

Biosphere Reserve as Learning Sites for Biocultural Conservation Education; Case of Mount Hakusan Biosphere Reserve in Japan

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Abstract

Biosphere Reserves (BRs) are highly recognized areas under UNESCO's MAB Programme for their conservation, learning and sustainable development initiatives. Even though Mount Hakusan BR (MHBR) in Japan was designated in 1980, its transition zone was recognized in 2016, and area still lacks any implementations or functions as BR. We suggested that introducing the place-based learning will be one of the most important logistic functions of MHBR, and it will provide the site-specific knowledge and experience for bio-cultural education. We conducted five educational fieldworks at MHBR sites, with the objectives to assess the site-specific elements that links biological and cultural diversity of the region. Each field provided thematic understanding of ecosystems of the MHBR, such as forest, hydrology, wildlife, culture, livelihood as well as conservation initiative and tourism. Participant were 21 academic students. As the outcome of the course, several natural and cultural resources were assessed by the students as valuable "treasures" of the region. However, we found that local residences were not aware about the values of those regional resources, and about the role of MHBR as designated area. In future, we plan to evaluate the awareness change of local people before and after implementation of the educational fieldworks together with the youth, at BR sites.

1. Biosphere Reserves

Biosphere Reserves (BRs) are protected areas of terrestrial, coastal and marine ecosystems, established by the national government and recognized under the UNESCO's Man and the Biosphere (MAB) Programme. The purpose of the BR is to promote sustainable socio-economic development of the region by integrating the conservation of biological and cultural diversity, based on the efforts of local communities and stakeholders (1). It compiles the three main roles: *conservation role* with the need of maintaining biological diversity, genetic resources and ecosystems; *development role* with the need to associate the environmental protection with the development governing principle in the fields of socio-cultural and ecological sustainability; *logistic role* with the need to establish international network in the frames of MAB for monitoring, research, education and information exchange (2). In short BR are not just protected areas, their main function is to demonstrate the balanced relationship between the people and nature for the sustainable development. According to Madrid Action Plan, Education for Sustainable Development programmes promote BRs as a "learning site of excellence for sustainable development" (3), and BRs created a unique and excellent opportunities to act as a learning sites, in ordered to create and implement the national policies and strategies.

To secure the sustainable development BRs have three main zonation systems; core,

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buffer and transition zones. Only core zone requires the legal national protection with limited human activities, while human interaction with nature for the conservation and sustainable development is allowed in the buffer and transition zones (2), which contributes and combines for the community-base and protected-area based conservation strategies (4). The core zone seeks mainly the biodiversity protection, and it can be entered mainly for the research and monitoring purposes. The surrounding buffer zone allows low-impact activities with ecotourism, environmental education, research activities and functions to protect the core zone from human impact. Transition zone is the most flexible area with various land utilization activities which is supposed to be implemented with the models for the sustainable economic development in collaboration with local communities and different stakeholders. At the begging less attention was paid to the transition zone for the development activities due to its multiple-use and governance with different public and private authorities, and it was considered as the “area of co-operation” (5), whereas more attention were given to the core zone with the protected areas. The Seville Strategy (2), has enlarged the duties of BR and emphasized the key role of the community participation in the buffer and transition zones for the sustainable nature resource utilization and management (6,7).

Functioning as a model for sustainable development and as a successful learning sites, BR in every region needs to implement many learning and educational processes at the local and global levels. However, still there is no well-defined and agreed learning destinations that offers site-specific knowledge or integrated educational mechanism, and documentations of learning sites mainly becomes the references for the policy makers. BRs should point out the specific possibilities and directions which will bring to the sustainability-oriented lifestyle, and elucidate the role of local people and stakeholders in motivating, inventing and developing of BRs as a foundations for the sustainability learning sites. Being recognized as a learning site, BR was promoted as ecotourism destination for the sustainable development and local traditional knowledge, culture and field experiences of the community will become the key aspect to promote BRs logistic function (8). To date, experiential leaning (9), has been introduced to foster the learning for the sustainable development. This kind of learning can provide the opportunity to learn the specific environment, observe the particular lifestyle of the communities adjusted to the environmental conditions and facilitate the development of the human abilities and is considered to be the most effective to evoke self-responsibility for the environmental preservation (10). Learning sites has its own learning community, and it is very important to get the awareness about who those communities are, learn about their characteristic and specific behavior.

