The Fifth National Report
to the Convention on Biological Diversity

April 2014

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Cover: ***Megalerenthis saniculifolia*** **Owhi** (‘Mo-de-mi-pul’ in Korean)

This species, growing in shady and moist places on mountain slopes and in wet places along small streams at high elevations in mixed deciduous forest, is a sole species in the genus and endemic to Korea. ©Photographed by Soon Jae Park.

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Executive Summary

Biodiversity in Korea

Bridging the Asian continent and the Pacific Ocean, Korea shows diverse patterns of climate from the cold continental climate to warm oceanic climate, characterized by four distinct seasons. Considering the relatively small size of the land of 100,033 km², Korea still benefits from diverse biotic resources and beautiful natural environment due to the unique geography featuring the coexistence of forest and coastal ecosystem. Korea' territory is mostly mountainous with 64% of the land being mountains surrounded by the ocean on three sides, which provides excellent conditions for rich biodiversity.

Korea is inhabited by relatively diverse species as per its land size, with the number of native species estimated to be higher than 100,000. The number of species found in Korea has been increased to 41,483 as of the end of 2013. Among them, 2,177 are known to be endemic with nearly 38,000 indigenous species present. Korea is fully recognizing the significance the biological diversity holds, furthering related research, conservation and management of Korea's indigenous species.

Wetlands and tidal flats are habitats crucial to the formation of diverse and distinct characteristics of Korean species. Wetlands are important from the perspective of biodiversity in that they provide habitats for unique organisms, which evolve from environments different from those of terrestrial and aquatic organisms. However, with the gradual reduction in wetlands, diverse wetland species are threatened. Otters (*Lutra lutra*), Spoon-billed sandpipers (*Eurynorbynchus pygmeus*) and Tiny dragonfly (*Nannophya pygmaea*) are some of the species on the verge of extinction due to the widespread loss of wetlands. Meanwhile, expansive tidal flats are present on the western coast of the country, providing habitats for diverse types of crustacean, fishes and plankton.

A major biodiversity threat on the Korean Peninsula is habitat loss from rapid urbanization and industrialization, causing the number of endangered flora and fauna to increase at a speedy rate. Despite of the afforestation efforts, colony restoration, and natural restoration, approximately 20.4% of wetland, 15.9% of farmland and 2.1% of forestland have been reduced in size within the last two decades. Biodiversity is also threatened by climate change and invasion of alien species. The total number of alien-species that are naturally or artificially introduced into the country stands at 2,167 in total (333 plants and 1,834 animals). Out of them, 18 species disturbing the ecosystem are designated as invasive alien species (IAS) and kept under control.

Endangered species

Out of total 41,483 species, 2,038 species are designated for legal managements. These species are the ones which need special attention for the conservation, or which should be controlled by necessary measures due to their extant or potential threats to ecosystem or human living. Wild plants and animals endangered by natural or artificial threats are under legal protection depending on the severity of the risk it poses. Based on the 'Act on Wildlife Protection and Management', the number of the endangered species in designation is 246 species in two classes. Class I includes 51 species of endangered wild animals and plants that have a rapid reduction in their population to the extent that they may become endangered in near future unless the threats are removed or diminished. Class II includes 195 species of wild animals and plants which show a concerning rate of reduction in their population due either to natural or artificial threats.

Restoration of endangered species by breeding programs

The government of Korea is also expanding efforts in restoration of endangered species by breeding programs. It has been effectively serving as a tool to raise the public awareness by restoring species with high cultural value such as Crested Ibis. This also enhances multilateral cooperation by conducting bilateral restoration programs with neighboring nations. As about 40 endangered or critical species are under active restoration programs nationally, it is expected to make contributions in the conservation of regional biodiversity. Korea has been successful in restoration programs of Asiatic Black Bear and Crested Ibis, for example, to reach the adequate population size to be released into the wild.

Protected areas

Korea is protecting and managing areas especially worthy of protection for its excellent ecosystem and abundant biodiversity by designating them as protected areas in 10 major categories; i) Natural Parks, ii) Ecosystem and Landscape Conservation Areas, iii) Marine Ecosystem Protected Areas, iv) Marine Environment Conservation Zone, v) Wetland Protected Areas, vi) Baekdudaegan Mountains Reserve, vii) Forest Genetic Resource Reserve, viii) Nature Reserve, ix) Wildlife Protected Areas, and x) Special Islands. As of the end of 2013, 1,402 sites of 20,703.3km^2 in total with some overlapped areas are designated as protected areas in the country.

Major threats to biodiversity

Urbanization The biggest threat to biodiversity is the decline of habitats for animals and plants. Highly developed urbanization and centralization (more than 90%) cause difficulties in managing the natural environment, and lead to a gradual decrease of native habitat. Overuse of land and rapid urbanization destroys ecosystem, damages natural landscape and degrades the green and wetland. In the last two decades, 2.1% of forest, 15.9% of farm land and 20.4% of wetland have been decreased.

Invasive alien species The introduced IAS are also posing a threat to biodiversity in Korea. By the end of 2013, the total number of alien species has been estimated at 2,167 including 333 plants and 1,834 animals, among which 18 species were designated as invasive alien species. While not all of them are invasive, it is estimated that about 1% are potentially harmful to domestic biodiversity. In addition, the Ministry of Environment, local governments and affiliated agencies are making outstanding efforts to eradicate invasive alien species.

Poaching Poaching and drastic increase of individuals of certain species due to the extinction of natural enemy cause the imbalance of ecosystem in spite of diverse programs to protect and manage wild plants and animals. Threats against wildlife are continued by increased road kill due to road expansion, poaching and illegal trading. Illegal trafficking of incidental catches without legal permission required also causes serious problems especially for endangered species.

Legislation

Fully recognizing the importance of the environment conservation and efficiently responding to this globally emerging issue on biodiversity, ME has administered 57 laws to manage overall environmental issues, and 11 out of them are directly related to the conservation of environment and biological diversity. Especially, the government of Korea enacted the ‘Act on Conservation and Use of Biodiversity’ in February, 2012. The main purposes of this act are i) contribute to the enhancement of biodiversity by creating a national management system, ii) promote sustainable use of biological resources, and iii) cooperate

with the international mechanisms including the Convention and the Nagoya Protocol. The Act implements the following: i) setting up NBSAP every five years, ii) building a system for sharing information with National Biodiversity Center with a view to develop an integrated management of information on biodiversity, iii) preparing National Index of Species, iv) promoting cooperation with North Korea for conservation of biodiversity and endemic species in the Korean Peninsula, v) fair and equitable sharing of benefits from the use of biological resources, and vi) required pretest of alien species for any hazards to the local ecosystem.

The enactment of this act has facilitated the country to manage biodiversity, allowing relevant ministries to be able to apply a streamlined and comprehensive biodiversity management system in place. This particular enactment is serving as a meaningful stepping stone that the management of the wildlife, agriculture, forest, marine and bio-information will no longer be separately handled by different ministries. This timely approach is also highly welcomed nationally and abroad, strengthening Korea's global stance in numerous international agreements such as Nagoya Protocol adopted at CBD COP 10. The importance of the enactment also symbolizes Korea's national commitment in advancing environment protection and conservation as a hosting country of CBD COP12 in 2014. It will not only raise the public awareness on biodiversity effectively by engaging a wide range of national and international stake holders, but also make it move forward to rectify the Nagoya Protocol in near future.

The environment laws previously enacted in Korea include the Natural Environment Conservation Act, Wildlife Protection and Management Act (title revised from the Act on the Protection wild Animals and Plants), Act on the Conservation and Use of Biodiversity and Act on the Conservation and Management of Marine Ecosystems. In addition, there are Wetland Conservation Act, Special Act on the Conservation of Ecosystems on Island Regions including Dokdo, National Trust Act on Cultural Heritage and Natural Environmental Asset, Korea Natural Park Act, Cultural Property Protection Act, Act on Building and Managing Forestry Resources, Act on the Protection of Baekdudaegan Mountain Range, Act on Transfer of Living Modified Organism among Nations and Marine Environment Management Act.

National Biodiversity Strategy Action Plan

The 2nd NBSAP of 2009-2013, focused on the equitable sharing of benefits from biodiversity and the sustainable use of biological and genetic resources, has been pursued jointly by 11 relevant government bodies in 5 core areas and 14 strategies originally. In 2011, the 2nd NBSAP of 2009-2013 was revised in order to reinforce the area related the equitable sharing of benefits arising from the use of genetic resources to reflect the major contents of the Nagoya Protocol adopted during COP 10. The 3rd NBSAP of 2014-2018 is to be launched in the beginning of 2014.

Implementation for the achievement of Strategic Plans for Biodiversity 2011-2020

In 2012, the progress of the 2nd NBSAP achievement has been reviewed in the 21st Committee on Green Growth and the 11th Meeting for Reviewing Implementation of NBSAP 2009-2013 in 2012. In the review, 18 projects were judged as 'satisfactory'. However, 6 projects judged as 'unsatisfactory' need some improvements: i) expansion of the conservation of protected areas, ii) conservation of genetic diversity, iii) establishing the system of countermeasure for climate change, iv) securing and utilizing biological resources, v) expanding education programs and raising professional manpower on biodiversity, and vi) establishment of the information sharing system. To compensate the unsatisfactory projects, the government, in turn, suggested to promote 3 main goals; i) reinforcing biodiversity

conservation, ii) promoting sustainable use of biological resources, and iii) strengthening action plans for ecosystem threats, and then 9 approaches were suggested to achieve these goals.

Mainstreaming of biodiversity

Korean government has been making various approaches to mainstream biodiversity not only in making national policies but also in implementing the regulations to effectively raise the public awareness. The central government has been preparing the implementing systems to achieve the goals of conservation, but it has been somewhat insufficient to expand at local government level. The Ministry of Environment (ME) will be providing guidelines for regional biodiversity strategies. This will help the local governments set up series of localized implementation of the biodiversity strategies effectively. Furthermore, through introducing the linkage system between land use and environment plan at the stage of establishing policies and plans, the government is targeting to effectively prevent biodiversity loss and to achieve sustainable use of national land.

The government intends to raise the public awareness by operating the public participating programs such as the newly established program called BioBlitz, which engages the public including teenage students in exploring the natural environment. Also relevant organizations are running various programs at special occasions such as Biodiversity Day on the 22nd of May, Fascination of Plant Day, and World Wetland Day on the 2nd of February and Ocean Day on the 31st of May.

Since the level of awareness on biological diversity was 73% according to a research on the public's perception on the general status of biodiversity in 2011, numerous programs are underway to increase the awareness level to 90% in 2018. It is emphasized to engage more young citizens and to educate the young generation how to protect the biological resources, and 'teenage leadership program' is designed as a part of this attempt. In this creative approach, teenage leaders are appointed so that they can have a chance to properly explore the local environment, express their interests in certain species and participate in promotion projects. This program involving youngsters was established in 2006, and more than 3000 students participated as of the end of 2013.

