
Review

Harmonious co-existence between nature and mankind: An ideal lifestyle for sustainability carried out in the traditional Japanese spirit

Kunio IWATSUKI

Museum of Nature and Human Activities, Hyogo, Yayoigaoka 6, Sanda 669-1546 Japan

Abstract

The Japanese Archipelago has been developed to form distinct zones known as Hitozato, Satoyama and Okuyama, and these zones coincide well with the modern concept of sustainable development of conserved areas, residential and/or transitional areas, buffer zones and core areas. After the so-called Meiji Restoration, some 140 years ago, modernization proceeded rapidly and the Japanese people succeeded in achieving a richness of culture based on material wealth. In developing the Japanese Archipelago in such a modernized way, with modern technology, however, the Japanese spirit of respecting the harmonious co-existence between nature and mankind was set aside. This resulted in severe natural destruction, inviting serious environmental issues such as pollution, endangered species, harmful alien species, and so on. It is hoped that with the aid of this paper the sincere worship of nature by the Japanese people will be recalled and the idea of harmonious co-existence between nature and mankind will be extended throughout the world. This concept should lead to a global understanding of success in developing this, our only earth in a sustainable way.

Key words: chinju-no-mori, harmonious co-existence, satoyama, worship of nature, zoning of Japanese Archipelago

Introduction

Traditional Japanese worship of nature has been nearly forgotten by the Japanese people ever since the so-called modernization of Japan, especially after the Meiji Restoration. In this paper, the concept of ‘harmonious co-existence between nature and mankind’ will be taken into account, and the traditional Japanese spirit will be recalled to find the correct way to establish sustainability on this, our only earth.

When Expo '90 Osaka for Flower and Greenery was organized, a symbolic phrase, which may literally be expressed in English as ‘mankind and nature are to live together’, was adopted as one of the main themes. Since then, this symbolic phrase in Japanese has been popular when conservation issues, especially those dealing with biodiversity,

have been under consideration, and we have seen this phrase used very frequently in various documents on environmental issues in Japan. Chronologically, this process is parallel with the development of the concept of the sustainable use of biodiversity, or of this, our only earth, and this particular symbolic phrase in Japanese became popular. However, we met difficulties in translating this phrase into English or any other language to convey the true meaning of this short Japanese phrase, as the concept itself is difficult to explain in a few words to people who do not understand Japanese.

The Japanese term ‘living together’ is also applied to the biological term ‘symbiosis’, and some have translated the symbolic phrase in question into ‘symbiosis between mankind and nature’. The biological term ‘symbiosis’ in a broader sense includes three types of phenomena: mutualism,

commensalism and parasitism. If we apply the term 'symbiosis' to the concept of 'mankind and nature living together', it includes ironically the idea that 'mankind parasitizes nature'. This may be true, but it was not the idea proposed in Expo '90 Osaka!

After the success of the Expo '90 Osaka, the Commemorative Foundation for the International Garden and Greenery Exposition, Osaka, Japan, 1990 (Expo '90 Foundation) established a new international prize, the International Cosmos Prize, to succeed, extend and promote the concept of Expo '90. The concept 'mankind and nature are to live together' is, therefore, one of the main subjects included in the concept of this Prize. In the early 1990s, when we initially discussed the concept of this prize, one of the great concerns was the English expression of this fundamental concept. One day, I had a chance to discuss the topic with my botanical colleagues from England, and our conclusion, after a long discussion, was that the Japanese 'mankind and nature are to live together' should be translated into English as 'harmonious co-existence between nature and mankind'. This expression was adopted to explain one of the main concepts of the International Cosmos Prize.

Since then, I have tried to introduce this fundamental concept of the International Cosmos Prize, but I have had the impression that it is difficult for people living today to understand. As the opposite word of 'natural' is 'artificial', many people consider that mankind cannot live together with nature in harmonious co-existence with each other. It is necessary to analyze this difficulty with which we are faced.

It is expected in this paper to show the historical background of the concept 'harmonious co-existence between nature and mankind' and to explain the traditional Japanese spirit as it relates to this concept by introducing the particular way of development of the Japanese Archipelago in its long history. After the so-called Meiji Restoration, Japan learned much from western civilization, and it is clear that Japan is now one of the most developed countries, with a lifestyle based on fundamental values with an orientation toward material goods and energy. Parallel with this development, however, the destruction of nature persisted here for the past one hundred years, and now we must consider seriously the sustainability of our environment for a safe and prosperous future of the Japanese Archipelago on this, our only earth.

Historically, development of the Japanese

Archipelago has resulted in distinct areas, or zones, which have the following Japanese names: Okuyama (deep mountain areas where nature is conserved in good condition); Satoyama (rural landscapes adjacent to the Hitozato, from which people got additional resources partly in accordance with a lifestyle based on collecting and hunting); and Hitozato (villages in developed areas where people lived as residents with agricultural fields). This zoning coincides very well with the zoning idea designed by UNESCO in the 1960s in establishing the Biosphere Reserves in Man and the Biosphere Programme (MAB) and at the World Natural Heritages, distinctly recognizing 3 zones: a core area, a buffer zone and a transitional area. It should be remembered that the zoning of Okuyama, Satoyama and Hitozato is consistent throughout the Japanese Archipelago, except for Hokkaido, where only during the last 100 years such a zoning has been introduced, and this particular zoning was designed not by decision-makers but the people themselves.

In each developed village or town, our ancestors set a shrine, or uji-gami, which was believed to protect the villagers, and every oratory of the uji-gami was surrounded by forests known as chinju-no-mori (literally, forests to keep and protect the shrines, and more widely their villages and villagers). Actually, people intended the developed areas to be protected by 'kami' (often, rather erroneously, translated into 'god'), and such 'kami' was considered to be surrounded by primitive forests. 'Kami' has been believed to be something similar to nature, and the Japanese worship of 'kami' is equivalent to their sincere devotion to nature.

To apologize for their artificial development of parts of the Archipelago, a move which was made to increase and make constant the production of agricultural resources, our ancestors invited 'kami' from primitive nature and placed it in the forests, or a shadow of the primitive nature, although the Hitozato area covers, even at the moment, only some 20 % of whole the Archipelago. In our Japanese concept, 'kami' invited into the developed areas is called 'uji-gami', or 'kami' of each village and its people, and is a conglomerate of 8 million 'kami's. This may be a vestige of primitive animism, but even after the advance of modern civilization, sincere respect for 'uji-gami' is maintained in the hearts of the Japanese people. So the concept of 8 million 'kami's may be referred to primitive animism, but this worship of 'kami' has evolved in the spirit of the Japanese people

and has evolved as a subject of their religious beliefs in modern Japanese society.

In apology for damage to the 8 million ‘kami’s believed to be in the forests, our ancestors maintained the densely covered forests usually in harmony with nature, and they never destroyed the forests only for their own benefit. This is the basis of the traditional Japanese concept of harmonious co-existence between nature and humankind, and this idea is not found in modern western civilization. In the western concept, nature is wild, and the forests may harbor undesirable elements. Human civilization has cleared the wilderness to better develop sites for human habitation, and people conquered nature to maintain these areas as their civilization advanced. Finally, nature was to be protected in this advanced civilization in order to sustain forever the resources needed by mankind.

In this paper, I wish to introduce the attitudes of the traditional Japanese people who succeeded in developing the Japanese Archipelago in harmony with nature. It is often said that modern civilization developed the earth’s surface using technology based on advanced natural science, especially in the 20th Century, and that we are faced with serious environmental issues at the moment. However, it is not the fault of science and technology, and we need to have even further development of natural science to sustain this, our only earth. The problems of the 20th Century were caused not by the rapid development of technology based on natural science but more seriously by mismanagement of that technology.

