

Changes in Human Benefits and Values from Forest Services in Yakushima Island

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Introduction

Since the pre-modern period, the forest area in Yakushima Island, Japan, has experienced extensive human influence. Some of this influence has led to crucial changes in the forest environment in this area, and some reflects conflicts among stakeholders of the forest. These impacts fundamentally emerged because the range of forest services offered various types of benefits and values to the people. This paper aims to analyze the details and composition of and the changes in human benefits and values from the forest services in Yakushima Island in order to clarify how the relationship between the people and the forest has changed from the seventeenth century.

Basic Framework: Forest Services, Benefits, and Values

Table 1 classifies and details the existing forest services, benefits, and values provided by the forest in Yakushima Island. According to the results of analyses in field studies and the field of forest science (Clawson 1975, Hageneder 2005), I assume four basic forest services available to humans: provision of space for alternative uses, provision of materials for products, protection of the natural environment, and favorable effects on people's spiritual aspects. Further, I assume nine specific services that can clearly shed light on the human conflicts pertaining to this forest. Then, I also assume specific human benefits, based on nine fundamental human values regarding nature classified by S. Kellert (Kellert 1996, 1997) and my own research experience in the field.

This classification of and relationship among the forest services and their human benefits and values form the basic framework of the analysis presented in this paper, using which it can be clarified how humans, based on the benefits and values, formed the social structure surrounding the forest in each period and how they worked on and changed the forest environment in the island.

Six figures (Figure1-6) seen in the next chapter actually show overall compositions of these human values and benefits from the forest services in specific periods from the seventeenth century. In these figures, identified recipients who have same combinations of the benefits are represented as ellipses. Colors of the ellipses show attributes of the recipients. Black means the recipients living in the outside of the island, gray includes both living in the inside and outside, and white means almost all of them are living in the island. The benefits from the forest services recognized and enjoyed by them are represented as rectangles. Colors of the rectangles correspond to the colors that identify the nine specific forest services in the Table1. For example, a dark red rectangle of "material wealth" corresponds to the "material wealth" benefits from the forest service of "provision of commercial products."

Historical Change in the Composition of Human Benefits and Values from Forests

The Pre-modern Period (Seventeenth to the Early Nineteenth Century)

< Figure 1 >

From the beginning of the Edo Period, the pre-modern period in Japan, feudal rulers such as Tokugawa Shogunate and the Satsuma Domain focused on the forest service of provision of materials for commercial products in the island. Based on the benefit of “material wealth,” they expected to obtain large-diameter timbers for large constructions from the dense forest in the island. Satsuma Domain also regarded the forest, especially the ancient cedar trees (*Cryptomeria japonica*) known as *yakusugi* and aged over 1,000 years old, as a means of strengthening their finances. As a feudal obligation, they decided to charge sliced *yakusugi* timber known as *hiragi* toward the villagers. *Hiragi* and other forest products from the island were mainly sold in the western parts of Japan by domain-designated merchants from Kagoshima (the capital of the Satsuma Domain and Kagoshima Prefecture today) or Osaka. It can be concluded that this period is characterized by the process in which feudal organizations gradually conferred utilitarian values to the forest in the island; these organizations shared the benefit of material wealth from the forest service of provision of commercial products.

On the other hand, these feudal rulers also partly implemented afforestation in order to keep away wind and sand in coastal areas. This implies that they attempted to secure the benefits of local villagers on the forest service of “protecting lands, water, and daily life” in this period. Moreover, the fact that they designated hunting areas for the loads of the domain in the forest shows that the rulers also recognized the benefit of “spiritual elevation” on the forest service of offering human recreation at that time.

The villagers in the island mainly enjoyed the benefits of the forest service whereby they were provided space for living and farming, and provided products for daily use by the forest. They also relied on and felt an affinity toward the dense forest and old trees covering the island. The spiritual benefits enjoyed by the villagers are confirmed by the fact that one of the public events involved visiting mountains to pay homage to the god and spirit residing in the forests and mountains. Of course, they simultaneously enjoyed the benefit of accumulating commercial goods and material wealth while they engaged in *hiragi* production and illegal timber trading.

In general, the recipients of the benefits and values were limited under the Shogunate system under which access to the outside world was restricted in this period. Therefore, the composition of the benefits and values from the forest services in Yakushima Island was relatively simple and did not reflect serious conflicts among the recipients, or drastic changes in the forest environment.

From the Meiji Restoration to the Administrative Lawsuit (1868–1920)

< Figure 2 >

In the Meiji period when Japan initiated industrialization and modern nation-state building, the composition of the benefits and values from the forest became increasingly complex.

Soon after the Meiji Restoration, the new administration decided to abolish class distinctions in the old regime, including the warrior class, and promote industrial development in order to increase state power.