The Korea Biodiversity Observation Network (KBON) has been set up to monitor the biodiversity at national level in long term. The ME has established a partnership with the private business sector for the conservation of environment. Representatives from business sector also participate in the National Biodiversity Committee, which comprises of officials from relevant government agencies, experts from academic societies and NGOs. Through the collaboration between ME and the Ministry of Culture, Sports and Tourism (MCST), a pan-society promotion system has been built for ecotourism with the participation of related government sector such as Korea National Park Service (KNPS), Korea Tourism Organization (KTO), local governments and local residents. Especially, eco-tour voucher is offered for vulnerable social group to promote eco-tour for the equitable benefits of ecosystem service.

Hosting CDB COP 12 in 2014

The CBD COP12, which will be held in Korea from the 29th of September to 17th of October, 2014, is expected to provide an excellent opportunity to raise the public awareness on biodiversity and to promote the participation of various stakeholders in biodiversity programs. Korean government will make great effort to gain successful

outcomes of the COP12. In addition, using this as a stepping stone, the government of Korea is putting efforts to make policies in biodiversity area and tries to make contributions in the conservation of global biodiversity.

Direction into the future

Korean government expanded the biodiversity conservation infrastructure, but it is still necessary to promote eco-friendly life style for the conservation of biodiversity by improving management and conservation systems, securing biological resources and enhancing people's awareness. It is highly required to prepare the scientific conservation and management system on the basis of the strengthened monitoring of the vulnerable areas and susceptible species and the analysis of the impact of climate change. It is also needed to extend the participations of the local governments and the private sector in building biodiversity policy. During its implementation process, it is necessary to enhance the social awareness of biodiversity conservation. Consistently enlarging the protected areas and strengthening the management systems are crucial in the conservation of biodiversity. In addition, it is urgently needed to assess the current status of indigenous species, which will be the fundamental basis for making policies and information sharing system.

Part 1 Biodiversity status, trends, and threats and implications for human well-being

1.1 Importance of biodiversity in Korea

Korea has relatively diverse biotic resources compared to its land size as a result of such factors as the distribution of diverse vegetation belts, unique topography, geographical features and climate, as well as the coexistence of forest and coastal ecosystems. For this reason, Korea is inhabited by relatively diverse species as per its land size, with the number of native species estimated around 100,000. The total number of biological species recorded as of end of 2013 is 41,483, including 5,308 plants, 1,899 vertebrates, 22,612 invertebrates including 15,651 insects, 4,153 fungi including 702 lichens, 4,879 algae, 1,573 protozoans and 1,059 prokaryotes. Among them, more than 2,200 species are known to be endemic, and this relatively high ratio of endemic species is due to the four distinct seasons resulting from seasonal winds, the development of coastlines, geological formation from flat fields to high mountains, and ecological diversity on thousands of islands as well as inland, which provide diverse environments of habitats. In addition, since Korean Peninsula is located in the northeast of Asia, bridging the Asian continent and the Pacific Ocean, it shows the diverse patterns of climate from the cold continental climate to warm oceanic climate. Biodiversity in Korea has the unlimited potential to create future growth engine, from the food industry to cosmetics, new pharmaceuticals, and eco-tourism.

1.2 Major changes in the status and trends of biodiversity and environment

1.2.1 Biodiversity

Since ‘Native Species Survey Project’ was launched in 2007, the number of species found in Korea has been increasing to 41,483 as of the end of 2013. This comprehensive project was led by National Institute of Biological Resources (NIBR). In addition, the Ministry of Oceans and Fisheries (MOF) has supported the project of ‘National Marine Life Collection’ to investigate marine biological resources intensively. Despite of increase in the number of species and organisms and improved conservation efforts, the 2014 EPI placed Korea in the 43rd out of 178 countries with an overall score of 63.79 out of 100 and ranked the108th with a score of 50.4 in the biodiversity and habitat category and 16.94 for the changes made to the biodiversity and habitat in the last decades.

A major biodiversity crisis on the Korean Peninsula is habitat loss from rapid urbanization and industrialization increasing the number of endangered flora and fauna. Despite of afforestation, colony restoration, and natural restoration, approximately 20.4% of wetland, 15.9% of farmland and 2.1% of forestland has declined within last two decades. Biodiversity is also threatened by climate change and invasion of alien species. With summer temperature rising, the distribution of Korean fir (*Abies koreana*), an endemic species, is decreasing, and with rising sea water temperature tropical species are clambering onto the country’s coastal areas. The total number of alien animal and plant species that are naturally or artificially introduced into the country stands at 333 for plants and 1,834 for animals, which is 2,167 species in total. Among them, 18 species that disturb the ecosystem and encroach onto the habitat of endemic species are designated as ecosystem disturbing species and kept under control.

Table 1. Biodiversity in Korea

Classification		Number of Species	Total
Vertebrate	Mammal	124	1,899
	Bird	522	
	Reptile and Amphibian	52	
	Fish	1,201	
Invertebrate I	Urochordata	102	6,961
	Enchinodermta	194	
	Chaetognatha	40	
	Porifera	307	
	Cnidaria	285	
	Platyhelminthes	124	
	Rotifera	145	
	Acanthocephala	1	
	Endoprocta	1	
	Bryozoa	142	
	Brachiopoda	9	
	Sipuncla	9	
	Mollusca	1,283	
	Annelida	383	
	Tradigrada	36	
	Nematoda	423	
	Gastrotricha	31	
	Nematomorpha	5	
	Nemertea	1	
	Echiura	2	
	Ctecophora and Phoronida	4	
	Arthropoda	3,434	
Invertebrate II	Insect	15,651	15,651
Fungus/Lichen	Fungus/Lichen	3,451/702	4,153
Plant	Monocotyledon	1,076	5,308
	Dicotyledon	2,974	
	Fern/Gymnosperm	334	
	Bryophyte	924	
Alga	Bacillariophyte	1,738	4,879
	Flagellates	686	
	Freshwater Chlorophyte	1,275	
	Charophyte	33	
	Marine Phaeophyte	193	
	Marine Chlorophyte	123	
	Marine Rhodophyte	592	
	Cyanophyte	239	
Protozoan	Protozoan	1,573	1,573
Prokaryote	Bacterium	1,059	1,059
Total			**41,483**

1.2.2 Species in legal management

Out of total 41,483 species found in Korea, designated are more than 2,000 species for legal managements. These species included in 11 categories are ones which need special attention for the conservation, or which should be controlled by necessary measures due to their potential threats to ecosystem or human living.

Table 2. Designation of plants and animals included in legal management (unit: species)

Endangered Species (ME)	Marine protected species (MOF)	Wildlife for protection (local governments)	Special forest species for protection (KFS)	Rare/endemic Plants (KFS)	Wild animals of no hunting (ME)
246 (Class I 51, Class II 195)	52	305 (49 by Seoul City, 24 by Incheon City, etc)	53	571/360	486

* Eighteen introduced species are designated as IAS by ME

Endangered wild species of Korea

Wild species endangered by natural or artificial threats are under legal protection according to the severity of the risk. Based on the 'Act on Wildlife Protection and Management', the number of designated endangered wild plants and animals increased from 221 species in 2007 to 246 in 2012. Fifty seven species have been added in the list while 32 previously designated species that have escaped the risk of extinction or that have completely disappeared in the country have been deleted in the list. The ME classified the endangered species into two classes in consultation with the heads of related central administrative bodies and relevant experts. Class I includes 51 species of endangered wild animals and plants which show a rapid reduction in their population to the extent that they may become endangered in near future unless the threats are removed or diminished. Class II includes 195 species of wild species that have a declining population due to natural or artificial threats.

Table 3. Endangered wild plants and animals notified by ME (July 27, 2012)

Classification		Number of species	Total
Class I	Mammal	11	51
	Bird	12	
	Amphibians Reptile	2	
	Fish	9	
	Insect	4	
	Invertebrate (excluding insects)	4	
	Plant	9	
Class II	Mammal	9	195
	Bird	49	
	Reptile and Amphibian	5	
	Fish	16	
	Insect	18	
	Invertebrate (excluding insects)	27	
	Plant	68	
	Algae	2	
	Fungus	1	
Total			**246**

Ban on consumption of wild animals

The ME has notified that the consumption of some wild species as food, including processed food, is banned. The wild animals designated are total 32 species, which are14 mammals, 9 birds, 6 reptiles and 3 amphibians.

Wildlife hunting restriction

The ME prohibits hunting of the endangered wild animals and some other species that are considered having the potential danger of decreasing. Total 486 species (64 mammals, 396 birds, 16 reptiles and 10 amphibians) are designated in this category.

Harmful wild animals

Wild animals, which cause serious threats either to human life or to property, are designated for control by ME.

Wild animals damaging crops and fruits densely inhabit a small area, to the extent that they can harm agriculture/forestry/fishery.

- Wildlife that appears near airports, posing the risk of harm to airplanes or special buildings, or of hindering military operations.
- Ferocious beasts that appear near human habitations, and threaten or may threaten humans or cattle.
- Wild boars (*Sus scrofa coreanus*) that damage tombs.
- Magpies (*Pica pica serica*) that damage power transmission facilities, such as posts.

Game animals

Wild animals that may be hunted in designated areas during a certain season as designated and announced by ME. Total 16 species, 3 mammals and 13 birds, are included in this category.

Invasive Alien Species in Korea

Eighteen introduced species, 12 plants and 6 animals, were designated as IAS by ME.

Species of possible threats to ecosystem when introduced

ME designated 24 alien species of concern that may threaten to the native ecosystem in case they are introduced to Korea. These organisms are considered to cause serious effects on the current ecosystem in a specific area.

Living Modified Organisms

Since the genetically modified organisms possibly disturb the balance of the ecosystem, they are controlled according to the Act on Transboundary Movements of LMOs. Although there are no LMOs commercially produced in Korea, researches on LMOs are in progress. As over nine million tons of agricultural products including LMOs are imported annually, the government puts continuous efforts to raise the public awareness. The 7th MOP for Cartagena Protocol on Biosafety will be held with CBD COP 12 in Peongchang, Korea.

Wild animals subject to the permission for transportation

The government requires permission for transporting 689 species of wild animals including 130 mammals, 492 birds, 51 reptiles and 16 amphibians out of their boundary. This regulation is also applied to the possession of processed products of those species. The permission can be obtained from mayor, county governor or a ward chief.

Species designated by CITES

Since Korea joined CITES in 1993, the wild fauna and flora, of which international trade is controlled in CITES, are also protected in the country with the application of the same principles.

