

Participatory Governance of Land and Water Resources: The *Satoyama* System of Japan

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Introduction

Socio-ecological systems (as defined by Berkes et al. 2003¹) emphasize four important elements: ecosystems, local knowledge, people and technology, and property rights institutions. These systems are geared toward meeting the objectives of sustainability, especially the capacity to cope and adapt (Lebel et al. 2006), and are therefore a function of governance capacities. Here, governance is defined as “the management of natural resources, as well as the structures and processes that provide the social and institutional environment in which that management can take place” (Bodin and Crona 2009). Governance attributes include participation, representation, deliberation, accountability, empowerment, social justice and organizational features (Lebel et al. 2006).

This paper seeks to explore the concept of participatory governance using the Japanese socio-ecological landscape system known as “*satoyama*”. *Satoyama* refers to communities in montane forests or grasslands that use “the gifts from the forest”. Wetland resource use by rivers, lakes, and coasts is referred to as *satoumi*. The *Satoyama Initiative* defines *satoyama* as: “a traditional Japanese multi-functional land use system in which agricultural practices and natural resource management techniques are used to optimize the benefits derived from local ecosystems” (<http://satoyama-initiative.org/en/about>).

To explore the diversity of socio-ecological systems that characterize *satoyama*, a wide variety of locations was sampled and will be described. This essay frames *satoyama* within a landscape level approach instead of an ecosystem level approach (Dumbrell et al. 2008) to allow for an appropriately scaled response and to avoid catchall phrases. Emphasis will be given to the *satoyama* and national park at Aso for a number of reasons: (1) Aso’s grasslands are rare in *satoyama*; (2) Aso is not near larger cities, so it is not managed as part of urban areas like most contemporary *satoyama*; and

(3) Aso’s management is not typical of a park’s nor *satoyama*’s since it was not originally intended as a park.

This paper will start with descriptions of relevant national policies. Case studies will be presented, and their diversity, as well as common threads, will be highlighted. Social networks will be considered to emphasize the notion that social network perspectives harness important potential in analyzing cross-scale interactions (Bodin and Crona 2009).

Japan’s contemporary agriculture, landscape and protected areas

Once mainly self-sufficient in food production, in 2001, Japan imported 72% of its grains and 60% of its food calories. Farming has been increasingly undertaken only on a part-time basis. Although Japanese law prohibits development on prime farmland, and rural people consider it shameful to sell ancestral lands, exodus from farms has been stemmed only to a certain degree.²

In the last two decades, the total agricultural income has been halved, and profitability decreased (MMAF 2010). The number of farmers is falling and most that remain are over age 65. The declining farming business is attributed to two main trends. Firstly, the diet preference of the Japanese has been shifting from rice to wheat (Bauzon 1979). It used to be that the annual rice consumption was 60 kg per capita, but now it is much less. Secondly, Japan is undergoing population decrease and aging of the population, which means the proportion of older people is rising (Yamashita 2006).

Government countermeasures to reverse the trend include: more effective use and acquisition of farmland, financial assistance programs to meet the needs of different farmers, and increased agricultural assistance. Rice cultivation is government regulated to protect market prices. Government programs help increase sales prices, increase

sales volumes and reduce costs (MMAF 2010). Simultaneously, the government, recognizing the importance of agricultural biodiversity, has been supporting policy schemes, such as: direct payment for cultivating in less favorable areas (LFA); measures to conserve and improve the environment; and an agri-environmental payment scheme (Nomura et al. 2012). The degree of effectiveness of these recent initiatives has yet to be seen.

Japan's land use policies are influenced by rice farming politics led by the government and the Japanese Agricultural Association (JA), the nationwide farming association, and controlled through strict regulations. Police regularly check the harvest time and rice trade outside permissible JA routes are investigated. Since the early 1990s, partly due to domestic incentives, free trade has been developing in Japan. The transition is marked by the rice policy reform charter of 2002, which encouraged minimum acreage for subsidies and the exclusion of smaller acreage farms from the protection package (Horiuchi and Saito 2010).

In 1996, food security laws changed: multiple options became available, be it fixed prices (through JA) or market prices (through private channels) (Horiuchi and Saito 2010). The government also limited the use of pesticides to twice a year and farmers who used them only once a year could obtain special certification (*toko betsu saibai mae*).

