

# JAPAN BIODIVERSITY



Report of Comprehensive Assessment of Biodiversity in Japan

## OUTLOOK

The Current State of Biodiversity in Japan

-An assessment of biodiversity over the past 50 years and action to be taken-

There are many types of ecosystem in the world, for example, forests, rivers, marshes, mud flats, coral reefs, where many species of plants and animals live and grow. Even within a single species, there exist differences depending where it lives, or even from individual to individual. "Biodiversity" means such differences among ecosystems, species, and individuals.

All over the world, however, we are now seeing tropical forests shrink, coral reefs degrade and invasive alien species damage local environments, leading to serious concerns over the rapid loss of biodiversity. In the decades following the end of World War II, Japan saw phenomenal economic growth, but at the same time, biodiversity suffered great losses as a result.

Given these developments, many have come to recognize the need to evaluate the current state of biodiversity in Japan. The Committee on Comprehensive Assessment of Biodiversity in Japan, which was established by the Ministry of the Environment, produced the *Report of Comprehensive Assessment of Biodiversity in Japan* (or *Japan Biodiversity Outlook* for short), which was released in May of 2010.

# The loss of biodiversity

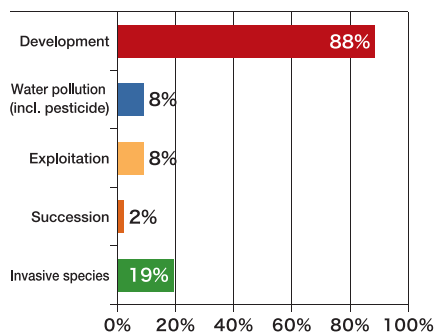
## First Crisis

This crisis refers to the reduction or extinction of species, and the decline and loss of habitats caused directly by human activities, especially development.

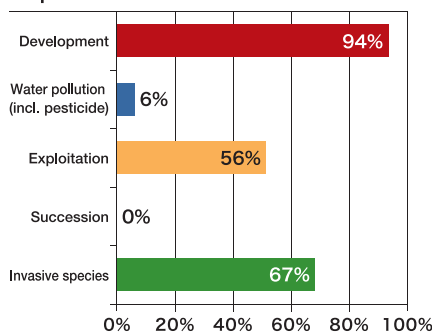
Development undertaken during the period of rapid economic growth has been the largest driver of the loss of biodiversity over the past 50 years, affecting all ecosystems. At present, the pace of the large-scale development is gradually slowing down, but the small-scale and local development can still be seen. While a number of measures have been taken, major losses incurred in the past have yet to be repaired.

### Drivers of decline of endangered species

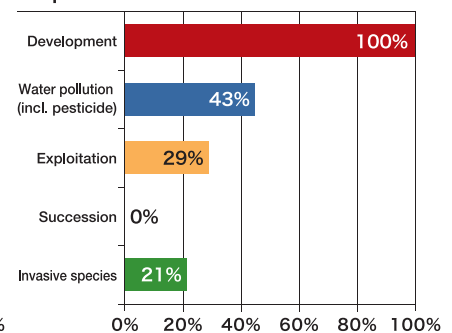
#### Mammals



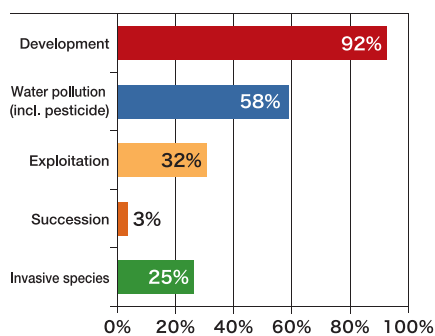
#### Reptiles



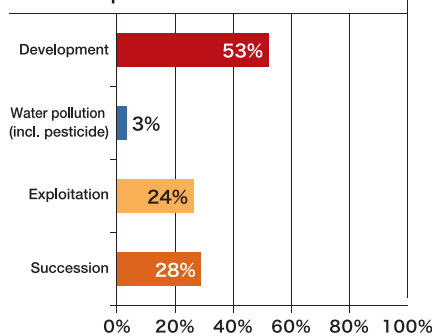
#### Amphibians



#### Brackish and freshwater fishes



#### Vascular plants



#### Development

Includes logging, swamp, lake, river, coastline, marsh, and grassland development, coal mining, the construction of golf courses and ski slopes, land improvement projects, and road and dam construction projects.