Because of these policies, the former warrior class of the Satsuma Domain had to find a new means of earning a living, and the local government supported their immigration to Yakushima Island and allowed them to engage in forest production and exploitation in order to make them contribute to regional development. However, when both the number of immigrants and the amount of timber harvested by them increased in the island, the local villagers felt that the benefits they were receiving from forest services, such as obtaining products for daily use or accumulating commercial goods, were under threat. As a result, conflicts concerning forest usage occurred between the villagers and immigrants on the forest border.

The other factor that changed the composition of benefits and values in this period was the nationalization of the forest under the prevalence of the modern property rights system. After several investigations conducted in the late nineteenth century, more than 90% of the forest area in the island was designated as state owned. This nationalization reflected the commercial benefit of material wealth of the Meiji administration. The connection between the Ministry of Agricultural and Commercial Affairs and local forestry offices represented this stance, and the administration intended to exclusively maintain and produce high-quality timber in order to satisfy the demand for nation-state building.

Facing the tightening of bans and regulations in the nationalized forest area, the villagers again felt that their benefits and values were being restricted. They not only repeatedly sent petitions to the local government and forestry offices in order to regain their right to the forest surrounding their villages but also engaged in illegal lumbering to express passive resistance.

This latent conflict between the administration and villagers surfaced in the administrative lawsuit from 1904 to 1920 in which villagers claimed to regain the state-owned forest. However, during these 16 years of the trial, the claim of the complainant was not based on the benefits and values of the villagers alone. Large capitalist organizations, such as newly formed conglomerates producing timbers, actively supported villagers as a proxy for the plaintiff. In return for the support, the villagers signed a contract stating that if they won the lawsuit, these organizations could get more than around half of the commercial revenue from the disputed forest. It was clear that these external capitalist organizations wanted to enjoy the commercial benefit of material wealth from the forest in this island and therefore supported the villagers during the trial. At the last stage, different strategies toward the lawsuit and paybacks offered by multiple external organization led to internal rifts among the villagers.

This process shows that in the context of industrialization, the diffusion of modern market economy, and property rights, the recipients who focused on the benefits and values of the forest in Yakushima Island were divided. Based mainly on the commercial benefit of material wealth, the human relationship concerning the forest became more complex with many conflicts. On June 7, 1920, the administrative lawsuit concluded with the dismissal of the villagers' claim. This result legitimized continued forest management by the state for most of the forest area in the island from then on.

The Start of Full-scale Operation by State Entities during the War Period (1921–1945)

< Figure 3 >

The harsh result of the lawsuit put the villagers in very difficult situation since they had been deprived of means by which to accumulate goods from the forest and had accumulated substantial debt during the 16

years of the lawsuit. In 1921, the local office of the national forestry administration, in response to this situation, decided to allocate 7,000 ha of the forest area in the coastal mountains as “commitment forest” (*itaku-lin*). In this zone, the villagers were allowed to purchase forest products for commercial trade and daily use. At the beginning of the war period in the 1930s, this commitment forest gradually became the area in which materials for military demands were produced, such as charcoal for fuel, camphor for gunpowder, and birdlime for medical products. Through the regional and local government and the national forestry administration, the central government mobilized the villagers to large-scale operation to produce these goods in this zone. In particular, the charcoal formed in dense broadleaf forests in this zone was highly valued in this period.

In the other forest areas of the island, full-scale operation conducted by the national forest administration started immediately after the lawsuit ended. This operation, based on purchasing the commercial products of the forest, involved the cutting and use of large-diameter timber, such as those from ancient cedars. The operation was partly restricted to the zone in which the administration had decided to preserve forest vegetation for water purification and land protection, which meant that at least the benefit from the forest service involving protection of the natural environment was publicly recognized.

Another restriction of the operation based on commercial benefits rose from the increase in the benefits characterized by the scientific and aesthetic values of the forest. In 1921, two areas comprising 4,413 ha of state-owned forests were designated as “forest preserved for scientific purposes” and were also designated as a national monument managed by the Ministry of Home Affairs. These designations reflected the growing calls for preservation from famous biologists, ecologists, and forest scientists who had visited the island forest for research. They insisted on the importance of the extremely beautiful physiognomy and biodiversity of the forest in terms of future development of sciences and human wisdom, and many government officials and foresters also supported this argument. Based on the framework of this paper, this claim can be regarded as a combination of the “knowledge expansion” benefit of the “preservation of biodiversity” forest service, and “spiritual elevation” benefit of the “beautiful and communal landscape” forest service, both of which are strongly characterized by scientific and aesthetic values. As a reflection of these benefits and values, the national forestry administration had to begin, at least to some extent, preserving a part of the forest in Yakushima Island around the same time as starting full-scale operation.

The Period of Economic Growth after the War (1946–1960s)

<Figure 4>

For more than 20 years after the Second World War, Japan experienced postwar reconstruction and economic growth, and the commercial benefit of material wealth based on utilitarian value was still a core factor for the characterization of the composition of the benefits and values from the forest in the island. However, changes in the stakeholders and produced materials concerning this benefit distinguished the composition in this period from those in the previous periods.

