Maintenance of forest ecosystem health and vitality (2 indicators)

d. Conservation and maintenance of soil and water resources (5 indicators)

e. Maintenance of forest contribution to global carbon cycles (3 indicators)

f. Maintenance and enhancement of long term multiple socio-economic benefits to meet the

need of society (20 indicators)

g. Legal, institutional and economic framework for forest conservation and sustainable management (20 indicators)

METHODS AND DATA

Study Location

Oguni-machi (Figure 1) is a rural town located in Kumamoto Prefecture, southern Japan, close to Mount Aso , one of the world's largest volcanic calderas. The municipality covers 13,700ha, of which 74% is mountainous. It is a cool upland region with an annual average temperature of 13^0C. Its rainy and humid climate is suitable for growing high-quality Japanese cedar, *Cryptomeria japonica,* which occupies about 62.4% of the total forest area and 88.1% of plantation forests (Table 1). Oguni cedar has dense and clear-grained wood characteristic of a severe climate, and has been traded for 120 years (Yagi, 2005). Other important plantation forests in Oguni are sawara cypress (*Chamaecyparis pisifera* -- 5.3% of plantation forests), oak (*Quercus* spp. -- 3.3%) and bamboo (0.7%). According to available census data at the Oguni Town Office (2005), total forests cover was about 10,716ha, representing 78.1% of the total land area (Table 1). Politically, Oguni is governed by an assembly of local representatives, under the head of a mayor. The population of the town has declined in recent years; in 2004, it was 9,166 (Oguni Town Office population figure). There are concerns about the aging population which is general to the whole country and which affects many economic activities in the town, particularly agriculture and forestry. Tourism is however booming due to the numerous hot springs (*onsen*) and the undulating and hilly topography with broad, grassy plains in the interior of the Aso caldera.

Figure 1 about here

Table 1 about here

Sampling and Data Collection

Data for this study were collected through primary and secondary sources. Primary data were collected through personal interviews of 70 randomly selected forests owners, 10 officials of the forests management institutions and five key informants. Data on outlined activities towards achieving the Montreal Process SFM C&I and the role of each institutions, were collected during the personal interviews. Thirty activities of the institutions targeted at meeting SFM C&I were identified during the personal interview of officials of OFC and FMU. Secondary data were collected on forests ownership and land use records. Data on forms of forest ownership were collected from reports of OFC and FMU. Table 1 shows that 91.7% of the total forest area was under private ownership and over 70% of the forest owners owned less than 5ha; about 1% owned over 50ha of forests.

Land Use Data Collection and Analysis

Land use data were obtained from local land use inventory and 100m-grid land use database (1976: 1/2500 topography map, 2006: Terra (Aster)/ALOS, National Land and Transportation Ministry, Japan) covering a period of 30 years was used (1976-2006). Land cover was reclassified into six classes: (1) paddy field, (2) farm land, (3) forests, (4) built-up area, (5) water area, (6) others. The land cover change from 1976 to 2006 was analyzed in a geographic information system with Arc GIS software 9.3.1.

RESULTS AND DISCUSSION

Activities of Community Institutions in Promoting SFM and Conserving Forest

The goal of the institutions in forest management is to achieve sustainability by meeting the SFM C&I of the Montreal Process. In promoting SFM, the formal institutions (FMU, OFC) play direct roles through outlined activities in forest management while LUPT played an indirect role, as an informal institution. The total number of forest management activities carried out by the institutions was 30, with a goal of meeting SFM C&I of the Montreal Process (Table 2). Of the 30 activities, the respondents ascribed 17 to FMU, 29 to OFC, 17 to LUPT. Based on the SFM C&I of the Montreal Process, the activities met 42 of the 64 indicators. This indicates that the institutions through their activities satisfied about 66% of the SFM C&I. Detailed analysis needed to determine the actual extent of forest sustainability goes beyond the focus of this study.