My intention in this paper is to develop a concept of harmonious co-existence between nature and mankind, and for this purpose sustainability science should be better developed in the wider context of integrated science.

Development of the Japanese Archipelago and its zoning

In this section, I will introduce the process of development of the Japanese Archipelago to show the concepts of the traditional Japanese who established a harmonious co-existence between mankind and nature on their archipelago. Thus the topics in this section are restricted to the period of history from the beginning of the New Stone Age some 25 centuries ago and the so-called Meiji Restoration in the latter 19th Century.

The Japanese Archipelago were originally covered



Figure 1. Landscape of Hitozato, Jike, Yokohama city; backyard of cultivated fields is covered by the secondary forest.

by dense forests, with a rich biodiversity on its complicated topography and a warm and humid climate; people who established their lives on the Archipelago derived a variety of resources from the forests. These people obtained their resources by collecting and hunting, and this lifestyle was maintained much the same by all primitive people in the Stone Age. The Japanese Archipelago was rich in resources, and people there could sustain themselves easily with the natural production on the Archipelago. As the population grew, people sometimes came to suffer an insufficient supply of forest resources, such as fruit productivity that varied from year to year. As people began to wish for a more safe and continuous supply of materials, they began to cultivate plants and animals. Some ten thousand years ago, as people learned crop production, a primitive type of cultivation was initiated and established. Many species of wild animals and plants were, then, bred to cultivated races, and resources were maintained more continuously and more richly based on this new lifestyle of agriculture and pasturing.

As space for cultivation was needed, it became necessary to convert the densely covered forests to new agricultural sites. In developing the Japanese Archipelago, our ancestors who initiated the New Stone Age cut down small areas of forests in order to have agricultural sites, and they started monocultures of some particular crops (Fig. 1). Up to that time, the whole of the Japanese Archipelago had been beautifully and densely covered by forests which benefited from good environmental conditions, warm, moist climate and complex topography. The development of the Archipelago was, however, restricted to very small areas along the seashore and very narrow gorges along the rivers. At first, several

thousand years ago, some traditional crops, such as millets, *Setaria italica* and *Panicum miliaceum*, barn grass, *Echinochloa utilis*, and others were cultivated; then rice, *Oryza sativa*, was introduced and bred in Japan to better cultivate races adapted to the Archipelago. Finally, *japonica*-type rice was widely cultivated in the Japanese Archipelago. The production of food and other resources increased, and the lives of the people became much richer and safer by the additional and constant supply of cultivated crops. However, the total habitable areas for residential and agricultural sites are very restricted in Japan, chiefly owing to its topography, as is seen by the occupation of a quarter of the whole land area to this day. For some time in our early history, people might have depended wholly on the resources available in these developed areas, but the increase in population resulted in the need for more materials for human consumption. Still, it may be surmised that our ancestors enjoyed the natural resources that were quite beneficial to them both in quantity and quality.

Before the introduction of agriculture, people depended wholly on a lifestyle of hunting and collecting in obtaining materials for their lives, and they continued to have such lifestyle even when agricultural life brought them a steady supply of resources. The hilly areas were rich in biodiversity and in natural resources, and people collected firewood there. They also collected various food stocks, housing materials, medicines and other resources from the hilly or lower mountain areas behind the villages. They established such an area to encourage a lifestyle of collecting and hunting in addition to agriculture in the village areas. In a method similar to shifting cultivation, our ancestors used such backyard areas efficiently in obtaining firewood and other resources, and a particular zone between the mountainous areas (Okuyama) and residential areas (Hitozato) was formed by this artificial belt (Satoyama) established throughout the Japanese Archipelago. People extended their activities of hunting and collecting continuously, but the areas utilized for such purposes were restricted to the backyards of village areas. The particular nature of the Satoyama zone is nearly continuous throughout the Japanese Archipelago, and it serves as a buffer belt between Okuyama and Hitozato.

For thousands of years, the backyards of village areas, where hunting and collecting were performed, were covered beautifully with secondary forests, and now we call this particular zone Satoyama. In

developing nature in this zone, the Okuyama or core area was kept naturally for many years, and this area covers about a half of the whole Japanese Archipelago. The Okuyama forest area is left untouched, or under less artificial influence, as a sacred site. Traditional Japanese people believed that 8 million 'kami's lived in the forest even recently, and they consciously kept the Okuyama forest relatively intact.

The life in Satoyama is variable according to the districts and sites concerned, and structure and function of Satoyama are also somewhat variable. It is rather difficult, therefore, to recognize the line between Hitozato and Satoyama as well as that between Satoyama and Okuyama. Generally speaking, the green area of Hitozato is not covered by forests, and consists mostly of cultivated and developed open areas. The boundary between Okuyama and Satoyama is more vague, as both of them are covered by forests, though Satoyama forest is more distinctly deciduous secondary forest as well as pine forest. It was roughly estimated that Satoyama covers some 20 % of whole the Japanese Archipelago, and this is based on the area of the deciduous secondary forest and pine forest.

It is not very rare to see landscapes similar to the Japanese Satoyama in various places in Asia outside Japan, but they are always in a spot around particular villages. The Japanese Satoyama is distinctly developed to form a belt throughout the Archipelago, and such a widely continuous Satoyama zone is not found in any place outside Japan. This type of development of the whole Archipelago was not designed by any scientific or other means, nor was it designed for national development under the leadership of any particular decision-makers. It was, instead, the result of the general Japanese population, working throughout its long history in harmonious co-existence with nature, adapting very effectively to the particular topography and climate of the Japanese Archipelago. And, the design of this zoning was brought about by the sincere worship by the Japanese of their 8 million 'kami's, or everything in nature itself, as noted above.

Satoyama as a buffer zone between wildness and human activities

Satoyama

It is rather difficult to define the term Satoyama. This particular zone of the Japanese Archipelago



Figure 2. Topography of Japanese Archipelago, a picture of western Aichi Prefecture, taken from airplane; only small areas are for agricultural sites.



Figure 3. Basal tree-trunk with new trees growing, in Satoyama secondary forest after cutting down about 1 m high: *Prunus jamazakura* in Machida, Tokyo.

was formed naturally during its long history, and it was not the design of any particular person. Life in the Satoyama zone is more or less different in each particular site, and the vegetation is also variable. After the 1960s, most of the Satoyama forests were abandoned and rarely maintained; most of these forests at the moment are better called devastated forests after Satoyama. This makes the definition of Satoyama much more difficult.

Satoyama means the mountain in the villages, contrary to Okuyama which means literally the mountain far from residential areas. As the topography of the Japanese Archipelago is very complicated (Fig. 2), most of the country is covered with mountains, even near the coastal areas. Japanese converted land to agricultural sites only in flat places and established villages in the lowlands. Terraced fields are restricted to particular places, as most of the mountains on the Archipelago are steep and complicated in their topography. Around lowland villages, however, there are hills and lower mountains, and such areas were developed as Satoyama. From there they cut firewood periodically, collected dead branches and fallen leaves for building fires, produced charcoal, and collected the fruits and young leaves of plants as well as edible fungi for supplementary foodstuff. They did not plant and cultivate the forest trees, but their way of using trees is similar to shifting cultivation, re-harvesting an original site some 10 to 20 years after the former cutting. Deciduous trees such as *Prunus*, *Quercus*

and so on were cut down for firewood but their basal stocks were carefully left in place. Side shoots from the basal stocks grew up and firewood was available again 10 to 20 years after the preceding cut (Fig. 3). Thus, the forest on Satoyama was ideally sustained for many years, cutting down the trees there every 10 to 20 years. So the real meaning of Satoyama is not a structure of hills and lower mountains but the forest developing there. Satoyama is, as a result, an area covered by secondary forest, and such a Satoyama forest is also called a rural forest, coppice forest, or summer-green secondary forest. This type of forest will become a lucidophyllous (warm temperate, broadleaved evergreen) forest in most parts of the Japanese Archipelago after several hundreds of years of abandonment.