The first phenomenon that was observed after the war was an increase in the number of immigrants to the island, including those who came back from the front and former colonies, and these immigrants exploited the forests around the coastal areas to earn a living. This implied that at the end of the war, the

benefits from the forest service of provision of space for alternative uses were highlighted again. Due to this movement, the area covered by the state-owned forest decreased around 660 ha in this period (Local Offices of National Forestry Administration, 1951).

In this period, a second movement arose in the former commitment forest that was renamed “shared-use forest” (*kyoyo-lin*). As the war ended and an energy revolution from biomass fuels to gas and oil occurred in local societies in Japan, the benefits for the government and villagers who produced materials for commercial and daily use from the commitment forest in the previous periods were suddenly eliminated. From 1945 to the 1950s, cooperatives that comprised villagers and led the production in the commitment forest in the war period were dissolved. Therefore, the stakeholders, especially the villagers, were forced to find new ways to enjoy the benefits offered by the zoned forests near residential areas.

An increase in the demand for timber and pulp during the Korean War and economic reconstruction yielded a solution to this situation. In 1963, encouraged by the government of Kagoshima Prefecture, major paper enterprises and local timber and paper companies jointly established the Yakushima Forest Development Cooperation. This cooperation and the companies involved signed contracts with the national forestry administration, and they hired residents and undertook the task of cutting broadleaf forests in this zone and producing pulp. The Public Corporation for Forest Development handled regeneration and management of the cleared area; this other new entity was run by the prefecture government, the town councils (two former villages grew into two towns at the end of the 1950s), and local communities (natural villages) that formed the cooperatives for the shared-use forest.

Reflecting this increase in the demand for timber, logging in other state-owned forest areas also increased in this period. The local office of the national forestry administration allowed immigration of many workers specialized in logging. They lived in the dense forest in the center of the island and engaged in logging of large-diameter timbers. Further, from the 1960s, some people living in the capital of Kagoshima Prefecture started the business of processing ancient cedars from the island for crafting products. They were distributed the cedars for crafts by the local office and enjoyed commercial benefits such as material wealth, knowledge expansion, and worker identity.

Based on the above movements, this period can be characterized by the replacement of the old style of forest usage by the new stakeholders who also enjoyed the commercial benefits of the forest, and gave new valuations. Reflecting this replacement, the people and organizations associated with the forest clearly changed. However, the recipients of the benefits and values from outside the island, such as the governments and companies, remained the key players in the drastic changes in the forest environment.

In this period, one of the human actions in the forest that clearly deviated from the commercial benefits was observed, as well as the previous period, in the benefits and actions supported by the scientific and aesthetic values on the forest. As a reflection of the benefits they received, i.e., expanding scientific knowledge on biodiversity and the spiritual elevation afforded by the beautiful forest landscapes in the island, scientists and conservationists lobbied for the Ministry of the Health and Welfare of the central government to designate the core forest area in the island as a national park. In March 1964, some forests in the central part of the island were designated as conservation areas of a national park. This designation also enhanced the potential human benefits from the forest services in the island, whereby people could enjoy the

beautiful forest landscape and recreation and receive healthcare. Many tourists and trekkers subsequently visited the island to enjoy these benefits.

Another action against the distribution of the commercial values of the forest was based on a sense of danger regarding the clearing of the forest for timber and pulp production. In the late stage of this period, this sense gradually transformed into a voice that demanded the cessation of reckless clearing. Besides the scientists and conservationists from outside the island, some of the local residents also played a major role in this movement, and this reflected their sentiments toward the ancient cedar trees or the local identity felt toward the communal forest. In the next period, these residents behaving as conservationists played the main roles in consecutive campaigns for protecting the forests against the national forestry administration and companies promoting the operation who desired commercial benefits. However, the benefits and values they received from the forest were related to their life on the island; therefore, latent hostility toward foreign entities such as tourists and environmentalists who actually supported the campaigns also gradually surfaced since the population and garbage in the forest increased because of the tourists in this period.

Increasing Conservation Campaigns and the Decline of Commercial Forestry (1972–1993)

< Figure 5 >

In Yakushima Island, the period from the 1970s to the 1980s was characterized by two movements: forest conservation campaigns extending from the conservational action from the previous period and the downfall of commercial forestry in Japan due to a sharp increase in amount of timber imported under the global market economy.

In this period, people acting toward protecting the forest from clearing due to the associated commercial benefit had already formed one faction among the island residents. The leaders of this faction were “boomerang people” who had once lived and worked outside the island and then decided to return to their native villages. Their claim in the consecutive campaigns for forest conservation was based on the protection of three specific benefits from the forest: gaining security of life in the context of increasingly frequent landslides due to forest clearing, spiritual elevation, and shared awareness of the beautiful and communal forest landscape under the slogan of “protecting the beautiful forest in our home island.” The environment agency, biologists, ecologists, and environmental groups from outside the island, according to their own benefits and values, supported these campaigns. Their joint effort led to the designation of several protected forest areas, such as a Wilderness Area at Hanayama, and the expansion of special protection areas in the national park.