Here we focus on the Mount Hakusan Biosphere Reserve (MHBR) in Ishikawa Prefecture, Japan, to evaluate the role of BRs site-specific fields in terms to develop the skills and new ways of thinking for the youth. MHBR, as a BR, needs to execute three main roles of conservation, development and logistic functions, however, even though that MHBR was designated in 1980, transition zone was recognized only in 2016, and there is still no functions and any implementations conducted by the local authorities or academic institutions as of BR. We considered that introducing the experiential learning will be one of the most important logistic functions, which will provide the site-specific knowledge and experience of the newly designated area.

Japanese rural areas which represents the harmonious coexistence between nature and culture started to decline, because of the rapid industrialization and the shift from rural-based to urban-based economic. This resulted in land use decline, field abandonment and depopulation of the rural areas, and there is an urgent need to educate the youth to act towards regional conservation and regeneration. Universities can play a fundamental role to educate the youth by integrating of scientific knowledge together with local communities, and promoting the research for the solutions of regional issues. However, BRs concept is not applied to the local academic institutions as a learning sites for the sustainable development, and in this paper as a pilot study, we decided to develop the integrated conservation and sustainable development oriented model created at Kanazawa University, through the fieldtrips in the specific environmental conditions in the transition zone of Shiramine village of MHBR, and apply this model for the students to increase the skills and awareness towards the environmental preservation. For our model we suggested the three dimensional framework, with activities mainly divided into the following themes 1. Biological diversity; 2. Cultural Diversity; and 3. Conservation and Restoration (Figure 1). Introducing the biological diversity will provide the basic knowledge of the regional ecosystem, and the students would be capable to acknowledge the importance of the natural resources to sustain the culture and livelihoods. Cultural diversity fieldtrips bring students closer with the communities and increase the understanding of the daily lifestyles, values and beliefs. Finally, increased awareness towards the daily struggle and local issues, would make the students to be motivated to act towards the conservation and preservation of the region.

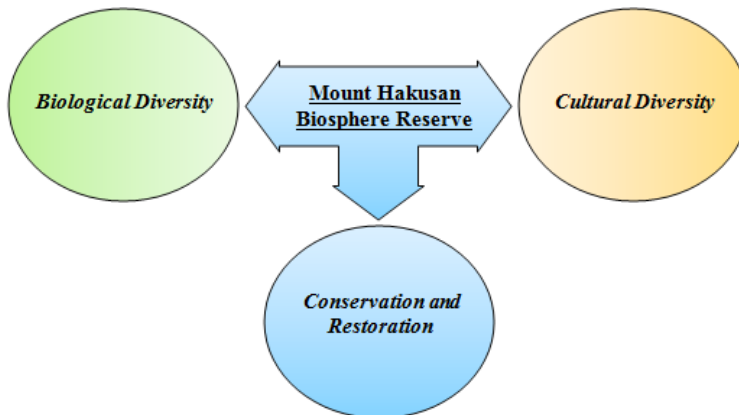


Figure 1. Three Dimensional Learning Framework for Mount Hakusan Biosphere Reserve

2. Mount Hakusan Biosphere Reserve and Shiramine Village

The brief description of MHBR and Shiramine village highlights the current local issues and challenges which faces Biosphere Reserves. MHBR (Figure 2) is one among five BRs of Japan (Shiga Highland, Mt Odaigahara and Mt Omine, Yakushima Island and Aya). It is located on the central part of Japanese archipelago, latitude 36°N and longitude 137°E facing the Sea of Japan side, with the Mt. Hakusan (2,702m) on its

heart. The total area of BR is 199,329ha and population 17,023 people. The area is expanded over the four prefectures Fukui, Ishikawa, Toyama and Gifu. The core area has alpine and subalpine zones and is famous for its endemic vegetation and Japanese beech forest in the buffer zone. Transition zone with hilly and mountainous areas are settled by local villages. It was designated by UNESCO's MAB in 1980 (11) and at the beginning only core area with alpine/subalpine zones and buffer zones was recognized. After 30 years, in 2016 transition zone was designated with the mountain villages and settlements.