The activity framework shows that FMU provides the policy framework for forest management and administers forest property regimes, taxation and subsidy. FMU operates the national and prefectural policy on SFM and provides regular information to forest owners and other formal institutions on policy regulations towards SFM. It serves as the connecting pipe between the people and government and develops local policy objectives for management and utilization of forest resources. This institution is a regulatory body, a state control methodology that follows the Hobbesian solution for cooperative behaviour among resource users. This institution is found in most developed countries of the world to ensure compliance with national or local policy among private forests owners.

OFC manages the forests on behalf of forest owners and organizes forest business activities. Results from Table 2 shows that OFC handles day-to-day management activities of forests, in line with policy directive of FMU. Some of the activities important to SFM C&I

carried out by OFC were thinning of forests for commercial purposes, developing forests management plan and securing green certification. As a cooperative institution, its structure is based on voluntary membership; members that have made contractual agreements and have partly or wholly submitted the management of their forests to appointed officials. OFC's relevance in SFM has become important in recent years with the decline in price of wood and low profit from commercial thinning. The decline in price is a disincentive to many forest owners in complying with policy directives of FMU. OFC plays a crucial role in expanding forest product chain and securing forest certification (Sustainable Green Ecosystem Certification, SGEC), which has the potential to enhance quality and place higher premium on Oguni cedar wood.

Over fifty years of its existence, the view of its members is that OFC has managed the forests effectively in line with specific regulations; it sells wood at premium prices and secures government subsidy. As found in the United States and Europe, members of the cooperative in this community benefit from generally higher-than-normal prices in the market and non-members can sometimes sell wood to these organizations and generally benefit from their influence in the market (Kittredge, 2005). Apart from the economic gains, OFC manages the forest to meet the cultural beliefs of forest owners. As a formal institution rooted in the community system, it operates within Japanese socio-cultural belief, a factor that provides an indirect incentive for SFM. OFC involvement reduces overall management cost and at the same time enables the owners to fulfill their traditional values on forest management.

LUPT is an informal institution and its roles are indirect, mainly through advocacy and advisory services on forest-based social activities to FMU and OFC. For LUPT to fulfill its role, it advocates for forest management in a way that is socially desirable and culturally acceptable. It

also follows trends within and outside the community and organizes events to promote forest tourism. The direct promotion of forest tourism by LUPT informs its indirect involvement in forest-road construction or thinning or any other activities that will promote tourism (Table 2). LUPT is not a membership organization like OFC but its management is composed of community volunteers that have interest in promoting social relationship through forest management. The six LUPT in Oguni concentrate on their respective physical jurisdiction and encourage forest owners to comply with policy directive towards SFM.

Furthermore, LUPT as an informal institution has a more diffused role in forest management displayed through the cultural disposition of forest owners to management activities, thereby influencing their decisions towards SFM. LUPT tends to promote the importance of forests in meeting the social, cultural and spiritual needs of the people. This situation also supports the theoretical position of North (1990) that informal institutions are a part of cultural heritage which defines the way people process and utilize information and affects how informal institutions get specified. It also shows that Oguni residents' dependence on forests is organized so as to maintain traditional beliefs and enhance social relationships, to protect the environment and safeguard forests from degradation.

The relevance of these institutions in achieving SFM and conserving forests is evident in their roles in: effecting policy and administering regulations, coordinating forest management activities and promoting marketing of thinned wood, promoting socio-ecological relationships and influencing collective behaviour of forest owners. Plantation forests that are left untended become too dense, preventing trees from reaching adequate light and causing trees with small-diameter stems and shallow roots. This situation also leaves the trees vulnerable to windthrow

under torrential rain or typhoon conditions. Forests that are not thinned cannot produce bigger and more valuable trees.

