World Natural Heritage

# Ogasawara Islands Management Plan

(Summarized version)

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Ministry of the Environment
Forestry Agency
Agency for Cultural Affairs
Tokyo Metropolitan Government
Ogasawara Village

# Contents

# 1. Introduction

The Ogasawara Islands refers to a group of islands located in the northwestern part of the Pacific Ocean to the south of the main islands of the Japanese Archipelago, spanning approximately 400 km from north to south. They show geological features that indicate the process in which an oceanic island arc that constituted the basis of the continental crust was formed, and the terrestrial lands boast unique ecosystems containing many endemic species, which are continuing to evolve through characteristic adaptive radiation. At the 35th session of the World Heritage Committee in June 2011, the Ogasawara Islands were inscribed on the World Heritage List as a natural property, on the basis of unique ecosystems having Outstanding Universal Value.

In January 2010, in nominating the Ogasawara Islands for a World Natural Heritage property, the Ministry of the Environment, Forestry Agency, Agency for Cultural Affairs, Tokyo Metropolitan Government, and Ogasawara Village (hereinafter referred to as "Management Authorities") adopted the Management Plan for the Ogasawara Islands World Natural Heritage Nominated Property, setting out basic policies and guidelines for the management of the Ogasawara Islands. And they have been taking measures for preservation and management of these islands in accordance with the Management Plan. Recently, taking into consideration the latest conditions of the natural environment and the social changes, the Management Authorities revised the Plan with a view to enhancing its effectiveness. This document is a summary of the revised management plan, World Natural Heritage *Ogasawara Islands* Management Plan (hereinafter referred to as the "Plan").

◆ Basic Idea

The Management Authorities will work for the preservation and management of the Ogasawara Islands by sharing and conforming to the basic idea that is set forth below:

> Understand correctly the Outstanding Universal Value of the Ogasawara Islands, a World Natural Heritage property, and pass on the superior natural environment of the Ogasawara Islands to future generations in good condition by ensuring coexistence between people and nature of the Ogasawara Islands.

◆ Recognition of the present condition – Upon revising the Management Plan

Due to invasion by alien species and their dispersion, substantial changes have been taking place in the ecosystems of the Ogasawara Islands even since inscription on the World Heritage List. In response to these changes, the Management Authorities made efforts to eliminate major alien species such as *Capra hircus*, *Rattus*, and *Leucaena leucocephala*, resulting in certain effects in preserving endemic species and restoring ecosystems. It also has become clear, however, that efforts to eliminate particular alien species changed the ecosystems beyond original expectation, as is shown for example in the increase in the number

of other alien species. The Management Authorities have managed to take responsive actions to address these changes so far, but in the future, more prompt and appropriate responses might be necessary.

Meanwhile, particularly on inhabited islands, there have been cases in which efforts for the preservation and management of the Ogasawara Islands affect the lives and livelihoods of local communities. In light of this, the Management Authorities decided to improve the system for the preservation and management of the ecosystems, recognizing the need to strengthen cooperation with the Scientific Council and member organizations of the Regional Liaison Committee.

# 2. Basic Information on the Management Plan

## (1) Objectives of the Management Plan

The objectives of the Plan are to clarify basic policies concerning the enforcement of various conservation and management instruments and to promote appropriate and smooth conservation and management of the natural environment of all of the Ogasawara Islands, including the area constituting the World Natural Heritage property (hereinafter referred to as “Property”).

For the conservation and management of the Ogasawara Islands, the individual Management Authorities share the objectives of conservation and management and ensure close mutual communication and cooperation with other administrative agencies, local residents, business stakeholders engaged in tourism, agriculture, and fishery, researchers, NPOs, visitors including tourists, and other stakeholders (hereinafter referred to collectively as “Stakeholders”).

## (2) Scope of the Management Plan

The Property is composed of all the islands of the Ogasawara Archipelago, excluding some parts of Chichijima and Hahajima, as well as the whole islands of Nishinoshima, Kita-iwoto, and Minami-iwoto.

For the purpose of conservation and management of the natural environment of the Property, actions such as awareness-raising programs and the removal of the impacts of alien species need to be taken. Because most of these actions must be implemented integrally without distinction between the Property and its surroundings, the Plan covers the entire Ogasawara Islands including the Property, surrounding terrestrial and marine areas, and ship navigation routes. The geographical area covered by the Plan is shown in the figure below, together with the extent of the Property inscribed on the World Heritage List.

## (3) Planning Period of the Management Plan

The Plan contains long-term goals for the next 10 years and management measures needed to achieve the goals. The Plan will be reviewed in five years and revised, as necessary, in response to changes in the natural environment and social circumstances.

## (4) Vision for Implementing the Management Plan

For implementing the Plan, Ogasawara Islands Ecosystem Conservation Action Plan (hereinafter referred to as “Action Plan”) was developed, setting out targets and activities for each island. Individual plans to be developed by each Management Authority based on different laws and individual project implementation plans shall take into account the Management Plan and the Action Plan.

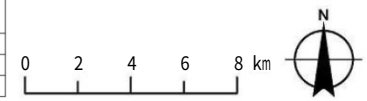
Figure 1　Major Islands Covered by the Management Plan

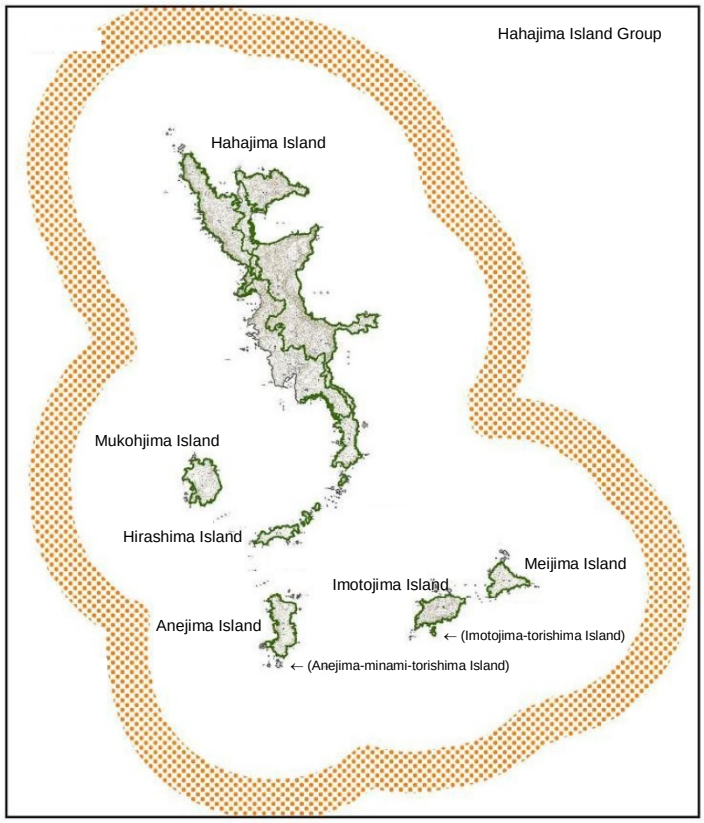
World Heritage property (land area)

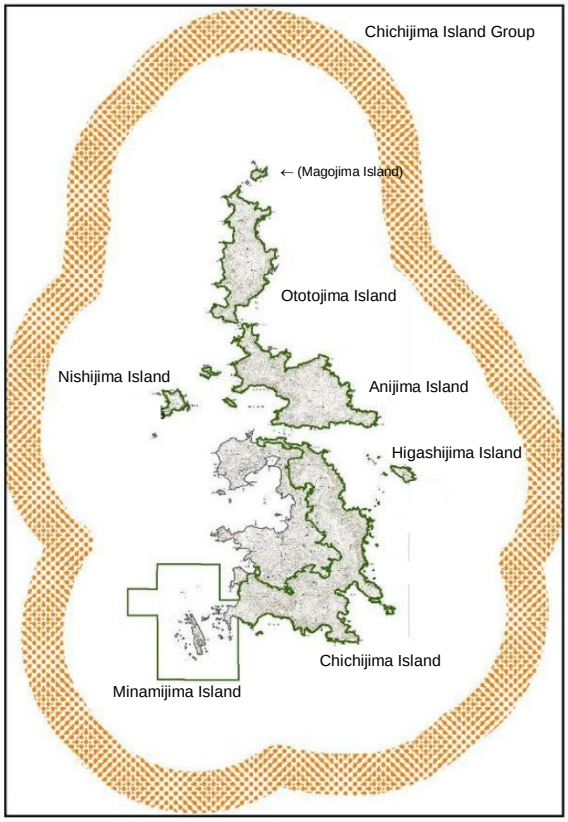
Major islands covered by the Management Plan

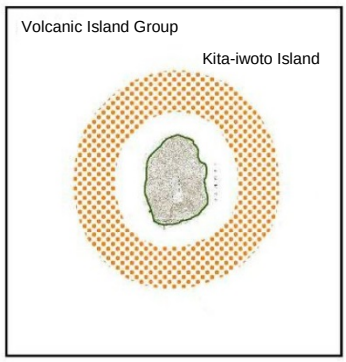
(Note) Section "5. Management Measures (7) Strategic Conservation of Ecosystems by Island" covers the islands illustrated below.