Shiramine village, is a small village in a mountainous area to the North-East site of Mt. Hakusan on the 500m altitude along the Tedoru River terrace, with the total area 222km² (12), (Figure 3), and it is included into the transition zone of MHBR. The main differences of the region from the other villages, is that the area has almost no flat lands, and is considered to be the foothills of the Mt. Hakusan with lots of snow precipitation that can reach 7 meters. Mt. Hakusan is a volcano, with the last eruption recorded in 1579. Due to its location, next to the Hokuriku coast, in winter, seasonal dry northwest winds flows from the Eurasian continent and moisture from the warm Tsushima Current from the Sea of Japan, creates the heavy snowfalls specific to the region. Most of the snow melts in summer and flows downhill by forming water systems, and Shiramine is considered to be one of the main water resource sectors of the Ishikawa Prefecture. Heavy snowfalls and different seasonal temperature creates the unique and diverse alpine environment with endemic flora and fauna. The vegetation is distributed with the forest zones of summer green broad-leaved (Japanese beech zone) which comprises the important vegetation element in Mt. Hakusan. This area is also densely inhabited with large mammals like Asiatic black bear, Japanese serow, Japanese macaque, Golden Eagle and mountain Hawk-eagle.



Figure 2. Mount Hakusan Biosphere Reserve area

Source: Google Maps



Figure 3. Shiramine Village
Source: Google Maps

2.1 Culture

Human population in Shiramine is 855 (for December, 2016, (13)). The major industry is forestry and agriculture. Due to the hilly landscapes the forestry, slash-and-burn cultivation, silk raising and hunting were the main practices in the village for many generations. The main lifestyle of the village was named seasonal “*Dezukuri*” which was practiced until the middle of 20th century. This is the method when, during the agricultural seasons of slash-and-burn (May through November) people were living in the houses at the mountains, and by winter coming (December to April) they were going back to the village. Thanks to the unique lifestyle, well-learned skills of food preservation practice, charcoal production, specific house construction techniques, gathering medical herbs and others, in Shiramine people were able to live in the mountain side all year round, even during the heavy snowfalls and harsh winter times. Due to the advanced well-living skills, Shiramine became one of the leading villages in *Dezukuri* practice in entire Ishikawa and Fukui Prefecture. In the 1930s, from 452 houses of Shiramine, the number of *Dezukuri* practice was 262 houses, comprising the half number of entire practice of Ishikawa Prefecture. Except the rice, all the food was derived from the forest and mountains (14). Human interaction with the surrounding nature in the mountains regions, created the unique landscapes, knowledge system and culture which was transmitted from generation to generations during several centuries, until the 1940th. In 1950th, during the period of high economic growth in Japan, and in 1970s under the countries rapid industrialization the main source of energy from fuel woods changed to fossil fuels, and this has dramatically changed socio-economic situation in Hakusan. The shift to the fossil fuels, decreased the demand on wood fuels and charcoals production and the management of the secondary forest declined. Construction of *Tedori* River Dam for hydroelectric power, water supply and flood control as well as, construction of the innovative road infrastructure, resulted in the merge of 300 households and loss of *Dezukuri* practice and hunting. Populations migrated from the mountain areas to the

urban cities and nowadays, natural resources management and the mountain landscapes of Shiramine have been rapidly changed and ecosystem services are threatened to be lost, due to the depopulation of the area. Depopulation results in the abandonment of the farmlands, loss of the local communities and traditional knowledge. After the road constructions local people started to search for the jobs outside the village, rather than managing the farmlands, and gained income provoked to consume the food bought by money. This resulted in the loss of the forest food culture, and main population stopped to consume and gather forest resources for food, such as, tree nuts, wild-plants, mushrooms and as well as utilization of the medical herbs was changed to purchasing the medicine from the pharmacies.

