Incorporating Biocultural Values in Biodiversity Conservation Policies: A Case Study of the Regional Strategy for Biodiversity in Okinawa

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Abstract

The article discusses the importance of linking policy and local culture to achieve the conservation and sustainable use of biodiversity. The Convention on Biological Diversity was adopted at the United Nations Conference on Environment and Development, held in Brazil in June 1992, with the aim of addressing biological diversity in cooperation with the global community. This Convention not only stipulates the conservation of biological diversity but also the sustainability of cultures and societies in human activities, including the protection of traditional cultures with respect to resource use and the equitable sharing of benefits. The interaction between region-specific biodiversity and cultural diversity was subsequently clarified using a biocultural approach by Mafii et al. In recent years, the concept of biocultural diversity has gained increasing attention in ecosystem conservation as it relates to biodiversity conservation, sustainable development, and the fulfillment of human potential. This study focuses on the regional biodiversity strategy of Okinawa Prefecture, a World Natural Heritage-listed biodiversity treasure, and reveals the process by which local biocultural values rooted in regional uniqueness were adopted as indicator items to evaluate biodiversity strategies in response to global policy imperatives. The paper examines how biocultural values and policy imperatives interact to define environmental policy at the prefectural level, which lies "between" the two. The wisdom and creativity of biocultural diversity is not only a treasure inherited from the past but also a compass for living with nature toward the future. To create an island society based on sustainable and enriched interactions between humanity and nature, it is urgent to deepen specific research in the Ryukyu Arc as a comparative study through exchanges with biocultural diversity researchers and local communities in the Pacific and Southeast Asia.

Keywords

Biocultural diversity, biocultural values, biodiversity conservation policies, regional biodiversity strategy, traditional ecological knowledge, Island

1. Background

This study aims to examine how policy and local culture can be linked at the global, national, regional, and local levels to achieve the conservation and sustainable use of biodiversity, particularly based on the development of a regional biodiversity strategy and the practice of recording biocultural values in Okinawa Prefecture. In recent years, there has been a growing awareness of the importance of cultural values such as wisdom, techniques/technologies, economic practices, and worldviews that have been cultivated over many years of human interaction with nature. However, there is a demand for greater cooperation among the international community beyond regional and national borders in the conservation of global biodiversity and resolution of environmental problems. At the United Nations Conference on Environment and Development (Earth Summit) held in Brazil, the Convention on Biological Diversity, which considers biological diversity not only in specific regions but also in cooperation with the global community, was adopted. The Convention stipulates not only the conservation of biological diversity but also the sustainability of the culture and society of human activities, including the protection of traditional cultures regarding the use of resources and the equitable sharing of benefits. Subsequently, the interaction between region-specific biodiversity and cultural diversity has been clarified using a biocultural approach proposed by Mafii et al. Biocultural diversity theory has become the focus of attention as a concept relevant to biodiversity conservation, sustainable development, and the fulfillment of human potential in the United Nations Environment Programme, the International Union for Conservation of Nature, the United Nations Educational, Scientific, and Cultural Organization (UNESCO), and elsewhere (Ankei, 2007; Hong, 2014; Maffi, 2001; Maffi and Woodley, 2010; Wantzen KM. (Ed), 2023.). In other words, the importance of bottom-up approaches at the local level, such as the prefectural or community level, as well as at the global or national level, has been recognized in biodiversity conservation and environmental problem-solving. Therefore, this study examines how local biocultural values rooted in regional uniqueness and global policy imperatives have interacted to define environmental policies at the prefectural level, which lies between the two.

2. National Trends and National Strategies for Biodiversity Conservation

In May 1992, the United Nations Convention on Biological Diversity (United Nations Convention on Biological Diversity/CBD) was adopted and enacted in 1993. The Convention on Biological Diversity defines biodiversity as: 'The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems. The same article defines the following three objectives.