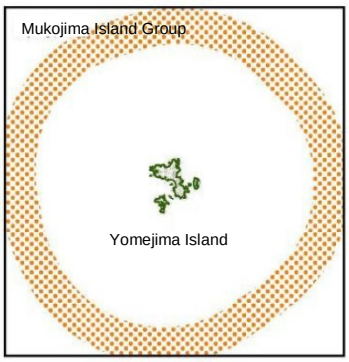
| | |
|---|---|
| Chichijima Island Group | Chichijima Island, Anijima Island, Ototojima Island (including Magojima Island), Nishijima Island, Higashijima Island, and Minamijima Island |
| Hahajima Island Group | Hahajima Island, Mukohjima Island, Anejima Island (including Anejima-minami-torishima Island), Imotojima Island (including Imotojima-torishima Island), Meijima Island, and Hirashima Island |
| Mukojima Island Group | Mukojima Island, Kitanoshima Island, Nakodojima Island, and Yomejima Island |
| Volcanic Island Group | Kita-iwoto Island and Minami-iwoto Island |
| Other | Nishinoshima Island |

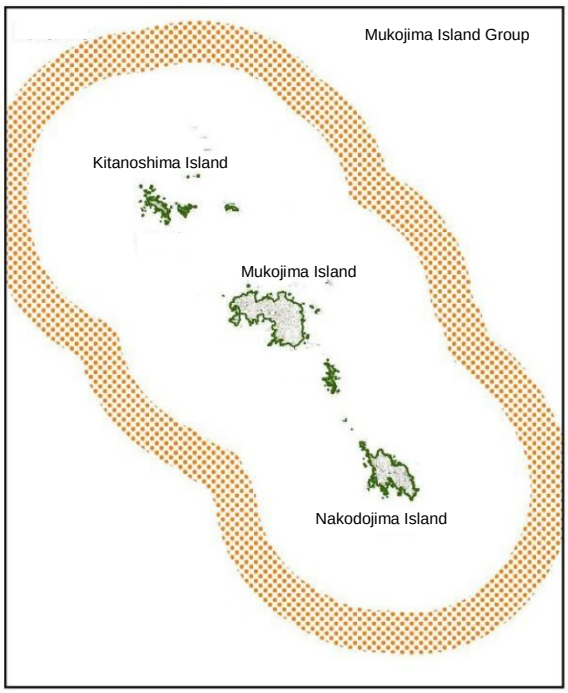


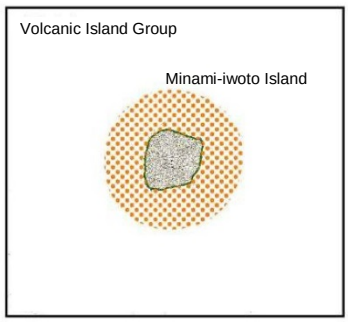



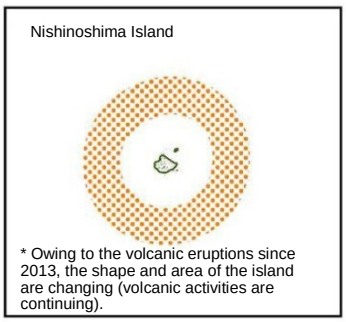



# 3. Overview of the Ogasawara Island World Natural Heritage Property

## (1) General Information

The Ogasawara Islands are a group of oceanic islands located approximately 1,000 km away from the mainland of the Japanese Archipelago.

Geologically, the islands are the only place on earth where the development process of an oceanic island arc can be observed aboveground. The strata exposed on a large scale tell the story of crustal movements from the start of the sinking of a tectonic plate some 50 million years ago to its establishment as a system of an oceanic island arc and a trench some 40 million years ago through the period of transition. In this area, the most advanced research on the evolution of an oceanic island arc is under way, and the islands are of extreme academic importance in looking into the mechanism of continental formation in the process of the earth's evolution.

Biologically and ecologically, owing to characteristic adaptive radiation and speciation, many endemic species came into being on these islands, forming unique island ecosystems. The Ogasawara Islands, which provide precious tracts of land in the northwestern Pacific, are home to many endemic and internationally important rare species.

Compared to other oceanic islands such as the Hawaii Islands and the Galapagos Islands, both of which have the natural environment typical of oceanic islands, the distinctive characteristics of the Ogasawara Islands are firstly that they have historically been less disturbed by human activity; secondly, they consist of many islands; thirdly, although none of the individual islands of the Property has high mountains and each island occupies a small area, the Property is rich in biodiversity with a large number of species of plants, land snails, and insects per unit area; and fourthly many of the species inhabiting the islands originated from the Eurasian continent. In addition, adaptive radiation and speciation are under way even today.

In 2011, the Ogasawara Islands were inscribed on the World Heritage List based on the value associated with their island ecosystems, which indicate the process of evolution as described above – particularly the high percentage of endemic land snails and vascular plants.

## (2) Natural Environment

### 1) Geology

The Ogasawara Islands are an oceanic island arc formed on the oceanic continental crust. The geology of the Izu-Ogasawara Arc on which the Ogasawara Archipelago and the Volcanic Island Group stand has continuously recorded the growing process of the oceanic island arc from its birth to the present day as a history of magmatic formation and volcanic activities. Furthermore, under the ground, the island arc's igneous activities are forming a middle crust, the essence of the continental crust, even today, indicating

that the process of the oceanic island arc is evolving into a continent. Actually, this was proven by the eruption of andesitic magma, which provides the basis for a middle crust, when in November 2013, Nishinoshima Island's volcano became active for the first time in about 40 years. For a young, immature island arc, this is a phenomenon that finds no parallel in the rest of the world. By January 2018, Nishinoshima Island had expanded to encompass its former island, and its area expanded nearly ten times (2.95 $km^2$), compared to the size before the eruption took place in 2013.

### 2) Climate and ocean currents

The Ogasawara Islands belong to a relatively mild subtropical climate zone. With a small annual and daily fluctuation range of temperature, they have a highly humid maritime climate.

There is no distinct ocean current in the seas around the islands, and the portion of the Japan Kuroshio Current that turns southward (Kuroshio Counter-Current) and the part of the North Equatorial Current that goes northward reach the islands.

### 3) Plants

Compared to the Ryukyu Archipelago, which consists of continental islands, the Ogasawara Islands lack Japanese chinquapins and evergreen oaks in the beech family, which are the dominant trees in mountain forests, and mangrove forests, which often occupy river mouths, as well as conifers such as pines, which usually dominate the continent, except *Juniperus taxifolia*, whose seeds are dispersed by birds. These are the characteristics of oceanic islands. In addition, species of diverse origins differentiated in a unique way. As a result, these islands are characterized by the large number and high percentage of endemic species per unit area even though they consist of small oceanic islands.

One example of adaptive radiation by plants is the parallel differentiation of two to three species in the same genus from the wet to dry environments.

The vegetation typical of the World Natural Heritage property includes the sclerophyllous scrub, which is adapted to the dry environment where the layer of soil is thin, and the subtropical rainforest, which is distributed in the humid environment where the layer of soil is well developed.

### 4) Animals

[Land animals]

◆ Land snails

One hundred and six native species have been recorded, 100 of which are endemic. One characteristic of these land snails is that they have achieved remarkable speciation not only between islands but also within each of them. The lifestyles of land snails in genera such as *Mandarina*, *Hirasea*, and *Ogasawarana* have diversified, indicating adaptive radiation, as they evolved in a way that suited their respective lifestyles. Furthermore, the distinctive feature of the adaptive radiation of these land snails is that such evolution occurred repeatedly on different islands and in different lines of genealogy. There are also examples of non-adaptive radiation, such as species of land snails whose shell has become small in adaptation to the wet environment, indicating that they are in the process of evolution from snails to slugs,

and populations of cryptic species with almost no visible morphological difference despite significant genetic speciation existing geographically closely. The existence of these contrasting radiation processes is an important part of the value of land snails on the Ogasawara Islands in terms of evoluation.

In terms of ecosystems, it is thought that, in particular, land snails occupy a core position in the fauna of large soil animals of the Ogasawara Islands, fulfilling an important function as decomposers.

### ◆ Insects

Up to now, more than 1,380 species have been recorded, 379 (27.5%) of which are endemic, and 18 endemic genera have been confirmed. Almost every year, undescribed species are discovered, and in the order *Coleoptera* in particular, many species (442 species) have been recorded. In recent years, many undescribed species of grasshoppers, which were considered relatively poor in terms of the number of species, have been confirmed. Among the endemic insects, particularly *Ogasawarazo rugosicephalus*, speciation has clearly been observed, and this is considered as adaptive radiation, which occurred as they adapted to the soil and arboreal environment. This is probably because of parallel evolution in each island group.

It is believed that, as a result of evolution unique to each island group and island, speciation due to geographical separation is occurring.

### ◆ Birds

Fifteen species of land birds are naturally distributed, 13 of which are endemic or subspecific. The land avifauna includes species in various phases of evolution such as *Monticola solitarius*, a widely distributed species, *Columba janthina nitens*, which moves between the Volcanic Island Group and the Ogasawara Archipelago, *Cettia diphone*, a species without genetic interchange between the Volcanic Island Group and the Ogasawara Archipelago, *Ixos amaurotis magnirostris* and *Ixos amaurotis squamiceps*, two species whose origins are different between the Volcanic Island Group and the Ogasawara Archipelago, and *Apalopteron familiare hahasima*, which does not travel between the islands, indicating decline in mobility, a typical type of evolution in oceanic islands.

So far, 21 species of seabirds has been confirmed to breed on the Ogasawara Islands, and, in particular, flocks of *Phoebastria nigripes* on the Ogasawara Islands are genetically unique.

In the Ogasawara Islands, where carnivorous mammals are not naturally distributed, *Buteo toyoshimai* is fulfilling an important function as the highest predator.