Japan does not have vast areas for establishing state-owned parks. National parks must be mixed in with farmland in densely populated prefectures and a balance between the needs of the environment and the people must be struck. Park management is decentralized to the prefectural government, with the designation process accorded to the Ministry of Environment (MoE). The government does not necessarily regulate the commons, which are often subject to traditional rules.³ However, parks have a zonation system, with the core entirely government-owned, whereas the rest may belong to the local government or individuals (Naomi Kibe, personal communication).

Most of the lands on which *satoyama* are located are private property. This complicates *satoyama* management more than if they were owned by the government.

CASE STUDIES

Methods

Observations were made through multiple visits and interviews at 12 sites throughout the three main islands of Japan: Aso, Uchinari, Mount Iwara, Mount Hiyama, Kounosuyama, Ikoinomori, Mizurogaike, Ohara, Ryokoku, Lake Biwa, Kamakura and Shimokawa (Table 1). About 40 people were approached with semi-structured interviews to determine the local perspectives on the socio-ecological features of each *satoyama*.

Aso Mountain, an unusual and complex *satoyama*

Resting in the middle of Kyushu, Aso Mountain is a mosaic of grasslands, forests and cultivated land. Along with the nearby Kuju mountain range, it is protected as the Aso-Kuju National Park. Aso has the world's largest caldera and is part of a glacial relict, resulting in an ecosystem with unique vegetation and endangered species.

A heterogeneous landscape is maintained by differing management practices among farms and a recent rice production regulation (MMAF 2010), keeping biodiversity high. Biodiversity is not necessarily considered important by individuals since wildlife rarely provides direct economic benefits. However, local communities are interested in conservation, with annual values estimated at ¥255 million (approximately US\$2.3 million) (Yabe 2007). This common objective of all stakeholders in Aso does not conflict with agriculture and forestry there⁴ (Iiyama et al. 2005, Keiji Nakahima personal communication).

The livelihoods of the inhabitants come from the cultivation of staple foods, cattle ranching, dairy production, and limited forestry activities, but are increasingly supplanted by a growing tourism industry. The latter emphasizes the volcanic landscape, hot springs and grasslands. The grasslands are communally managed and owned mostly by the government with, to a lesser extent, some members of the community. Farms are largely owned by individuals.

Traditionally, the community shared inherited rights and maintenance duties, such as the regular cleaning of irrigation channels. Cleaning duties were exchanged for access to water, thus unpaid. Now, under a new direct payment scheme, outsiders are allowed to partake of these resources.

Ranching is skewed toward the older generations and the government is providing farming subsidies to encourage recruitment of younger generations. The government also subsidizes forestry activities since local labor has become expensive, while wood prices have stagnated.

The forests are predominantly comprised of the widely planted Japanese cedar (*sugi*) and the native oak, with natural beeches on the decline. Oak trees that were planted are used for charcoal and firewood, making them an element of *satoyama*. Cedars were used only for timber, but could not compete with cheaper and better quality timber from the tropics.

The grasslands undergo regular management such as prescribed burning (*noyaki*), to prevent succession into areas occupied by Japanese pampas grass (*susuki*). Interest in grassland management is declining, especially since ranchers consider rice feed as more cost effective than grasses. However, grasslands are effective at controlling loss of water to the atmosphere through the mechanisms of evaporation (from soil and plant surfaces) and transpiration (from plant tissues). Because of Aso's grasslands, Kumamoto can provide underground freshwater for its 700,000 inhabitants and one million others in the surroundings areas. In the coming decade, water fees and levies may be applied.

In 2007, no fewer than 19 million people came to visit Aso. However, visits were often rushed and emphasized sightseeing, limiting their economic impact. Although tourism should benefit locals, ranchers sometimes disagree. An outbreak of foot and mouth disease in nearby Miyazaki in 2010 was a risk emanating from tourism. The ranchers had to rope in their cattle to avoid potential disease transmission.

Farmers have clear rights to access and manage natural resources. The city of Aso manages the national park lands. Ranchers are given tenurial rights to the area, which encompass grassland slash and burn, and the maintenance of roads. Correspondingly, the benefits are accruable to these communities.

Mountain tradition is still very strong in Aso, including medicinal knowledge (*sempuri*). The forests are thought to have therapeutic properties and patients who work on the mountain are believed to be healed. The owner can have the visitors cut trees and pave roads in exchange for access to the mountain, making it a win-win situation.