It is a pity to note here that we have recently some confusion for defining Satoyama. It is rather difficult to translate this term into English, and I am applying this original Japanese here in this paper. Sometimes, Hitozato is separated into two portions: Satochi and populated areas or villages and/cities. Satochi usually means agricultural site as well as grassland, and these artificially developed areas are also covered with beautiful green. ‘Secondary nature’ on the Japanese Archipelago is often collectively called Satochi-Satoyama to evaluate the places covered by green as opposed to the developed ‘concrete jungle’. Then, Satochi-Satoyama is translated as English countryside, and people are often misled into thinking that Satoyama

is countryside. This brings a great confusion in understanding Satoyama. Actually, about 20 % of Satoyama for all the Japanese Archipelago is counted as the site for the deciduous secondary forest, and the countryside, or Satochi-Satoyama, in Japan covers a wider part of the Archipelago. Satoyama was called 'yama' even at the time of Manyoshu, or some 1000 years ago, and actually the term Satoyama was already seen in the Yedo dynasty, some 250 years ago. Thus, some confusion is brought into the Japanese expression of Satoyama, and the secondary forest area is sometimes called Satoyama sensu stricto.

When the 3rd version of the Japanese National Strategy for Biodiversity was drawn up, Satoyama was taken up as one of the ideal conservation sites, and the Strategy wishes to start a so-called SATOYAMA-initiative to bring the concept worldwide. In this, the term SATOYAMA, which means Satochi-Satoyama or 'secondary nature' with beautiful green, is expressed in capital letters, and is expected to be distinguished from the traditional concept of Satoyama. It is preferable to recognize Satoyama in its original sense, and the countryside, or Satochi-Satoyama, should be taken up as a concept including wider areas, or all the green-covered 'secondary nature', on the Japanese Archipelago.

In Japan, the Satoyama zone forms a continuous belt between the Hitozato, or residential areas, and Okuyama, or nature conservation areas, throughout the Archipelago. In various Asian countries, there are hilly areas in the backyards of villages, and supplementary resources including firewood are often available in such areas. However, such hilly areas are usually separated from the other similar areas, and a continuous zone of such a forest forming a belt is never observed in any country other than Japan. In this sense, Satoyama is a particular landscape born of the particular culture of Japan.

Supplementary resources and the recycling system

Hunting and collecting were performed in the Satoyama zone for many years in order to obtain supplementary food and life-supporting resources in addition to materials for fires. Although the cultivated area is rather narrow, a stable and steady supply of resources from there brought the people peaceful lives. The Japanese people experienced little serious fighting among groups of people. Even when trouble inevitably came, they usually fought each other without serious damage to the forest. It is rather particular to Japan that the forest has never

met complete destruction by war, and most of the battles were fought on a smaller scale, or often by some representative persons on behalf of the groups or troops concerned. The forests were understood as the sites where there were 8 million 'kami's, and they were carefully kept as sacred.

Satoyama was, thus, maintained beautifully for many years, and the products from there were used efficiently. Satoyama was the site where firewood was steadily produced, and other non-edible materials were utilized as fertilizers for the agricultural sites. There was no unnecessary waste of seemingly useless materials or even of used materials, and a system of recycling materials succeeded throughout Japan for many years. In the Yedo dynasty, sewage produced in a big city like Yedo (the current Tokyo), with a population of more than a million people even in the first half of 19th Century, was used as valuable fertilizer in agricultural sites in the Kanto areas, and boat transportation of human waste on the rivers and canals was well organized. Agricultural products were sent to Yedo in the opposite direction on the same route.

Recently, the Japanese word 'mottainai' is well known even outside Japan. Still, it should be pointed out that the real concept of the word 'mottainai' has been nearly forgotten even by the Japanese themselves. This word now means 'wasteful' or 'don't waste any materials even if they are seemingly useless'. Originally, the word 'mottai' meant 'substance', and our ancestors considered that every substance was a gift from 'kami' and maintained it without useless wasting. 'Nai' means 'none', 'not' or 'absence'. Then, the meaning of 'mottainai' became extended and simply expressed 'wasteful'. Modern Japanese usually say 'mottainai' when someone consumes materials without any purpose, or throws away materials that are still useful. This spirit has come from the worship of the 8 million 'kami's who live in the forest. 'Mottai' is the substance existing in nature, and the Japanese people traditionally worshiped the 'mottai' as the gift from the 'kami'. They did not like to damage such 'mottai' and never wasted it without any positive purpose. Even when they fought with each other, the traditional Japanese wished to sustain the forest in its natural form. It is a pity to say, however, that most modern Japanese forget the real worship of nature, not considering the waste of natural substances as sacrilege. Recently, everything is evaluated by its market price, and materials without monetary value

are generally neglected. It is also a pity to note that the fundamental value of the earth's natural products is not very highly esteemed by modern Japanese.

Buffer zone

Maintaining this zone as noted above in supplying valuable resources for human life, Satoyama has been established as a buffer zone between the Okuyama and Hitozato. People had active lives in the Satoyama zone and no primitive nature was maintained there. As a result, however, human activities were less in the Okuyama area, and primitive nature was well conserved there. In one record more than one hundred years ago, it was noted that the concept of Satoyama was used efficiently in order to conserve the Okuyama free from human activity (Tutui, 1984). Okuyama was believed to be a site for 'kami' and people lived their lives in Hitozato and Satoyama. Wild animals, then, could live naturally and safely in the Okuyama area and we saw an abundance of natural biodiversity there. It may be noted here that no large-sized animal species were extinct in the Japanese Archipelago before the Meiji Restoration. In the Satoyama zone, another type of biodiversity is established with the more or less artificial influence in this zone. Various organisms live naturally in Satoyama, and it has been suggested that even speciation has occurred for organisms to adapt there (Iwatsuki, 1997).

After the so-called energy revolution began in Japan during the 1960s, regular cutting of fire-trees in the Satoyama zone ceased and supplemental food resources became unnecessary. The main energy source at the moment is petroleum, even in the deep back-countries, and supplementary food stocks are easily available in supermarkets which exist even in villages distant from big cities. Thus, the Satoyama is rarely visited by local people nowadays, and wild animals formerly restricted to Okuyama are active in areas extending into the Satoyama zone. Now, the Satoyama does not have any power as a buffer zone between the Okuyama and Hitozato for wild animals, and mankind and wild organisms often have an uneasy co-existence even in back-countries. The Satoyama zone is no longer beautifully covered by summer-green secondary forests. In abandoning the Satoyama utilization, the summer-green secondary forest is now reverting to wild forests, not quite natural in its successive stage from artificial secondary forests. Potential natural vegetation, in the case of central and southern Japan, is dominated by a lucidophyllous (or evergreen broad-leaved) forest,

but if the successive stage is unnatural we don't know which type of forest will dominate in the future.