Biological resources subject to permission for export

The regulations of ME list biological resources for which permission is required to take abroad because of their significance for the conservation of biodiversity in the country. A total of 1,138 species, comprised of 1 reptile, 76 fish, 418 insects, 30 spiders, 30 mollusks, 49 other invertebrates, 474 plants, 30 algae and 30 higher fungi, are included in the list. Especially, for those from marine and inland water, the approval from MOF is required to take out of the country.

Authorization required for breeding and capture

Total 12 wild animals including 1 mammal, 4 birds, 4 reptiles and 3 amphibians may be captured for breeding; commercial purposes if adhered to the standards and regulations specified by ME.

1.2.3 Protected areas

Korea is protecting and managing areas especially worthy of protection for its excellent ecosystem and abundant biodiversity by designating them as protected areas in 10 major categories; i) Natural Parks, ii) Ecosystem and Landscape Conservation Areas, iii) Marine Ecosystem Protected Areas, iv) Marine Environment Conservation Zone, v) Wetland Protected Areas, vi) Baekdudaegan Mountains Reserve, vii) Forest Genetic Resource Reserve, viii) Nature Reserve, ix) Wildlife Protected Areas, and x) Special Islands. As of the end of 2013, 1,402 sites of 20,703.3km^2 in total with some overlapped areas are designated as protected areas in the country.

Natural parks are designated and managed to protect natural ecosystems, breathtaking natural scenery and cultural heritage. Natural parks are classified into national parks, provincial parks and country parks. There are 78 natural parks with the total area of 7,908 km^2; 21 national parks, 29 provincial parks, and 28 county parks. Geopark is a newly established system in 2012. Five national Geoparks including Jejudo and Ulleungdo/Dokdo have been certified recently. Especially, Jejudo was certified as Global Geopark in October 2010 under the program of UNESCO.

The major protected areas included in categories i) – viii) are as follows; 32 Ecological and Scenery Conservation Areas of 284 km^2, 9 Marine Ecosystem Protected Areas of 213 km^2, 4 Marine Environment Conservation Zones of 1,882 km^2, 32 Wetland Protected Areas of 374 km^2, 32 Baekdudaegan Protected Areas of 2,750 km^2, 378 Forest Genetic Resource Protected Areas of 1,494 km^2, and 11 National Nature Reserves of 454 km^2. In addition, several areas with excellent natural conditions or landscape are inscribed or designated as protected areas under international agreements such as Ramsar Wetland, UNESCO Biosphere Reserve and World Natural Heritage. Total 18 areas are listed as Ramsar Wetlands, while Seoraksan , Jejudo, Shinan Dadohae and Gwangneung Forest were designated as UNESCO Biosphere Reserves. In 2007, Jeju Volcanic Island and Lava Tubes were inscribed in the list of UNESCO World Natural Heritage.

1.2.4 Major ecosystems

The 64% of Korea's total landscape consists of mountains, with the Baekdudaegan mountain range along the Korean Peninsula. Korea has a wide range of vegetative habitats from the warm temperate climate zone to the cold climate zone. In addition, the country's unique terrain, topography, and climate conditions, with its forest ecosystem linked to marine life, have made it possible for the country to possess a relatively large variety of flora and fauna.

Wetlands and tidal flats are habitats crucial to the formation of diverse and distinct characteristics of Korean species. Wetlands are important from the perspective of biodiversity in that they provide habitats for unique organisms, which evolve from environments different from those of terrestrial and aquatic organisms. However, with the gradual reduction of wetlands, diverse wetland species are threatened with extinction. Otters (*Lutra lutra*), Spoon-billed sandpipers (*Eurynorbynchus pygmeus*), Tiny dragonfly (*Nannophya pygmaea Rambur*), Folded crown mussel (*Cristaria plicata*), Water lily (*Euryale ferox*), Korean aster (*Aster altaicus* var. *uchiyamae)*, Water crawfoot (*Ranunculus kazusensis*) are some of the species on the verge of extinction due to the widespread loss of weltands. Meanwhile, an expansive tidal flat has been developed on the western coast, providing habitats for diverse types of crustacean, fish and plankton.

Korea's topographic characteristics and ecosystem

Korea's geographical and climatic conditions are extremely unique. Mountainous extending from Mts. Baekdu to Jiri and the resulting topographical variation as well as the presence of the sea on three sides has maintained on Korea's biodiversity. Mountains taking up approximately 64% of the land mass as well as some 3,200 islands, both inhabited and uninhabited, offer beautiful scenery and provide widely diverse biotic resources. Ecological habitats representing Korea include the DMZ, the Baekdudaegan Mountain Range, Ulleungdo and Dokdo. The DMZ mostly comprises forests and grasslands (97.4% inside the DMZ and 75.2% outside) and is home to 2,716 wildlife species including 67 endangered species. The Baekdudaegan Mountain Range, which links Cheonwangbong Peak on Jirisan with Hyangrobong in Gangwon Province, is home to 4,240 species including 27 endangered species.

The mountain range boasts beautiful topographical scenery including potholes sculpted by nature. The area's ecosystems, however, have been degraded due to habitat fragmentation and other threats brought about by development. The island regions maintain remarkable natural ecosystems where many endangered, unrecorded, natural monuments and unique plant life can be found. Specially, the island and coastal areas in the Jeolla-do region is the repository of biotic resources where the highest number of rare living organisms and unrecorded species can be found in the nation. The Sinan Jang-do wetland, Muan tidal flat, Jindo tidal flat, as well as tidal flat in the island regions provide habitats for a wide range of living organisms including invertebrates, fish and birds. The islands of Ulleungdo and Dokdo are volcanic with remarkable topographical scenery. Notably, the flora in the primeval forests stretching throughout Seonginbong Peak in Ulleungdo has significant ecological value.

Hallasan National Park, the Joongsangan area, and the Yeongcheon and Hyodoncheon areas in Seogwipo on Jejudo have a variety of biotic resources while boasting breathtaking scenery along with their caves, waterfalls, and valleys. The coastal waters of Seogwipo is the repository of a significant oceanic ecosystems, home to Korea's largest coral reef community

and 455 species of marine organisms. The western coast has an extremely expansive tidal range and well-developed tidal flats due to a complex shoreline and long inlets, making the region one of the world's five major tidal flats. Rising awareness of the role of tidal flats in stream and seawater purification and flood control as well as their ecological value has led to the rise of protection movements. Mountainous terrain comprises a large proportion of the Korean Peninsula, and thus caves are found in large numbers. Since the mountain range on the Korean Peninsula stretches from the north and east to the southwestern part, most of the caves in South Korea are found in Gangwon-do. A number of long caves are also found on Jejudo, which is volcanic. Geographically, the features of the caves shed light on the causes of the formation of these caves, which boast spectacular rock formations, stone pillars and, stone pagodas.

Island, coastal and marine ecosystem

The total area within maritime jurisdiction in Korea is around 443,838 km^2, 4.5 times of land size of Korea. The number of maritime species is 9,534, including 6,110 (64.1%) animals, 1,048 (11.0%) plants, 2,172 (22.8%) phytoplanktons and 204 zooplanktons. Due to climate change, sea water temperature has risen from 16.5 ^{o}C in the 1970s to 17.3 ^{o}C in the 2000s, causing the increase of subtropical species in the southern coast of Korea. In spite of the rise in temperature of the open sea of the East Sea, temperature of coast rather drops, which makes the environment favorable for cold sea life to live.

The total area of coastal wetlands in Korea is 2,489.4 km^2, accounting for 2.5% of the national territory, of which 83.6% (2,080 km^2) are concentrated on the western coast. The coastal wetland areas have been decreased by 22% since 1987. Reportedly, 1,141 species of maritime species, including 955 animal species and 186 plant species live on coastline wetlands. The coastal areas in Korea offer magnificent sights with their bays, lagoons, sea cliffs, tidal flats, sand spits, sand bars, and underwater landscape, which are utilized as rural fishing village and ecological tourism resources. A total of 133 coastal sand dunes have been known in Korea, and the number is estimated to exceed 200 including those in the island regions. Coastal sand dunes serve as natural barriers against wind, tidal waves and ocean waves. They have significant conservation value as they play diverse roles as the repository of sand and underground water habitats for rare organisms. Since most coastal sand dunes are situated in the hinterland of sandy coasts that can generally be used as beaches, they face strong pressure to be developed into lodging facilities and parking lots.

The total length of the coastline is 12,682 km, 78% of which is natural coastline and 22% artificial. Coastlines artificially changed or created through the development of coasts include landfills, land reclamation and constructions of ports for residential areas and industrial complexes. Although the number of marine species is significantly lower than that of terrestrial species, marine species are relatively diverse, classified into 34 phyla and 83 classes. Estuaries are ecological zones of transition where freshwater meets seawater. These highly productive ecological regions are being rapidly damaged by development. The status of the ecological system in estuaries, 12 in total, was studied according to the Wetland Conservation Act, and wetland areas designated for conservation at Hangang River and Nakdonggang River have been assigned for management. The west southern coastal regions of Jeollabukdo and Jeollanamdo Provinces are typical rias coasts dotted by a large number of islands and intricate coastlines. The coastlines of Jeollabukdo and Jeollanamdo account for more than 50% of Korea's coastlines with Jeollabukdo accounting for 491 km and Jeollanamdo accounting for 6,592 km. Coastal rock faces, coastal sand dunes and salt

marshes are well developed in the eco-zone. The Jeollabukdo and Jeollanamdo, a transition zone where the sea and land meet, have high level of biodiversity.

With the distribution of a wide range of habitats including estuaries, seashores, and coastal sand dunes, the area has high ecological value that merits protection. The landscape of the diverse coastal topography including sea cliffs, sea caves, notches, tafoni, marine plateaus, and coastal sand dunes are significantly influenced by marine erosion. Of the 3,217 islands confirmed nationwide, the ecosystem is well preserved on 1,964 islands situated in the Jeollabukdo and Jellanamdo, with rich biotic resources having high conservation value. Rare species as well as unregistered ones continue to be discovered here, and among the 170 special islands where species with high conservation value inhabit, 80 islands (47%) are situated in the Jeollabukdo and Jellanamdo. Also, the area stretching 573.12 km^2 through Dochodo, Bigeumdo, Chilbaldo, Heuksando, Hongdo and Jeungdo in Sinan, Jeollanamdo, were designated as biodiversity conservation areas by UNESCO (May 2009). Among marine animals, 4,989 species are marine invertebrates, 97 species are Urochordata, 987 species are fish stocks, and 37 species are marine reptiles and mammals. Marine invertebrates comprise the largest proportion at 81.7%.