On the other side, the stakeholders of the forest interested in its commercial usage, such as the local office of the national forestry administration; timber and pulp companies; and residents engaged in forest production, including forestry workers and the managers of the processing business for crafting products, jointly tried to protect their commercial benefits from the forest in the beginning of the 1970s. At that time, the Kamiyaku and Yaku Town Councils became the battle stage for the two sides. However, global changes such as a decreasing demand for domestic wood production given the increase in the amount of timber imported and the switch-over in energy source and building materials from wood, and a worldwide increase in environmental awareness clearly supported the conservationists’ side. As a result, the councils authorized

a series of resolutions that ordained a ban on cutting the ancient cedar trees or the forests in important areas, aiming to protect the land, precious species, and landscapes; this reflected the three main benefits from the forest that the resident conservationists regarded as local “common sense.” These resolutions contributed to spreading awareness of these benefits to all the residents.

In response to these campaigns and the decline in the commercial benefits from timber and pulp production, the national forestry administration gradually shifted their main purpose of forest management from materials production to land protection. Through this process, the focus of the conflict related to the commercial benefits of the forest changed from forest clearing to the production of old stumps of the ancient cedar trees for craft production. In this period, many people living outside the island operated the craft industry involving wood from the ancient cedars. From the 1980s onward, they continued to negotiate with the local office of the national forestry administration, conservationists, and craft industries within the island over the amount of old stumps available to them.

Overall, due to previous human actions on the forest and the global changes, a new type of human conflict concerning the forest surfaced for the first time on Yakushima Island. Both sides of the stakeholders concerning clearing the forest held clearly different benefits from the different categories of the forest services. This was not as previous conflicts only over the commercial benefits and services.

After the Designation of a World Natural Heritage (from 1993)

<Figure 6>

In the 1990s, the change in the benefits and values accelerated from that in the previous period. Forest operations based on commercial benefits were no longer sustainable. The benefits and values received by the villagers realigned according to this change. They seemed to internalize the benefits from the forest that the resident conservationists held in the past. Therefore, prominent conflicts that divided the residents cannot be identified in this period.

In December 1993, 10,263 ha of the forest area in Yakushima Island was designated as a World Natural Heritage based on a request by the Ministry of Environment and scientists who enjoyed the benefits and values regarding scientifically or ecologically precious biodiversity from the forest, and the tourism industry that expected to receive the benefit of material wealth through the development of ecotourism on the island. Due to this designation, Yakushima Island attracted worldwide attention, and the number of tourists increased dramatically. This led to the development of the tourism industry, which included not only large tourism enterprises from outside the island but also island residents who managed guesthouses, produced handicrafts as souvenirs, or worked as forest guides. Further, the number of people referred to as “new immigrants” also increased; these people came from outside the island and wished to live in the rich forest environment. Today, they account for around 10 percent of the population.

However, these people’s attention and social changes in the island due to the designation gradually highlighted a potential conflict between the foreigners and island residents with regard to differences in the benefits and values received. The new beneficiaries of the development of tourism in the 1990s, such as the tourism enterprises or the forest guides of the new immigrants, enjoyed the benefit of “material wealth” from the forest services of provision of “beautiful landscape” or “healthcare and recreation.” Further, the

tourists and new immigrants enjoyed the benefits of “spiritual elevation” and “peace of mind” by visiting and living in the forest, sightseeing, or participating in recreational programs. However, the benefits and values enjoyed and internalized by the island residents in the previous periods differed from those of the tourists and new immigrants. Those residents’ benefits are, even equally from the forest service of giving favorable effects on human spirit, including the benefit of “shared awareness” of the communal forest landscape, “reliance” or “affinity” toward the forest and trees, “security of life” by protecting the forest, or accumulating knowledge and culture through contact with the diverse species in the forest, and all of these developed because they had lived for a long time in the villages on the island.

The abovementioned difference in the benefits and values from the forest led the island residents to feel that their benefits were ignored and interfered since the designation of a World Natural Heritage. Except for some recipients of the “new” benefits, several villagers were frustrated because in some cases, the recreational benefits were enjoyed entirely by the tourists or tourism enterprises and because the increased population hampered their original benefits due to changes in the shared forest because of an increase in the amount of garbage, deterioration around forest trails, and expansion of resort buildings.

The environmental administration, environmental groups, and scientists who had their own combinations of the benefits and values and supported the increase in the benefits for the residents with regard to forest protection in the previous period now appeared to be in a difficult position between the new recipients and residents.

Concluding Remarks

Based on the historical changes in the composition of the benefits and values from the forest services, the following concluding remarks can be derived.

First, it is concluded that the relationship between the people and the forest in Yakushima Island from the pre-modern period to recent times is very special in that almost all types of forest services, benefits, and values were recognized by various people and organizations. In this regard, the human conflicts and relationships concerning the forest created many variations within each period. The type of conflicts mainly over the commercial benefits in the pre-modern to war periods no longer existed in the 1970s when the conservationist side expressed its desire to protect the forest with their benefits and values. Further, this side was also divided, especially since the forest was designated a World Natural Heritage in 1993, and thus, it enjoyed the different benefits and values from the forest services.