### ◆ Mammals

*Pteropus pselaphon*, an endemic species, is the only mammal that lives on the Ogasawara Islands. Since on the Ogasawara Islands there is no bird that eats large fruits, the bat is fulfilling its function as a disperser of large seeds and as an animal that carries small seeds over a long distance for dispersal.

◆ Soil animals

Details of soil animals are unknown, because few surveys have been conducted since 1977, but the rate of appearance of usually dominant species in subtropical areas such as cockroaches, termites, grasshoppers, and earthworms is characteristically low.

◆ Limnophilous animals

Unique species such as *Stenomelania boninensis*, *Paratya boninensis*, and *Ligia torrenticola* which moved from habitats that depended on the sea to brackish waters and pure freshwater areas have been confirmed, and these animals are important in clarifying the process of evolution from saltwater to freshwater life.

[Marine animals]

Hermatypic corals around the Ogasawara Islands are comparable to those around Amami Oshima Island, which is located at the same latitude, in terms of the number of species, which demonstrates remarkable diversity for isolated oceanic islands.

The majority of mollusks and fishes on and around the Ogasawara Islands are species that are widely distributed in the Indian and Pacific Oceans. However, there are also species that are endemic to the sea waters around the Ogasawara Islands, including the Izu Islands and northern Mariana Islands. In addition, some species that are distributed mainly in the area from the central Pacific Ocean to the Mariana Islands are also established as common species, making the Islands' fauna different from that of the Southwest Islands.

◆ Cetaceans

Almost all cetaceans that are distributed in or migrate to the subtropical waters in the northern Pacific Ocean are observed, and the number of species is similar to that of the Gulf of California, the Gulf of Mexico, coastal waters of Hawaii, or the Southwest Islands. Of these cetaceans, *Megaptera novaeangliae*, *Physeter macrocephalus*, *Tursiops aduncus*, and *Stenella longirostris* are confirmed as breeding in the surrounding waters of the Ogasawara Islands. These are the species that are featured in whale-watching tours.

◆ Marine reptiles (sea turtles)

*Chelonia mydas* migrate to the Ogasawara Islands for reproduction. The Ogasawara Islands are the species' northernmost and largest breeding ground in the western part of the northern Pacific Ocean.

## 5) Ecosystem interactions and evolution

The Ogasawara Islands contain islands in different stages of growth: Nishinoshima Island is an expanding island newly born from the activities of an undersea volcano, the Volcanic Island Group has a history of tens of thousands of years to hundreds of thousands of years, and the Ogasawara Archipelago

boasts a long history of more than 40 million years. These have ecosystems that correspond to the respective stages of growth.

The Ogasawara Archipelago, to which Chichijima and Hahajima Islands belong, is comprised of islands of old origin, which have been eroded to the extent that they have become lower than the Volcanic Island Group in spite of repeated uplifting. Since it contains many islands of varying sizes and elevations, there exist diverse environments such as subtropical rainforests, sclerophyllous scrubs, desert vegetations, and coastal vegetations. As a result, remarkable speciation has taken place owing to adaptive radiation and archipelagic effects.

## (3) Social Environment

### 1) History of human settlement

Human settlement on the Ogasawara Islands began with the migration of five Westerners and a dozen of people from Pacific islands, mainly Hawaii, to Chichijima Island in 1830. Subsequently, the Edo shogunate and the Meiji government of Japan carried out survey and developed these islands on a continual basis. In 1876, the Ogasawara Islands were internationally recognized as part of the Japanese territory.

In 1889, the population exceeded 1,000. In 1944, as the situation of the Second World War aggravated, all of the 6,886 inhabitants of the islands were forced to evacuate to mainland Japan, excluding those who stayed as army civilian employees.

After the end of the Second World War in 1945, the Ogasawara Islands were put under the rule of the USA; in 1968, they were returned to Japan, enabling all of the former inhabitants to return to the Ogasawara Islands.

### 2) Major economic activities

The key industries of the Ogasawara Islands are tourism, agriculture, and fisheries. In particular, since some 20,000 tourists visit the islands each year, the tourism industry are making efforts to make appropriate use of natural resources through eco-tourism.

### 3) Land ownership

The national forests supervised by the Forestry Agency account for about 80% of the total World Heritage property.

### 4) Visitors

Currently, the means of transport to the Ogasawara Islands are limited to ships. It takes 24 hours one way between Takeshiba Pier of mainland Tokyo and Chichijima Island and two hours one way between Chichijima and Hahajima Islands.

## (4) World Natural Heritage Ogasawara Island

### 1) Value of the heritage (*excerpt from the evaluation by* the *World Heritage Committee*)

The Ogasawara Islands were inscribed on the World Heritage List in June 2011 under criterion (ix) Ecosystem. The evaluation by the World Heritage Committee is as below.

◇ Criterion (ix):

The property's ecosystems reflect a range of evolutionary processes illustrated through its rich assemblage of plant species of both southeast Asian and northeast Asian origin. There is also a very high percentage of endemic species in selected taxonomic groups, resulting from these evolutionary processes. Within the flora it is an important center for active, ongoing speciation.

The Ogasawara Islands provide valuable evidence of evolutionary processes through their significant on-going ecological processes of adaptive radiation in the evolution of the land snail fauna as well as in their endemic plant species. The examples of fine-scale adaptive radiation between and sometimes within the different islands of the archipelago are central to the study and understanding of speciation and ecological diversification. This is further enhanced by the relatively low extinction rates in taxa such as the land snails.

It is the combination of both the concentration of endemism and extent of adaptive radiation evident on the Ogasawara Islands which makes the property distinct from other places illustrating evolutionary processes. When taking into account their small area, the Ogasawara Islands show exceptionally high levels of endemism in land snails and vascular plants.

### 2) Requests and encouragement from the World Heritage Committee

Requests and encouragement stated by the World Heritage Committee, which decided to inscribe the Ogasawara Islands on the World Heritage List are as follows.

| | |
|---|---|
| Request (a) | Continue its efforts to address invasive alien species. |
| Request (b) | Ensure all significant infrastructure development, including for tourism and access to the islands, is subject to rigorous prior environmental impact assessment. |
| Strong encouragement (a) | Consider further expansion of the property's Marine Park Zones to facilitate more effective management and thereby enhance the integrity of the marine-terrestrial ecosystem dynamic. |
| Strong encouragement (b) | Develop and implement a research and monitoring programme to assess and adapt to the impacts of climate change on the property. |
| Strong encouragement (c) | Ensure careful tourism management in anticipation of increased future visitation and, in particular, to strengthen the Ogasawara Ecotourism Council integrating the Scientific Council as a member of the Ogasawara Ecotourism Council and advising on appropriate tourism policies that protect the island's values. |
| Strong encouragement (d) | Ensure careful regulation and incentivization of commercial operators to manage visitor impacts, including through mandatory requirements and certification incentives for tourism operators. |

### 3) Current Status of the heritage (Changes, achievements and problems of the measures after the registration as a World Natural Heritage property)

There are unique ecosystems, including many endemic species, on the Ogasawara Islands, but various alien species have already invaded the islands, affecting the endemic species seriously and disturbing the ecosystems substantially. Therefore, in order to preserve the value of the Ogasawara Islands as a World Natural Heritage property, it is especially important to take measures to address alien species.

[Response to Request (a)]

The Management Authorities had already been working to take countermeasures against invasive alien species as one of the priorities before inscription on the World Heritage List, and after inscription, they have continued to take additional measures to preserve the value of the Ogasawara Islands. The major actions taken so far are described below.

◆ Response to alien plants

Many alien plants have already taken root on the Ogasawara Islands. In particular, tree species such as *Bischofia javanica Blume*, *Casuarina stricta Aiton*, and *Leucaena leucocephala* occupy large areas because of characteristically high environmental adaptation ability and growth speed. The Management Authorities had already been working to eliminate these species before inscription on the World Heritage List, steadily bringing about results, including the eradication of almost all *Bischofia javanica Blume* on Ototojima Island. However, there are still many islands where these alien plants account for a large percentage. Actions to be taken for alien woody plants in the future are described in the Restoration Plan for Forest Ecosystem Reserve (2016).

◆ Response to alien rats

On the Ogasawara Islands, where there is no native rat, alien rats such as *Rattus rattus* are highly invasive, preying on many endemic animals and plants to an extent that affects the ecosystems seriously. In 2007, a campaign to remove these rats using rodenticides at bait stations was launched on Nishijima Island, and in 2008, the aerial spraying of rodenticides was carried out on Higashijima and Mukojima Islands. Through these and other measures, the Management Authorities have been working to eliminate the invasive alien rats gradually from major uninhabited islands in the Mukojima and Chichijima Island Groups.

As a result, on Higashijima Island, *Rattus* was eradicated and *Puffinus bryani*, a critically endangered species, was identified.

There are many cases, however, in which individuals of *Rattus* are spotted again several months or years after the eradication campaign was carried out, indicating the possibility that they made re-invasion or that a few individuals survived the eradication campaign. On Anijima Island, the number of *Rattus* was

once reduced to a small population after the spraying of rodenticides but it has increased rapidly, affecting land snails significantly.

Although there are demands for elimination of alien rats from inhabited islands too, the feasibility is currently examined, because it is necessary to assess the risks of affecting the lives of people.

◆ Response to feral goats

Goats were introduced together with the settlement of people in Ogasawara and they have become feral. They eat a great amount of plants, causing disturbance to and/or loss of the vegetation as well as soil erosion. Therefore, even since before inscription on the World Heritage List, the removal of feral goats has been carried out. They have been successfully eradicated on the uninhabited islands of the Mukojima and Chichijima Island Groups, resulting in restoration of some endemic plants and seabirds. In this respect, the Management Authorities have achieved substantial results.