1. Biodiversity conservation
2. Sustainable use of biodiversity components
3. Fair and equitable distribution of benefits arising from the utilization of genetic resources

Japan signed the treaty on June 13, 1992, during the Earth Summit and deposited its acceptance with the UN Secretary-General in 1993. Japan was the 18th country in the world to become a signatory to the Convention and was quicker to conclude the treaty than other nature conservation-related conventions such as the World Heritage Convention, the Ramsar Convention (nine years before the World Summit), and the Washington Convention (seven years after the Earth Summit), which took 20 years to conclude. As parties to the Convention on Biological Diversity are obliged to formulate a

National Biodiversity Strategy, the Japanese government formulated its first National Biodiversity Strategy (called the First National Biodiversity Strategy) in 1995. In 2003, the Cabinet approved the National Biodiversity Strategy 2023–2030 (the Sixth Strategy), which has been revised five times as of July 2023.

Table 1. Development and main revisions of the National Biodiversity Strategy in Japan

1995:	National Biodiversity Strategy
2002:	New National Biodiversity Strategy ("Three Crises")
2007:	Third National Biodiversity Strategy (addition of "Crisis due to Global Warming")
2010:	National Biodiversity Strategy 2010 (Legal plan based on the Basic Act on Biodiversity)
2012:	National Biodiversity Strategy 2012–2020 (reflecting the Aichi Targets and the experience of the Great East Japan Earthquake)
2023:	National Biodiversity Strategy 2023–2030 (developed based on 2030 target)

In particular, the New National Biodiversity Strategy formulated in 2002 identified “three crises” for biodiversity: “crises caused by human activities such as development,” “crises caused by the reduction of our influence on nature,” and “crises caused by things introduced by humans,” which became the basis for subsequent national strategies. In the third national strategy formulated in 2007, the crisis caused by global warming was added as the fourth crisis. This strategy was developed in accordance with the 2020 and 2030 targets of the Convention on Biological Diversity.

In addition, the Basic Act on Biodiversity, which requires prefectures and municipalities to strive to establish regional biodiversity strategies either independently or jointly (Article 13), was enacted in 2008. As of August 2022, 149 municipalities in 47 prefectures have established regional biodiversity strategies (Ministry of the Environment, 2023). While the rate of formulation at the prefectural level is 100%, the formulation rate by municipality (1741 municipalities as of July 2023) is approximately 8.5%; excluding government-designated cities, the rate is only 7.5%. This number is lower than that of similar regional plans, such as the Basic Environmental Plan (720 municipalities) and Basic Green Plan (680 municipalities). Unlike at the prefectural level, there are often no specialized biodiversity-related departments at the municipal level, and the absence of relevant administrative resources, especially staff with expertise in biodiversity, is thought to be a major factor. Regional strategies range from those that simply summarize existing policies to those that are highly ambitious and set specific goals with the participation of local residents (Higashi, 2022).

In Japan, the term “biodiversity” has been recognized by non-specialists since the 10th Conference of the Parties (COP10) held in Nagoya, Aichi Prefecture, in 2010[1]. Until the 2000s, the Cartagena Protocol on Biosafety to the Convention on Biological Diversity (the Cartagena Protocol) and other specialized discussions on genetic resources and biosafety did not include specific numerical targets. Regarding the Cartagena Protocol, on the one hand, many technical discussions have been held on genetic resources and biosafety; however, specific numerical targets have not been included. COP10, on the other hand, aimed to set more urgent targets, stating that “effective and urgent action should be taken to halt the loss of biodiversity so that ecosystems are resilient and able to provide basic services by 2020.” The Aichi Biodiversity Targets set 20 individual targets, and in particular, Target 11, “integrate 17% of terrestrial areas and 10% of marine areas into nature conservation areas and similar areas,” which sets specific numerical targets, has become a widely known target. As a mid- to long-term goal, “coexistence with nature” was communicated, clearly stating that “by 2050, biodiversity will be valued, conserved, restored, and used wisely, while maintaining ecosystem services, sustaining a healthy planet, and providing necessary benefits to all people.” The fact that the message of “coexistence with nature” was widely shared with the international community in light of the reality that many endangered species

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were found in areas where human intervention was widely practiced, such as Satoyama, coastal areas, marine areas, and islands, was an important achievement of the Aichi Targets.