#### Water pollution (incl. pesticide)

Includes water pollution and agricultural chemicals pollution.

#### Exploitation

Includes illegal gathering for decorative, medicinal, and other purposes.

#### Succession

Includes negligent management, succession, and changes in vegetation.

#### Invasive species

Invasion of predators, naturalization, invasive competition, hybridization, release of alien species

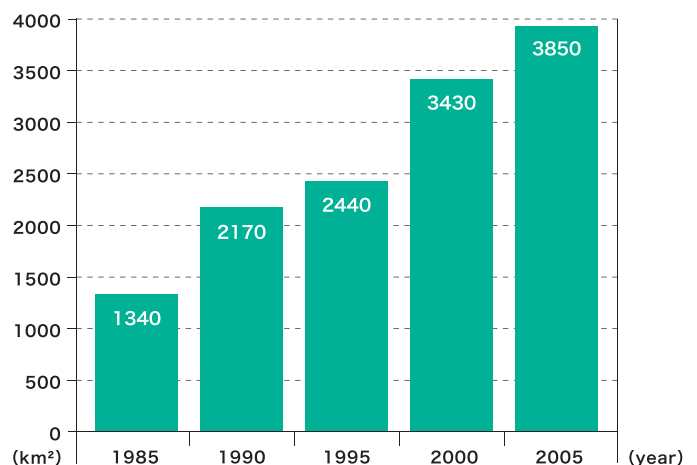
Source: Ministry of the Environment's Red Data Book (Ministry of the Environment)

## Second Crisis

This crisis refers to the changes in environmental quality, decline in number of species, etc. affecting primarily *Satochi-Satoyama* areas brought about conversely by the reduction or cessation of human activities that have so far sustained associated ecosystems.

There are concerns about the impact on the biodiversity intensified by the decline of the use of biological resources and succession of vegetation, which are caused by changes in energy supply structures, changes in the agricultural industry and farming methods, and the declining population and aging of society in farming communities. Promotion of sustainable agriculture and forestry have been started, but fundamental solutions are not easy to be found.

### Area of farmland left uncultivated



Source: Census of Agriculture and Forestry (Ministry of Agriculture, Forestry and Fisheries)

## Third Crisis

This crisis refers to disturbance on ecosystems caused by invasive alien species, chemicals, and other things introduced by humans.

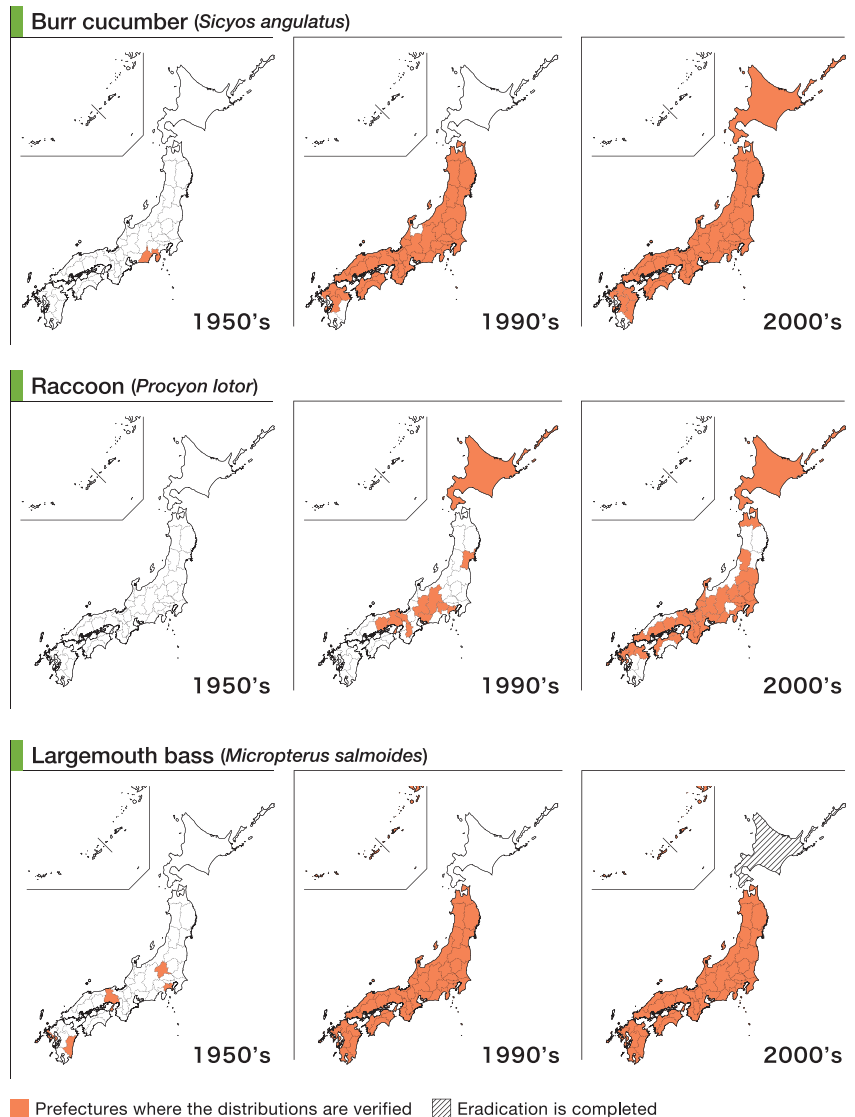
The impact of invasive alien species have become outstanding in recent years. There are serious concerns over inland water ecosystems and island ecosystems, which are especially vulnerable to invasive alien species. Regulations on importing and rearing invasive alien species have been implemented, but at the same time the distributions of invasive alien species that have already established are rapidly spreading.