Currently, feral goats only remain on Chichijima Island and on-going efforts are being made to eliminate them. The Management Authorities are achieving positive effects such as the restoration of some endemic plants.

Meanwhile, there are places, such as cliffs, where it is technically difficult to take actions to eliminate them. In addition, there are concerns that the elimination of feral goats might result in the growth of alien plants that have been eaten by them so far. In light of this, the monitoring of feral goats and alien plants is conducted.

◆ Response to *Platydemus manokwari*

Invasive planaria, such as *Platydemus manokwari*, are extremely aggressive, significantly affecting endemic land snails by preying on them, and no effective method of their removal has been established yet. On Chichijima Island, where they already exist, they have had a great negative impact on endemic land snails since the 1990s, wiping out nearly all of them. Since 2006, in order to prevent invasive planaria from spreading from Chichijima Island to Hahajima Island and the satellite islands, where they are not established yet, the Management Authorities have been taking measures, such as cleansing the sole of shoes when passengers who travel to the island board a vessel, in addition to the installation of fences etc. to prevent the introduction of invasive planaria in an effort to preserve land snails' remaining habitats on Chichijima Island. Efforts are also being made to develop technologies to eliminate invasive planaria completely.

◆ Response to *Anolis carolinensis*

Following the sharp decrease in the number of diurnal insects on Chichijima and Hahajima Islands, which was confirmed to have occurred after around 1990, surveys were conducted, which clearly showed that it was *Anolis carolinensis* that was affecting the insects by preying on them and that this alien species was so extremely invasive that insects on the Ogasawara Islands could be driven to extinction. Since before inscription on the World Heritage List, the Management Authorities have been working to capture

*Anolis carolinensis* at ports and their vicinities in order to prevent the spread of this invasive alien species from Chichijima and Hahajima Islands, where it already spreads widely, to their satellite islands, where it does not exist yet. In addition, on Hahajima Island, they have installed fences to prevent this invasive alien species from invading the habitat of *Celastrina ogasawaraensis*, an insect endemic to the island.

In 2013, the habitation of *Anolis carolinensis* on Anijima Island was confirmed for the first time. The route of invasion is not clear, but in addition to the routes that had been assumed thus far, such as riding on oceanic currents and travelling with people or vessels, the possibility of being carried by *Buteo buteo toyoshimai* was suggested. On Chichijima Island, because of *Anolis carolinensis*, pollinator insects for the sclerophyllous scrub had disappeared, affecting the ecosystems significantly; therefore, it was likely that *Anolis carolinensis* would have similar negative impacts on the ecosystems of Anijima Island, too. For this reason, the Scientific Council declared a state of emergency and made urgent recommendations. Subsequently, fences were installed to prevent its invasion and efforts were made to capture it. As a result, its dispersion has been curbed and the population has been under control, resulting in successful prevention of decrease in the number of insects. Efforts are being made to develop technologies to eliminate this invasive alien species completely.

◆ Response to feral cats

In 1998, Ogasawara Village established the Ogasawara Village Ordinance for Proper Husbandry of Household Cats, the first of its kind in Japan, to control the raising of pet cats. In addition, it has been working to prevent domesticated cats from newly becoming feral by carrying out continuously educational activities for stakeholders inside and outside the islands.

Since 2005, because feral cats caused damage to bird populations by preying on them, the municipal government has been taking measures, including capture of feral cats in collaboration with stakeholders. On uninhabited islands, the elimination of feral cats has been completed. Also on inhabited islands, the population of feral cats has decreased in mountainous areas. As a result, great results have been achieved: for example, the reproduction of *Columba janthina nitens* and seabirds at Hahajima Island's Minamizaki Cape has recovered remarkably. A system has also been established in which captured feral cats are sent to caretakers in mainland Japan with the cooperation of stakeholders in the local community, the Tokyo Veterinary Medical Association, and others.

However, there are still issues to be addressed, including difficulties in capturing feral cats in steep mountains and the existence of feral cats difficult to capture, and countermeasures continue to be sought.

◆ Response to new alien species

In 2004, the invasion by *Pheidole megacephala*, which had already spread widely on Chichijima Island, onto Hahajima Island was confirmed. Since it became clear that it preyed on small land snails, the Management Authorities have made efforts to eliminate the species from these islands.

It also became clear that *Geonemertes pelaensis* affected the soil fauna, with no effective countermeasure developed so far. Ways to prevent invasion by these species and their dispersion are being explored.

◆ Present condition of species to be preserved

○ Plants

Since before inscription on the World Heritage List, many native plants had been subjected to affecting factors such as predation by feral goats and alien rats and suppression from alien plants. As a result, the composition of vegetation changed, and the populations of native plants decreased, and these and other factors have put some plants in danger of extinction. For this reason, the Management Authorities have been making efforts to restore native plants by continuously working to eliminate invasive alien species such as *Capra hircus*, *Bischofia javanica Blume*, *Casuarina stricta Aiton*, and *Leucaena leucocephala.*

As a result, an increasing number of alien species-dominated plant communities are recovering to those of native species every year. On Anijima Island, the number of endemic species, such as *Callicarpa parvifolia*, is on the increase.

The Management Authorities are preparing the Genetic Guidelines for Major Native Tree Species with a view to planting native species at sites from which alien plants are eliminated.

They are also implementing conservation programs for the twelve species that are designated as National Endangered Species of Wild Fauna and Flora, including *Melastoma tetramerum* and *Rhododendron boninense*.

○ Land snails

Since before inscription on the World Heritage List, invasive planaria and alien rats have been preying on endemic land snails, causing their populations to decrease, and in particular, on Chichijima Island, endemic land snails have been driven to the verge of extinction. As is exemplified by this, they are in an extremely difficult situation, and therefore the Management Authorities are working to preserve them inside and outside their habitats.

Efforts to preserve endemic land snails in their habitats involve installing electrified fences to prevent invasion of invasive planaria in Chichijima Island's Mount Toriyama, where endemic land snails still remain. However, the complete prevention of the invasion of invasive planaria has not yet been achieved, and invaded areas are gradually continuing to expand.

Meanwhile, rodenticides were sprayed on Anijima and other islands, and as a result the density of alien rats became extremely low. A significant recovery of the population of endemic land snails on Anijima Island has not been observed yet. However, no tendency of extreme decrease has been observed either, compared to the time when the density of alien rats was high.

Hahajima Island has almost as many species of land snails as Anijima Island, and *Platydemus manokwari* has not been found on the island, even though it is inhabited by people.

Efforts to preserve land snails outside their habitats involve raising them indoors, and the Management Authorities have established technology to raise and reproduce *Mandarina mandarina* indoors. They have also started to look into the possibility of reintroducing land snails on satellite islands of Chichijima Island.

[Response to Request (b)]

In relation to the implementation of various projects in the World Natural Heritage area, the Management Authorities have made progress particularly in putting in place mechanisms to integrate environmental consideration into public works, together with other measures such as the clear requirement in project specification documents of rigorous environmental impact assessment and environmental consideration prior to project implementation. With respect to the construction of an airport expected to be initiated as one of the important infrastructure development projects, a rigorous environmental impact assessment will be carried out prior to project implementation in line with discussions at the Ogasawara Air Route Committee and thorough environmental consideration will be delivered.

[Response to Strong Encouragement (a)]

The Ministry of the Environment (MoE) is checking the Park Plan for Ogasawara National Park and making adjustments to expand a protected marine area.

For five years from 2012, in order to provide the latest information for MoE's plan to expand the marine reserve, the Tokyo Metropolitan Government conducted surveys of the present condition of stony coral, mollusks, arthropods, echinoderms, and fishes at some 80 locations on and around the Mukojima, Chichijima, and Hahajima Island Groups. As a result of these surveys, the living environments, indicator species, etc. have been clarified for peculiar stony coral communities, hitherto overlooked benthic animal communities that inhabit sandy land, stoney zones, etc., biological communities that are specialized to the environments of the inner bay or the open sea, biological communities that inhabit the intertidal zone connecting the sea and land, and the diadromous biological communities. In addition, the surveys identified species endemic to the sea around the Ogasawara Islands, temperate species introduced from the Pacific coastline of the mainland, species mainly distributed in the central Pacific, and other species that show unique geographic distribution and therefore need to be conserved, as well as places of special importance in terms of the distribution of these species.

[Response to Strong Encouragement (b)]

Based on the monitoring program relevant to the effects of climate change in the forest ecosystems, the Forestry Agency is collecting and analyzing data and considering measures to adapt to the effects of climate change on the forest ecosystems.

The results of information gathering show that the temperature is rising and that, as the temperature rises, the forests are becoming dry, and there is concern about the effects of rising temperatures on vegetation and land snails.

The MOE has built a system to observe coral communities and seawater temperatures at twelve points around Chichijima Island and three around Hahajima Island and started to provide data on seawater temperatures on the website of the Ogasawara Islands Nature Information Center (ogasawara-info.jp). The results of observation indicate that the characteristics of seawater temperatures around Chichijima Island vary from one place to another and that the risk of coral bleaching is high in deep bays and the western sea area and low in the northern to eastern sea areas.

[Response to Strong Encouragement (c)]

After the inscription of the Ogasawara Islands on the World Heritage List, the number of visitors to the Ogasawara Islands increased. However, there have been no adverse effects of tourism, such as the concentrated use of tourist resources and damage to the value of the Property, because the use of tourist resources has been made in compliance with laws, ordinances, and voluntary rules, including lectures about the use of the forest ecosystem reserves. The Ogasawara Ecotourism Association has established a system to obtain advice from the members of the Scientific Council by having a member of the Council as its member and the chair of the Scientific Council as its advisor.