In December 2022, the Kunming-Montreal Biodiversity Framework (abbreviated as GBF from Global Biodiversity Framework) was adopted as the "Post-2020 Targets."[2] The GBF set more specific numerical targets, and Goal 3, "30 by 30" (Thirty by thirty), which states that "by 2030, 30% of the Earth will be integrated into protected areas and OECMs," was widely reported in the media and became a buzzword along with the term "other effective area-based conservation measures" (OECMs). Notably, OECMs are different from traditional protected areas such as national parks and bird sanctuaries, which are designated for the purpose of nature conservation, and refer to "areas that are not intended for nature conservation but contribute to biodiversity conservation." Examples include shrine and temple forests, sacred sites, corporate forests, managed fishing grounds, and water-source forests. In Japan, a certification system for "nature symbiosis sites" was launched in FY2023, and while OECM is based on the premise of "areas that are not nature conservation areas," whether publicly or privately owned, natural symbiosis sites have been established as a system to certify mainly areas where private entities are involved, regardless of whether they are nature conservation areas. This situation is unique to Japan.

3. Regional Biodiversity Strategy - "Biodiversity Okinawa Strategy"

As mentioned above, the Basic Act on Biodiversity, enacted in 2008, made it mandatory for local governments to make efforts to establish regional biodiversity strategies either independently or jointly. The National Biodiversity Strategy 2010 clearly states that the goal is for "all prefectures to have started formulating regional biodiversity strategies by 2012." Chiba et al. (2012), who analyzed the current status and issues of regional strategy formulation for local governments across Japan, pointed out the importance of active efforts by citizens and residents as well as a thorough awareness of the mandatory effort rule for effective regional strategy formulation. How has Okinawa Prefecture, with its many islands and unique natural, cultural, and historical characteristics, developed its regional biodiversity strategies?

In 2011, Okinawa Prefecture established the Okinawa Biodiversity Regional Strategy Formulation Study Committee, which consisted of government officials, experts, businesses, Nonprofit Organization, and others. In addition to this committee, the prefecture held hearings, workshops in various regions, and public comments to incorporate diverse perspectives into the formulation of the strategy. The "Okinawa Biodiversity Strategy" was formulated and published in March 2013 (Okinawa Prefecture, 2013).

The local biodiversity strategy of Okinawa Prefecture is stated as follows: the island's nurturing chimugukuru (heartfelt cherishing of the natural ecosystem) and yuimaaru (mutual lending of hands between biodiversity and humans), a basic plan for the conservation and sustainable use of Okinawa's biodiversity (mid- and long-term targets of 2030 and a short-term target of 2022), and five basic measures: 1) halting biodiversity loss; 2) conserving, maintaining, and restoring biodiversity; 3) making wise use of natural gifts; 4) raising awareness of biodiversity; and 5) encouraging citizen participation in biodiversity conservation efforts.

The regional strategy and the five measures implemented in Okinawa Prefecture have three major characteristics. First, the regional strategies are positioned in the "Second Okinawa Prefecture Environmental Basic Plan," an environmental policy that promotes the "Okinawa 21st Century Vision Basic Plan (Okinawa Development Plan)," the prefecture's higher-level administrative plan, and the related ordinances and other related measures are systematized. According to Higashi (2022), who analyzed the process of formulating regional strategies, local governments' regional strategies have the