Forest ecosystem

The ecosystem in the mountainous region forms the backbone of forests in Korea with the Baekdudaegan Mountain Range as the ecological axis. Korea's forests have diverse vegetation zones ranging from warm temperate to sub-boreal forest. Although its land size is the smallest among temperature zone nations, Korea has diverse and rich forestry resources. The total area of forests in Korea reach 6,369,000 ha as of the end of 2010, taking up 64% of the national territory, of which national forests account for 1,543,000 ha (24%), communal forests 488,000 ha (8%), and private forests 4,338,000 ha (64%). Coniferous forests extend 2,581,000 ha, taking up 41% of the total area of forests, deciduous forests extend 1,719,000 ha, comprising 27% of the total, mixed forests reach 1,865,000 ha, taking up 29% of the forests, and bamboo groves extend 204,000 ha, accounting for 3%. The distribution of forestry area by age-class is 2,023,000 ha, 32% of the total forestry area, for trees under 30 years old and 4,142,000 ha, 65%, for trees over 31 years old. Forest vegetation includes oaks, maples, and hornbeams which are classified as temperate deciduous broad-leaf forests. Pine trees, which are needle-leaf trees, account for 23% of the total forestry area, and are distributed over the largest area for a single tree species. Meanwhile, broad-leafed evergreens grow in the southern coast and island regions, while polar needle-leaf trees grow in the northern regions. The number of plant species in Korea's forests totals 5,026, which include 4,942 indigenous and 84 foreign plants, and 2,268 agro-types are not included.

Farmland ecosystem

The rural population in Korea stands at 3.06 million, which accounted for 15.3% of the total population in 1990, but fell by more than half to 6.4% in 2010. Korea's farmland accounted for 17.9% (1,782,000 ha) of the national territory of 9,972,000 ha as of the end of 2007, of which 60% (1,070,000 ha) are rice paddies and 40% (712,000 ha) dry fields. The total area of farmland is gradually declining. It shrank by an annual average of 14,668 ha from 2000 to 2007, with a noticeable decline in rice paddy areas, which provide habitats for various inhabiting the farmland (rice paddies, dry fields) ecosystem amounts to 527 species, and vegetation biotopes are classified into eight classes, two sub-associations, and 32 communities (a total of 41 biotopes). Aquatic invertebrate fauna in the rice paddy ecosystem comprise 5 phyla, 7 classes and 222 species according to the surveys by 2009.

Freshwater ecosystems

The studies on natural lakes have been limited because there are not many natural lakes in Korea and they are relatively small in size. However, there is a significant need to conserve the natural lakes since they have rich biodiversity, serving as habitats for endangered wetland organisms, as well as being valuable for paleontological research. Freshwater ecosystems have been changing due to the construction of artificial lakes. The construction of small reservoirs as well as large dams including Soyang Lake, Chungju Lake and Andong Lake for securing sources of water and flood control led to the formation of new deep-water habitats which had not existed in the past. Korea has many artificial lakes which undergo severe fluctuations in water level. Although there are not many wetlands nearby the lakes, some are observed especially near the large lake, one example being Upo Wetlands of the Nakdong River.

Growing awareness in wetland conservation has led Korea to join the Ramsar Convention. Since Yongneup in Daeamsan, Gangwondo was designated as Korea's first Ramsar Wetland, Korea has registered 17 sites (176.755 km^2) as Ramsar Wetlands in 2011. Geographically, large streams flow gently toward the western and southern coasts, while streams flowing to the eastern sea consist of short, rapid currents. With the seasonal concentration of precipitation, there is minimal flux during regular times, but the rainy season produces a concentration flow.

The ecosystem unique to streams is facing significant degradation resulting from physical factors such as the construction of dams, artificial rerouting under stream maintenance, dredging, quarrying of crushed rocks, building of dikes and reservoirs for irrigation, development of terrace land on river banks, excessive use of stream water to supply industry, degradation of the basin (exploitation of forest, forest fires, reclamation for farmlands, landfill of wetlands); chemical factors including wastewater from industrial plants, domestic sewage, leakage of harmful and poisonous substances or oil; and biological factors including largemouth bass, blue gill, bullfrog, and other invasive alien species.

Urban ecosystems

The urbanization rate as surveyed at the end for 2009 reached to the upper limit for Seoul, Busan, Daegu, Gwangju and Ulsan, 98% for Daejeon and 97% for Incheon, recording the average of 99.4% for the seven metropolitan and local governments nationwide. Facing such extensive urbanization, ME is promoting the production of biotope maps designed by local governments in order to expand the range of green belts and biotopes in urban areas. Local governments have been producing biotope maps since 2006 and 32 local governments had completed the production of such maps by 2010. With the UNFCCC Kyoto Protocol entering into effect in 2005, Korea is striving to perform the role of a carbon sink through 1,645 city forests built in national and public lands from 2003 to 2010. A total of 34,800 km of streets has been lined with trees as of 2010, constructing networks among city forests and forests in the outskirts.

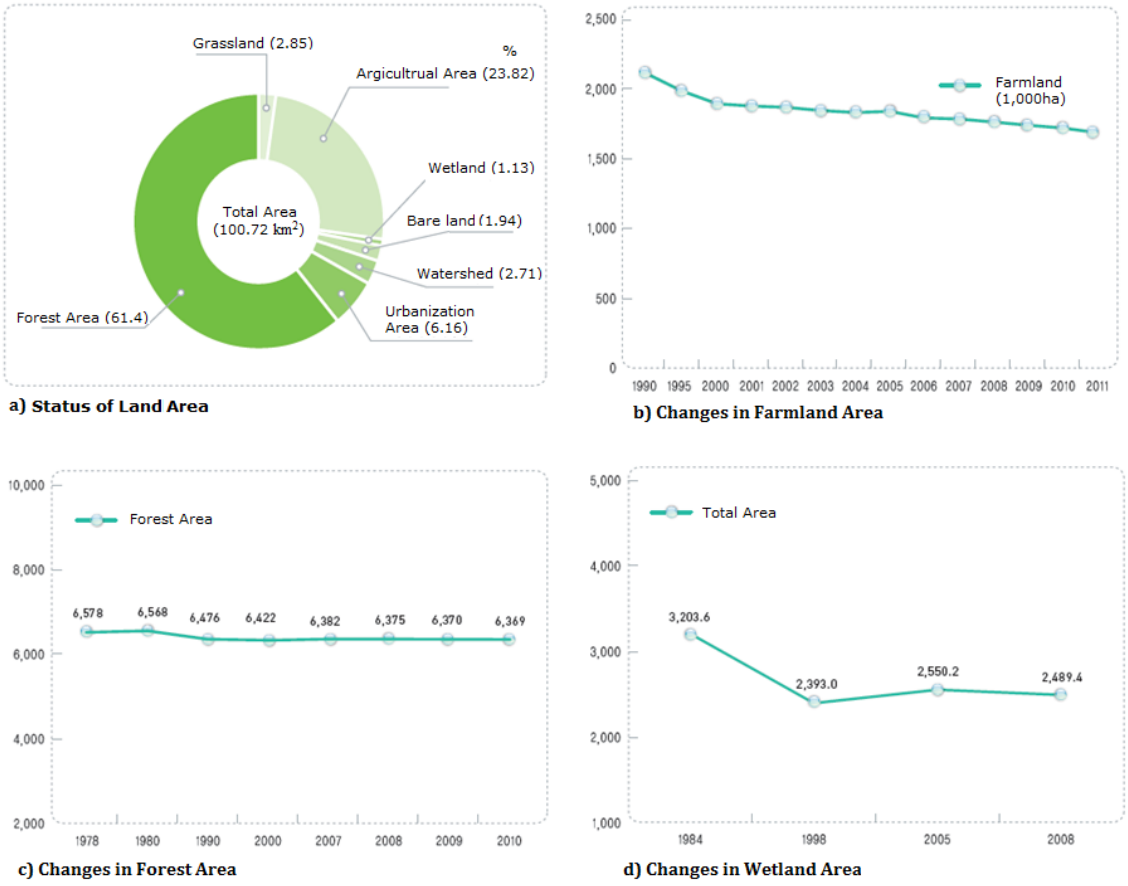

Figure 1. Statistics of current ecosystems in Korea (Environmental Statistics Yearbook, 2012).

1.3 Major threats to biodiversity

1.3.1 Urbanization

The biggest threat to biodiversity is the decline of habitats for animals and plants. Highly developed urbanization and centralization cause difficulties in managing the natural environment and leads to a gradual decrease of native habitat. Overuse of land and rapid urbanization destroy ecosystem, damage natural landscape and degrade the green and wetland. In the last two decades, 2.1% of forest, 15.9% of farm land and 20.4% of wetland have been decreased.

Destruction and degradation of native habitat will continue through growth in road construction and development. The area of forest was 6,422,000 ha in 2000 and decreased to 6,369,000 ha in 2010, and the length of road extension was 88.8 million km in 2000 and increased to 105.7 million km in 2012.

1.3.2 Invasive alien species

Invasive alien species cause a major threat to biodiversity. A species introduction is usually vectored by human transportation and trade. By the end of 2013, alien animal and plant species that were naturally or artificially introduced into the nation numbered 2,167 species (333 plants and 1,834 animals), among which 18 species were designated as IAS. Common

invasive species in Korea are nutria (*Myocastor coypus*) which damage to the wetland and aquatic plants, and largemouth bass (*Micropterus salmoides*) which recklessly devours aquatic insects, fish and amphibians, resulting in the degradation of the freshwater ecosystem and decline in the number of indigenous species.

Agricultural alien pests are 323 species (36 pathogenic organisms, 43 pests, 244 weeds) and continuous damages to forest and farms are predicted due to increase in trading and climate changes. Invasive alien species are prohibited from being farmed, planted or released into nature, and restricted from being imported except for research purpose. The ME, local governments and affiliated agencies are making a great deal of efforts to eradicate invasive alien species. Furthermore, since 1994, ME has been regulating IAS based on the Natural Environment Conservation Act. The introduction of alien maritime species through ballast water is also increasing by the increase of international trading. To the present, 27 maritime species are identified as IAS in Korea

1.3.3 Poaching

In spite of diverse programs of wildlife protection and management, the imbalance of ecosystem is caused by poaching or drastic population increase of a certain species due to the extinction of natural enemy. Threats against wildlife are continuing due to the increased number of road kills through habitat fragmentation, poaching and illegal trading. Poaching and illegal trading prosecuted are 600-800 in every year and over 5,700 road kills were reported. The poaching of 602 cases was prosecuted in 2005, which increased to 643 cases in 2011.The illegal collection of the edible and medicinal plants in the wild, most often in the spring season, causes additional treats to the biodiversity of forests.