Following abandonment of the traditional Satoyama life, the beautiful secondary forests established in this zone have disappeared. In recent years, we have met with severe problems caused by wild animals throughout Japanese Archipelago. The population of some wild animals, such as bears, deer, wild pigs and others, have increased tremendously only within the past few decades, and sometimes they attack people and agricultural products. Some conflict existed even before the 1960s, while the Satoyama life was still performed in traditional ways, but it was not so serious at that time. Even in my childhood, wild pigs were not very rare in my home country, and they were often shot by hunters. They produced special wild pig meat for cooking 'Botan-nabe', or a particular style of miso-flavored Sukiyaki.

Bears are endangered in the Japanese Archipelago, and recently they appear very often in the Hitozato area, sometimes attacking people there. Formerly, they enjoyed their lives restricted to the Okuyama area, and they rarely came to the Satoyama buffer zone, as they were afraid of human beings who were active there. Today, however, less human activity is seen in the Satoyama zone, and bears sometimes come here, safely enjoying their food without any disturbance from humans. They can find more attractive resources, such as the persimmon fruits that are abundant on the trees in the Hitozato area. When I was a small boy, most persimmons were collected and eaten by the local people, but recently they remain on the trees until they are fully ripe and drop. As the bears learn the superior taste of the persimmon, they begin to prefer it and visit the Hitozato area more frequently. They have no barrier in the Satoyama zone, and people are less frequently seen even in the Hitozato area in the deep back-country. When they do meet occasionally with older people there, they attack to protect themselves. Information is much more quickly transported through various media these days, and we know almost instantly how frequently the bears attack village people, especially in years when the fruiting of oaks and other trees is poor. As a result, more than 4000 bears were killed in 2006 in the Japanese Archipelago to protect the lives of local people ! (Ministry of Environment, 2007).

The deer population is increasing tremendously, and they feed on plants on the forest floor very quickly. In western Japan, forest undergrowth has been seriously damaged mainly by wild deer, and the



Figure 4. Typical landscape of Satoyama with shifting cut down of trees, Kurokawa, Hyogo Prefecture; various ages of forests are seen in belt showing shifting cut down of trees for charcoal production.



Figure 5. Kikuzumi; best kind of charcoal for tea ceremony.

existence of various plant species is now threatened by their overgrazing. In a wide range of agricultural areas, crops and vegetables cultivated there are attacked by deer, and attempts by farmers to protect them by netting and other barriers have little effect. Control of the deer population is urgently needed, but no successful method has yet been developed. Hunters are promptly decreasing in number and their mean age is increasing, and deer meat is not very highly appreciated in Japan. One hopes that a better method of cooking of deer meat can be developed, so that more deer can be shot by hunters.

An active example of a typical Satoyama forest

After the so-called energy revolution of the 1960s, much more petroleum was used even in the back-countries in Japan and firewood was no longer cut in the Satoyama. Thus it came to be abandoned by the local people and is no longer sustained by the activities of their daily lives. The lifestyle of the Japanese in general, especially in the back-country, has changed such that local people do not depend on natural resources from the Satoyama, and it is quite difficult to keep its landscape beautiful throughout the Japanese Archipelago.

However, there is one good example of Satoyama forest still maintained in its original style. This can be seen in Kurokawa, in the eastern part of Hyogo Prefecture, western Honshu (Fig. 4). There are a few people who still produce charcoal there, and they consume the wood from the Satoyama forest in

the backyard of their factories. Charcoal production is one of the main industries in the Satoyama zone, though no significant production occurs there at the moment; this is due both to the so-called energy revolution and new charcoal production in Southeast Asian countries, especially near mangrove forests.

The charcoal produced in Kurokawa village is of a special quality named 'kiku-zumi' (or chrysanthemum charcoal, as the cutting surface of each piece shows a figure something like a chrysanthemum flower), and it is used especially for the formal tea ceremony (Fig. 5). Thus, 'kiku-zumi' charcoal is considered a cultural product and is traded at a better price. As a result, charcoal production in Kurokawa is economically sustained, although it is necessary to enlist volunteers to cut the undergrowth in the secondary forests. There are many people to manage the Kurokawa forest to sustain its vitally important materials for the traditional culture of the tea ceremony, and charcoal production is maintained with the aid of volunteers.

In typical Satoyama forests, wood is cut down every 10 to 20 years for firewood, for energy resources such as lighting, cooking, warming and cooling homes, heating bathwater and so on. After this 10-15 year period, the new forest growth is ready to be cut, and thus secondary forests in various stages are maintained in this particular area. This is the typical way of keeping the Satoyama, and the resources obtained were efficiently utilized in the interim between the two cuttings. No collecting and hunting lifestyle takes place now in the Kurokawa



Figure 6. Satoyama, Tamba, Hyogo Prefecture; secondary forests are abandoned, and *Cryptomeria* trees are planted in wide area without effective utilization.

area, and the only product is wood for charcoal. Volunteer collaborators are taking care of the forests there, and such a collaboration is necessary if the Satoyama landscape is to maintain its original style.

Recently, it has been widely recognized that the Satoyama landscape is endangered, and many people are interested in contributing to its sustainability. Voluntary co-operation takes place, however, mostly in urban areas, and abandonment of the Satoyama landscape progresses day by day in the deep back-country even today. The Satoyama has been maintained as an active site of human habitation, and contributions to maintaining it have been performed mostly by the people living there. The village people are now inactive in the Satoyama zone, as they do not need its firewood, and gathering supplementary food stocks from there is now no more than a hobby. Voluntary activities to maintain the Satoyama landscape work rather well in urban areas, but not in the deep back-country, so the extent of the Satoyama landscape in the Japanese Archipelago continues to diminish (Fig. 6).

Sustainability of the Satoyama

It has been noted that the Satoyama is endangered, and many people hope to sustain this typical Japanese landscape. There are many voluntary groups, some forming NPOs, or non-profit organizations, which contribute greatly. This type of effort is greatly welcomed.

Population density in rural areas in Japan is rapidly decreasing, and especially young people do not wish

to stay there. The population of Japan as a whole has increased about fourfold since the Meiji Restoration some 140 years ago, but most of the people are now in city areas, especially in greater Tokyo. Thus, the population is less dense in the back-country, although it is now more or less the same as it was at the time of the Meiji Restoration. The average age of the population is greater, and activities are restricted to agriculture in the strict sense. Now is the time to develop a way to sustain the Satoyama in the national conspectus, and to have harmonious co-existence between nature and mankind forever.

The Satoyama forest should be sustained within the time frame of this century, and we should have, now, an idea to maintain it for our descendents to come. This forest type is not uniform throughout Japan, although it is as a whole forming a zone continuous throughout the Japanese Archipelago. It is natural, therefore, to have various types of development of the Satoyama for the future. They should include: 1) To maintain the Satoyama as it was. The Kurokawa Satoyama range is a good example for this type, as the charcoal production will call for volunteers to maintain the forest there. This type of conservation will be possible only where economic activity is maintained with the help of voluntary contributors. 2) To maintain the Satoyama as a cultural monument. In various sites near cities, voluntary activities lead to success in sustaining the Satoyama landscape, and local governments often support such kinds of voluntary contributions. The maintenance of such a Satoyama landscape must be a long-term project,

and it will be possible to keep this type of cultural monument in an urban area. 3) To maintain the Satoyama as an educational site. The Satoyama is one of the best sites for small boys and girls to enjoy their daily lives in harmony with natural products and biodiversity. They can observe various natural phenomena in the Satoyama, learning the history of the Japanese people and their worship of nature. It is necessary to raise funds to maintain the Satoyama in this sense, but it is a worthwhile goal.