## Climate Change Crisis

This refers to the impact of ongoing climate change on biodiversity, including the extinction of species, the destruction of vulnerable ecosystems.

Although the effects of rising temperature on biodiversity are still unclear, temperature or sea level rise can significantly affect alpine areas, coral reefs, and island ecosystems.

### The expansion of invasive alien species



Sources: National Survey on Natural Environment at Rivers and Watershores (Ministry of Land, Infrastructure, Transport and Tourism), Tsuribito Novels (Youshun Kaneko, Tsutomu Wakabayashi), National Survey of the Natural Environment (Ministry of the Environment)

## Ecosystem Services -Biodiversity Supports Our Livelihood and Cultures-

Our livelihoods and cultures depend upon biodiversity which provides us with food, timber, medicine, to perform regulating functions through the pollination of crops and control of pests, and to enrich unique regional cultures. These benefits and conveniences that people receive from ecosystems are referred to as ecosystem services. Generally speaking, loss of biodiversity brings degradation of ecosystem services, but over the last several decades, overvaluing a certain ecosystem service leads to the loss of overall biodiversity and overdependence on foreign countries for ecosystem services.

One pertinent example is the set of social demands imposed upon Japanese society during the period of rapid economic development. In the areas of the forest, mountain, and cultivated

ecosystems, these demands required a supply of efficient ecosystem services in large volumes in the form of building materials, food, and other necessities. This in turn led to the development of farmland, the replanting of forests, and the large-scale use of chemical compounds, all of which ultimately resulted in a loss of biodiversity.

After the period of rapid economic growth, the country gradually began to import massive amounts of biological resources in the form of timber, food, energy, and other resources and largely became dependent upon foreign countries for most ecosystem services. Experts have noted that this in turn led to a neglect of the domestic management ("Second Crisis"), while at the same time resulting in the loss of biodiversity overseas.





## Japan Biodiversity Outlook

The Comprehensive Assessment of Biodiversity in Japan is designed to assess the loss of biodiversity in Japan in order to raise the awareness of the state of biodiversity, and also to provide the governmental organization responsible for environmental administration with the information necessary to make policy decisions. Japan Biodiversity Outlook Science Committee (Chairperson: Tohru Nakashizuka, Professor at Tohoku University), established by the Ministry of the Environment, completed the Comprehensive Assessment of Biodiversity in Japan after spending 2 years from 2008, with help from 208 experts.

- The assessment period was defined as the duration from the latter half of the 1950's to the present, and encompassed biodiversity throughout Japan.
- There were 30 indicators and 104 data to measure the drivers of biodiversity loss (degree of impact), the current state of biodiversity (degree of loss), etc.
- As for drivers of loss, the assessment project developed four categories: the "First Crisis (brought about by development, direct use, and water pollution)", "Second Crisis (decrease in use and management of *Satochi-Satoyama* areas)", "Third Crisis (invasive alien species and chemicals)", and the "Climate Change Crisis".
- The current state of biodiversity was assessed along the following six ecosystem types: "Forest and Mountain Systems", "Cultivated Systems", "Urban Systems", "Inland Water Systems", "Marine and Coastal Systems", and "Island Systems".