[Response to Strong Encouragement (d)]

Eco-tourism has been promoted since before inscription on the World Heritage List. For example, whale-watching was commercialized in 1989 and the ecotourism by the TMG was launched on Minamijima Island and Sekimon in 2002.

In 2005, sixteen related organizations inside and outside the Ogasawara Islands, such as administrative agencies, NPOs, researchers, fisheries and agricultural cooperatives, and enterprises, worked together to establish the Ecotourism Association, and since then, the Ecotourism Association has been discussing how eco-tourism should be and also has been working to build a consensus. After the Ogasawara Islands were inscribed on the World Heritage List, the Ecotourism Association started to implement the Ogasawara Land Guide System, and through daily guiding activities by registered guides, it has been making efforts to achieve both the preservation and sustainable use of nature and culture and also to educate users. Today, it continues to work to expand this system.

Also, with regard to the forest ecosystem reserves, which occupy almost all of the World Natural Heritage area, appropriate measures for conservation and management have been taken by restricting people to designated routes in principle and, requiring them, in coordination with related organizations, to be accompanied by qualified guides who have taken lectures about the use of forest ecosystem reserves.

As a result of these efforts, there have been no issues indicating the excessive use of the natural environment.

# 4. Basic Idea and Principle of Management

## (1) Basic Idea

◆ Basic Idea

Understand correctly the Outstanding Universal Value of the Ogasawara Islands, a World Natural Heritage property, and pass on the superior natural environment of the Ogasawara Islands to future generations in good condition by ensuring coexistence between human beings and the nature of the Ogasawara Islands.

## (2) Principles

In order to realize the basic idea, the Management Authorities will take actions in accordance with the principles that are set forth below.

### 1) Conservation of the natural environment, which holds the value of the heritage

The ideal goal is to restore the ecosystems that had existed before human beings came to the Ogasawara Islands; however, if technical limits are taken into consideration, the basic principle is to prevent invasive alien species from interfering with the value of the Property to the extent possible. In addition, the Management Authorities will properly conserve and manage the individuals, communities, and habitats of endemic and rare species that constitute the core value of the heritage in an effort to avoid their extinction.

### 2) Continuing measures against invasive alien species

Invasive alien species are introduced either intentionally or unintentionally into the islands, as a result of the movement of people and goods, administrative measures, economic activities, and so forth. They exert various kinds of influence on the Ogasawara Islands' ecosystems. It is important to take measures to address this issue.

To that end, the Management Authorities will take efficient and effective countermeasures, paying attention to species that move over wide areas and the complex relationships between species that vary from one island to another, while accumulating knowledge, technology, etc. and obtaining a deeper understanding of the already lost functions of ecosystems and the functions fulfilled by alien species.

The Management Authorities recognize that it is important to prevent new alien species from being introduced and prevent already introduced alien species from spreading to areas into which they have not been introduced yet. Along with the measures to address already introduced alien species, the Authorities will carry out actions to inform and educate people about the importance of this policy.

### 3) Harmony between daily life of humans and nature

The cooperation of local communities and visitors and the nationwide support of people are essential for maintaining the World Natural Heritage property.

The Management Authorities will take measures to maintain the World Natural Heritage property, while obtaining the understanding of local people about how the daily lives of people and nature should be harmonized and sharing with them the significance and necessity of measures taken.

### 4) Adaptive conservation and management

In preserving and managing the ecosystems, the Management Authorities will make efforts to reduce the negative impacts of various projects by predicting their negative impacts on the ecosystems. Furthermore, they will conduct long-term, continuous surveys of various items, including the effects of climate change. Based on the results of these surveys, they will implement adaptive conservation and management.

They will also work to reach a consensus over matters that need to be reconsiled with the lives of local communities and others by providing appropriate information and taking necessary measures.

# 5. Management Measures

## (1) Proper Enforcement of Protective Instruments

The existing laws and protective systems guarantee the protection of the value of the Ogasawara Islands as a World Natural Heritage property. The Management Authorities will appropriately enforce the protection systems for the preservation and management of the Ogasawara Islands' excellent natural environment, including endemic and rare species, the unique ecosystems that consist thereof, and geological features that show the formative process of the oceanic island arc.

In addition, the Management Authorities will review the protective systems, responding to changes in natural and social situations as required, and improve the management methods, including the development of measures to ensure the protection of Nishinoshima Island, where a new tract of land emerged with the eruption of a volcano in 2013.

◆ Long-term goal

The Management Authorities should continue to enforce the protection systems appropriately and make efforts to improve the management systems.

◆ Protection systems

- Wilderness Area
- National Parks
- Forest Ecosystem Reserves
- National Wildlife Protection Area
- National Endangered Species of Wild Fauna and Flora
- Natural Monuments
- Other systems addressing alien species

## (2) Prevention of Introduction and Dispersion of New Alien Species

In accordance with the basic principle "To continue measures to address invasive alien species," the Management Authorities will take the following actions:

◆ Long-term goal

The Management Authorities, recognizing the prevention of invasion and dispersion of new alien species as an important issue, determine the roles of the relevant organizations and stakeholders and implement measures whenever feasible. While continuing technological development for effective countermeasures, they should consider systems and devices by obtaining the understanding of stakeholders through education and information dissemination.

## 1) Ecosystem conservation, management, and research

◆ Past actions

- For the projects that are implemented by third parties based on the contract with the Management Authorities, contract documents clearly require compliance with environmental consideration. In addition, guidelines and rules have been made to prevent the invasion and dispersion of invasive alien species and to ensure appropriate use of natural resources of the Ogasawara Islands.
- The Ogasawara World Heritage Centre, which opened in 2017, has an inspection and treatment room equipped with a clean room, in which materials that are employed for surveys and projects are frozen, fumigated, and stored.

◆ Policies for future actions

- The concrete contents of the prevention of the invasion and dispersion of invasive alien species will be clarified in writing and adopted based on the agreement of all the members of the Management Authorities as the common mandate that they should comply with.
- With regard to surveys and other projects that are carried out by organizations other than the Management Authorities, thorough consultation will be made to request them to comply with the common mandate, taking advantage of individual legal procedures.
- Prompt actions will be taken to establish systems to take countermeasures against alien species at wharfs and Hahajima Island, where there is concern about invasion and dispersion of new alien species.

## 2) Greening and construction works

◆ Past actions

- Guidelines for environmental consideration in public works and a list of recommended tree species have been prepared to promote good practices to prevent invasive alien species, for example encouraging that, whenever native tree species are used, trees that have been locally grown on the Ogasawara Islands should be selected and that closely related species should not be used to avoid hybridization with endemic species.

◆ Policies for future actions

- When projects are implemented within the islands, the Management Authorities will provide appropriate guidance to project managers in preventing invasion and dispersion of alien species and and review the existing guidelines etc., as required, taking into account the latest information.
- The Management Authorities other than the Tokyo Metropolitan Government (TMG) will be requested to implement projects in conformity with the standards required for TMG-implemented projects, and other administrative agencies will be requested to do so in accordance with TMG's guidelines.

### 3) Use of natural environment

◆ Past actions

- The use of the natural environment is accompanied by the risk of spreading invasive alien species, which may stick to people's clothing, soles, etc. Therefore, the Management Authorities are taking measures such as cleansing the soles of users' shoes before they land on satellite islands and removing seeds that stick to users' bodies at the entrance of walkways.
- In addition, the Management Authorities have established rules for various types of use of nature and are working to raise awareness of people by distributing brochures and putting up posters.

◆ Policies for future actions

- The Management Authorities will sort out rules to be observed and actions to be taken to prevent invasion and dispersion of invasive alien species, taking into account the latest information. They also establish guidelines accessible to local communities, tourism operators, visitors, guides, and other stakeholders and raise public awareness.

### 4) Agricultural activities

◆ Past actions

- Seedlings (for agricultural use) that are introduced mainly from the mainland, the Southwest Islands, and overseas countries with soil attached to them carry the risk of invasive alien species spreading from the agricultural land where they are planted. Therefore, the Management Authorities have taken measures such as providing farmers with relevant information for prevention of the introduction of alien species.

◆ Policies for future actions

- With respect to seedlings with soil attached to them, the Management Authorities will look into the possibility of developing technologies and putting in place implementation mechanisms that can reduce risks of invasion of invasive alien species, while obtaining the understanding of farmers. They will also assess other risks associated with earth, fertilizers, biopesticides, etc. and examine measures to address them.

- The Management Authorities will call on farmers to consult with them in advance in case they intend to introduce plant species that are known to be invasive for agricultural uses and provide guidance to them concerning the adequacy of such introduction and management practices.
- They will also consider putting in place mechanisms to control the introduction of alien species.

### 5) Care and introduction of domesticated animals and garden plants

◆ Past actions

- The Management Authorities have been working to ensure the proper husbandry of pet animals mainly through the Ogasawara Village Ordinance for Proper Husbandry of Household Cats as well as the activities of the Ogasawara Cat Liaison Committee and the Council for Island Development through Coexistence of People, Pets, and Wild Animals in Ogasawara, which was established in FY2016.

◆ Policies for future actions

- The Management Authorities will work to raise public awareness about the proper husbandry of pet animals and institutionalize new systems and implementation meachanisms, while obtaining the understanding of local communities.
- As it is becoming normal for people to purchase horticultural plants on the Internet etc., the Management Authorities will examine measures to deal with them in the same way as plant species for agricultural uses.