I cannot predict what percentage of the Satoyama will be maintained in the above ways. Probably a vast portion of it, except for the sites conserved under the above concepts, will be abandoned. In the process of reverting to natural forest in such abandoned areas, however, we should monitor the sites very carefully, and such a process may take a few centuries. The Satoyama is under artificial control for many years, and we cannot predict in which way this area will come back to natural forest or to potential natural vegetation. We need to set up a large-scale fund to observe the process of re-naturalization of this area, and this is another type of fund for the reconstruction of the human environment. We need to observe such a Satoyama landscape which will eventually change to natural forest over several centuries. Some preliminary experiments were performed in Hyogo prefecture to see in which way the abandoned Satoyama will come to mature forests (Urasugi, 2008). The process of recovery, or more naturally evolution, of Satoyama should be watched carefully. Without such an effort, it is impossible to have harmonious co-existence between nature and mankind throughout the Japanese Archipelago.

In addition, in sustaining the role of the Satoyama as a buffer zone between the Okuyama and the Hitozato, it is necessary to maintain the Satoyama forest as a continuous belt throughout the Japanese Archipelago. Carefully observing the re-naturalization of the Satoyama forest, we should invite the people coming in and moving around that zone to keep the wild animals within the Okuyama. For this purpose, it is recommended to keep carefully designed passageways in the present Satoyama zone, either trails or roadways. People will then be able to enjoy the forest life there, sometimes collecting wild plants and animals for recreation and as additional resources. The management of such passageways is not as costly as the construction of so many useless roads that have been built in Japan in recent years.

Decrease of biodiversity in the Satoyama

The Satoyama has been formed historically by human activities supporting the daily lives of its residents, and this particular zone is also known by its rich biodiversity. There are a number of wild species naturally occurring there, but there are some additional species which were introduced when the Satoyama zone was established. Among these introduced species are some that have been moved from other areas to find a better habit and habitat for them in this artificially established site. It should also be noted that some species are newly formed in this particular area. I suggested that speciation has repeatedly occurred in this man-made environment, especially in the Hitozato and Satoyama (Iwatsuki, 1997). Speciation there seems to be common, especially in non-sexually reproducing species as well as in polyploid plant species.

Influenced by the abandonment of the Satoyama, the forests there are significantly changing in nature. It is evident, therefore, that many species in the Satoyama are faced with endangerment. It is true that they are not naturally living in the Satoyama but transferred there after artificial influences prevailed in this area. If we insist on considering that all artificial activities are in opposition to nature, and 'artificial' is really a term that is the opposite of 'natural', endangered species in an artificially formed environment may not be problematic. It is still evident, however, that we are faced with a decrease of biodiversity in Japan influenced by this abandonment of the Satoyama forests. As the Satoyama was established on the Japanese Archipelago, it is necessary to sustain the environment there based on its present status and its future conspectus to form a harmonious co-existence between nature and mankind. It is not recommended to encourage the Japanese Archipelago to revert to its primitive nature, and we should maintain our Archipelago by creating a better environment there.

'Uji-gami', 'chinjyu-no-mori' and worship of nature

'Uji-gami' in every village of Hitozato

Traditional Japanese people believe that there are 8 million 'kami's around them. The figure '8 million' in Japanese means numerous or indefinite. It indicates, then, that everything is infused with 'kami' in Japan. The general tendency is that Japanese 'kami' should be translated into the English 'god', and every dictionary actually describes it as such. I have to note here that I am not very sure if 'god' is really a direct

translation of the Japanese ‘kami’ or not. I am now describing the Japanese concept here in the original Japanese word ‘kami’, referring to a concept different from ‘god’ in English.

It is often said that some under-developed tribes living in the forests believe in the existence of their own ‘god’, something like Japanese ‘kami’, and it is explained that this primitive animism is still maintained in an undeveloped form of religion there. The Japanese 8 million ‘kami’s are often introduced as similar to the ‘gods’ in primitive animism. The Japanese worship of ‘kami’ is standing in parallel with higher levels of science and technology today, and it is different from the concept of animism in under-developed tribes, although it may be explained that the origin of the concept of ‘kami’ was something similar to that of primitive animism. The ‘kami’ in Japan has originated in primitive animism but has developed very much throughout its history and is modernized to fit our current religion.

After the creation of language and its development as a means of communication, human beings had a tremendous amount of information preserved in their society, and based on such information sophisticated activities were created along with the development of agriculture and pasturing. Thus, human beings started to have their own culture both in their spirit and in their way of obtaining resources. In the sophisticated activities of human beings, it may be considered that the impression of beauty led people to create art, the understanding of mystery led people to create science, and the fear of a demonic power brought people the creation of religion. If we can classify our sophisticated activities in this way, primitive animism should be an original form of religion, and an organized system of religious sects may be derivatives of that. The first person who appreciated the beauty of a flower should be known as the first person with human culture. Not many years have passed since human beings started to have their own culture. This marks the time when they started to have a particular culture, or sophisticated activities, and they became distinct from the other organisms, even though – from a scientific standpoint – it is known that human beings are different genetically from chimpanzees in only 1.2 % of their genes. We need to have a long discussion on this topic, and I am here very briefly summarizing it based on a more or less dogmatic reduction of a complicated discussion.

After establishing villages in residential areas, or forming the Hitozato in low-lying places near

the coast and along narrow valleys in the Japanese Archipelago, our ancestors set a shrine in every village and prayed sincerely to the ‘kami’s housed there. I am not very familiar with the history of local shrines, but many of them have their own traditional stories, and most of the local shrines are said to have been in their present sites for more than several hundreds years. It may be noted here that the shrines are for the village, and everyone in the village is expected to be protected by the ‘kami’ of that village.

Village people usually consider that 8 million ‘kami’s are in every shrine, in addition to ‘kami’s particular to that village, sometimes historical persons. Such a village-shrine was called ‘uji-gami’, or the ‘kami’ of the particular village people concerned. (It is to be noted here that ‘gami’ is a phonetic synonym of ‘kami’.) Literally, ‘uji-gami’ means the tutelary deity of the village people, for ‘uji’ is a local group of people sharing a common lineage. All the people living in the same village shared a strong kinship with each other, and the village shrine, or ‘uji-gami’, is the home of the ‘kami’ who loves and protects all the village people there. This habit of the Japanese was already established even before whole the people on the Japanese Archipelago were reigned by the Emperor, although it was said that the shrines at that time were only the forests and the houses of the ‘kami’s were built later. Thus the shrine was a central focus of worship for many years. In my childhood, I remember experiences when my parents took me with my brothers and sister to the ‘uji-gami’ shrine early in the morning of New Year’s day. We prayed very sincerely to the ‘uji-gami’ for happiness, health and prosperity in the new year. My parents were educated people, more so than the average Japanese at that time, but they were very attentive to the ‘kami’ as most Japanese half a century ago were. It should be noted here that ‘uji-gami’ is the subject of worship by the village people collectively and less so by individual persons within the village.

The worship of such a ‘kami’ originated in primitive times, and it has continued throughout our history. It is interesting to know that, throughout our history, the Japanese people have brought new ideas, concepts and objects into Japan to digest them and transform them in our own Japanese way. This is true in technology, science and culture, as well as in religion. When Buddhism was introduced into Japan, it mixed with the traditional ‘kami’, and the concept

of this mixture of Shintoism and Buddhism grew rapidly. Buddhism was amalgamated into a native worship of nature and itinerant Buddhist priests grew in a style particular to the Japanese. Even today, when science and technology are at levels comparable to the most developed countries, the majority of Japanese people still sincerely worship their 'kami's. It is a pity to note that this worship of 'kami's or Shintoism had a poor history during times of war, when it was combined with eccentric nationalism led by the political powers. We should observe the history of our worship of 'kami's on a scientific basis, and Shintoism carries a real religious idea, although it may have originated from a form of animism.