Second, it can be confirmed that during the change in the relationship, the benefits and values received by the entities from outside the island, such as the modern state administration, large capitalist firms and companies from the Meiji period to the 1970s, scientists, and tourists, had strong impacts on the relationship while reflecting the global changes in each period, and these entities actually spearheaded the actual changes in the forest environment. The considerable attention and impact of these foreigners often created situations in which the residents of the island felt that their benefits and values from the forest were under threat.

However, the third conclusion is that these island born residents who accepted external impacts were not stable stakeholders who received only one combination of benefits and values. Besides the members changing over time because of the various types of immigrants, they also changed their standpoints and

internal structure, while they accepted the impacts and revised the combinations of benefits and values from the forest. The shift to commercial benefits from the Meiji period and the internalization of the benefits for forest protection through the conservation campaigns in the 1970s are good examples of this.

An understanding of this complex and dynamic change in the composition of human benefits and values from forest services can clarify the human relationships and actions surrounding the forest in Yakushima Island and will offer good examples and implications in an effort to consider a sustainable relationship between the people and forests worldwide.

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Table1: Forest Services and Human Benefits and Values

Forest Services, Benefits, and Values			
Forest Services		Human Benefits	
Basic Services	Specific Services	Benefits	Merits of Benefits
Provision of Space for Alternative Uses	Provision of Space for Alternative Uses	Having Spaces for Life	People can exploit and divert forests in order to have spaces for building houses, clearing farmlands, or constructing factories.
		Having Material Wealth	From the diversions, people become able to accumulate goods through having products and selling it in the market. This is a typical way for people to accumulate goods and have material wealth in the modern world.
		Having Feeling of Accomplishment	Through the diversions of forests, people can have feeling of accomplishment and satisfaction, since they could change natural environment as they liked.
Provision of Materials for Products	Provision of Commercial Products	Having Material Wealth	Through the production and market trade of forest products, people can accumulate goods evaluated by the market.
		Expanding Knowledge	Through the commercial production, people can develop their knowledge about economic efficiency of using forest materials and species. This expansion of knowledge will not only help accumulating goods, but also bring intellectual satisfaction of some people.
		Having Worker Identity through Productions	Through the production and process of specific forest products, people can form identity as the workers and proud themselves on it. This feeling tends to be synonymous with their meaning of life.
	Provision of Products for Daily Use	Having Products for Daily Use	Through the securement of fuel, lumber, or food by hunting-gathering in forest, people can maintain and enjoy their affluent daily life.
		Expanding Knowledge	Through the process of the production, people can develop their knowledge about the reasonability of using forest materials and species. This expansion of knowledge will not only help having products, but also bring intellectual satisfaction of the people.
Protection of the Natural Environment	Preservation of Bio-Diversity	Having Material Wealth	In addition to "material wealth" in the other categories, this forest service can facilitate the enjoyment of this benefit in its own way. The best example of this is to increase agricultural or forest production by regulating ecosystem process in forest.
		Expanding Cultural Knowledge	Through the relationship with diverse species and ecosystems in forest, people can get local knowledge about their use, develop communication capability by featuring them, and increase ability for self-protection.
		Expanding Scientific Knowledge	To understand the mechanism, functions, or characteristics of diverse forest species and ecosystems, correlated with the whole mechanism of the earth and life, satisfies people's intellectual curiosity, and develops people's rational, scientific way of thinking.
	Protection of Lands, Water, and Daily Life	Gaining Security of Life	The functions of forest, such as water purification, protection of soil runoff and disruption, air purification, protection of wind, sand or tide, and mitigation of local climate change prevent natural disasters. And people can reduce threats to their life.
		Indirectly Having Material Wealth	Through preserving and securing water, and protecting lands and soils, this forest service can support various types of human productive activities in which people purchase goods accumulation.
		Expanding Knowledge	To understand those functions can develop people's knowledge about the importance of forest on the security of their life or goods accumulation. This expansion of knowledge will help enjoying those benefits, and bring intellectual satisfaction of the people.
	Absorbance of Carbon Dioxide	Gaining Security of Life	Through prevention of the global warming, people can reduce potential risks from it, and gain the security of their life.
		Expanding Scientific Knowledge	According to the development of scientific knowledge about the mechanism and effects of forest as a carbon sink, people can get intellectual satisfaction.
Giving Favorable Effects on Human Spirit	Provision of Beautiful or Communal Landscape	Having Spiritual Elevation	Beautiful forest landscapes stimulate and satisfy human aesthetic sense, creative ability, or the spirit of self-sufficiency.
		Having Material Wealth	People can accumulate goods evaluated by the market through engaging in service-sector jobs based on beautiful, communal forest landscapes, such as tourist business, or fine arts dealers.
		Having Shared Awareness from Communal Landscape	To share communal forest landscape, people can form some sort of local identity or sense of unity. This supports to keep up someone's mental stability.
	Provision of Human Health Care and Recreation	Having Peace of Mind	Forest can create the space and mood that reduce people's stress, depressive feeling, or tiredness, and make them relaxed.
		Having Spiritual Elevation	Mountain climbing, fishing, hunting, hiking in forest environment can stimulate and satisfy people's spirit of inquiry, adventure, and curiosity.
		Having Material Wealth	People can accumulate goods evaluated by the market through engaging in service-sector jobs on the recreations in forest, such as tourist business, forest guides, and instructors.
	Cultivation of Human Spiritual Cultures	Having Feelings of Reliance	People living in forests usually respect and have faith in dense forests or large, ancient trees surrounding them. This feeling becomes their cultural backborn, and increase their comfort in daily life.
		Having Feelings of Affinity	Wildlife, including forest species, can give people an avenue for developing the emotional capacities for attachment, bonding, intimacy, and companionship. This sense of affiliation reduces isolation or loneliness of them.