Uchinari, a rice paddy that emphasizes *satoyama*

Located in the outskirts of Beppu, paddy fields interspersed with forests in Uchinari have long been traditionally managed. The *satoyama* provides rice and vegetables for both market and local consumption. Although forests are abundant, they are not used for their natural resources because of depopulation. Charcoal is primarily imported from nearby producers. Bamboo is also becoming difficult to control. Only some species can be used for handicrafts, limiting its economic value.

An aging population remains but they cannot continue with an agrarian lifestyle any longer. Discussions on how to attract people back to Uchinari have been held, but the actual change, if at all, may take years. The landscape may be gone by the next generation, reverting to forests now rife with invasive bamboo.

Mount Iwara, depopulation impacted forests

The *satoyama* in Mount Iwara, Itoshima, is recognized as public land that belongs to the local community and provides basic subsistence needs. People move periodically to accommodate the regeneration of forest products such as charcoal. The forest is predominantly cedar, with occasional oak, chestnut, ginkgo, and

bamboo occurring, as well, and actively maintained. Cedar thinning is necessary to allow the growth of other desirable biota, such as mushrooms. The level of maintenance required cannot be sustained since only a third of the traditional population remains, changing the quality of the forest ecosystem. For instance, overly dense cedar forests limit the growth of individual trees and cause severe pollen allergies.

Mount Hiyama, a local knowledge harnessing *satoyama*

Hiyama, one of the better-managed *satoyama* around Itoshima, is surrounded by mixed broadleaf-coniferous forests. In the early 1990s, sakura dominated the landscape, but recent invasions of bamboo and pests have altered the ecosystem.

The local community manages the forests but does not prioritize conservation and cannot live off the *satoyama*. Traditional ecological knowledge⁵ to realize better silvicultural techniques have advanced accordingly. In order for plants to be properly rooted in the ground, *dango* (small ball, made of local red soil) have been used. The ball contains seeds which can naturally germinate (Eiji Yoshimura, personal communication).

Planting of sakura has now been replaced by “Tarayou” *Ilex latifolia* (which is naturally distributed in eastern China and southern Japan). “Tarayou”, considered a sacred tree in Buddhism, is thought to occur only in sacred places.

Plant propagation occurs using a method called coppicing whereby, after two years, the plant grows a clone. Another propagation technique uses small trees from nurseries, but this is not ideal because the bottom part of the trees must be cut for easier transport when sold. On-site seed germination is another option resulting in longer-living plants, but takes as long as nine years.

To fight bamboo invasions, locals use it for charcoal and handicrafts. Charcoal is used in recycling as a purifying substance or as fertilizer. The advantage of bamboo-based biochar is that it does not yield dioxine. Bamboo older than seven years emits carbon dioxide, which is bad for the environment (Michael Hall, personal communication).

Kounosuyama, a sakura conservation area in the middle of a *satoyama*

Near Kounosuyama, Fukuoka, is a *satoyama* forest on a granite and sedimentary landscape. The occurrence of steep granite makes residential development difficult, leaving the area a primarily sakura forest with planted oaks. Tombs dating probably before and since the Meiji era (150 years ago) border the *satoyama* (Jin Ono, personal communication).

The *satoyama* forest is owned by the city council of Fukuoka. In the 1950s and 1960s, oak was used for firewood and charcoal. The locals later abandoned the forest, and it became dark and unattractive. However, in recent years, the locals came back to manage the forest, particularly by thinning trees to allow more sunlight in for the undergrowth.

The residents of Fukuoka recently formed a *satoyama* club to preserve and maintain the *satoyama*, mainly the culturally important stands of sakura. The *satoyama* now functions as a recreational forest where people take walks, and children play and learn. A favorite pastime of the children is collecting bugs. However, strictly speaking, collection of biodiversity specimens is not allowed. In nearby Itoshima, which consists of mostly private lands, visitors have collected ferns, fruits, mushrooms.

The forest is culturally important since it is believed to protect the mountains where the gods live. The city council forbids cut trees from being taken out of the forest. The cut

trees may be used as local fertilizer, or for building fences to protect certain places, such as nursery areas. Tree trunks may be used to mark paths or as benches for resting. Invasive bamboo from China is cut every year to preserve the state of the forest.

Evidence of the practice of *satoyama*, particularly coppiced trees, can be seen in the tree trunks that appear to be united at the base. There are also signs of charcoal ovens from approximately 50 years ago.