These community institutions therefore represent three important aspects of SFM. FMU represents legal and policy planning aspects, OFC for market development and coordinating the local forest economy, and LUPT for social development and cultural/religious aspects of SFM. With this institutional arrangement, the possibility of achieving SFM and meeting the C&I indicators of the Montreal Process will not be a daunting task. While the formal institutions appear very important in meeting the SFM C&I, the relevance of LUPT can not be overemphasized, in the sense that the traditional belief system influences every decision and activity of private forest owners. The traditional belief system in this case forms the basis upon which the activities of the formal institutions are defined.

Table 2 about here

Land Use Change

The images in Figures 2 and 3 show land use in Oguni in 1976 and 2006 respectively. The essence of this is to ascertain to what extent the activities of the institutions have affected forest cover in the last 30 years. There was a loss in forest cover by 122ha in this period, accounting for about 0.9% change in total forests area (Table 3). Over the same period, the built-up area increased by 374ha (2.75%) as a result of emerging need for real estate and tourism industries. The change in forest cover, over the 30-year period implies an average yearly loss of 4.06ha (about 0.4% of total forest). Information obtained during the personal interviews revealed that most forest conversion occurs around the 1980s as a result of a sharp decrease in price of wood and the high cost of forest management. Some forest owners converted their forests to real estate

for higher economic benefits. This affected mostly owners with small forest size and those with younger trees of less than 40years. Despite the commercial thinning of wood over the 30year period, Oguni forest cover is relatively stable, through institutional regulations and management. However, with sustainability in mind, the result suggests that the institutions will need to concentrate more on factors that will act as incentives to existing forest owners to keep their forests and not convert to other land use that may endanger the sustainability goal.

Figure 2 about here

Figure 3 about here

Table 3 about here

Factors Influencing Institutional Effectiveness in Forests Management and Forest Owners' Collective Behaviour Towards SFM

Certain theoretical assertions posit that a private regime would lead to forest degradation and unsustainable management (Brouwer, 1995) but in a situation where there is a regulatory body (Ophuls, 1973) or cooperative behaviour by individual property owners (Margolis, 1982, Ostrom, 1990), private forests may be managed sustainably. Ten factors influencing forest owners' collective behaviour towards SFM and influencing institutions' effectiveness in forest management are identified below.

HEREDITARY LEGACIES

While there are forest owners that acquired forests through purchase or leasing, majority of the forest owners acquired through inheritance. The history of forest plantations in Oguni spans over 300years indicating that forest resources have gone through several generations, and the present generation are managing the forest on behalf of their forefathers. This belief system,

which is entrenched in Japanese traditional institutions, was seen to have influenced forest owners to manage the forests in a way that will keep this hereditary legacy. With this perception, the policy directive of FMU, the day-to-day activities of OFC and the social advocacy of LUPT, all became necessary to maintaining the hereditary legacy of forests and achieving SFM.

TRADITIONAL COOPERATIVE BEHAVIOUR

From observation and key informants' interviews, the Japanese are traditionally group-oriented. The group culture stems from many cultural and social reasons, but the ones emphasized by the respondents are the high homogeneity of the country and the *haji* culture, which means 'individual's fear of shame to fail'. This cultural condition has created a sense of group-orientation rather than individualism. In this social setting, situations where private forest owners act 'rationally as utility maximizers' are avoided. The traditional and social institutions in this case are seen as moderating the behaviour of forests owners to act in a 'we', cooperative term.

ECONOMIC FACTORS AND BUSINESS DEVELOPMENT

Beyond the cultural values, the need to make economic benefits and develop a commercial wood industry was the main motivation for establishing OFC. The ability of OFC to handle wood sales efficiently follows the assertion that 'when it is costly to transact, institutions matter' (Coarse, 1937, cited from North, 1990, p. 12). In addition, the establishment of OFC as a management body balances resource utilization with individual rational choice such that resource degradation is avoided.

POLICY

The policy framework built at national and local levels forms a cohesive and well coordinated approach in forest management. The role of FMU in this case is to act as a state agent to enforce

regulations and monitor property rights. Policy as an instrument in this case was used to administer forest management, guide activities and monitor compliance.