advantage of integrating and systematizing biodiversity-related measures. Second, the basic policy of the regional strategy clearly states the principle of the "wise use of nature's blessings," which means using nature in a sustainable manner in consideration of the ecosystem. According to a survey conducted by Yoshida et al. on local government officials, more than 70% of the respondents answered "very necessary" or "somewhat necessary" to "incorporate the wisdom and techniques of nature management passed down from one generation to another in the promotion of regional strategies for biodiversity." However, while interest in traditional ecological knowledge and technology was high, some respondents answered that they did not actually "utilize" them. About 40% of the respondents in the 3-way construct selected "there was no information" as the reason for this (Yoshida et al., 2018). Here, we can point out the challenges faced by cultural transmission that bridges traditional ecological knowledge and techniques. The third step is the collection and visualization of biodiversity data. It is important to understand the actual status of individual species that comprise the local ecosystem to formulate effective regional strategies based on scientific evidence, such as the establishment of protected areas and reduction of anthropogenic impacts. However, the Basic Act on Biodiversity, which is the legal basis for the formulation of regional strategies, has no provisions vis-à-vis biodiversity information, data, or indicators in regional strategies. Therefore, the degree of information on biodiversity and methods of disclosure vary from one municipality to another. In Okinawa Prefecture, based on existing Red Data Book information and other natural history data, a carte that divided biodiversity patterns into 1 km-scale segments based on ecological big data was created, where priority areas for conservation were ranked (Shiono T et al., 2021). What is noteworthy about this chart is that, along with scientific information on species, it also establishes a biocultural perspective, including traditional ecological knowledge and techniques that have been cultivated through the relationship between humans and nature, as basic data for formulating regional strategies in Okinawa Prefecture. One of the authors of this paper, Masanao Toyama, a biologist from Okinawa, played a central role in this effort. The next section describes the background and process.

4. Bridging the Wisdom of "Biocultural Diversity" - Local Environmental History and "Environmental Chart"

Toyama, one of the authors of this paper, conducted interviews throughout the Ryukyu Arc regarding the traditional uses of plants and animals, including their dialects (e.g., Toyama et al., 1998; Toyama et al., 2004; Toyama, 2003, 2015, 2016b; Toyama, 2019). This biocultural approach to human interactions with nature is now being used for biodiversity conservation and cultural succession efforts in Okinawa. This section provides an overview of how the bottom-up biocultural approach has been linked to prefectural-level Okinawa policies.

4.1. Okinawa's Steps toward Biodiversity Conservation

At the time of the Ryukyu Kingdom, Okinawa had a resource management system implemented by the royal government, in which forest resources were used while being managed (Miwa, 2011). However, when the kingdom collapsed in 1879 with the abolition of the Han system, mountainous areas were devastated by logging and other activities. The Japanese Forest Law slowed the pace of destruction because of the unplanned and momentary use of forests during the Taisho period (Toyama, 2010); however, logging for reconstruction began after the Battle of Okinawa and its aftermath. Until then, logging operations were conducted mainly by human labor, and there were limits to how far into the mountains human labor could go. However, since the 1950s, technological innovations in mechanization, such as the use of large bulldozers paid for by the U.S. military, have made it possible to conduct large-scale logging even deep in the mountains. As shown in Figures 1 and 2, aerial photo surveys have revealed the history of the expansion of vegetation destruction (Toyama, 2010, 2015).

In the 1980s, several new species were discovered in northern Okinawa, including the Okinawa rail Gallirallus okinawae (Cuonidae) in 1981, and the Yanbaru long-headed scarab beetle Cheirotonus jambar (Cheirotonidae) in 1984 (Figures 1 and 2). The conflict between the conservation of forests inhabited by rare species and their development (such as deforestation) has become a major social issue (Figure 3). However, in the northern part of Okinawa Island, the livelihoods of some local residents depend on forestry. Since 1990, the concept of "environmental conservation" through the wise and sustainable use of natural resources gradually began to emerge from the traditional "nature conservation" approach to protect plants and animals from destruction by human activities. In 2016, the northern part of Okinawa Island was designated as "Yanbaru National Park," and in 2021, "Amami Oshima, Tokunoshima, northern Okinawa Island, and Iriomotejima" were registered as World Natural Heritage sites. One reason for this designation is biodiversity, and the rich relationship between nature and people. In this sense, Okinawa's post-war period can be described as a process of changing values from a conflict between unwise use and nature conservation to sustainable coexistence with the environment through responsible and wise use. One manifestation of this change in consciousness is the compilation of the "History of Okinawa Prefecture," which redefines the local environment as the history and culture of the relationship between nature and the people.

Fig 1. Footprint of natural use by human power (near Ura, Kunigami Village, Okinawa Island, April 1946, Japanese Geographical Survey Institute).

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Fig 2. Natural use of mechanical power. The mountain road was cut, and the mountain on the lower right-hand side of the photograph was scraped (near Ura, Kunigami Village, Okinawa Island; October 1962, Japanese Geographical Survey Institute).