Ikoimori, providing both fuel wood and recreation functions

Ikoimori, on the outskirts of Hiroshima, harbors a semi-natural forest landscape which is maintained by the local communities. The forests provide recreational opportunities for locals, and pathways and facilities have been established for this purpose. The forests also allow for wood chip collection from dry branches and have specific collection points designated for trucks.

Mizurogaike, a small pond in town

The pond of Mizurogaike in Kyoto was designated a National Designated Natural Monument on 12 June 1927 because of its unique ecological properties, specifically the aquatic plant colonies. When further studies found more rare insects and other species, a strengthened decree was enacted on 24 December 1988. The pond consists of a cool temperate zone similar to the upper marshlands in north-eastern Japan, which is different from the local Kyoto basin that has been classified as a warm temperate zone.

Active *satoyama* management through regular cutting allows the riparian ecosystem to be restored. Reeds are regularly removed from the pond to control the levels of crucial nutrients such as nitrogen, phosphorous, kalium and natrium. The *satoyama* committee also handles issues related to forest thinning and illegal recreational fishing.

Ohara, a *satoyama* on forests lands owned individually

In Ohara, on the outskirts of Kyoto, are extensive citizen—or community-owned forests. Because forests are owned personally, the *satoyama* forests are small and patchily distributed. Collaborations are often difficult, despite their importance to successful *satoyama* management.

One of the current priorities of the *satoyama* is the use of indigenous wood. However, it will take a long time to reverse current trends in Japanese forestry. Japanese wood is expensive and forestry infrastructure is insufficient, resulting in carpenter's preferring cheaper, imported wood. Future management can be facilitated through education. Children can be taught and encouraged to cut ropes, make charcoal, cut logs and plant native wood.

Ryokoku forest, a *satoyama* that is also a university research center

Ryokoku forest, on the outskirts of Kyoto near Lake Biwa, is comprised of *konara* oak (which responds well to coppicing), planted *sugi*, as well as natural red pine (*akamatsu*). *Akamatsu* was formerly the main timber product of the *satoyama*. Shiitake mushrooms are cultivated on the *konara* trees, whereas *matsutake* mushrooms are cultivated on the *akamatsu*.

There was once a takeover attempt by a golf course, but the area was deemed unsuitable; and, now, the Ryokoku University co-manages the forest with the local community. The forest is equipped with educational and research-related structures, such as observation towers with climate loggers, artificial wells, composting infrastructure, leaf litter traps, camera traps, and nest boxes. Compost must be made because the soil is very poor but yields important byproducts, such as grubs of Japanese rhinoceros beetles.

Lake Biwa and its *satoyama-satoumi*

Lake Biwa (-ko) is unique in having not only a managed forest *satoyama*, but also a *satoumi*, representing a strong connection between mountains and water. Biwa-ko is surrounded by smaller lakes with waterways that can be used for tourism.

Shaped like a *biva* musical instrument, Biwa-ko is the largest lake in Japan. It is a basin surrounded by forested mountains. The water catchment area covers 80% of Shiga Prefecture. No fewer than 460 rivers flow into the lake, with only the Seta-Uji-Yodo River and the canal of Biwa-ko flowing out. The lake provides water for households and industries in the Kinki region, which is populated by over 14 million people. The *satoyama* is characterized by rich biodiversity, with 600 species of animals and 500 species of plants, including 50 endemics.⁶

The forest provides vegetables, fruits and mushrooms. Interspersed grasslands also yield important products such as thatch. People live and farm at the foot of the mountain. Fire wood, bamboo for baskets and chopsticks, charcoal, and game species from the forest are plentiful.

The management of paddy fields is also important to species that require open habitats, such as the *itotombo* (dragonfly) and *sashiba* (see also Katoh et al. 2009). Villagers sell or trade forest products in town for goods that are not found in abundance on the mountain.

After WWII, at the expense of other tree species, the government encouraged monocultures of *sugi*, leading to a loss of biodiversity. *Sugi* turned out to be unprofitable as trade of tropical timber increased, so it now overruns the forest.

Of special interest is the village of Ogi, which is the subject of the NHK film, *Japan's Secret Watergarden*.⁷ Prior to the documentary, Ogi was already a household name for *satoyama* because it highlighted the diverse interactions

between humans and nature. Trees in it were planted in rotation, not unlike slash and burn cultivation. These habitat enrichment activities are similar to “gap dynamics”, which provide patches of open areas crucial to insects, birds, and mammals.