SGEC CERTIFICATION

SGEC certification of forests in Oguni in 2006 opened another chapter in forest management in Oguni. According to OFC officials, the forests of its members, representing about 80% of total forests in Oguni, are certified. SGEC, apart from his ecological benefits of Oguni cedar, have economic benefits derivable from product branding and premium placement that may yield higher demand and better prices. This development motivated forests owners towards collective behaviour for achieving SFM.

SUBSIDY (HOJOKIN) AWARD

The award of subsidies was found to be important in forest management for meeting the cost of day-to-day management and helping to sustain forests owners' commitment to collectiveness. Through the assistance of FMU and OFC, forest owners could benefit from government subsidy (*hojokin*), as an incentive for SFM practices. The subsidy enables forests owners to meet their obligation of forest management and to cover the cost of maintenance. With a subsidy of ￥300,000/ha of thinned wood/year, the forest owners earned about ￥218,300/ha of thinned wood (profit before tax) (Oguni Forest Cooperative, 2010). While subsidies are intended to increase production and resource conservation (Inoue, Suzuki, Nakashizuka, Sakurai and Toyota, 2003), they may also increase capitalization and subsequently contribute to unsustainable timber harvesting practices (Managi, 2010). However, subsidies are relevant in this context insofar as they help high-cost (inefficient) wood producers to break even and manage forests sustainably.

INCOME FROM AGRICULTURE

It was observed that many forest owners, particularly the small owners, did not qualify to receive government subsidy. These owners therefore used part of their income from crop and livestock production to augment the cost of forest management. This set of forest owners were driven by their social and cultural belief to cover costs of forest management in order to keep their forests managed in line with institutional regulations.

LOW PROFIT MARGIN FROM FOREST ENTERPRISE: Since the early 1980s, the profit margin from commercial thinning has been declining, which is a major disincentive to many forest owners in responding to regulations of FMU and OFC. The estimated return (without subsidy) from commercial thinning of a hectare of forest (generating 70m^3 of wood) was ￥-81,700 as at 2010 (Oguni Forest Cooperative, 2010). Though forests owners wanted to fulfill some social and cultural beliefs, the economic disincentives posed limitations to their decision in this regard.

AGE OF FOREST OWNERS

Respondents opined that older forests owners may have more traditional attachment to forests and that younger owners have more of economic interest. This means that while the older forest owners make efforts to adhere to SFM practices, younger ones with economic motives may look for other alternatives, one of which may be conversion of forests to other economic purposes.

AVAILABILITY OF FORESTRY WORKERS

As the existing workers are old and retiring, OFC is finding it difficult to recruit younger people as forest workers due to the tediousness of forest management operations and the attending economic disadvantages. This implies that institutions' effectiveness in forest management in the near future hinge in part on their ability to attract younger forest workers.

CONCLUSIONS AND LESSONS LEARNT

Community institutions in Japan serve as operational tools for implementing national, regional and local policy plans for SFM. With the goal of achieving SFM through the C&I of the Montreal Process, the institutions have displayed their responsibilities in organizing forest management activities. OFC and FMU are formal institutions with clear policy directives and outlined activities while LUPT is informal and underlies the formal institutions in moderating the behaviour of private forest owners from the individualist rational choice option to a cooperative posture that is useful to institutions' effectiveness in forest management.

In conclusion, the institutions were seen to have fulfilled five functions in Oguni-machi: (a) provision of services such as forest labour, advisory services, transportation of wood, subsidy application and processing; (b) business development, in the area of marketing of wood and business promotion of the Oguni cedar industry within and outside the community, enhancing profitability of forest products through SFM initiatives; (c) regulatory services, based on prescribed rules and laws governing forest management by defining property rights and developing management plans; (d) forest conservation, acting as tools for conserving forests through SFM practices. Forest thinning was used to enhance forest vitality and sustain forest cover instead of clear-cut harvesting. The institutions also worked to promote environmental friendliness through forest certification, securing and improving ecological services; and (e) social networking, by recognizing the forest as a social resource for promoting social relationships and transferring traditional beliefs on forest management from one generation to another.