Fig 3. Okinawa rail was discovered in 1981 (Kunigami Village, Okinawa Island, 1995, Photo by Toyama, M.).

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Fig 4. Yanbaru long-headed scarab beetles were discovered in 1984 (Kunigami-mura, Okinawa Island, 1984, Photo by Toyama, M.).

Fig 5. Logging deep in the mountains using machinery (Kunigami Village, Okinawa Island, 1985, Photo by Toyama, M.)

In Japan, prefectural governments compile local histories as part of their educational administration to record the local history, culture, and nature of the area. The specialized subcommittee held in December decided that its purpose was to "summarize the relationship between the natural environment and human life in Okinawa" (Okinawa Prefectural Office of Education Cultural Property Division Historical Records Editorial Team, 2015). This perspective on the interaction between humans and nature is identical to what will later be defined as biocultural value. While other prefectural histories viewed the subject as a "nature history" with a focus on natural science, only Okinawa Prefecture had the foresight to compile a comprehensive view of the relationship between nature and culture. Toyama was appointed by the Okinawa Prefectural Education Agency in 1995 to be in charge of the compilation. When we asked Dr. Sadao Ikehara, an ecologist who served as the first chairman and head of the committee, about the background for this naming, he said,

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"The relationship between nature and people will become more important in the future," although he did not provide any specific examples at that time. Thus, in Okinawa in the 1990s, a local worldview that cognized nature not only from the science side but also as an integral part of the relationship with humans was accepted by the administration as the prefecture's desirable vision of biodiversity. Subsequently, not only scientific research but also interviews through dialogue with local communities were conducted throughout the Ryukyu Arc. In 2015, the "Okinawa Prefecture History 'Natural Environment Edition'" (Okinawa Prefectural Education Agency, Cultural Properties Division, Historical Records Editorial Team, 2015) was completed, incorporating general descriptions of biocultural diversity, as well as content from various fields, including flora and fauna. This effort also influenced the "Biodiversity Okinawa Brand Dissemination Project," one of the environmental policies of the Okinawa Prefectural Government, which will be discussed next.

4.2. Regional "Biodiversity Okinawa Strategy" and Environmental Chart

The Biodiversity Okinawa Brand Dissemination Project is one of the environmental policies implemented under the Okinawa 21st Century Vision Basic Plan, a five-year plan that began in 2016. Its objectives are to: 1) identify and comprehensively assess the current status of biodiversity in each region, 2) develop guidelines for appropriate conservation and use, and 3) brand the region by capitalizing on its biocultural values. In 2019, the Nature Conservation Division of Okinawa Prefecture began publishing the "Biodiversity Conservation and Use Guidelines OKINAWA (tentative; abbreviated as CSUBO)" as part of its branding project (Okinawa Prefecture Nature Conservation Division website). CSUBO is a guideline for biodiversity conservation that is subordinate to Japan's National Biodiversity Strategy and Okinawa Prefecture's Regional Strategy for Biodiversity. In other words, it is the foundation of biodiversity conservation. The Environmental Chart is a geographic location map that indicates the geographic location of the reference area mesh (tertiary mesh), which divides the national land into approximately 1 km meshes using code numbers (the Statistics Bureau of the Ministry of Internal Affairs and Communications website). This method uses big data, mainly information on the distribution of organisms, and the results of the environmental analysis are used in the environmental chart. Additionally, content on biocultural value based on the efforts of Okinawa Prefecture History, which has been compiled from the perspective of the interaction between nature and humanity since the 1990s, was added to this environmental chart. This was based on the recognition that human connections are important for biodiversity conservation (Okinawa Ikimono Lab Website). However, this effort has just begun, and at present, the data are insufficient. It is expected that as the survey progresses, information from each region will be added, leading to the conservation of biodiversity.

In Okinawa, a subtropical island region, unique human–nature relationships and worldviews have been nurtured, depending on the island. This biocultural diversity has attracted considerable attention, especially since the 1970s, and has been the focus of ecological anthropological research. Currently, there is a wide range of biocultural diversity in major areas, such as Okinawa Island (e.g.,, Toyama et al., 1998, 2004, 2022), almost the entire Miyako Islands (Ichikawa, 1977; Matsui, 1975a, 1975b; Toyama, 2023), and Yaeyama Islands (Yamada, 1984, 2012; Ankei website).