Tanada or terraced paddy fields are an important part of the *satoyama* landscape, especially where land is hemmed in by mountains. In Iko, mountains are very close to the lake and paddy fields must be terraced. In Koka, mountains are far away and land is plentiful, so the paddy fields which encroach on natural forests are flat (*yatsuda*).

Interest in *satoyama* management by younger people is weak because of the influence of urbanization. However, ecology students interested in sustainability may serve as an important key to the future maintenance of *satoyama*.

Kambatsu or thinning is very important to the management of forests. Trees are planted rather densely, but the smaller ones are removed as they grow. An example of this in practice is a restoration project nearby, at Hakuo-cho, Omihachiman where invasive bamboo stands also harbor boar as pests. The bamboo stands have been thinned as part of an endeavor to allow deciduous trees to grow again and recreate the *satoyama* landscape. The project is a collaborative effort by local communities and Shiga Prefectural University.

Kamakura, urban use of the forest landscape

Kamakura, on the outskirts of Tokyo, is a popular tourist destination because of the sitting Buddha. A “natural” environment has been created within the local vicinity. However, its focus is not on traditional *satoyama* activities; instead, it uses the ecosystem indirectly by emphasizing its cultural, historical and recreational significance.

Local farmers may each develop their own perceptions regarding resource use in the nearby mountains. Urbanites, particularly those from

Tokyo, visit and enjoy the foliage and wildlife due to Kamakura's proximity. Unfortunately, locally urbanized environments are also encroaching on the *satoyama*. Tourism activities have driven up property values, but some residents feel a loss of tranquility because of the accessibility of the place to crowds of visitors from Tokyo.

Shimokawa, an eco-model town, as a new *satoyama*

Shimokawa is in the relatively cool northern reaches of Hokkaido Prefecture, three hours from Sapporo by train. Shimokawa, 90% covered by forests primarily *karamatsu* (large Japanese spruce), has a population fewer than 4,000 people. Timber derivatives, especially wood chips, are used to generate energy.

Shimokawa acts as an eco-model town for the future of *satoyama* by emphasizing strategies based on sustainable forest management and the progressive development of local forestry resources. Economic growth is fostered through a resource cycle that sustainably develops and maintains the forest, while providing jobs and timber products. People can get certification for forest management and create a chain of custody. Energy independence is fostered by employing biomass boilers to generate heat locally. Additional income for forest management is provided by J-VER, a verification scheme for credits generated through the reduction of emissions. Subsequent certification by the Ministry of Environment allows carbon credit to be obtained. By channeling funds back to emission reduction, the scheme promotes local industrial growth.

Discussion

The socio-ecological system, especially the site-specific ways in which resources are being used, has a strong influence on the landscape. *Satoyama* also comes with invaluable traditional ecological knowledge (TEK).

Traditional *satoyama*, as defined by Takeuchi (2001), were found in Hiyama and Iwara; TEK featured prominently, although TEK was also on the decline.

Alternatively, new *satoyama* in Shimokawa, and to some extent, Kamakura and Ryokoku, use the landscape in new ways, such as recreation and energy production. They are still *satoyama* since local stakeholders manage them with sustainability and efficiency in mind by introducing new uses for available resources.

Landscapes with a long history of socio-ecological systems may provide the vision of "agricultural landscape as part of cultural landscape" (Nobukazu Nakagoshi, personal communication). For instance, Aso has places that have distinct ecological and historical values, and require protection.

This study emphasized social networks as a common and effective denominator for calling different stakeholders to collectively tackle issues of resource use (Bodin and Crona 2009). The social structure that governs the system, coupled with clear rights and obligations, is especially important.

In contemporary times, people may not use their rights but, nonetheless, are subjected to communal responsibility for the landscape, such as paying dues. With decreased reliance on *satoyama*, an increasing number of people only see *satoyama* as a cumbersome obligation and do not benefit from the system. Responses needed include economic enhancement of ecosystem services and local biodiversity. Revitalization of local agricultural resources should be based on the concept of *chi san chi sbo*, which means local production for local consumption (Kurita et al. 2009).