It is suggested that cooperative culture, economic incentives and policy consistency are key factors that influence private owners and enhance effectiveness of the institutions in achieving SFM. The institutional interplay has produced optimistic outcomes in forest

management and supports theoretical positions on institutions as 'the rule of the game', 'external constraints' and 'facilitators of change'. This institutional and cooperative model in forest management can be a useful model for other locations, particularly in the developing world. Important lessons drawn from this institutional arrangement that could be useful for other settings are manifest in the following:

a. institutional independence but shared efforts

b. private property but cooperative management

c. forest commercialization but regulated logging system for sustained forest cover

d. differentiated functions and activities but a common goal.

There is a need for coordinated strategy from the national, regional and local levels to improve the forest-product development chain that can increase demand, resulting in higher prices and giving more incentives to forest owners towards achieving SFM. Regulation for logging and thinning should however be upheld to maintain forest cover and environmental friendliness of forest plantations. The spirit of collectiveness should be upheld by promoting a more positive social relationship among younger generations of forest owners.

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Table 1: Land Use Record of Oguni-machi and some forest ownership variables

Land Use (size in ha)	**Frequency**	**Percentages**
• Total land size	13,700	100.0
• Total forest size	10,716	78.1 (of land area)
• Plantation forest	7,935	74.8 (of total forests)
• Natural forest	2,781	25.9 (of total forests)
• Cedar Plantation	6,990	88.1 (of plantation forests) & 62.4% of total forests
• Other forest plantation	945	11.9 (of plantation forests)
Forest ownership structure (ha) (% of total forest size)		
• Private ownership (*kojin*, individual)	9823	91.7
• Private ownership (*kyoyurin*, group/family based)	-	-
• Public ownership (*kokuyourin*, country)	391	3.6
• Lease ownership (*bunshurin*, of country forest)	364	3.4
• Communal utilization (*Iriai*, of country forest)	27	0.3
• Public ownership (*konyourin*, town ownership)	502	4.7
•		
Forests size of owners (ha) (Number of forests owners = 2353)		
• 0.1-1.0	1047	44.50
• 1.0-5.0	905	38.46
• 5.0-10	198	8.41
• 10-20	118	5.01
• 20-30	34	1.44
• 30-50	25	1.06
• 50-100	16	0.68
• Above 100	9	0.38
Membership forest cooperative members (OFC) (N= 2352)		
• Members	702	29.8
• Non-members	1650	70.2

Source: Oguni Annual Report 2005; Census data, aggregate of various years from 1980-2005; and Field Survey, 2010