We can also recall that Chinese characters had already been imported to Japan by the 1st Century, although they did not become popular until a few centuries later. From these characters, the Japanese developed their own phonetic letters, or 'kana', either 'katakana' or 'hiragana', and in mixing them with characters in a particular way, they developed their own written Japanese. The idea and concept of the Japanese way then grew based on the Japanese expression in this written Japanese. The Japanese people are excellent in improving their own culture and civilization by modifying the imported subject to suit their own idea. We can enumerate many examples in industrial materials developed in Japan in this fashion. I note here that this type of natural ability of the Japanese people is also evident in the Japanese style of Buddhism.

'Chinju-no-mori'

Worldwide it is not very common to invite 'gods' to the villages and pray to them to protect the people there. In primitive forms of religion, people usually believe in their own 'gods' and decidedly reject those of others. I will not discuss here the development of religions in general, as this is not the subject of this paper. I would like to point out the fact that it is a distinctly Japanese phenomenon for all the village-shrines, or 'uji-gami', to be surrounded by forests. We call this type of forest 'chinju-no-mori'. Literally, 'chinju-no-mori' originally meant a grove of a tutelary shrine quietly protecting the 'uji-gami' and accordingly, the village people. Miyawaki (2007) referred to it in discussing the potential natural vegetation at the sites concerned, and put importance on its protection. I understand that this particular Japanese term, 'chinju-no-mori', is often used in the field of vegetation science and is now more or less



Figure 7. Chinju-no-mori, from Tamba, Hyogo Prefecture; seemingly primitive forest is kept covering the shrine even in midtown in my hometown.

popular in this field of science.

I am not very sure if any such forests surrounding the residences of 'gods' exist outside Japan. Christian churches are usually in the midst of cities or villages, and they are often associated with gardens and/or with big trees but are rarely surrounded by natural forests. Islamic mosques are usually in open places in villages and, except for some trees planted around them, no forests surround them. Christianity and Islam originated and grew in desert areas, so it is not difficult to understand that churches and mosques are not in the midst of forests. Buddhist temples are often deep in the mountains, especially in China. Soon after Buddhism was introduced into Japan, some temples were constructed in dense forests deep in the mountains. Perhaps the logic was that Buddhist monks would learn the philosophy of this religion quietly deep in the mountains, separated from the busy lives of the townspeople. When I visited the Taklamakan desert area in northwest China, I saw that the ruins of the Buddhist temples were in artificial caves in dry hills, such as the Bezeklik Thousand Buddha Caves, but not very far from the green belts along rivers found in these areas. Monks should be separated from the general public while they learn the philosophy of that particular religion, and after they complete their difficult studies they can help the general population through 'satori', or spiritual awakening. As noted in the case of these three larger religions, their sacred places are not generally surrounded by forests. The Japanese 'chinju-no-mori' is a particular case where the forests surround

the shrine (uji-gami), or the residence of the 'kami's (Fig. 7).

Buddhist temples in Japan are more or less different from those in India, China and other countries, as the Japanese people always modified the existing culture and amalgamated it with traditions they already had. When Buddhism was introduced into Japan, it was combined with local religions there. The local religion that believed in 'kami's in mountainous areas had an especially strong influence on the earlier stages of Buddhism introduced into Japan. The education of Buddhist monks in China involves quiet prayer in isolation, but the Japanese way adds a component of physical labor, following the style of learning in praying to the 'kami's in the mountains. Actually, when the largest sect of Japanese Buddhism, Singonshu, was established, the temple was built on Mt Koya-san, which used to be close to a traditional mountainous religion. Thus, the training of the young monks there was connected with hard physical exercise. Ascetic training in various religions is often accomplished spiritually or mentally, but in some sects of Buddhism in Japan, training involves very hard physical exercise and results in an amalgamation of Buddhism with traditional mountain religions.

It is said that village-shrines covered by 'chinju-no-mori' have defined Japan's unique landscape since around the 10th Century. This type of landscape was maintained until the end of the Yedo dynasty, or the time of Meiji Restoration. Until that time, local shrines (uji-gami) were often placed in villages with Buddhist temples, which are usually considered to protect the shrines and 'kami's, and the forests are expected to cover both of them. This co-existence of shrines and temples was supported by the idea of a mixture of Shintoism and Buddhism. Such 'chinju-no-mori' forests were believed to be on behalf of the Okuyama, or 'yorishiro' in Japanese. It was necessary to introduce such forests on behalf of the Okuyama, as people had destroyed the primitive forests to develop their villages, expecting a continuous and safe supply of necessary resources. Their deep apologies to 8 million 'kami's for destroying the forests formed the 'chinju-no-mori' as quiet residence of these 'kami's.

At the time of the so-called Meiji Restoration, Japan opened its doors to foreigners for the first time since the Yedo dynasty, or the early 17th to mid-19th Centuries. Only one small port at Nagasaki-Dejima was open during this time for Dutch traders, and all knowledge of the outside world was brought through this port. When our Meiji ancestors saw what was

occurring outside their own borders, they admired the degree of development of western civilization and realized that they had a lot to learn from it. At that time, westernization was the leading fashion, and 'uji-gami', usually with Buddhist temples surrounded by 'chinju-no-mori', was considered a symbol of old-fashioned and traditional behavior unique to the Japanese people. As westernization expanded, people preferred to destroy the 'chinju-no-mori' forests as an example of a classical Japan to be suppressed and overcome. All the 'old fashioned' traditions were criticized at that time, and they gradually disappeared in favor of modernization.

At the end of the Yedo dynasty, 'chinju-no-mori' established throughout the Japanese Archipelago had been constructed by our ancestors with a strong worship of 'uji-gami'. When this dynasty began in the 17th Century, this particular type of Japanese landscape was widely established throughout Japan, from northern Honshu to the southern Ryukyu Islands. This custom and landscape were established and retained for a long time, and most of the 'uji-gami' and 'chinju-no-mori' were created and maintained by the local people. Large shrines such as Ise Jingu shrine were supported by the government and/or particular groups and persons, but most of these 'uji-gami' and 'chinju-no-mori' had no government support. No aid was given by the government except in some particular cases such as the Meiji Jingu shrine, the Yasukuni Jinja shrine and others that were newly constructed after the Meiji Restoration. It is interesting to see that the Meiji Jingu shrine in memory of the Emperor Meiji is covered by a new type of 'chinju-no-mori' with the trees donated from various localities in Japan. In contrast, the Yasukuni Jinja shrine, established for the army and navy who died in wars, was planted with many cherry trees. The cherries flower briefly in early spring, for just a few days, and fall down gracefully, and it is respectful in militarism in Japan to show the beautiful death of military soldiers. The Yasukuni Jinja shrine is different from other shrines without 'chinju-no-mori', and it represents a post-Meiji Restoration type, without traditional 'kami's. I have to note that there is another shrine who has no typical 'chinju-no-mori'. This is Temman-gu shrine where *Prunus mume* trees are beautifully planted.