Communities serve as the effective unit to maintain a given area, with each and every one of them coming to a consensus and deciding what to do. When compensation for less favorable areas (LFA) was introduced, subsidies were given for redistribution to communities instead of individual farms, leading to the more effective maintenance of LFAs.

Relevant stakeholder groups should be effectively identified, including regional governments and outside users. The Ministry of Environment and the Ministry of Agriculture, Forestry, and Fisheries should work together to maintain national parks and zoning regulations.

Conclusions

Despite grave challenges from depopulation and urbanization, there is potential for maintaining and even revitalizing the *satoyama*. Future *satoyama* may harness the development of wood-based energy. Presently, Japan is taking measures to shut down its nuclear plants, and wood biomass can be considered as a sustainable alternative (Yamazaki Toru, personal communication).

The future of the *satoyama* cannot be left only to the locals. Beneficiaries need to be mobilized to gather mechanisms of support from both within and beyond the *satoyama*. It is encouraging that the government is facilitating non-profit organization and volunteer involvement for landscape revitalization.

Still, the measures are incomparable to the previous levels of use. Above all, depopulation removes the crucial ingredient of the *satoyama*—“rule making” or *iriai-chi*. Rule making will be the greatest challenge in maintaining effective participatory governance.

NOTES

¹ The integrated concept of humans in nature is emphasized. It is reasoned that since social and ecological systems are interlinked, differentiation between the two is artificial and arbitrary (Berkes et al., op. cit.).

² <http://newfarm.rodaleinstitute.org/international/features/0404/teikei/index.shtml>

³ <http://www.env.go.jp/en/nature/nps/park/index.html>

⁴ The case would be different from Okinawa, where a non-government organization is more likely to oppose agricultural activities since fertilizers and pesticides may run off and pollute coral reefs lining the shores.

⁵ The cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down thorough generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment (Berkes 1998).

⁶ <http://www.env.go.jp/en/nature/nps/park/index.html>

⁷ http://docuwiki.net/index.php?title=Satoyama:_Japan_%27s_Secret_Watergarden

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Location	Date visited	Satoyama bases	Declining resource	Responses, especially revitalization measures
Aso, Kumamoto	19/09/2011 11/11/2011 26/11/2011	grasslands forests	Underutilization of grasslands and forests, unique biodiversity	Active maintenance, e.g., regular burning of grasslands in springtime; ecotourism; boosting economic returns from local cows; promoting consumption of local agricultural products
Uchinari, Beppu – Oita	21/06/2012	forests, paddy fields	Bamboo taking over natural pine and oak forests	Slowly developing agricultural tourism and sightseeing
Mt Iwara, Itoshima	28/11/2011	forests	Depopulation overgrown forests	—
Hiyama, Itoshima, Fukuoka	24/04/2012 13/05/2012	forests, mainly pine and oak	Bamboo taking over natural pine and oak forests. Insect pests are on the rise.	Harvest of bamboo shoots for crafts and biochar
Kounosuyama, Fukuoka	06/06/2012	forests	Invasive bamboo	Forests are maintained by thinning and cutting, which also preserve the sakura trees
Ikoimori, Hiroshima	13/04/2012	forests	-no information-	For the purpose of recreation and wood chips, forests have been maintained by the local communities.
Mizurogaie, Kyoto	17/03/2012 06/05/2012	Oligotrophic, pond, representing cool temperate zone, and surrounding forests	Invasive alien species (blue gill fish), run off from the land, uncontrolled growth of reeds	Active management by committee which recruits university students
Ohara, Kyoto	17/03/2012	forests	Local wood cannot compete with imported wood	Local satoyama management committee, building collaborations with local landowners
Ryokoku	20/03/2012	forests; important shrine nearby	-no information-	The forest was developed by local communities and as research facilities by the local university.
Biwa	21/05/2012	Lake, forests, paddy fields, shrine nearby	Invasive bamboo mammals such as boar	Restoration project aimed to control bamboo proliferation and wild boar
Kamakura, Tokyo	19/12/2012	Forests	Increased visitation by urbanites	Recreational use of the forests by the Tokyo urbanites
Shimokawa	13/12/2012	Forests	Depopulation	Cyclic forest management to boost economic revitalization; wood biomass boiler as energy innovation. Also, planting fast-growing willows as energy resource crop (Osaki 2011); additional income for forest management through a verification scheme for credits, generated through the reduction of (in) GHG

Table 1. Examples of contemporary tenure that provided innovative responses

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