In 2012, Shiramine was selected as “Important Preservation District for Traditional Buildings” by Japanese Government. Due to the close river terrace settlements, the village had faced great flooding in 1896 and 1934, and houses of local villagers are built on the elevated stonewalls which composes the specific townscape of the region. Besides, due to the heavy snowfalls and sericulture practice, the houses with two or three-story were constructed to be resistant to the heavy snow and used as warehouses. However, because of the depopulation, many houses were left by the owners and the number of abandoned houses are increasing annually. Because of the heavy snowfalls, it becomes very hard to look after the abandoned houses, and they are easily collapse under the heavy snows, which significantly affects the townscapes of the village.

3. Methodology of the Course

During the autumn semester of the academic year 2016, between the beginning of October and the end of February, intensive teaching activities were carried out, including in-class activities for theoretical and methodological tools, and fieldtrips activities. In total five field trips were carried out, which lasted for one or a half days. The number of the participants were academic 21 students with different study backgrounds. At the beginning of each trips the instructors gave the basic explanation about the trips, concerning the landscapes, ecological and social-economic backgrounds of the region, and explained the local issues related with the depopulation, aging, effects of global warming and others. Later students had the experiential practice together with the local communities. All trips were guided by the professional local instructors and educators, and were issue-oriented. Fieldtrips were divided into the following thematic trips; biodiversity with forest and wildlife, winter mountain experience, town scenes walk with local villagers, traditional food making, livelihoods and spiritual practice (Table 1).

Table 1. Activities Performed at the MHBR

Activities	Outcomes
Forest and Wildlife	- Walk in the forest with the nature instructor, search for the wild plants, mushrooms, animal trails, listen to the lectures about the flora and fauna of the region
Shiramine Folk Museum	- Learn traditional culture, <i>dezukuri</i> (winter houses), snow and lifestyle, medical herbs, silk production, sustainable utilization of the hemp

Socio-cultural	- Walk in the town with the professional guides, learn about the local architecture, forest management, townscapes, communicate and interview with local villagers, traditional cooking experience with locals
Snow-mountain	- Lecture about the specific hilly landscapes of the town, experience the traditional Shiramine mounta walking with the traditional snow shoes <i>kanjiki</i> , communicating with local villagers
Spiritual	Visiting Hakusan Shiramine Shrine, learn about the regional beliefs, <i>Shinto</i> practice and <i>Hoonko</i> food making (food served during Buddhist offerings)

Students were asked to find the main element, which they considered would be the most important think that creates and supports the biodiversity and cultural diversity of the community. The element should be site-specific and it could be as living as well as non-living objects. During each course they made interviews to the local villagers, and after each course students were given the time to think and analyze site-specific objects that will link the biological diversity with cultural diversity. Students submitted the reports were they indicated more than five elements and described its specificity and the ways for its preservation. Also, we conducted the survey, to derive the students' feedback, awareness and knowledge about the bio-cultural linkage and the concerns towards the regional conservation. Awareness and knowledge were scored by 1=Very Bad, 2=Bad, 3= Good, 4=Very Good, and concerns were rated as 1 = Not concerned at all, 2 = Somewhat concerned, 3 = Neutral, 4 = Concerned, 5 = Very concerned.

4. Results

All explanations of the instructors during each trips, were highly appreciated by the students and helped them to deeply understand the local issues (86%). Awareness about the biological and cultural linkage was increased (90%). The site-specific elements evaluated by the students as the “treasures” to sustain community are shown in Table 2. Students (90%) evaluate that the snow plays significant role in the lifestyle of the local villagers, and it is the resource that links biological and cultural diversity of the region. It was clearly seen that most of the students felt motivated to take part in conservational activities after participating in the fieldtrips (81%). All students agree that the fieldtrips were highly educational to understand the BRs function as the learning sites and served as site-specific platform to link the biological and cultural diversity. However, students found that local communities were not well informed about BR role, and their evaluation of the local resources were mismatching and contradicting with the ideas of local villagers.