### 6) Movement of goods and people by regular cargo and passenger ship services

◆ Past actions

- When passengers on the Ogasawara-Maru and Hahajima-Maru disembark, the Tokyo Metropolitan Government’s rangers and other staff members visually check whether they bring animals and/or plants with them and ensure that they cleanse the soles of the shoes before landing.
- In addition, the Management Authorities alert people to the risks of invasion of alien species by distributing brochures and putting up posters and provide cooperation and guidance to school education programs for elementary and junior high school students.

◆ Policies for future actions

- The Management Authorities will further alert people to the risks of introduction of alien species etc. which could take place through regular cargo and passenger ship services, while obtaining the understanding of local communities. In addition, they will look into the possibility of applying similar measures to address irregular arrivals of cargo boats, cruise ships, yachts, etc.

## (3) Environmental Consideration in Individual Projects and Research

In accordance with the basic principle of striking "[h]armony between daily life of humans and nature", the Management Authorities will not only comply with laws and regulations for environmental protection, but also integrate environmental consideration in various projects they implement, including conservation and management works and civil engineering works, to avoid and reduce their negative impact on the natural environment while aiming to achieve the objectives of these projects, as follows:

◆ Long-term goal

Management Authorities and other implementing agencies put in place mechanisms to raise the awareness for environmental consideration, share information about environmental consideration, and ensure compliance.

## (4) Promotion of Lifestyle in Harmony with Nature

In accordance with the basic principle of striking "[h]armony between daily life of humans and nature", the Management Authorities will promote actions for conservation and management, while obtaining the full cooperation and understanding of local communities of people living on the Ogasawara Islands, and businesses engaged in tourism, agriculture, fisheries, and other industries, as follows:

◆ Long-term goal

◎Raising awareness and promoting the participation of stakeholders

Management Authorities create opportunities for stakeholders, including local communities, to participate in conservation and management activities and support voluntary work by local groups.

◎Training human resources to support the future of the Ogasawara Islands

Education of children at school and at home will be enhanced, so that local children can deeply understand the value of the natural heritage, participate in conservation activities with pride, and play a role in transmitting information inside and outside the village.

◎Promotion of industries in harmony with nature

Actions to support the sustainable use of natural resources, respecting the rich natural environment, will be promoted not only in tourism, but also in agriculture, fisheries, etc.

## (5) Promotion of Ecotourism

In accordance with the basic principle of striking "[h]armony between daily life of humans and nature", the Management Authorities will promote ecotourism to minimize the impact of tourism on the natural

environment and to enable visitors to enjoy and understand the value of the islands' ecosystems at the same time, as follows:

◆ Long-term goal

◎Sustainable use of natural resources by promoting eco-tourism

Sustainable tourism will be promoted by enforcing utilization rules and operationalizing relevant mechanisms based on the principles of eco-tourism.

## (6) Monitoring and Management of Information

In accordance with the basic principle of "[a]daptive conservation and management", the Management Authorities will continuously conduct surveys and manage information properly in close cooperation with researchers and NPOs, as follows:

◆ Long-term goal

◎Implementation of continuous research

To implement research on a continual basis, changes in the natural environment etc. will be monitored in the long term to the extent possible.

◎Sharing and utilization of information

Information obtained as a result of research will be collected, shared, and utilized for the theoretical and technical improvement of conservation and management works and for effective and sustainable conservation and management of the natural environment. In addition, obtained information etc. will be disseminated and interpreted to villagers, so that they can easily understand.

## (7) Strategic Conservation of Ecosystems by Island

The Ogasawara Islands consist of small oceanic islands, each of which witnessed its own process of speciation, resulting in distinctive ecosystems and species structures that vary from one island to another. In addition, the way that people interact with nature, the historical background of such interactions, and the degrees of impact of invasive alien species are also different from one island to another.

For this reason, the Management Authorities handle each island as a basic unit for the purposes of conservation and management and set out goals and policies for specific measures for each island, based on which ecosystem conservation and management will be carried out.

| | Policies for specific measures | Long-term goals |
|---|---|---|
| 1) Chichijima Island (Chichijima Island Group) | Since the island has a large area, and the negative impacts of alien species are substantial, it takes time to restore the ecosystems. For the time being, the ecosystems in Higashidaira and other important areas where there is concern about the effects of alien species will be preserved, and emphasis will be placed on preventing decreases in the number of endemic and rare species and their extinction. On the other hand, the Management Authorities will encourage steady progress in technology for countermeasures against alien species and work on countermeasures against alien species that incorporate new methods. Furthermore, they will lead these initiatives to coexistence with nature by making the most of Chichijima's strength as an inhabited island to restore the ecosystems mainly through collaboration with local residents and tourists. | ◎To restore the ecosystem mainly based on native vegetation such as sclerophyllous scrubs, *Schima mertensiana*, etc.<br>◎To conserve the habitats of endemic land snails in the ongoing evolutionary process.<br>◎To restore the habitats for endemic insects<br>◎To conserve the habitats of the wood-pigeon and with the goal of stabilizing the habitation of this species in combination with actions to be implemented on the other islands.<br>◎To conserve the habitats of the Bonin flying fox with the goal of stabilizing the habitation of this species in combination with actions to be implemented on the other islands.<br>◎To prevent the introduction and dispersion of new alien species.<br>◎To be in harmony with nature in various kinds of activities, industries and daily lives of humans. |
| 2) Anijima Island (Chichijima Island Group) | In the Chichijima Island Group, nature is preserved most in Anijima's central plateau. The Management Authorities will consider the area as an important base and make all-out efforts to eliminate alien species in an effort to preserve its ecosystems. In other areas, they will take necessary countermeasures according to the degree of their importance. In addition, they will work to prevent invasion by new alien species. | ◎To restore the ecosystem mainly based on sclerophyllous scrubs.<br>◎To conserve the habitats of endemic land snails in the ongoing evolutionary process.<br>◎To conserve the habitats of endemic insects such as *Cicindela bonina*.<br>◎To conserve the habitats of birds such as the Japanese wood-pigeon and Bonin flying fox with the goal of stabilizing the habitation of these species in combination with actions to be implemented on the other islands. |
| 3) Ototojima Island (Chichijima Island Group) | In the Chichijima Island Group, Ototojima Island is important as an island without *Anolis carolinensis* which provides habitats for insects. The Management Authorities will strive to restore the ecosystems while paying attention to the restoration of not only insects but also the populations of various endemic and rare species. | ◎To restore the ecosystem mainly based on *Schima mertensiana*.<br>◎To conserve a pure population of *Morus boninensis.*<br>◎To conserve watersheds that serve as habitats of endemic dragonfly species or aquatic organisms.<br>◎To conserve the habitats of birds such as the Japanese wood-pigeon and Bonin flying fox with the goal of stabilizing the habitation of these species in combination with actions to be implemented on the other islands. |

| | | |
|---|---|---|
| 4) Nishijima Island (Chichijima Island Group) | The island's vegetation is strongly affected by human activities, but it provides precious safe havens for small animals because it does not have *Anolis carolinensis*, *Platydemus manokwari*, and *Geonemertes pelaensis*. The Management Authorities will strive to restore the ecosystems making the most of nature's ability to recover while preventing invasion by alien species. | ◎To conserve the ecosystem mainly on native vegetation, including animals such as endemic land snails and insects, etc.<br>◎To conserve the habitats of birds such as the Japanese wood-pigeon and Bonin flying fox with the goal of stabilizing the habitation of these species in combination with actions to be implemented on the other islands. |
| 5) Higashijima Island (Chichijima Island Group) | Higashijima is the Chichijima Island Group's only island from which *Rattus rattus* has been eradicated. The Management Authorities will strive to preserve endemic land snails and rare birds and at the same time take necessary preservation measures while monitoring the process in which the ecosystems are restored. | ◎To conserve the ecosystem mainly on native vegetation, including endemic land snails, etc.<br>◎To conserve the breeding sites of seabirds. |
| 6) Minamijima Island (Chichijima Island Group) | As the ecosystems are being restored, the Management Authorities will strive to both take measures needed to preserve the ecosystems and utilize them while making the most of the advantage of being not invaded by *Platydemus manokwari* and *Anolis carolinensis.* | ◎To conserve the ecosystem mainly based on native vegetation.<br>◎To conserve the breeding sites of seabirds.<br>◎To promote ecotourism. |
| 7) Hahajima Island (Hahajima Island Group) | In important areas where the ecosystems of subtropical rainforest remain in a good condition, the Management Authorities will preserve vegetation making the most of nature's ability to recover with focus on the elimination of alien species. In other areas, they will take time to restore vegetation, but new methods such as planting will be used as required. Since Hahajima is the largest island that has not been invaded by *Platydemus manokwari*, invasion by the species must be prevented. The Authorities will pay particular attention to preserving endemic and rare species such as *Celastrina ogasawaraensis* and *Carduelis sinica kittlitzi*. Through these efforts, they will enhance the attraction of the island and seek coexistence with nature. | ◎To restore the ecosystem mainly based on endemic vegetation such as subtropical rainforest, *Ardisia sieboldii* forest, and the sclerophyllous scrub typical of the Hahajima Island Group, and forests dominated by *Dendrocacalia crepidifolia* in a cloud belt.<br>◎To conserve the habitats of endemic land snails in the ongoing evolutionary process.<br>◎To conserve the habitats of endemic insects such as *Celastrina ogasawaraensis*.<br>◎To conserve the habitats of birds such as the Japanese wood-pigeon.<br>◎To conserve the habitats of Bonin flying fox.<br>◎To prevent the introduction and dispersion of new alien species.<br>◎To be in harmony with nature in various kinds of activities, industries and daily lives of humans. |