		Human Actions on Forest				Valuations
Human Values	Recipients	Human Actions on Forest		Characteristics of Human Actions on Forest		Economic Valuation
Values on Nature (S. Kollert)	Main Recipients of Benefits and Values	Human Actions on Forest	Objects of Human Actions in Forest	Imagined Term of Enjoyment of Benefits	Main Impacts on Forest Environment	
Utilitarian, Dominionistic, Negativistic	Residents, Farmers, Industrial Enterprises, Governments	Clearing, Diversion	Zone, Whole Area	Short Term	Decrease	Probable
Utilitarian	Farmers, Industrial Enterprises, Governments	Clearing, Diversion	Zone	Short Term	Decrease	Done
Dominionistic, Negativistic, Aesthetic	Settlers, Farmers, Scientists, Industrial Enterprises, Governments	Clearing, Diversion	Zone	Short or Middle Term	Decrease	Questionable
Utilitarian	Forest Farmers, Enterprises and Workers, Intermediate Agents, Consumers	Cutting, Regeneration, Plantation	Species, Zone	Short or Middle Term	Decrease, Constancy, Simplification	Done
Scientific, Utilitarian, Dominionistic, Aesthetic	Forest Scientists, Forestry Engineers, Forest Farmers, Enterprises and Workers	Cutting, Regeneration, Plantation	Species, Zone	Short or Middle Term	Decrease, Constancy, Simplification	Questionable
Utilitarian, Moralistic, Aesthetic, Dominionistic	Forestry Engineers, Forestry Enterprises and Workers, Processors	Cutting, Regeneration, Plantation	Species, Zone	Short or Middle Term	Decrease, Constancy, Simplification	Questionable
Utilitarian	Gatherers, Consumers	Cutting, Gathering, Regeneration	Species, Zone	Middle or Long Term	Constancy, Decrease, Second-Growth Forest	Probable
Scientific, Moralistic, Naturalistic, Utilitarian, Dominionistic, Aesthetic	Gatherers, Forest Scientists, Sociologists, Anthropologists	Cutting, Gathering, Regeneration	Species, Zone	Middle or Long Term	Constancy, Decrease, Second-Growth Forest	Questionable
Utilitarian, Moralistic(?)	Producers, Consumers, Engineers, Governments	Preservation, Afforestation, Gathering	Species, Zone	Long Term	Constancy, Increase, Diversification	Probable
Symbolic, Scientific, Naturalistic, Negativistic, Utilitarian	People in Local Societies, Producers, Engineers, Folklorists, Anthropologists	Preservation, Afforestation, Gathering	Species, Zone, Whole Area	Long Term	Constancy, Increase, Diversification	Questionable
Scientific, Aesthetic, Naturalistic, Dominionistic, Moralistic	Biologists, Ecologists, Earth Scientists	Preservation, Afforestation, Gathering	Genes, Species, Zone, Whole Area, Global Environment	Long Term	Constancy, Increase, Diversification	Questionable
Negativistic, Dominionistic, Moralistic, Utilitarian, Aesthetic	Residents, Governments	Preservation, Afforestation	Zone	Long Term	Constancy, Increase	Probable
Utilitarian	Farmers, Enterprises	Preservation, Afforestation	Zone	Long Term	Constancy, Increase	Probable
Scientific, Naturalistic, Moralistic, Utilitarian	Forest Scientists, Agriculturalists, Engineers, Farmers	Preservation, Afforestation	Zone	Long Term	Constancy, Increase	Questionable
Utilitarian, Moralistic	Everyone, Residents on Coast Areas, Governments, Environmental NGOs	Afforestation, Preservation	Whole Area, Global Environment	Long Term	Increase, Constancy	Questionable
Scientific, Naturalistic, Moralistic, Utilitarian, Negativistic	Scientists	Afforestation, Preservation	Whole Area, Global Environment	Long Term	Increase, Constancy	Questionable
Aesthetic, Naturalistic, Dominionistic	Everyone, Tourists, People in Local Societies	Preservation, Visting, Afforestation	Zone, Whole Area	Short, Middle, or Long Term	Constancy, Increase	Questionable
Utilitarian	Tourist Enterprises, Governments	Preservation, Visiting, Afforestation	Zone, Whole Area	Short, Middle, or Long Term	Constancy, Increase	Done
Moralistic, Aesthetic, Utilitarian	People in Local Societies, Governments	Preservation, Afforestation	Zone, Whole Area	Middle or Long Term	Constancy, Increase	Questionable
Naturalistic, Symbolic	Everyone, Tourists	Visiting, Preservation, Afforestation	Zone	Short, Middle, or Long Term	Constancy, Increase, Degradation	Questionable
Dominionistic, Naturalistic, Aesthetic, Negativistic	Nature Lovers, Outdoorsmen, Tourists	Visiting, Preservation, Afforestation	Zone	Short, Middle, or Long Term	Constancy, Increase, Degradation	Questionable
Utilitarian	Tourist Enterprises, Nature Guides, Instructors of Forest Recreations	Visiting, Preservation, Afforestation	Zone	Short, Middle, or Long Term	Constancy, Increase, Degradation	Done
Moralistic, Negativistic, Aesthetic, Naturalistic, Scientific, Utilitarian	Believers in Animism or Buddhism..., Religious Leaders, Governments	Preservation	Species, Zone, Whole Area	Long Term	Constancy	Questionable
Humanistic, Aesthetic, Dominionistic, Naturalistic	People in Local Societies, Benefactors of Forestry, Nature Lovers	Preservation	Species, Zone, Whole Area	Long Term	Constancy	Questionable