Table 2. Site-specific elements evaluate by the students

	Site-Specific Elements	Evaluated (%)
1	Snow	90
2	Hemp	81
3	Mountains, Hot Springs	81
4	Plants, Trees	67

5	Water	62
6	<i>Kanjiki</i> (Japanese snowshoes)	52
7	Horse Chestnuts, Walnuts	43
8	Local People, Wisdom	38
9	Forest	33
10	Silk-production	29
11	Slash-and-burn Agriculture	29
12	Food preservation	20
13	Wild-life	14
14	History	10
15	Traditional Houses	5
16	Snowman Festivals	5

5. Discussions and Future Suggestions

The course with the fieldtrips in the MHBR site, provided us with important lessons about what BR sites looks like in practice, and how it can raise awareness about the interrelation between biological and cultural diversity, and finally how BR can contribute for the conservation activities. Our fieldtrips showed that the awareness level and knowledge about the bio-cultural linkage were increase in the students, and they were able independently analyses and evaluate the site-specific elements of the region. Besides, communication with the local villagers and experiential practice helped them to understand the daily struggle of local communities and increased their willingness to contribute in regional preservation and conservation.

MHBR sites proved that it can be used as education oriented sites and its main activity relies on dissemination of the knowledge and the conservation activities. However, our observations and inspections of MHBR showed that its site-specific characteristic are not recognized for the local villagers. Sustainable rural conservation would be impossible unless the local villagers understand the importance of the system and how easily it can be lost. We found that regional “treasures” mostly evaluate by the students, were considered by local villages as the element that makes their lifestyle very difficult or its usage were either forgotten or replaced by the modern elements. For example, student’s evaluation of the snow, as the most valuable element at MHBR, was contradicting with the local’s thinking. Heavy snowfalls limits the transportation, damage the houses and requires to use lots of fuels, and sometime it make aged villagers to leave the village and abandon their houses. Some students even get the comments, that “Shiramine village would be the perfect place to live, if there is no snow”. However, students found that the large amount of snowfalls creates all the livelihood of the village and supports the site-specific bio-cultural diversity, in terms of forest management, food preservation, townscape and architectures. The other, example is the Hemp. Hemp production was very famous in Shiramine, and it was mainly used for making fabrics, housing and even used as food supply and fuel. However, its cultivation became illegal with rapid economic growth, and its production was completely stopped in all Japan. Students found that hemp could be very sustainable product, because it has a diverse ways of utilization which are environmentally friendly. We found that local villagers were

surprised by the student's feedback, and we got some comments that "maybe local villagers just not aware about the benefits of natural resources that the village has", and they should change their attitude and the ways of utilization of the natural resources, to foster the regeneration of the community and the village. Students in their comments clearly showed that the real BR is not well understood by the local villagers and its real meaning has yet to be established.

Finally we would like to outline some recommendation for the further implementations of the educational programs in MHBR; 1. Holistic idea of MHBR's key role as learning destination should be established not only by academic institutions, but mainly with the support from local government. 2. MHBR should provide the united and equal awareness about the natural and cultural heritage of the region as for the locals and for the visitors. 3. MHBR combines the multi-disciplinary approaches, therefore teaching methodologies and pedagogical strategies for the students should implement the variation of knowledge not only on the academic level, but also apply the experimental practice. 4. In reverse, for the local villagers it will be very important to create the learning communities, where they can deeply understand their ecosystem and renew their vision on living environment.

In this study we have missed to make the prior evaluation of the local villagers before starting our fieldtrips, and we were mainly focused on educating the academic students. Further studies must be conducted to evaluate the awareness and knowledge level of the local villagers before conducting the fieldworks at MHBR, and in our future study we plan to evaluate the awareness change of local people before and after implementation of the educational fieldworks together with the youth.

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