Table 2: Activities of Oguni Community Institutions in SFM

S/No	Activities	SFM criteria	SFM indicator(s)	FMU	OFC	LUPT
1.	Age categorization of trees	1	1.1a, 1.1b	■	■	■
2.	Demarcation of protected areas	1	1.1c, 1.2a; 1.2b; 1.2c	■	■	■
3.	Regulated harvesting and avoiding large-scale clear cutting	2	2a, 2b, 2c, 2d, 2e	■	■	■
4.	Forest thinning activity (and policy on forest thinning)	2	2a; 2b; 2c, 2d, 2e	■	■	■
5.	Regeneration treatment – *tekichi tekiboku*	3	3a, 3b	■	■	
6.	Weeding	3	3a, 3b		■	■
7.	Protection against fires	3	3b	■	■	■
8.	Tree belts for protection on windy ridges, riversides and roadsides	4	4.1a		■	■
9.	Forest erosion control	4	4.2b		■	■
10.	Conservation of natural vegetation	5	5a		■	■
11.	Forest certification for carbon offset	5	5a, 5b	■	■	■
12.	Production of mushroom	6	6.1b		■	■
13.	Use of forest for tourism	6	6.4a; 6.4b			■
14.	Economic valuation of forest	6	6.1a, 6.2a,	■	■	
15.	Employment of staff for forest management routines	6	6.3a, 6.3b		■	
16.	Protection of forest area important to protecting cultural, social and spiritual values of people	6	6.5a, 6.5b	■	■	■
17.	Forest tenure and logging license	7	7.1d, 7.1e	■	■	
18.	Clearly defined forest regime and fragmentation	7	7.1a	■	■	
19.	Construction of forest roads	7	7.2d	■	■	■
20.	Training on environmental education and safety measures	7	7.2c;		■	■
21.	Marketing and price information for wood	7	7.1c		■	
22.	Marketing of forest wood	7	7.3a; 7.3b		■	
23.	Logging and transportation	7	7.3a;		■	
24.	Training for young people in forest management	7	7.2a		■	■
25.	Reporting for annual planning, taxation and subsidy	7	7.4a, 7.4b, 7.5a	■	■	
26.	Assistance for preparation of forest individual unit management plan	7	7.4a, 7.4b		■	
27.	Application for annual subsidy (*hojokin*) for forest management	7	7.1d	■	■	
28.	Development of forest management plan and policies	7	7.1b; 7.2b, 7.2e	■	■	
29.	Insurance of forest	7	7.1d	■	■	
30.	Orientation on climatic impact of forest	7	7.5d	■	■	■
Total			**42**	**21**	**29**	**17**

Table 3: Land use change, 1976 - 2006

Land use	1976		2006		Land use
	Ha	%	Ha	%	change (ha)
Paddy field	1,114	8.19	892	6.55	-222
Farm land	397	2.92	459	3.37	62
Forest	9,339	68.62	9,217	67.72	-122
Built-up area	200	1.47	574	4.22	374
Water area	407	2.99	305	2.24	-102
Others	2,153	15.82	2,163	15.89	10
Total	13,610	100.00	13,610	100.00	0