| | | |
|---|---|---|
| 8) Mukohjima Island (Hahajima Island Group) | The Management Authorities will make all-out efforts to guide people to prevent invasion by new alien species and take adaptive countermeasures against alien species to enable endemic species to survive while paying attention to correlations between species. | ◎To conserve the ecosystem mainly based on the sclerophyllous scrub typical of the Hahajima Island Group, including endemic land snails.<br>◎To conserve the habitats of *Carduelis sinica* and *Apalopteron familiare hahasima*. |
| 9) Anejima Island (Hahajima Island Group) | The Management Authorities will make all-out efforts to guide people to prevent invasion by new alien species and take adaptive countermeasures against alien species to enable endemic species to survive while paying attention to correlations between species. | ◎To conserve the ecosystem mainly based on the sclerophyllous scrub typical of the Hahajima Island Group, including endemic birds and animals. |
| 10) Imotojima Island (Hahajima Island Group) | The Management Authorities will make all-out efforts to guide people to prevent invasion by new alien species and take adaptive countermeasures against alien species to enable endemic species to survive while paying attention to correlations between species. | ◎To conserve the ecosystem mainly based on the sclerophyllous scrub typical of the Hahajima Island Group, including endemic land snails.<br>◎To conserve the habitats of *Carduelis sinica kittlitzi* and *Apalopteron familiare hahasima*. |
| 11) Meijima Island (Hahajima Island Group) | The Management Authorities will make all-out efforts to guide people to prevent invasion by new alien species and take adaptive countermeasures against alien species to enable endemic species to survive while paying attention to correlations between species. | ◎To conserve the ecosystem mainly based on the sclerophyllous scrub typical of the Hahajima Island Group, including animals such as endemic land snails and insects. |
| 12) Hirashima Island (Hahajima Island Group) | The Management Authorities will make all-out efforts to guide people to prevent invasion by new alien species and take adaptive countermeasures against alien species to enable endemic species to survive while paying attention to correlations between species. | ◎To conserve the ecosystem mainly based on original vegetation, including animals such as bird species. |
| 13) Mukojima Island (Mukojima Island Group) | Alien rats have been eradicated from the island. The Management Authorities will strive to preserve vegetation and rare birds and take necessary, adaptive measures to preserve the ecosystem while monitoring the process in which the ecosystems are restored. | ◎To conserve and restore the ecosystem mainly based on the *Ardisia sieboldii* forest, including animals such as endemic insects, etc.<br>◎To conserve the breeding sites of three species of albatross. |
| 14) Kitanoshima Island (Mukojima Island Group) | The Management Authorities will take measures to preserve seabirds, vegetation, etc. as required. | ◎To conserve the ecosystem mainly based on original vegetation.<br>◎To conserve the breeding sites of seabirds. |

| | | |
|---|---|---|
| 15) Nakodojima Island (Mukojima Island Group) | Goats have significant effects on vegetation as they eat it, and it is necessary to restore the vegetation. To that end, it is desirable to eliminate *Rattus*. Then, the Management Authorities will strive to restore seabirds and vegetation based on Mukojima's experience. | ◎To conserve and restore the ecosystem mainly based on original vegetation.<br>◎To conserve the breeding sites of seabirds. |
| 16) Yomejima Island (Mukojima Island Group) | The Management Authorities will work to restore the ecosystems by taking measures such as eliminating *Rattus rattus*, which hinders the restoration of vegetation and the reproduction of seabirds. | ◎To conserve and restore the ecosystem mainly based on original vegetation.<br>◎To conserve the breeding sites of seabirds. |
| 17) Kita-iwoto Island (Volcanic Island Group) | In order to ascertain the present condition, the Management Authorities will conduct monitoring as required. | ◎To conserve ecosystems unique to oceanic islands. |
| 18) Minami-iwoto Island (Volcanic Island Group) | The Management Authorities will analyze and publish the results of past surveys and minimize human effects, including research and studies. | ◎To minimize human influence on the environment, including investigation and research and conserve ecosystems unique to oceanic islands that remain in a primeval condition. |
| 19) Nishinoshima Island (Other) | Owing to volcanic activity, the island is in a condition similar to the beginning of oceanic island ecosystems. In order to protect its condition, human effects such as research and studies should be minimized. | ◎To conserve ecosystems unique to oceanic islands that remain in a primeval condition. |

# 6. Management System

## (1) Management Authorities

In order to preserve the value of the World Natural Heritage property, the national government of Japan will serve as the contact and also the coordinator for preservation and management based on this Plan, operate the protection system, and implement concrete measures. Local governments will work with the national government to implement various measures from the perspective of protecting natural resources that are also the property of local communities.

If new issues that need to be addressed urgently arise or if it is not clear which agency is responsible, the Management Authorities will promptly consider putting in place an appropriate framework to address these issues, including the division of roles and the allocation of human and financial resources.

## (2) Adaptive Management System Based on Scientific Findings

Since there are uncertainties in predicting changes of ecosystems, the Management Authorities will conduct preservation and management in an adaptive manner by exploring and implementing several alternative measures in parallel, based on scientific knowledge obtained from continuous researches and studies of the natural environment and with advice from the Scientific Council (Figure 2).

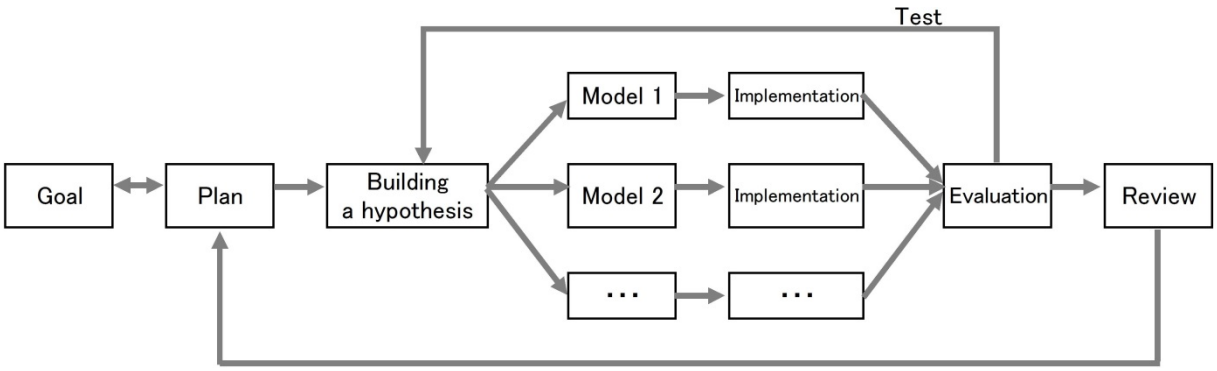



Figure 2 The Concept of Adaptive Management

## (3) Coordination Among Stakeholders

### 1) Regional Liaison Committee

The Regional Liaison Committee widely collects opinions and proposals from related organizations and other stakeholders through regular sessions and makes necessary communication and coordination to achieve both the conservation of the excellent natural environment and the high quality of life of local communities.

The Regional Liaison Committee encourages active involvement of and independent initiatives by its members.

2) System to examine local issues

Among the issues to be addressed for the protection of the World Natural Heritage property, those which particularly require the active participation and cooperation of local communities and/or the formation of a consensus among them are taken up as special “local issues”, for which working groups etc. are set up, as necessary, to have discussion with the participation of people who are closely related to individual issues. In the process of discussion, communications with the Scientific Council and experts will be ensured, so that information about the issues that need to be solved will be shared and necessary advice can be obtained from them (Figure 3).