Figure 1: The Pre-modern Period (17th to the early 19th Century)

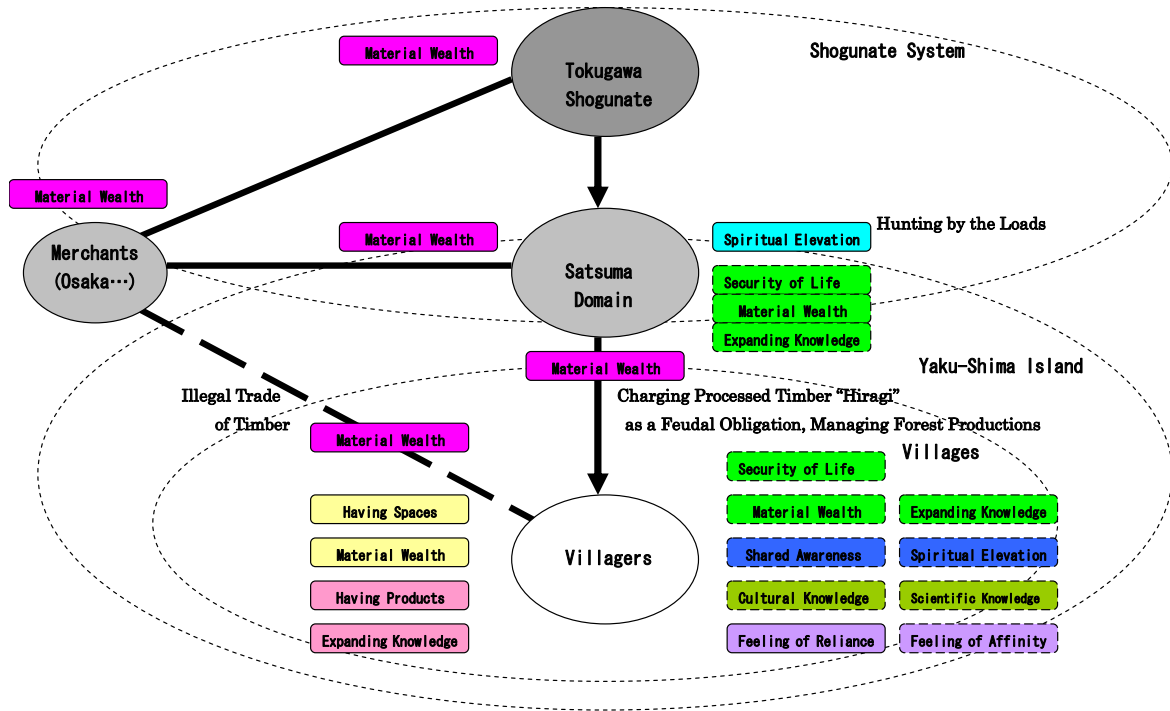


Figure 2: From the Meiji Restoration to the Administrative Lawsuit (1868 to 1920)