1.4 Future perspective of biodiversity in Korea

In 2011, the National Institute of Meteorological Research (NIMR) announced a report describing the possible future changes for biodiversity and their impacts driven by the climate change. The report claims that if greenhouse gases (climate change) are emitted in current trend (RCP 8.5), the temperature in Korea will increase by 3.2 ^{0}C, and the annual rainfall will increase by 15.8%, and surface of the sea level will rise by 27 cm. Due to the rise in temperature, subtropical climate will be expanded to all of the country. The heat wave and the number of tropical nights will also see a rise, consequently affecting the quality of human life.

Also, it will impact on the length of each season. Understanding the seriousness of the climate change, ME and other government organizations have reported estimated impact it can pose on the general status of future biodiversity. Climate change on the Korean Peninsula is taking place at a faster rate than the global average. It has led to a rapid decline in biodiversity, with the average temperature in Korea’s six major cities rising by approximately 1.5 ^{0}C for the past 1000 years.

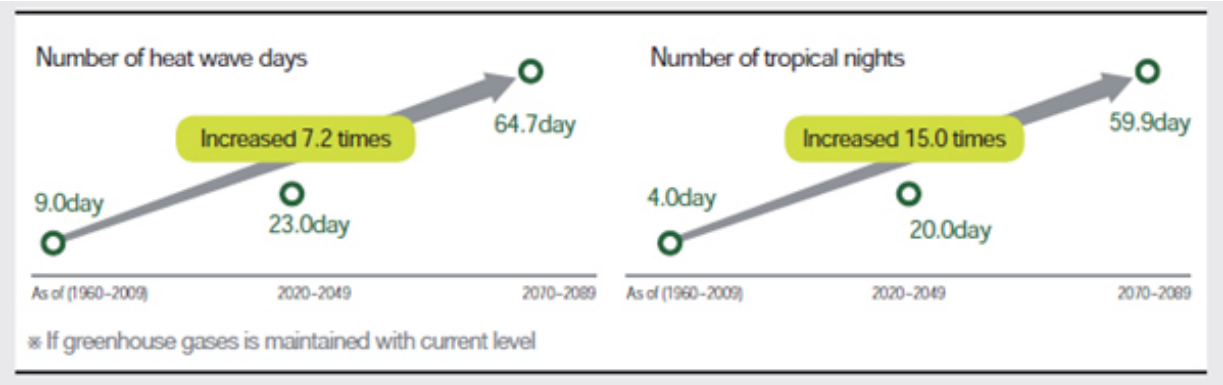

Figure 2. Predicted climate change due to CO_2 emission (November 11, NIMR)

When temperature rises by 2 ^{o}C, the ecosystem in Korea might change from temperate to subtropical, which provoke reduction of pine tree forest and increase in southern IAS such as *Vespa nigrithorax* Buysson Reportedly, due to climate change and subsequent increase in disease and pest, agricultural production is decreasing with lower quality. Also, such a change increase frequency of natural disaster such as abnormal cold wave in winter and localized heavy rains, strong drain and heat wave in summer.

Climate change has led to an increase in natural disasters and ecosystem disruption, posing a serious threat to the forestry environment. Rise in summer temperature, led to a decline in the growth rate of indigenous tree species, Korea firs, on Jirisan and Hallasan. Also, rise in water temperatures and change in ocean currents drove organisms that have lived in tropical waters to migrate to the Korean seas, leading to the disappearance of existing native organisms.

Furthermore, acidification of land has also become aggravated which stood at pH 5.48 in the 1980s but fluctuated to pH 4.95 in 2006. Statistical Research Institute in Korea has reported that the total amount of damage resulting from meteorological damage such as typhoons, heavy rainfall, and heavy snow for the ten years from 1997 to 2006 amounted to KRW 20 trillion.

CASE STUDY - Forest Ecosystems Restoration and Conservation in Korea

Reforestation and restoration of Korean forests was a daunting mission with little chance of success when the massive efforts for tree planting started around 1962. Korea was one of the poorest and least developed countries in the world at the time with nominal GDP being mere US $82 per capita. It seemed unlikely that Korea could rehabilitate its forests, which had been devastated during the Japanese occupation (1910-1945) followed by the Korean War (1950-1953).

I. Forest Degradation

The growing stock per ha in Korea in 1945 was just 16.6 m^3, which is only 13% of the present growing stock as of 2010. The state of Korean forests had reached the worst point in its history during the Korean War; almost half of the forest land was destroyed, and the average volume of growing stock dropped to about 36-40% of what it was before the war. After the war, there were not enough political and financial supports to restore degraded forest land, and the poverty drove rural people to illegal logging, slash-and-burn agriculture, and collection/sale of fuel wood, all of which contributed to the further forest degradation. Furthermore, the population increased 25.4% between 1945 and 1950; such rapid population growth after the war had adverse impacts on forest resources management and the volume of growing stock. Combined with this, the weak governance with lack of administrative capacity was another prominent driver of forest degradation.

II. National Reforestation Program

The National Reforestation Program of Korea was implemented over twenty-five years (1962-1987) to restore 2,637,000ha of degraded forest land (about 40% of the forest land at the time), mainly divided into two separate forest rehabilitation plans. The First Plan was concluded in six year period (1973-1978), and the Second Plan was concluded within 9 year period (1979-1987). The goals and strategies of the forest rehabilitation plans, independently established by Korea Forest Service (KFS), were stated as the following four parts. First, to make the forest resources profitable, have all citizens participate in forest rehabilitation with patriotism. Second, complete the rapid reforestation of denuded forest. Third, create new economic zones in mountainous areas by systematically managing forest earnings of all villages as in stock. Fourth, coordinate with community organizations, local government agencies, police, forest agencies and forestry schools and focus all efforts into promoting forestry in the development of mountain area. There were also policy linkages within the Program. The Saemaul Undong was an effort to modernize rural economy as well as improve rural living conditions. Closely linked the forest rehabilitation plans, the government provided a win-win strategy for both. For an instance, the Saemaul Undong promoted the tree plantings in the rural areas, and in turn the government would purchase entire volume of woods at open market price ensuring the income for the village.

Voluntary Participation of All Citizens: Students, Soldiers, and Village People

III. Success Factors of the National Reforestation Program

There were several factors which contributed for the successful outcome of the National Reforestation Program. First factor was the strong personal conviction of the supreme leader; the president had put the forest rehabilitation as the top priority among government projects. Second factor was the establishment of the organization and system for more effective forest administration. Korea's forest administration began as a small bureau under the Ministry of Agriculture and Forestry (MAF), but later on KFS was established as a separate organization under MAF in 1967, with the recognition for stronger administrative power for forestry. Third factor was the continuous economic growth of Korea; after 1962, Korea had accomplished continuous and rapid economic growth, due to the success of the economic policies represented by the 5-Year Economic Development Plan. Because of these growths, the government was able to continuously put in monetary resources into the forestry sector for the rehabilitation. Fourth factor was the migration of rural population into cities, and fifth factor, closely linked with the fourth, was the expansion of the household alternative fuels. The most significant driver of forest degradation had been the enormous consumption of firewood across the country, cutting trees for the household-uses. The migration of rural populations into cities decreased the total amount of firewood consumed within Korea sixth factor was the clearing of the slash-and-burn fields; slash-and-burn farming was one of the major causes of deforestation, and strict government regulation and clearing of the slash-and-burn fields became a major factor in the success of the forest rehabilitation. The last factor was the large-scale reforestation; the massive reforestation implement during 1973 to 1987 with the National Reforestation Program transformed the denuded mountains and fields of Korea, building the foundation of the successful reforestation within Korea.

VI. Outcomes of the National Reforestation Program

The forest rehabilitation plans of Korea during 1973 to 1987 provided the following positive outcomes. First, it brought changes in the forest resources; during the 14 years of National Reforestation Program, the volume of deforested land was reduced by 77%, while the forest area and growing stock were both increased by 9% and 270%, respectively. Second, it brought changes in biodiversity. The increased growing stock and stabilized land allowed forest species to root down quickly and diversified species. Third, it brought changes in forest watershed; the reforestation efforts of Korea in last 50 years have been a major contributor to create and conserve forest soil, and thus it paved a way for forests to act as a source of fresh water resources. Fourth, it brought changes in forest recreational resources. As the forests were rehabilitated, the government began to establish the National Parks, which more and more people began to use for the recreational purposes. Recently, KFS introduced diverse "the forest welfare services" for different age groups and more people have been enjoying benefits provided by forests. Various services of recreational forests, such as hiking, forest therapy, and education, are becoming the part of the daily lives of people in Korea as well as the part of the mainstream culture.

Rehabilitation of eroded land at Yeongil district (Pohang City)

CASE STUDY- Possible change in the distribution of *Machilus thunbergii* by the predicted scenarios of climate change in Korea (Yun et al., 2011)

Machilus thunbergii Siebold & Zucc. (Lauraceae) is currently distributed in warm temperature zone in Korea such as coastal area, low lands of Jejudo, and Ulleungdo. This species is a typical element of warm temperate evergreen broad-leaved forest of Korea. Yun et al. (2011) have demonstrated how the climate change will affect the distribution of warm temperate evergreen broad-leaved forest in Korea as well as *M. thunbergii*. They carried out a modeling study to find climate factors which determine the distribution of *M. thunbergii*, and the potential habitats under the current climate and three climate change scenario by using classification tree (CT) model. Four climate factors; the minimum temperature of the coldest month (TMC), the warmth index (WI), summer precipitation (PRS), and winter precipitation (PRW): were used as independent variables for the model. The model of distribution for *M. thunbergii* (Mth-model) constructed by CT analysis showed that minimum temperature of the coldest month (TMC) is a major climate factor in determining the distribution of *M. thunbergii*. The area above the -3.3 of TMC revealed high occurrence probability of the *M. thunbergii*. Potential habitats was predicted 9,326 km^2 under the current climate and 61,074-67,402 km² (South Korea: 58,419-61,137 km², North Korea: 2,655-6,542 km²) under the three climate change scenarios (CCCMA-A2, CSIRO-A2, HADCM3-A2). The Potential habitats was to predicted increase by 51-56% (South Korea: 49-51%, North Korea: 2-5%) under the three climate change scenarios. The potential expansion of *M. thunbergii* habitats has been expected to compete with warm-temperate deciduous broad-leaved forest. *Machilus thunbergii*, as a potential indicator of climate change, should be monitored to assess the progress in the climate change in Korea.