# The five main conclusions of Japan Biodiversity Outlook

- 1 Loss of biodiversity as a result of human activities in Japan has affected all ecosystems, and the loss is continuing on the whole.
- 2 The degree of loss of biodiversity has been especially large in inland water systems, marine and coastal systems, and island systems. The trend towards biodiversity loss continues up to now.
- 3 As for the drivers of the loss, the “First Crisis (brought about by development, direct use, and water pollution)”, particularly development, has had the greatest impact, but the speed at which loss attributable to this crisis has abated slightly. The “Second Crisis (decrease in use and management of *Satochi-Satoyama* areas)” continues to intensify. Furthermore, of all the factors that fall under the “Third Crisis (invasive alien species and chemicals)”, the effects of invasive alien species are particularly prominent. The “Climate Change Crisis (the impact of climate change on living organisms)” poses serious concerns for certain ecosystems that are particularly vulnerable. Various responses have been taken to address these crises, and these responses have been effective to a certain degree, but given the major socioeconomic changes that indirectly drive biodiversity loss, these responses have not been sufficiently effective.
- 4 The Japanese people currently enjoy lifestyles characterized by material wealth and convenience, but for the past 50 years those lifestyles have meant the domestic loss of biodiversity and dependence upon the supply of ecosystem services overseas. From 2010 onwards, the lingering effects of past development (First Crisis), the increasing seriousness of the problem of reduced use and management of *Satochi-Satoyama* areas (Second Crisis), settlement and further encroachment by invasive alien species (Third Crisis), increased temperatures (Climate Change Crisis), and similar factors are expected to result in further loss. Thorough responses, including those that address indirect drivers, are necessary. To that purpose, it is important to build consensus at the local level.
- 5 Some losses of biodiversity in inland water systems, island systems, and marine and coastal systems may in the future transform into grave losses, causing irreversible changes or having other serious consequences.

## Assessment Results

The drivers of loss since the latter half of the 1950’s and the state of biodiversity loss in 2010 can be assessed as follows. They interact in complex and inextricable ways in each ecosystems and cause biodiversity loss.

Biodiversity loss as of 2010	Current state of loss and trends		Drivers of loss (degree of impact) and current trends				
	Degree of loss from original state	Degree of loss from state as of latter 1950's and current trends	First Crisis	Second Crisis	Third Crisis	Climate Change Crisis	Other
			Development, direct use, and water pollution	Reduction in use and management	Invasive alien species and chemical compounds		
Ecosystem type							
Forest and Mountain Systems						*1	
Cultivated Systems	—						•Decrease in local varieties of crops and livestock
Urban Systems	—			—			
Inland Water Systems					*2		
Marine and Coastal Systems				—	*3		•Outbreaks of coral predators •Coralline flat
Island Systems				—			

Subject of Assessment	State			Drivers			
	Current degree of loss		Current trend of loss	Degree of impact during assessed period		Current trends in degree of impact	
Legend	Not lost		Recovering	Weak		Decreasing	
	Not significantly lost		Same	Medium		Same	
	Lost		Being lost	Strong		Increasing	
	Significantly lost		Being rapidly lost	Very strong		Increasing rapidly	

Note: The dashed lines for the assessment of the degree of impact indicate that the data is not sufficient.  
 Note: “\*” indicates that there are multiple factors and data related to the indicator in question, and that there are factors and data that exist which show trends that differ from the current assessments of the degrees, effects, and trends of overall loss.  
 \*1: The degree of impact on alpine systems has been and continues to be serious.  
 \*2\*3: While the problem of chemical compounds has been mitigated to some extent, the problem of invasive alien species is serious.

# Assessing the state of loss in the various ecosystems



## 1 Forest and Mountain Systems

The condition of forest and mountain systems has deteriorated over the assessment duration span from the latter half of the 1950's to the present. Over the long term it has exhibited a trend towards degradation.

- Although no major changes in the overall scale of forest and mountain systems have been seen, the ratio of pristine natural forests has declined due to conversions to artificial forests. Forests have also become increasingly fragmented ("First Crisis").
- Throughout the latter half of the assessment period, the rate at which pristine forests are disappearing has declined, yet the quality of ecosystems provided by secondary forests and artificial forests has been on the decline ("Second Crisis").
- More recently, there has been a significant increase in the population levels of sika deer and a noticeable increase in damage to vegetation and other wildlife as a result of broader sika deer distributions. Furthermore, there have been reports of alpine vegetation being negatively affected by what is thought to be the effects of climate change ("Second Crisis", "Climate Change Crisis").
- At present, changes in socioeconomic conditions have contributed to lower levels of development and "improvement" pressures in forests, but there are still concerns over lasting effects.