Recently, 'chinju-no-mori' has been evaluated and considered to be endangered, and it has been proposed for protection by some conservationists, especially with the idea of conserving biodiversity *in situ*. After

the Meiji Restoration, the idea of a mix of Shintoism and Buddhism was criticized and 'chinju-no-mori' was developed under the direction of a government that wished to learn much more from western civilization. That government saw 'chinju-no-mori' as a bad example of the old Japan, and it preferred that a smaller number of larger-scaled shrines should be maintained to raise Shintoism to a national religion. It was recommended that many small-scaled shrines be united, and many others with their 'chinjyu-no-mori' were actually destroyed at the beginning of the 20th Century. This action was supported by developers as well, who expected financial gain from the development of well-sited 'chinju-no-mori' forests. Kumakusu Minakata, a famous naturalist, bravely protested against the government for such destruction of 'chinju-no-mori', but few people supported him at that time and he had to fight the government alone. He was then prosecuted and sent to prison for some time (Minakata, 1912). Amalgamation of shrines by governmental acts was abandoned, but rapid westernization brought to the spirit of the Japanese a higher respect for the richness of a material energy-based life. During the past 140 years since the beginning of the Meiji Restoration, more than two-thirds of the 'chinju-no-mori' have vanished from the Japanese Archipelago.

Recently, 'chinjyu-no-mori' has been re-evaluated as the area that remains as a site of potential natural vegetation. Some vegetation scientists such as Miyawaki, Suganuma, and others have published a number of excellent papers on the vegetation of 'chinjyu-no-mori', and the environmental benefit of these areas is now well understood by vegetation scientists. It is clear that a rich biodiversity is conserved here, and conservation of these historical sites is valuable to sustain such biodiversity on the Japanese Archipelago.

'Chinju-no-mori' has, however, resulted in relation to in the style of development of the Japanese Archipelago, forming the zones of Hitozato, Satoyama and Okuyama. 'Chinju-no-mori' is the forest that covers the residence of 8 million 'kami's who were transferred from primitive forests to villages to protect the people there. Minakata's protest is now remembered by conservationists, but most of them point out that his activity was a conservation issue alone. The real idea of Minakata is the recollection of the traditional spirit of the Japanese, and the concept of the destruction of 'chinju-no-mori' as an assault on that spirit (Minakata, 1912). It is vitally

important to re-consider Minakata's concept now, when development in Japan is based on a much more material, energy-based society and prevails over the worship of nature by traditional Japanese. The most important point is that 'chinjyu-no-mori' was established by the local people themselves and not by the government. Neither political nor scientific leadership was given to form 'chinjyu-no-mori', and purely democratic actions drew this landscape, including 'chinjyu-no-mori', throughout the Japanese Archipelago.

Humankind in the forest or in the desert

It is now generally recognized that the ancestors of the modern human originated in Africa. At first, they left the forest and lived in the open grassland. We cannot pinpoint the original life-style of these early humans, but it is true that many Asian tribes lived in forests for many years, in contrast to Africans and Europeans who lived in drier places. In the case of the Japanese, our ancestors very much respected nature with its high diversity of organisms, while Europeans preferred to control nature, relating to civilization as preferable to nature. From the beginning of 19th Century, after the Industrial Revolution in the latter half of the 18th Century, western civilization was well adapted to managing many aspects of primitive nature.

The leaders of Japan in the Yedo dynasty, or Tokugawa shogunate, preferred to have everything controlled within Japan. With the primary goal of escaping from Christian (more precisely, Catholic) influence, the Tokugawa shogunate closed Japan to other countries except for the Dutch (Protestants), who were allowed to come to Japan through only one port on an artificial island, Dejima, near Nagasaki. Until the beginning of the 17th Century, Japanese culture was strongly influenced by China, often introduced via Korea; but during the Yedo dynasty, cultural intercourse with these neighboring countries was minimal, and Japanese culture grew rather independently. It is true that the typical Japanese culture developed in this Yedo dynasty, and in the field of biology it is amazing to see the comprehensive success of breeding of many particular cultivated animals and plants. Among them, there are a number of races useful for people's daily lives, but there are many other cultivated taxa that are only for recreational use. Thus, Japanese culture is unique in enjoying the beauty of such a diversity of organisms.

When Japan opened its gates in the latter half

of the 19th Century, Japanese leaders at that time were surprised to see the degree of development of western civilization (based on a more material world), especially new trends in technology through advanced natural science. They admired the usefulness, benefit and safety of various machines and tools produced by western civilization. It was only natural that they wished to obtain such goods by their own abilities, and they began to put much effort into learning more about western civilization. They thought that a high level of education should be given not only to the selected elite but also to all Japanese to keep the general level of culture higher. The educational system in the schools, from primary school to higher university levels, was ideally organized, and fundamental education was given to all Japanese as a basic duty. After a century of hard effort, the Japanese people had learned a lot from western civilization, and economically Japan is now one of the top countries from the standpoint of material possessions. In this sense, we may say that Japan's educational system was successful for a century following the Meiji Restoration, although we are now faced with a variety of serious problems in this system and its products. One of the most serious is that many Japanese people now consider richness only in terms of material goods and have forgotten their traditional spirit of loving nature. This depends mostly on the Japanese system of school education, where it was expected to have progress in civilization seeking more material goods. We should be reminded that the exact literal meaning of Japanese 'education' is to lead the student in a direction expected not by him or herself but by the teacher, in contrast to the original English meaning of education, which is to increase the talent of student for his or her own benefit.

Worship of nature

After tracing this success story in Japan's recent history, however, we remember that in those days the Japanese people were accused by the Europeans of being economic animals. It was necessary for the Japanese after the Meiji Restoration to concentrate their efforts on this particular point, or economic growth, to achieve the higher level of western civilization and to exceed the advanced countries. Along this line, we have to recognize the fact that the Japanese people forgot the spirit of traditional culture and instead stressed education in technology and economics. The Japanese Archipelago was developed to some extent and zoning of the

Archipelago was modified by a shift of life-style from one of a spirit-oriented culture to one seeking richness based on material goods. We are faced with this conflict between nature and human activities, as it is understood that the natural and artificial are antithetical to each other. Now, we recall the concept of harmonious co-existence between nature and mankind, and we begin to insist on it as a primary idea for sustaining the Japanese Archipelago. This concept of conservation was established and maintained by the Japanese people themselves without any suggestion by the government, and we should take it seriously and develop it with confidence.

The power of politics and economics is now very strong, and the future of the earth may be controlled by such powers, but still the sustainability of the earth is not a subject to be supported only by politics and economics, but by daily activities of the general populace based on a worship of nature. It is necessary for politics, the economy, science, religion and so on to propose guidelines for sustaining this, our only earth, and to support the activities of the people, but the action of conserving the human environment should be the responsibility of those inhabiting the earth. Conservation will be successful only when all people on earth act on its behalf. I am rather reluctant to say that we have still only a short time to consider this situation seriously and to solve the problem with which we are faced.

Creation of ideal human environment

I do not like to say that we should protect the environment. Rather, we should remember what happened when the earth's surface was first attacked and developed by humans. When agriculture was introduced, our ancestors cut down the forests and started to plant cultivated races that were artificially bred. This action may be called the first destruction of nature, but it was performed step by step to adjust the transformation of the earth's surface in a sustainable way.

We know that 'artificial' is a term opposite 'natural', and every artificial action should be recognized as the destruction of nature, according to modern wording. However, no one wishes to say that the creator of the New Stone Age who cut down the forests to develop agriculture in a particular site was also a destroyer of nature. They created an environment well-adapted to humans to accommodate an ever-growing human population. Actually, traditional Japanese people

had the concept of harmonious co-existence between mankind and nature and developed the Japanese Archipelago with this idea in mind, although they understood this as a philosophical concept. Zoning of the Japanese Archipelago was well designed with particular a buffer zone, or Satoyama, between the core area (Okuyama) and the residential area (Hitozato). Through rapid growth of technology based on science, then, the earth's surface was damaged to some extent in the past one hundred years mostly by large-scale developers. Since then, it has changed greatly, and environmental issues are the most urgent and difficult problems with which we are now faced.