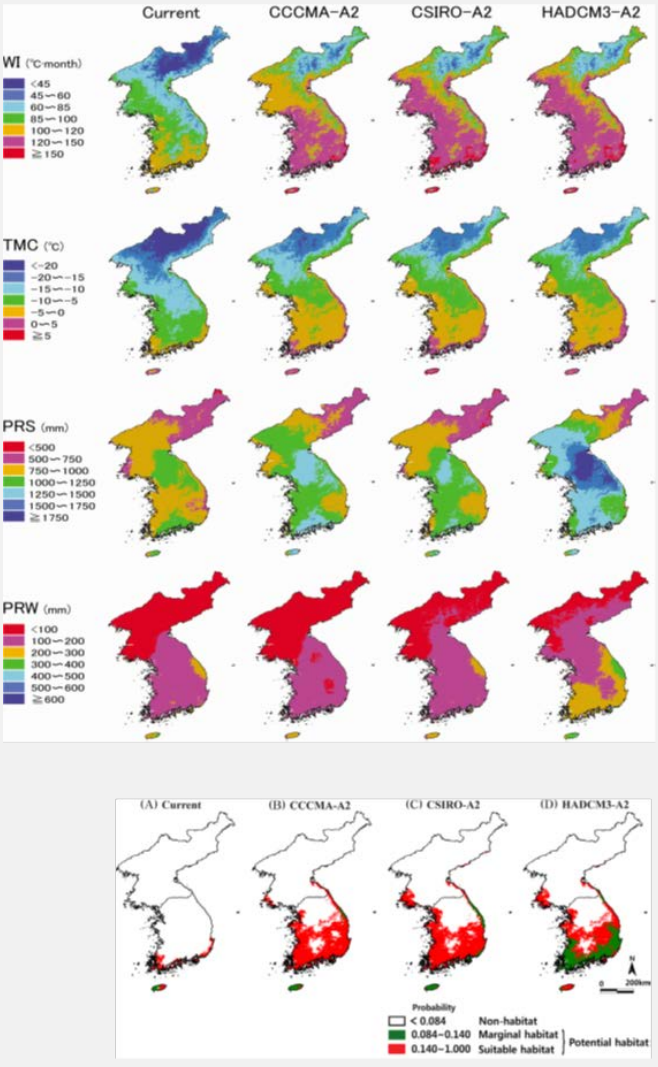

Figure 3. Maps of four climate variables under the current climate (1961-1990) and three future climate scenarios, i.e., CCMA-A2, CSIRO-A2 and HADCM3-A2 of 2081-2100 (WI: Warmth index, TMC: Mean minimum temperature of the coldest month, PRS: Summer (May-September). Bottom: Predicted distribution of *Machilus thunbergii* under the current climate and three climate change scenarios.

Part 2 National Biodiversity Strategy and Action Plans

2.1 Korea's biodiversity targets

Conservation of biodiversity through sustainable use of biological resources is the main biodiversity target in Korea to comply the Convention. Korea aims for healthy and well-established ecology, which provides buffering capacity to climate change with the full harmony of diverse plants and animals in Korean Peninsula. Through re-connecting the nature with the people separated by urbanization and industrialization, benefits of ecosystem services should be regained. People, as an element of ecosystem, should give a full effort to strengthen the ecological network in Korean Peninsula for all lives to prosper.

2.2 Development of NBSAP

Under Articles 6 and 26 of the Convention, the contracting parties are obliged to establish national strategies and submit reports. Accordingly, Korea established NBSAP over two occasions. Following deliberation by the Cabinet Council in 1997, Korea finalized the 1st NBSAPs and submitted to the COP 4 meeting in 1998. In October 2008, the Task Force on Biodiversity was established for the purpose of drawing up the National Biodiversity Strategies and compiling the National Report, and the formulation of the 2nd National Biodiversity Strategies was launched. In December 2008, a workshop on formulating the National Biodiversity Strategies was held, and the 2nd National Biodiversity Strategies were established in May, 2009 through a joint effort among 11 relevant government ministries. The 3rd NBSAP was recently established in early 2014. As a hosting nation of the CBD COP12, one of the most core objectives of the new NBSAP is mainstreaming biodiversity and sustainable use of biological resources.

The 2nd NBSAP for 2009-2013, focused on the equitable sharing of benefits from biodiversity and the sustainable uses of biological and genetic resources, has been pursued jointly by 11 relevant government bodies in 5 core areas and 14 strategies originally. In 2011, the original NBSAP was revised in order to reinforce the area related the equitable sharing of benefits arising from the use of genetic resources to reflect the Nagoya Protocol.

Table 5. Strategies of Korea's 2nd NBSAP (2009-2013)

Area related to CBD	Strategy
Protection of biodiversity elements	1. Effective conservation of major ecological regions (1) Protection of biodiversity in major ecological regions (2) Expansion and preservation of protected areas 2. Conservation of diversity in species (1) Strategy to conserve plants on Earth (2) Study and restoration of endangered species 3. Conservation of genetic diversity
Promotion of sustainable use	4. Sustainable use and consumption (1) Application of the approach method for ecosystem (2) Enforcement of CITES
Countering the risks to	5. Study and management of invasive alien species

biodiversity	6. Management of Living Modified Organisms 7. Establishment of countermeasures against climate change
Maintaining biodiversity for the welfare of mankind	8. Maintaining productivity of ecological goods and services (1) Ecological tourism (2) Measures for attracting tourists
Protection of traditional knowledge, innovation, and customs	9. Protection of traditional knowledge and regional diversity (1) Protection of traditional knowledge (2) Protection of social and cultural diversity in regional societies
Fairness in benefits resulting from genetic resources and guarantee of fair sharing	10. Access to genetic resources and sharing benefits
Establishment of financial, personnel, and technological support	11. Technological transfer and provision of funds (1) Technological transfer (2) Finances and financial system 12. International cooperation and participation of interested parties 13. Communication, education, and reinforcement of awareness (1) Communication, PR (2) Education (3) Systems of information sharing
Monitoring and evaluation	14. Monitoring and evaluation (1) Monitoring and research (2) Global Taxonomy initiative
Action towards the Nagoya Protocol (supplemented in Dec. 2011)	15. Action towards the Nagoya Protocol (1) Promoting follow-up measures of a pan-government (2) Re-shaping the domestic legislation for the implementation (3) Establishing national management mechanism for import/export of biological resources (4) Continuous expansion of genetic resources DB

2.3 Implementation of NBSAP

The 1st NBSAP focuses on preserve of biodiversity, sustainable use of biological use, capacity building and better management practices. The 2nd NBSAP was developed with emphasis on the equitable share use of biological resources, effective response mechanisms for future challenges and international cooperation. Comprehensive understanding of the current status of the biological resources in Korea was shared with the establishment of the National Species List inclusive of nationally endangered species list, designation of the protected areas and its expansion. Further, the national biological diversity protection agency has been founded. Standardized and systematic approach is made with the National Biodiversity Resources and the National Red List Index being published.

Restoration and protection efforts at national level were also proactively sought after with the significance of the government's role to be continuously acknowledged. Amendments in related regulations are introduced in order to systematically categorize the designation of

protected areas. National Parks as well as the areas with excellent scenery, sites with rare biodiversity resources, wetlands and various islands are now included, which resulted in the increased number of nationally designated protected areas from 1,297 in 2008 to 1,402 in 2013. In 2013, a newly selected national park, Mudeungsan, was designated.

Effective management practices for IAS in Korea to reduce the habitat loss and fragmentation are in place. Nationwide crackdown on illegal poaching, international smuggling and trafficking of the endangered wildlife is enforced. National research organizations specializing in biodiversity and its protection are expanded. Some of the newly set up agencies are as follows; National Institute of Ecology (2013), Marine Biodiversity Institute of Korea (2014), National Institute of Nakdong River Biological Resources (2014), National Baekdudaegan Arboretum (2015), National Endangered Species Restoration Center (2016), National Sejong Arboretum (2017)

2.3.1 Contributions for achievement of the strategic plans for biodiversity 2011-2020

The government of Korea has reviewed the achievement of NBSAP 2009-2013 in the 21st Committee on Green Growth and the 11th Meeting for Reviewing Implementation in 2012. In the review, 18 tasks out of 24 were judged as ‘satisfactory’ and the other 6 tasks were judged as ‘unsatisfactory,’ which needs improvement: i) expansion and conservation of protected areas, ii) conservation of genetic diversity, iii) establishing the system of countermeasure for climate change, iv) securing and utilizing biological resources, v) expanding education programs and raising professional manpower on biodiversity, and vi) establishment of the information sharing system.

The task on expanding the protected areas was judged as unsatisfactory due to insufficient awareness of biodiversity conservation and opposition from local residents, who were concerned on economic disadvantage due to restrictions on commercial activities in the area. The improvement plans are suggested to enhance people’s awareness through an extension of education and research programs on biodiversity and changing the policy paradigm from conservation-centered strategy to conservation strategy in balance with sustainable use for the privately owned lands within the protected areas.

The government suggested to promote 3 main goals; i) reinforcing biodiversity conservation, ii) promoting sustainable use of biological resources, and iii) strengthening action plans for ecosystem threats, and then 9 approaches were suggested to achieve these goals. The main indicators are suggested as follows; expanding protected area from 20,000 km^2 in 2011 to 23,000km^2 in 2020, accelerating the survey program for indigenous species with a goal of 60,000 species by 2020 and creating goods and services using biological resources from 6 trillion Korean won (KRW) in 2010 to 40 trillion KRW in 2020.

2.3.2 National approach to biodiversity decline

Habitat loss

To minimize the habitat loss as possible, Korea has been providing an advanced management system for all areas of wildlife habitat, continuous support for conservation of habitat and expands target area of an ecological corridor for wildlife. The relevant regulations will be revised in 2014. The insurance system to compensate for the loss caused by wildlife was also introduced to protect wild animals near human settlements.

Protection of endangered species

Protection of endangered wildlife constitutes the core policy for conserving biodiversity in Korea. Annual surveys are being conducted on the distribution of 246 endangered wild species, while their habitats are under maximum protection. Those who illegally hunt or collect endangered wild species are subject to a sentence of up to 5 years in prison or a fine up to 30 million KRW. Also, as a signatory nation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Korea has strongly implemented the CITES since 1993 nationally.

As for 43 endangered wildlife species that require extra care in addition to protection of the habitats, active restoration measures are established and implemented. For example, since there had been only 5 Asiatic black bears left in Jirisan under high risk of extinction, 34 Asiatic black bears were imported and released to nature until 2012. As 10 or so mountain goats had been living in Woraksan faced with extinction due to inbreeding, a breeding project is under way to restore genetic diversity by getting individuals from other regions and releasing them into the area. Moreover, based on close bilateral cooperation between Korea and the People's Republic of China, Crested Ibis, critically endangered in Korea, a restoration project was launched in October, 2008. Meanwhile, to ensure *ex situ* proliferation and conservation of endangered wild species, many *ex situ* conservation institutions (24 for terrestrial species and 6 for marine species) are designated and supported. Also, 12 biological resources conservation units are being under governmental control. When it comes to the protection of marine species, especially for 4 species of sea turtles, 2 species of sea horses and Indo-Pacific bottlenose dolphin (*Tursiops aduncus*), proactive conservation programs are also underway based on the 'Act on the Conservation and Management of Marine Ecosystems.'