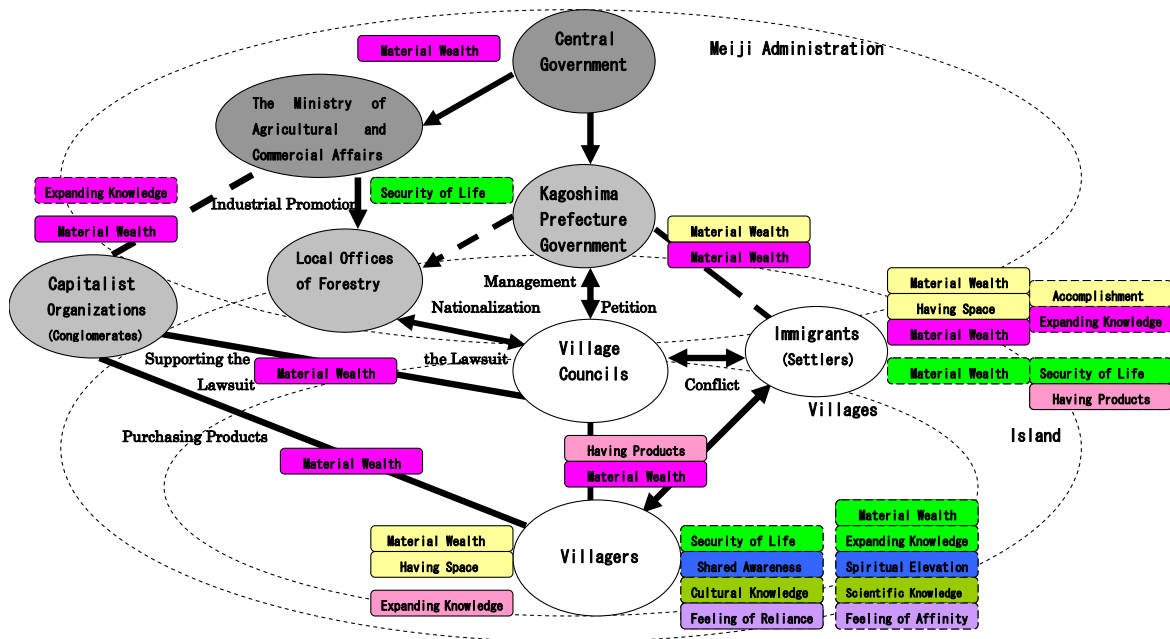


Figure 3: Under Full-Scale Operation during the War Period (1921 to 1945)

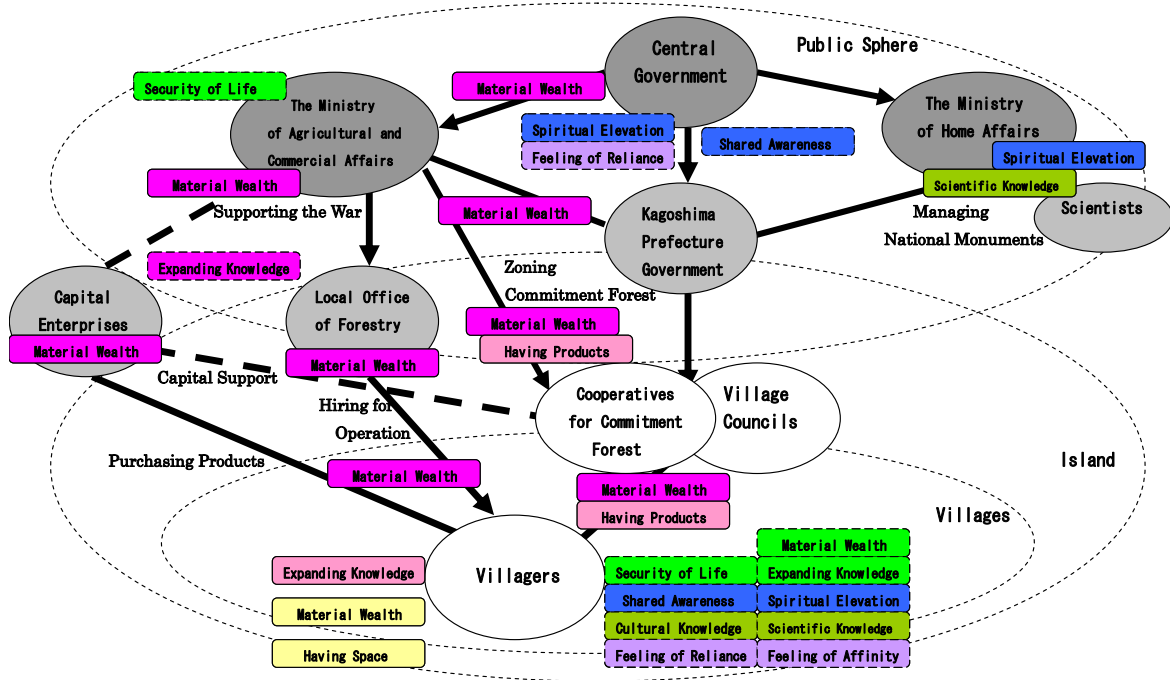


Figure 4: The Period of the Economic Growth after the War (1946 to 1960s)