## 2 Cultivated Systems

The condition of cultivated systems has deteriorated over the assessment duration span from the latter half of the 1950's to the present. Over the long term it has exhibited a trend towards degradation.

- The sizes and qualities of cultivated systems were both seen to decline, caused by the development of housing and other projects, and changes to the agricultural industry and farming methods that were primarily perpetuated during the first half of the assessment duration ("First Crisis").
- The decline in the use of grasslands that marked the former half of the assessment duration and the decrease in farmland used, which characterized chiefly the latter half of the assessment duration, both contributed to the shrinkage in size of cultivated systems as well as the quality thereof ("Second Crisis").
- At present, changes in socioeconomic conditions have mitigated the pressures stemming from development and changes to the agricultural industry and farming methods, but there are still concerns over lingering effects. There are also those justifiably concerned over the growing impact stemming from the laxer use and management of cultivated land.



## 3 Urban Systems

The condition of urban systems has deteriorated to some extent over the assessment duration span from the latter half of the 1950's to the present. Over the long term it has exhibited a trend towards degradation.

- The reduction of green urban spaces such as farmland and forests, plus a degradation in the quality of water, during the first half of the assessment period caused declines and degradations in habitats.
- During the second half of the assessment period, various projects to promote new green areas in urban centers and to improve the water quality of rivers and other sources were pursued, and as a result some organisms that live and grow in these environments saw expansions in their distributions.



## 4 Inland Water Systems

Inland water systems have suffered major losses during the assessment duration span from the latter half of the 1950's to the present. Over the long term it has exhibited a trend towards degradation.

- Beginning with the first half of the assessment period, gathering sands and gravels from rivers, artificial improvements that turned natural rivers into artificial ones and projects that reclaimed lakes, ponds and marshes had the effect of shrinking the size of inland water systems on a nationwide scale, reducing their quality, and fragmenting them ("First Crisis").
- At the same time, while the water quality of lakes and ponds may have very well deteriorated during the first half of the assessment period, during the second half, the water quality has been on the rise ("First Crisis").
- Right now, changes in socioeconomic conditions have reduced development pressures exerted on inland water systems, but there are still worries over lasting effects. Furthermore, there are concerns over the capture and collection of species for ornamental purposes, as well as the increased impact of invasive alien species ("First Crisis", "Third Crisis").



## 5 Marine and Coastal Systems

Marine and coastal systems have suffered from major losses during the assessment duration span from the latter half of the 1950's to the present. Over the long term it has exhibited a trend towards degradation.

- Development and "improvement" projects during the first half of the assessment period in particular caused the massive shrinkage of coastlines on a major scale throughout the country ("First Crisis").
- Right now, changes in socioeconomic conditions have reduced development pressures such as reclamation exerted on coastal areas, but there are still worries over lasting effects. There are also new concerns about further coastal erosion, invasion by alien species and the effects of climate change ("Third Crisis", "Climate Change Crisis").