Protection of migratory birds

Out of all birds reported to inhabit Korea, there are 391 migratory birds, which comprise 86% of total bird species observed in Korea, with 337 of them visiting Russia, 281 visiting Japan, 337 visiting China, and 59 visiting Australia. In this light, Korea signed bilateral agreements on the protection of migratory birds with Russia, Australia and China in 1994, 2006, and 2007, respectively. Furthermore, in 2008, the city of Incheon hosted on the Secretariat of East Asian-Australasian Flyway Partnership (EAAFP)

Protection of wildlife

The ME carries out a variety of projects and manages wildlife with the policy goal of 'creating a healthy natural environment where humans and wildlife co-exist'. The policy for protecting wildlife is implemented in three principal directions: (1) to increase wildlife population and its density. (2) to control the density of over-populated wild animals, such as IAS, causing conflicts with and damage to humans, and (3) to keep up monitoring to check whether an optimum wildlife population and density are maintained. The projects implemented for wildlife protection include the establishment and operation of nation-wide 11 Wild Animal Rescue Center, prevention of damage to wild animals, protection of migratory birds through a contract for managing biodiversity, support for ex-situ conservation institutions, and crackdown on poaching. Also, surveys on population density is conducted for wildlife management which includes monitoring of ecosystem disturbing species, census of winter migratory birds, and survey on the inhabitation status of wild animals and endangered species.

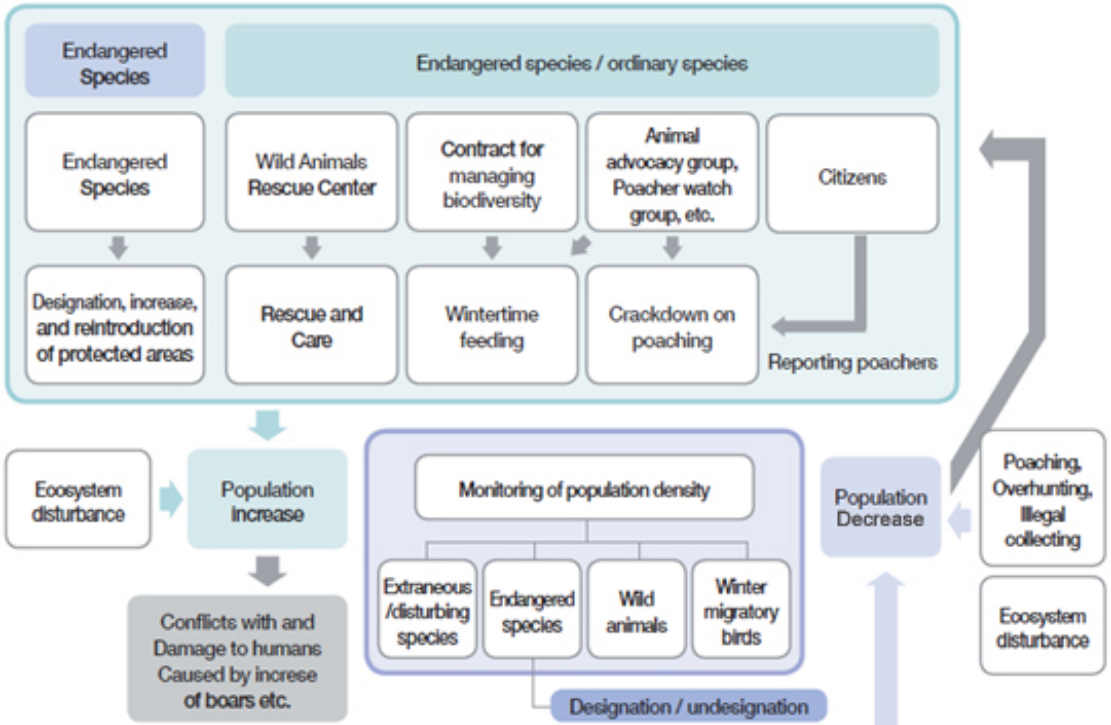

Figure 4. A schematic view of wildlife management and policy system.

Targets and actions to prohibit poaching

Korea prohibits poaching most animals, birds, amphibians and reptiles living in the wild. Furthermore, the government and private sector jointly organize and operate poacher watch groups to uproot poaching and trafficking. Poaching and trafficking have steadily dwindled since 2001, and in that regard, awareness raising campaign and poaching crackdown will continue.

Much effort is being made in rescuing and caring for wounded wild animals. First founded in 2004, there are currently a total of 11 Wild Animals Rescue Centers, which will be increased to 16 by 2015. Every year, over 7,000 wild animals are rescued and treated, and recovered individuals undergo rehabilitation training before they are released into nature.

Hunting is under strict supervision, being allowed only in authorized areas in a certain time of year, mainly in winter (from November to following February). The type and number of wild animals are specified for hunting, and hunters should obtain a license. As for boars and magpies that continue to proliferate and cause damage to farming and power supply facilities, hunting is permitted besides in the winter to control their population.

CASE STUDY – The Efforts on Restoration of Endangered Wildlife in Korea

Many wild species in Korea are threatened close to extinction, and this may continue to the future. The ME has designated 246 wild species as 'endangered' species for special managements. Among these species, ME has selected 54 species for a nation-wide plan, which is 'Endangered Wildlife Proliferation and Restoration Plan.' The purpose of the project is to regain ecological balance and harmony through restoration of the species. It is a complicated long-term project, which warrants the need for systematic implementation based on careful plans. The restoration of endangered species, as a project for biodiversity, is not just limited to increase the number of individuals, but it is even more meaningful to restore their habitats and healthy ecosystem by itself. For successful restoration and systematic work performance, ME has established the Species Restoration Technology Institute under KNPS and conducted numerous studies related on their ecology, reproduction and behaviors, etc. The ME has initiated to build the National Centre for Restoration of Endangered Species in 2013, which is expected to be in full operation by 2017.

I. Asiatic Black Bear Restoration Project

Asiatic black bears are classified as an endangered species. Although there were about 100 Asiatic black bears in Jirisan Mt. 50 years ago, only about 5 of them have survived from poaching and the destruction of habitats. It is believed that they may extinct unless if urgent restoration project is not taken to increase the size of the population. The project aims to increase the population to 50 individuals, which is considered to be large enough for this species to survive in the nature. Since 2004, 36 individuals have been released through a certain period of adaptation process in Jirisan Mt. Individuals, identified as Asiatic black bears genetically, have been introduced from Russia, North Korea, Northeastern China and Seoul Zoo, and released to the wild after quarantine with transmitter or GPS collar. Although all released individuals were observed to adapt well to the wild, a few had become so habituated to local residents that 4 of them were eventually withdrawn. Fifteen of them died in the wild. However, from 2009 to 2013, 9 individuals gave births to 18 cubs in the wild, which the number of individuals in Jirisan Mt. 35 in total. Researches have been carried on ecological characteristics and adaptation process by tracing the location of the released individuals. The ME finances to install electric fence around farms in the region to prevent damages from bears and compensates for damages occurred. Moreover, educational community programs are held to raise public awareness to enhance understandings and participations from local communities for restoration project.

II. Crested Ibis Restoration Project

Under the 'MOU for Crested Ibis Protection and Cooperation between Korea and China' signed by the leaders of the two nations, two male Crested Ibises were donated to Korea by China. Upo Ibis Restoration Centre, the national restoration organization in Changnyeong-gun, Gyeongnamdo Province, received them in 2008 to enhance genetic biodiversity and increase the number of this species in Korea. The restoration project not only symbolizes the friendship between Korean and China but also has a far-reaching impact on the biodiversity in the East Asian region. At present, the total number of Crested Ibis stands at 32 in Korea due to the success of this restoration program. Given that the size of the total population was 2 individuals back in 2008, the success of the project shows the commitment Korea has made in restoring critically endangered species in the region as well as technical advancements Korea has achieved. With extensive restoration programs underway also in China and Japan, this restoration project is expected to serve effectively in generating the public awareness in Korea since this bird has a strong cultural value by appearing often in the traditional fairy tales and songs. Considering the current progress, it is expected that the population of Crested Ibis in Korea will increase to 50 by 2015.

Reduction of direct pressure on marine biodiversity for sustainable use

Overfishing is a major threat to marine biodiversity in coastal fishery. Since the amount of catch has been dramatically dropped for last decades, prevention of overfishing is the only solution to recover marine fishery resources and to use them sustainably. Korea has introduced legal measures limit overfishing. Total Allowable Catch (TAC) is a resource management system by limiting the annual catch of the individual single fish species. For sustainable use of marine ecosystem, MOF strengthen culturing and growing fishery different from past catching fishery through restoration of spawning ground and habitat (sea farm project, sea forest project).The MOF also makes foreshore eco parks, foreshore eco exhibition halls, and foreshore visit trails.

- The amount of resources of TAC targeted species such as Chub mackerel, Jack mackerel, Red snow crab and etc. has been increasing. The number of species will be expanded from 11 species in 2010 to 15 species in 2017.

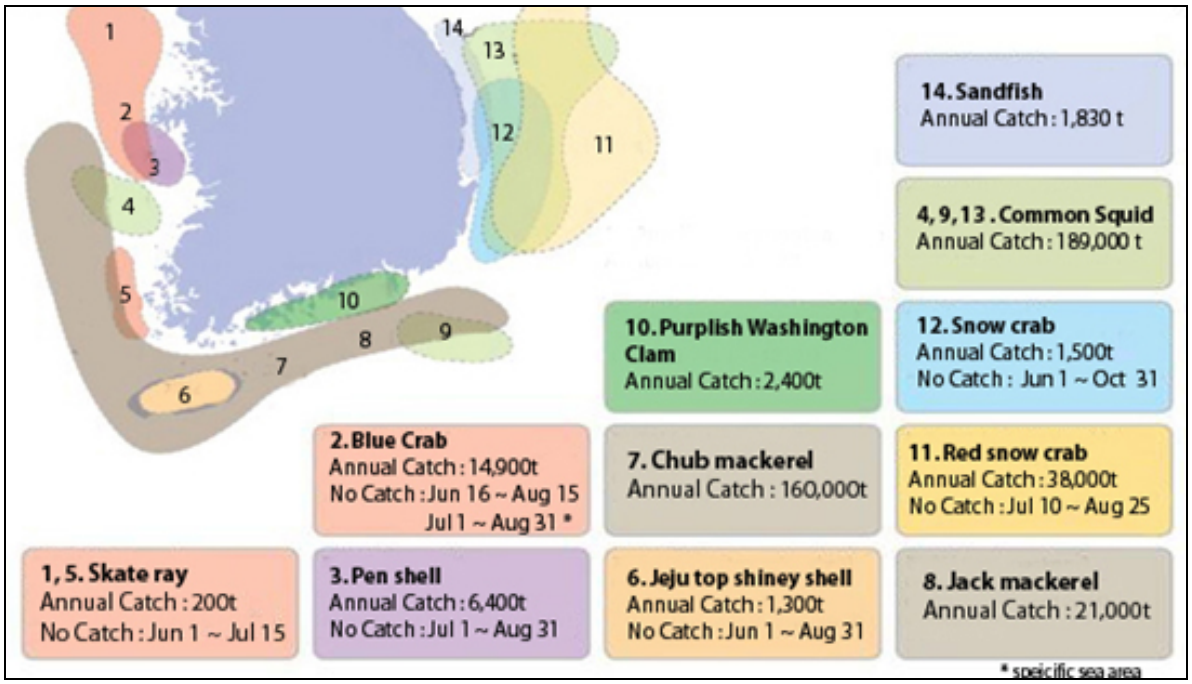

Figure 5. Fishery resources restricted by TAC in 2011 and their distribution.