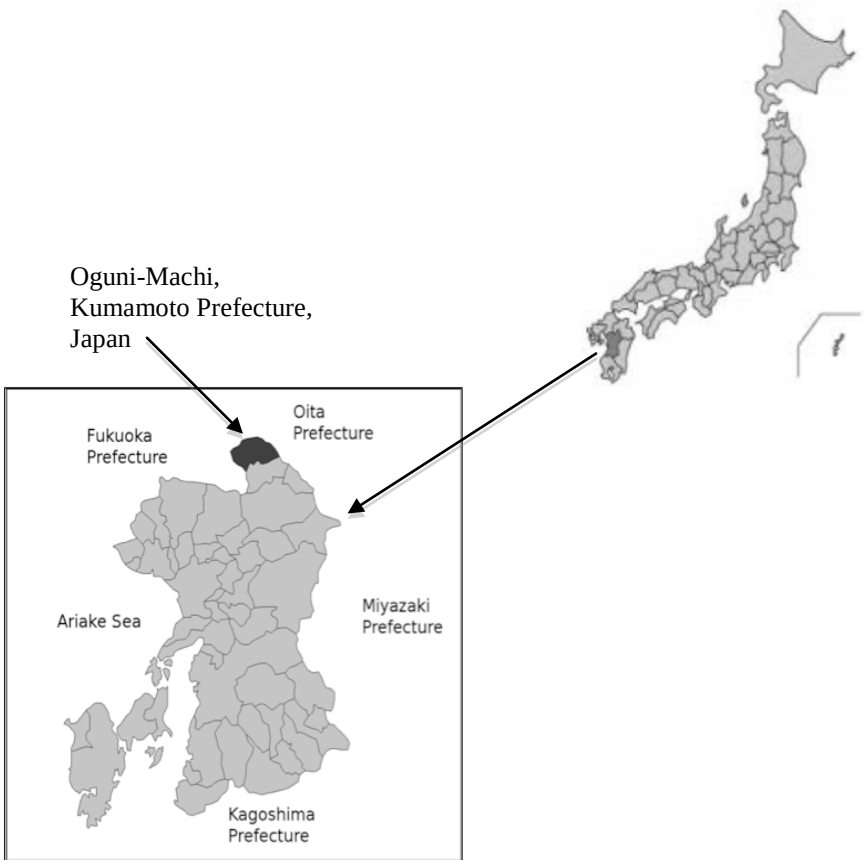

Figure 1: Map of Kumamoto Prefecture showing the study location, shaded in the inset map of Japan (right),

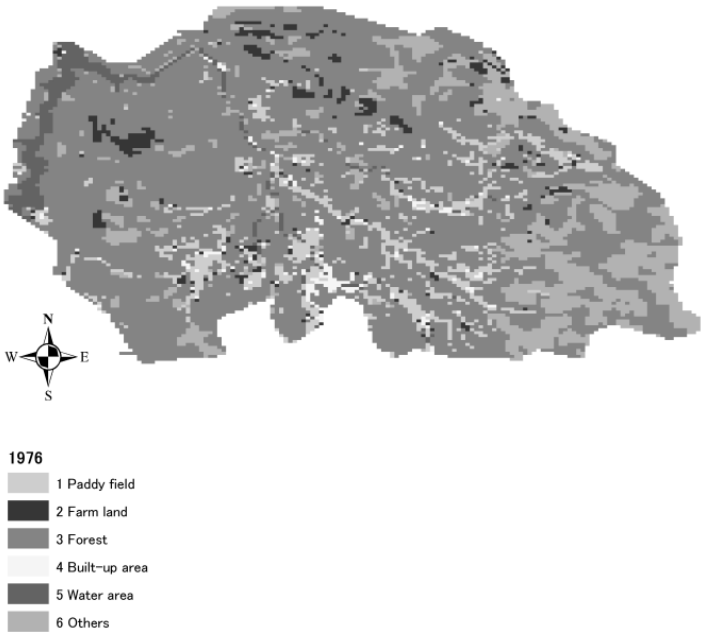

Figure 2: Land use map of Oguni - 1976

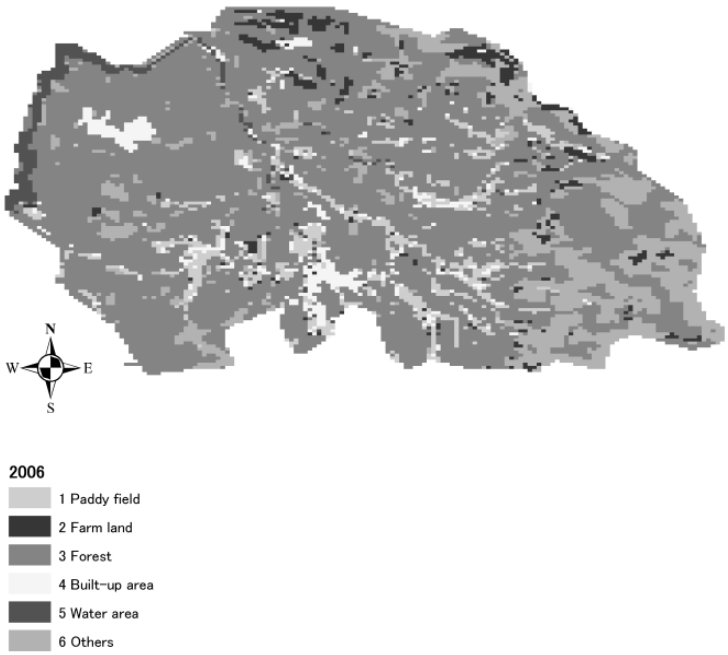

Figure 3: Land use map of Oguni – 2006