Modification of the earth's surface by artificial influences in the New Stone Age was quite different from the type of destruction taking place in recent years. Our Japanese ancestors tried to develop the earth's surface, but they never wished to conquer nature. They always tried to develop the earth in harmony with nature. There were a number of mistakes and sacrifices in the course of their development, but nevertheless they succeeded in constructing an ideal zoning of the Japanese Archipelago. This was performed throughout the Archipelago rather independently according to the localities concerned, and yet the zoning was remarkably similar throughout Japan. This was an example of successful development of the natural environment of the Japanese Archipelago, and artificial actions co-existed harmoniously with nature.

Contrary to this, development in the latter half of the 20th Century brought a variety of environmental problems. We trusted too much in technology based on science, although scientists themselves consider it to be under-developed to this day. People who enjoyed the benefits of technology seemed to believe that it could accomplish anything, and they thought that science could provide ways to recover from any problems. In this way, artificial actions applying modern technology based on advanced science became a term opposite the term 'natural'. It may be our fault that in recent days we only expected and promoted to have more development of natural science to make technology more effective. We should have concentrated much more on developing a field of science that could control the activities of technology's strong power based on natural science.

Development is a natural process and is inevitable for human beings, as our population is still increasing and our life-style is diversifying. We will need far more resources in the coming days, and this means

we will depend much more on the earth's natural resources. Because of this, there should be a public outcry for designing a harmonious co-existence between mankind and nature, and this concept can only be supported if it includes sincere worship of nature. In developing this, our only earth, we should not consider conquering nature by artificial means, but rather forming a harmonious co-existence with it.

Life-long learning of a nature-loving spirit

I am in a position to note here an idea to promote the concept of harmonious co-existence between nature and mankind. I published a short paper to propose the concept of 'spherophylon' (Iwatsuki, 2006), and stressed that we live as an element of biodiversity as well as individual human beings. Humans consider themselves to be the most advanced organism, but still it is evident that we cannot live in isolation. We can live only when the earth's biodiversity as a whole harmoniously collaborates with us. This understanding is the foundation for recognizing that we should promote harmonious co-existence between nature and mankind. Even now advanced technology based on natural science can contribute to biodiversity only partially, and we should learn a lot from nature and work in collaboration with it.

Mankind is a unique species with sophisticated behavior. Modern human activities are based on this sophistication, including science. Human technology is now mostly based on advanced science, and by using developed technology we can work efficiently in various ways. Sometimes in the recent past, we failed to manage technology correctly, and problems in our environment are often caused by such a misapplication of a particular technology. It is vitally important to know this fact, and that it is due to the ignorance of the general populace. When an ideal zoning plan for the Japanese Archipelago was drawn up, neither political nor scientific leaders had an important role in developing it, but the general population formed that superb landscape. To develop the earth optimally, it is important that all mankind learn much more about how to sustain this, our only earth.

Education is now given in the schools to make knowledge available in all fields of science. This is based on the concept that we expect all citizens to have a higher level of knowledge. However, education should be promoted at home as well as in society, and eventual support of life-long learning

should be strongly encouraged. Our environment is now changing rather quickly day by day, and we have a lot to learn to follow aspects of these changes. It should be noted here that the zoning of the Japanese Archipelago was built up by the people themselves, without any guidance from scientists or society leaders. Everyone learned nature by him or herself, and they usually incorporated aspects following the design shown by nature itself. We have to remind ourselves that modern people expect much more from their leaders, scientists, and others to plan for preservation of their environment. It is everyone's duty, however, to take care of this, our only earth as our home. In establishing such a world, environmental issues should be discussed and promoted in a democratic way. And, for this sake, each one of us should have a better knowledge of science to be a part of actions taken to sustain the earth.

Life-long learning is a sincere pleasure of people to live better on the earth; at the same time it is the duty of all the people living on the earth. In addition to a traditional education in school, everyone should enjoy life-long learning throughout their lives. This is a pleasure only human beings can enjoy.

Conclusion: For the creation of a human environment under harmonious co-existence with nature

Humans developed their civilization, and gradually their influence on nature grew due to an increase in their 'artificial' activities. They developed the surface of the earth and now make free use of its resources, which have been safely and continuously available. However, environmental issues have become a big problem in the 21st Century. Perfect protection of nature cannot be expected, as the demand on its resources is inevitably increasing due to endless population growth and the extension of a diversification in life-styles for all people. This means that we should create a better human environment on the earth, with ideal development taking into account the harmonious co-existence between nature and mankind.

We are faced with severe problems of sustaining our environment on the earth. Actually, the Japanese Archipelago has been developed so that it adjusts the demand of much more resources to maintain the lives of the people there. It was not possible to conserve the Archipelago in its original style, and our ancestors were successful in developing it in an ideal way even

from the standpoint of present conservation.

Now, our status is similar to that at the beginning of the New Stone Age, when there was a rapid increase in population and more diversification of life-styles. It is natural that we should refrain from additional consumption of nonessential materials, but in addition we should produce much more resources for the benefit of human beings in coming days. And, in developing the earth, we should learn sincerely from our ancestors who independently developed the Japanese Archipelago under an ideal design. For this sake, we should follow the attitude of our ancestors, and this means that we should learn from our earth how to develop its nature in harmonious co-existence with mankind.

Acknowledgements

I had fruitful discussions with Professor Tamotsu Hattori, Hyogo Prefectural University, on the topics in this paper, and he gave me various valuable comments on this paper, for which I would show my sincere thanks. I am also grateful to Ms Emily Wood, Harvard University Herbaria, who corrected the English in this paper and gave me valuable comments. Valuable comments from unanimous reviewers are greatly appreciated here.

References

- Iwatsuki, K.** (1997) Diversification of Plants under the Impact of Civilization (in Japanese) 194 pages. University of Tokyo Press.
- Iwatsuki, K.** (2006) Spherophylon, the concept of life at a level higher than that of the individual. Proc. Japan Acad. B **82**: 270-277.
- Minakata, K.** (1912). An Idea Against the Governmental Issue to Amalgamate the Shrines (in Japanese). Nihon oyobi Nihonjin 580-584.
- Ministry of Environment** (2007) Manual for Bears Control.
- Miyawaki, A.** (2007) Chinjyu-no-mori (in Japanese). Shincho-bunko, 183 pages. Shincho-sha Co.Ltd.
- Tutui, M.** (1984) A concept to maintain the forests in Akita (in Japanese). Shinrin Bunka-Kenkyu **5**(1) 243-245.
- Urasugi, K.** (2008). A Case Study from Hyogo Prefecture. In Proceedings of the G8 Environmental Ministers Meeting Commemorative Symposium, 26 April 2008. (in press).

岩槻邦男：人と自然の共生 - 日本の伝統に見る理想的な環境観

日本列島は、結果として人と自然の共生という理想に合うかたちで開発されてきた。この開発は、特定の指導者の考えに従ったものではなく、日本人の伝統的な自然観に基づくものであり、地球の持続性を希求するなら、この考え方を地球規模に拡大することが望まれる。日本列島の開発がどのように人と自然の共生という概念にあっていたか、里山、八百万の神、鎮守の杜などのキーワードをたどりながら考察する。

Recieved: July 23, 2008
Accepted: August 25, 2008