Furthermore, based on these efforts, in recent years, collaborative research has been conducted in various regions of the Ryukyu Arc, not only by researchers but also by local residents, to collect, record, and pass on basic data on the relationship between nature and humans, and the environmental history of the region has been clarified (Yumoto, 2011; Ankei and Toyama (Eds), 2011; Onish and Miyagi, 2016; Moriguchi and Miyagi, 2017; Toguchi, 2017; Takahashi, 2018; Takahashi, 2022; Lee Haruko, 2019; Goya and Mukai, 2022). In addition, since the 2000s, when the Ryukyuan languages were identified as "languages on the verge of extinction" by UNESCO, local communities have become increasingly interested in the inheritance of the region's unique culture and language. This growing community interest has led local governments at the municipal level to take the initiative in actively publishing nature journals and guidebooks that focus

on the unique nature of the region's relationship with nature and its people (e.g., Ginowan City, 2002; Miyakojima City, 2023). These are being used as educational materials for local studies in schools. The wisdom and creativity of biocultural diversity is not only a treasure inherited from the past but also a compass for living with nature toward the future. Awareness of biocultural values can be expected to lead to the realization of language and life based on interaction with nature, as well as to increased interest by local communities in the richness of the biodiversity living with them. Therefore, biocultural values are considered important indicators of community-based biodiversity conservation.

5. Conclusion

This study examines how policy and local culture can be linked at the global, national, regional, and local levels to achieve the conservation and sustainable use of biodiversity, specifically based on a case study of the development of a regional biodiversity strategy and the practice of recording biocultural values in Okinawa Prefecture. The biocultural approach focused on as a local practice in this study has been incorporated into the “Biodiversity Conservation and Use Guidelines OKINAWA,” which implements the Regional Biodiversity Strategy. The growing awareness of biodiversity conservation in Okinawa Prefecture based on a biocultural approach by local communities has illustrated the relevance of the bottom-up linkage of local practices interacting with nature and culture in conservation policies at the prefectural and national levels. Therefore, the biocultural approach can be utilized in management guidelines for national parks and World Natural Heritage Sites.

Okinawa's biodiversity is rich and unique in the Japanese archipelago, with a complex interplay between diverse coral reef ecosystems and subtropical forests. However, this rich nature has faced a major crisis brought about by human activities, particularly the wars of the past 100 years, the construction of U.S. military bases after World War II, and overexploitation and urbanization after Okinawa's reversion to Japan in 1972. Against this backdrop, as is clear from the regional strategy process described in this report, biodiversity conservation in Okinawa has shifted to a value system that redefines various aspects of human interactions with nature, not only in terms of natural science and economic value but also as biocultural diversity in its entirety. As described in this special issue, fieldwork conducted in collaboration with citizens has barely allowed us to collect and record basic information on the wisdom, techniques, voices, and material culture of biocultural diversity inherited from our ancestors. The Ryukyu Arc is one of the most advanced areas of biocultural diversity research in Japan. However, this effort is only at the beginning of its development, and at present, we have not been able to collect sufficient data. We hope that further research will reveal the regional characteristics of the biocultural diversity of the Ryukyu Arc, leading to biodiversity conservation. To create an island society based on sustainable and enriched interactions between humanity and nature, it is urgent to deepen specific research in the Ryukyu Arc as a comparative study through exchanges with biocultural diversity researchers and local communities in the Pacific and Southeast Asia in the future.

Conflict of Interest

Authors declare no conflict of interests.

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Endnotes

1. In a poll conducted by Japan's Cabinet Office in 2012, 19.4% of respondents (12.8% in the previous survey) said they knew the meaning of the term biodiversity, while 36.3% (23.6% in the previous survey) said they did not know its meaning but had heard of the term, both combined exceeding the majority for the first time (Japan's Cabinet Office 2012).
2. Initially, the adoption of the program was targeted for 2020, but due to the waterfront measures required in the context of the Covid-19, the adoption was delayed by two years.

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