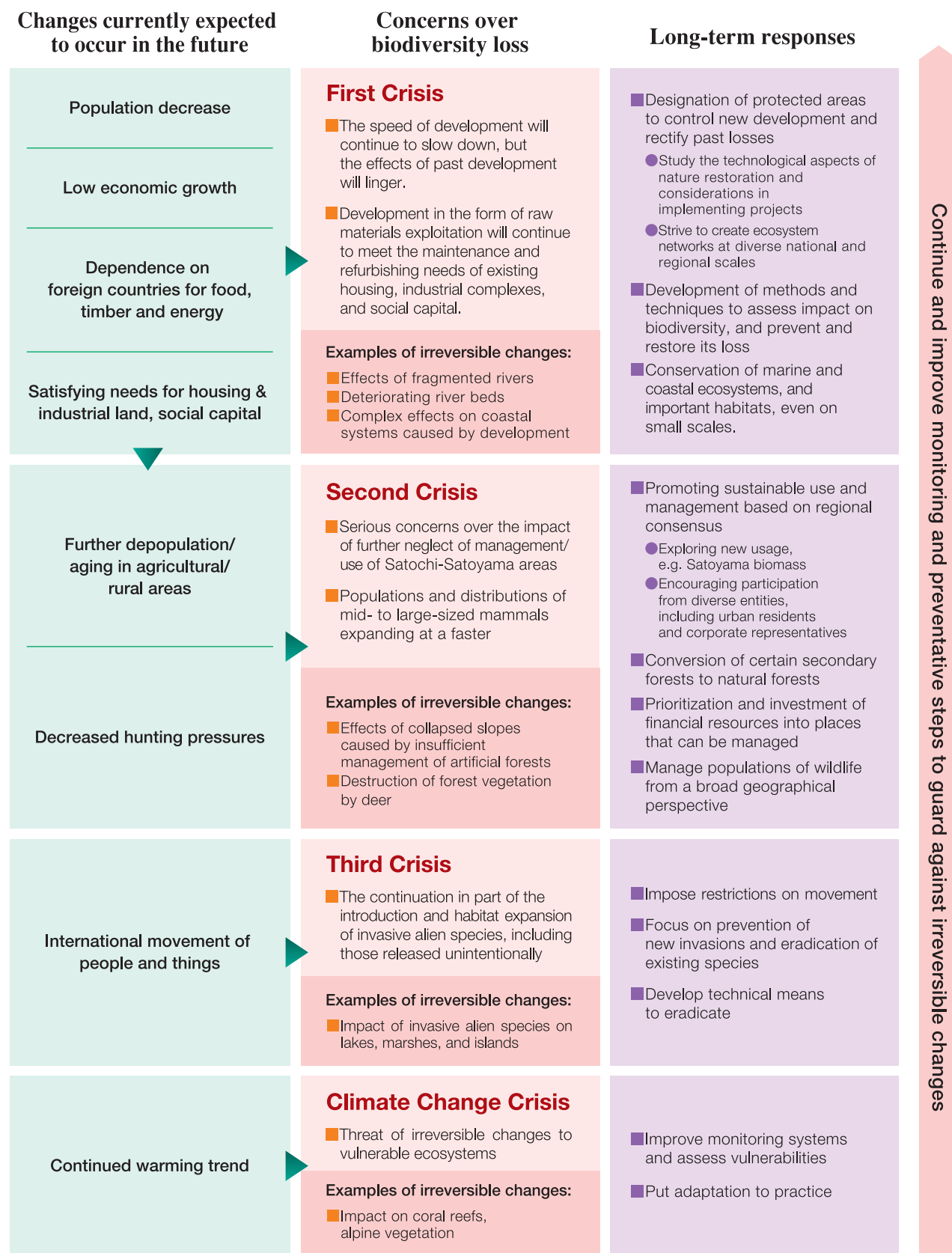
## 6 Island Systems

Island systems have suffered from major losses. While there are no adequate scientific materials documenting the first half of the assessment period, there is at least a reason to suspect the possibility that during the latter half (latter half of the 1970's), there was a long-term negative trend.

- Due to development and the invasion and establishment of populations of alien species, the habitats in which certain species live and grow, including endemic species, have degraded ("First Crisis", "Third Crisis").
- There are major concerns over the impact of climate change on coral reefs ("Climate Change Crisis").

# From Assessment to Action - Looking to 2050

The medium- to long-term goal of the National Biodiversity Strategy of Japan 2010 is the year 2050. With this goal in mind, when one ventures to project the currently projected trends upon the socioeconomic trends of the future, the predicted losses and direction of responses are as follows.





# Individual Roles

Based on the findings of the Comprehensive Assessment of Biodiversity in Japan, we find it necessary for the entities below to take the following actions:

## The national government

Place greater emphasis on studies and responses rooted in assessment findings, indicate nationwide targets, and provide stronger incentives for various parties to take actions to mitigate the loss of biodiversity.

## Local governments

Assess biodiversity on regional scales and find ways to incorporate local issues into broader-reaching biodiversity strategies.

## Researchers and NGO's

Use improved measurements of biodiversity and findings regarding ecosystem services to contribute to assessments.

## Businesses

Understand the effects that the economic activities of one's own business have upon biodiversity, assess those effects, and strive to develop strategies to mitigate those effects.

## Citizens

Consider seriously what can and should be done in one's community regarding biodiversity, and furthermore participate in the consensus-building processes at the national government, local government, business, and local movement levels.



This leaflet is a summary of the Report of Comprehensive Assessment of Biodiversity in Japan (also known as the Japan Biodiversity Outlook). For the full report and other more detailed information, please visit the Ministry of the Environment's official website.

<http://www.biodic.go.jp/biodiversity/>

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