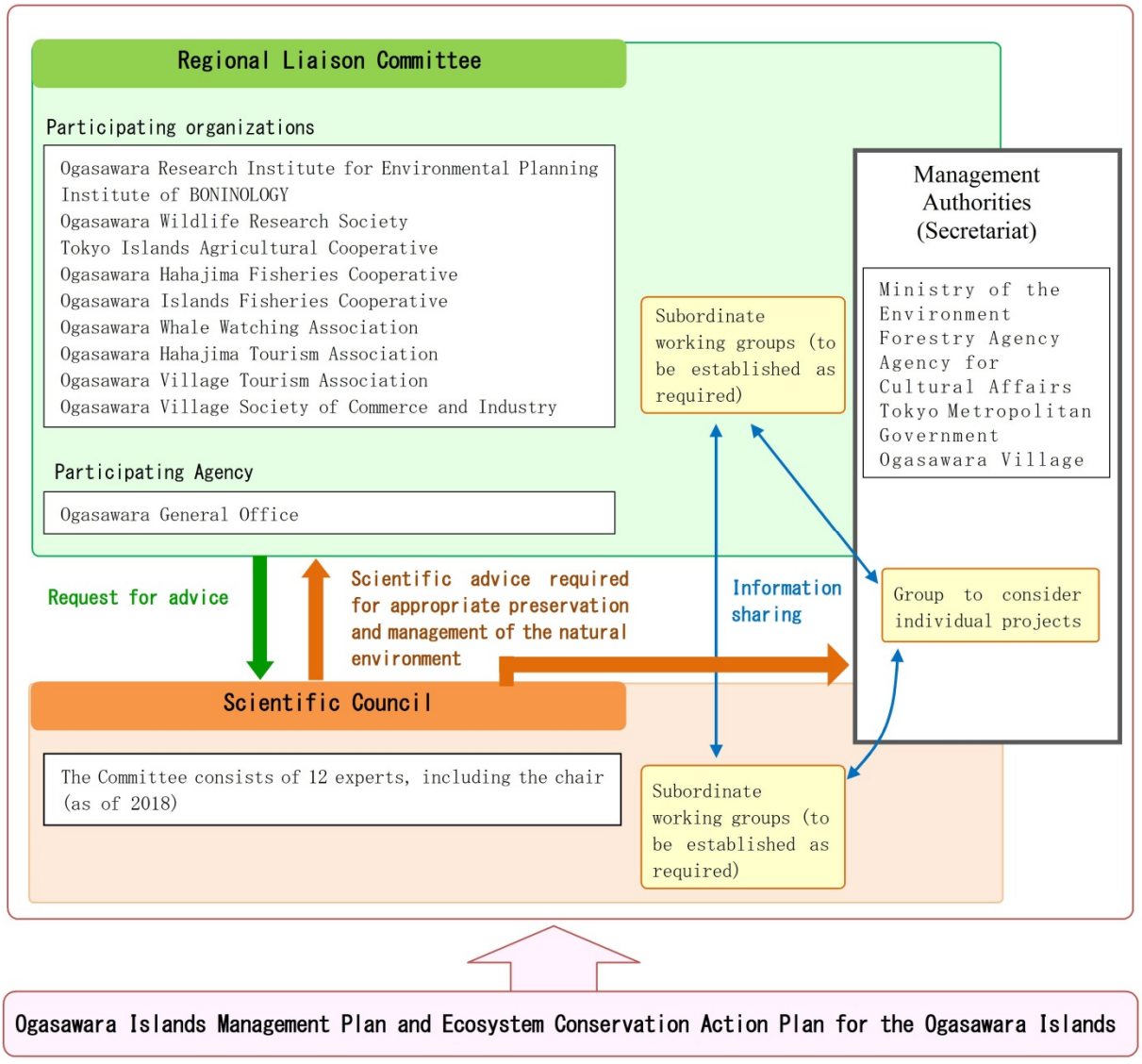



Figure 3 Conceptual Diagram of the System to Consider Issues

### (4) Cooperation with Domestic and Foreign Parties

In 2016, the World Natural Heritage Area Network Council was formed by eight municipalities located in the World Natural Heritage area to share information among them and work together for information dissemination .

The Council will share advanced examples and experiences with people in Japan and abroad, in coordination with scientific councils of other World Natural Heritage areas, and contributes to the conservation of the natural environment in the world.

## 7. Conclusion

The Management Authorities will work closely with each other for the preservation and management of the Ogasawara Islands, which boast a natural environment with no parallel in the rest of the world, and take various measures with active participation and cooperation of local communities and other stakeholders.

## Reference - Explanations about terms

[World Heritage]

| | |
|---|---|
| World Heritage property | A property of Outstanding Universal Value (particularly important value for humanity as a whole) which is considered by the World Heritage Committee as having heritage to be preserved for the future and inscribed on the World Heritage List. |
| World Heritage Committee | Intergovernmental committee established in the United Nations Educational, Scientific, and Cultural Organization (UNESCO) which consults about World Heritage. |
| Criteria | Inscription standards included in the Operational Guidelines for the Implementation of World Heritage Convention. Criterion (ix) (“Ecosystems”) applies to the Ogasawara Islands. The islands have been recognized as having Outstanding Universal Value because they have an extremely high ratio of endemic species for oceanic islands and because biological evolution is progressing there. |

[Place names]

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|---|---|
| Ogasawara Islands | Ogasawara Archipelago + Volcanic Island Group + Nishinoshima, Minamitorishima, and Okinotorishima Islands |
| Ogasawara Island Group | Mukojima, Chichijima, and Hahajima Island Groups |
| Volcanic Island Group | Iwoto, Kita-iwoto, and Minami-iwoto Islands * Nishinoshima is included in some cases. |

* The World Natural Heritage area includes the Ogasawara Archipelago as well as Kita-iwoto, Minimi-iwoto, and Nishinoshima Islands.

[Heritage management etc.]

| | |
|---|---|
| Management Authorities | Ministry of the Environment, Forestry Agency, Agency for Cultural Affairs, Tokyo Metropolitan Government, and Ogasawara Village |
| Other administrative agencies | Ogasawara General Office (Ministry of Land, Infrastructure, Transport and Tourism), Japan Coast Guard, Ministry of Defense, etc. |
| Regional Liaison Committee | The official name is the Ogasawara Islands World Natural Heritage Area Regional Liaison Committee. Established to consider ideal ways to manage the World Natural Heritage area in the Ogasawara Islands appropriately, the Committee aims at realizing them through promoting smooth communication and coordination among the related member organizations. Refer to Reference (4) The outline of establishment. |
| Scientific Council | The official name is the Ogasawara Islands World Natural Heritage Area Scientific Council. The Council, which consists of experts, has been established to give scientific advice required for appropriate preservation and management of the natural environment in the Ogasawara Islands. Refer to Reference (5) The outline of establishment. |
| Stakeholders | Various people engaged in activities in the Ogasawara Islands, including local communities living on the islands, operators in tourism, agriculture, fisheries, and other industries, researchers and members of NPOs, and persons visiting the islands for purposes such as sightseeing. |
| Species to be preserved | All species of life that are covered by human preservation activities, including the elimination of the effects of alien species, in order to hand the excellent natural environment of the Ogasawara Islands over to posterity in a healthy condition. |
| Adaptive management | Method of recognizing the uncertainty of predicting the future in planning and managing the natural environment while reviewing the plans through continuous monitoring and verification. |

| | |
|---|---|
| Eco-tourism | Tourism in which people take time to experience nature while paying attention to the preservation of the local natural environment.<br>◇Basic idea for eco-tourism in Ogasawara: Developing the islands so that the residents of the islands can live comfortably by handing the islands' irreplaceable nature to posterity and ensuring that visitors can experience the nature of the islands and the history and culture cultivated by it. |

[Geography and geology]

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| Middle crust | The earth's crust is divided into the upper crust and the lower crust according to its geological features, but if, between the two, there is another layer with different geological features, it is classified as the middle crust. |
| Oceanic island | Island that has never come into contact with a continent since its birth. |
| Oceanic island arc | Islands dispersed in an arc on the upper of the two oceanic tectonic plates along the subduction zone where one of the two sinks beneath the other. |
| Island arc volcanic activities | Generation, movement, and fixing of island arc magma as well as overall events that occur as a result thereof. |
| Cloud belt | Area where clouds and fog are often generated by ascending air currents, which arise along the slope of an island. |

[Living things (general)]

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| Land snail | Snail that lives on land all its life. |
| Vascular plant | General name for plants with vascular bundles, referring to pteridosperms and spermatophytes. |
| Hermatypic coral | Species of coral that build a reef as a skeleton is formed and calcification is promoted owing to the activity of zooxanthellae, which live in the coral. |
| Pollinator insect | Insect that acts as an agent for pollination mainly by attaching pollen to its body and carrying it. |
| Mollusk | Class of animals which have a soft body, including shellfish, octopuses, and squids. |
| Echinoderm | Class of animals, including starfishes, urchins, and holothurians. |
| Benthic animal | Animal that lives mainly on the bottom of the water. |
| Indicator species | Living thing that serves as an easy-to-understand mark for humans to identify the distinctive features of the environment and ecosystem of a particular place as well as their changes. |
| Ecosystem | System identified by putting together all living things in a particular area and its environment and paying attention to relationships between species and material circulation. |
| Native species | Species of life that have existed in a particular area since early on and its line. |
| Alien species | Living thing that originally did not exist in a particular area but has been introduced from another area through human activity. |
| Invasive alien species | Those of alien species which significantly affect the ecosystem into which they invade. |

[Living things (evolution)]

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|---|---|
| Speciation | Process in which a group of individuals with different characteristics is generated from a species of life and with the passage of time becomes another species which can no longer leave offspring by intermingling with the original species. |

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|---|---|
| Genetic differentiation | Term used to explain speciation from a genetic viewpoint. |
| Parallel evolution | Process in which living things in close lines that have a common ancestor come to have similar characters. The process in which living things in different lines come to adopt the same lifestyle as a result of adaptive radiation is called “convergence.” |
| Adaptive radiation | Process in which one species of life is physiologically and morphologically divided into many species in a way that adapts to various environments. |
| Archipelagic effect | Process in which speciation occurs in each island of an archipelago, generally causing more diverse ways of evolution to occur than in isolated islands. |
| Undescribed species | Living thing that is not considered as one independent species. |
| Subspecies | Taxonomically, a subspecies refers to a group of living things placed under the species which share unique characteristics and are distributed in a particular area. Subspecies in the same species occupy distribution areas that do not overlap each other, and they can latently be crossed. |
| Endemic species | Species of life that lives, grows, and reproduces only in certain areas. |
| Endemic subspecies | Term to emphasize that a particular subspecies is especially endemic. |
| Specific species | Taxonomically, a specific species refers to a species of life distributed in a limited area which is classified at the “genus” level rather than at the “species” level. |
| Cryptic species | Species that are traditionally treated as the same mainly because they cannot practically be distinguished in morphological terms but are classified as different due to DNA analysis and do not cross each other. |
| Widely distributed species | Living thing that is distributed not only in isolated islands and limited areas but also in wide areas. |
| Rare species (rare plants and animals) | Term used to emphasize that particular species such as those designated as National Endangered Species of Animals and Plants are driven to the verge of extinction. |

* The books listed below are referred to for descriptions.
  - *Iwanami Dictionary of Biology*, Iwanami Shoten, 1998
  - *Dictionary of Science and Technology Terms*, Nikkan Kogyo Shimbun, 1996
  - *Dictionary of Ecology*, Tokyodo Shuppan, 1995
  - Other sources include the Ministry of the Environment’s website