Targets and actions for climate change

National Long-term Ecological Research (NLTER) by ME has been carried out to monitor the changes of the ecosystem caused by climate change and economic development. Average temperature of the earth rose by 0.5 ^{o}C in the 20th century; however, climate change appears to be more severe in the Korean Peninsula, with temperature rising by 1.0-1.5 ^{o}C in South Korea and 1.9 ^{o}C in North. Starting in 2004, NLTER has been carried out for 10-years stages to ensure a mid- and long-term monitoring of changes in ecosystems due to climate change, and to cope with the decline of species and changes in ecosystems.

Currently, the first stage of research is finished with land, freshwater, coastal, and animal ecosystem being monitored in 19 locations across the country. From 2014, the period of survey is shortened to 5-years in order to cope with speedy climate change. To establish the effective prediction and monitoring system of the impact and vulnerability of climate change

to the distribution of biological species, 100 biological species were chosen as climate sensitive species by NIBR under ME.

Table 7. Climate-sensitive biological indicator species

Bird	Amphibian	Fish	Insect	Mollusk	Invertebrate	Plant	Fungus	Alga	Total
14	2	2	21	1	6	44	5	5	100

Targets and actions for invasive alien species

There are 2,167 alien animal and plant species naturally or artificially introduced into Korea. Among them, 18 species that disturb ecosystem and encroach on endemic species are designated as IAS for control purpose. One of the most common IAS in nutria (*Myocastor coypus*) which damage to the wetland and aquatic plants and largemouth bass (*Micropterus salmoides*) which recklessly devour aquatic insects, fish, and frogs. This can result in the degradation of the freshwater ecosystem and decline in the number of indigenous species. Invasive alien species are prohibited from being planted or released into nature, and restricted from being imported except for research purpose. In addition, ME, local governments, and volunteers are carrying out efforts to exterminate and eliminate IAS.

The ecological risk assessment has been set up to control IAS. This is to protect endemic biological diversity and resources as well as to minimize the economic damage and the ecological disturbance by preventing the settlement and spread of IAS around the country. Policy direction for controlling IAS is:

1) Promote early detection, surveillance and rapid response of the alien species coming into the country
2) Assess ecological risks for biodiversity
3) Manage, mitigate and restore of ecological risk caused by alien species
4) Build governance amongst central, local governments and local resident as well as international societies
5) Raise public awareness and education to control alien species

2.4 Implementation for the Convention

2.4.1 Legislation

Enactment of national acts and master plans

Upon the completion of the 2nd NBSAPs establishment, the government legislated ‘Act on the Conservation and the Use of Biodiversity’, which directly aimed at protecting biodiversity. The Act was enacted on the 1st of February in 2012 and took effect on 2nd of February in 2013. Even the government had enacted several regulations indirectly relating to biodiversity conservation in the past, this act was a meaningful turning point for Korea in that a national level approach is being proactively made, promoting the systematic biodiversity protection. The Korea government is also seeking to raise the public awareness on this crucial topic. Furthermore, the Korean government is making efforts in implementing a wider range of acts related to ecosystem conservation and management:

- Act on Natural Environment Conservation (enforced on Sep. 1, 1992)
- Act on Wildlife Conservation and management (enforced on Feb. 10, 2005)
- Act on Marine Ecosystem Conservation and management (enforced on Apr. 5, 2007)
- Act on Wetland Conservation (enforced on Aug. 9, 1999)

- Act on Nature Parks (enforced on Jun. 1, 1980)
- The Cultural Properties Protection Act (enforced on Jan.10 , 1962)
- Act on Developing and Management of Forest Resources (enforced on Aug. 5, 2006)
- Baekdudaegan Protection Act (enforced on Jan. 1, 2005)
- Act on the Transboundary Movements of LMOs, etc (enforced on Jan. 1, 2008)
- Act on the Conservation and the Use of Biodiversity (enforced on Feb. 2, 2013)

Through the '2nd Master Plan for Wildlife Conservation (2011-2015), the government has carried out ecosystem monitoring, protection of wildlife including endangered species, and management of harmful wildlife and invasive alien species. Regarding marine ecosystem conservation, the government of Korea developed 'Master plan for marine ecosystem conservation and management'. Under the master plan, its sub plan was also designed called 'Conservation countermeasures for marine life subject to protection'. Through the plans, marine organism habitat protection, marine ecosystem restoration and system management are being carried out.

Based on the '2nd Master Plan for Forest Biodiversity (2013-2017)', the government has carried out a national monitoring program on forest resources, enhancement of the national arboretum, restoration of damaged forest and implementation of the Global Strategy for Plant Conservation. Some of the national attempts to better protect the forest in Korea listed as follows: The 2nd Master Plan for Forest Biodiversity (2013-2017) has outlined the national research projects on the forest resources, expansion of the nationally operated arboretums and protection strategies for globally critical flora and fauna. The 2nd Korea natural park management plan (2013-2022) has also been established to boost the efficiency of the national park operation and related policies

Act on the Conservation and the Use of Biodiversity

In the past, wildlife, agriculture, forest, marine and bio-information were separately handled by different ministries; therefore Korea's legal system related to biodiversity lacked a systematic management. A comprehensive response on national level was required to adapt to the globally changing demands including Nagoya Protocol adopted at COP 10.

From this perspective, the Korean government enacted 'the Act on Conservation and Use of Biodiversity' in February, 2012. The Act has three main purposes: i) contribute to the enhancement of biodiversity by creating a national management system, ii) promote the sustainable use of biological resources, and iii) cooperate with the international mechanisms including the Convention and Nagoya Protocol. The Act implements the following: i) setting up NBSAP every five years, ii) building a system for sharing information with National Biodiversity Center with a view to an integrated management of information on biodiversity, iii) preparing National Index of Species, iv) promoting cooperation with North Korea for conservation of biodiversity and endemic species in the Korean Peninsula, v) fair and equitable sharing of benefits from the use of biological resources, and vi) prerequisite test of alien species for any hazards to the local ecosystem.

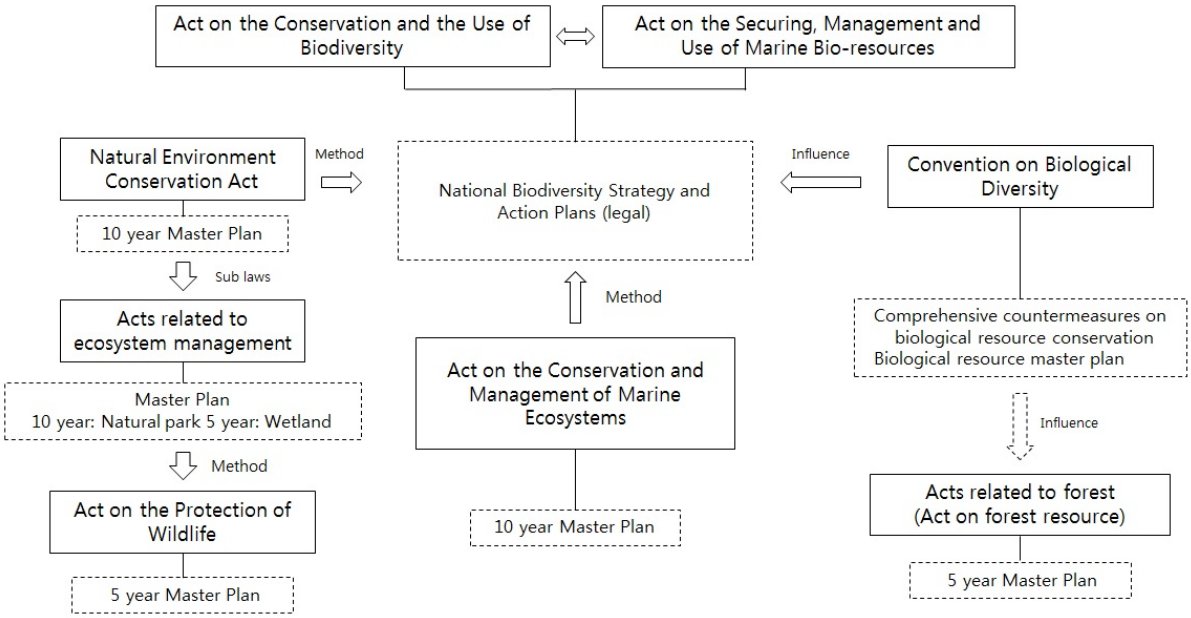

Figure 6. Flow chart of the major legislations related to the conservation of biodiversity (modified from Lee, et al., 2012).

2.4.2 Efforts and outcomes

Conservation and management of areas with excellent natural environment

Management of nature conservation areas

In order to conserve areas with excellent natural environment, actions led by the government are introduced as follows; i) designating such areas as Ecological Scenery Conservation Areas, Wetland Protected Areas, Special Islands, etc., and ii) restricting construction and land type conversion. In addition, prevention facilities and rehabilitation projects are being carried out to stop further damage to the impaired areas. Furthermore, a systematic management of conservation areas including ‘the basic plan for management of scenery conservation areas’ and ‘the wetlands conservation plan’ is established and implemented.

In areas designated as nature conservation areas, the conversion of land type as well as construction and extension of buildings are peremptorily restricted, and access is prohibited or only limited access is allowed when necessary. In addition, conservation areas are strictly managed with restrictions, under which the violators are subject to fine and become liable to restore the original condition. Besides, private lands in conservation areas are purchased by the state through negotiations with the owners.

Management of national parks

Korean natural parks are small in size compared to those in other countries and are mainly comprised of mountains. Since the designation of Jirisan as the first national park in 1967, major areas of the country with excellent ecosystems have been protected as national parks. The high population density in the country creates a great multitude of visitors as shown in the fact that national parks alone have 40 million visitors each year. Accordingly, efforts are made to meet the public expectation by upgrading the tour services as well as the level of conservation.

KNPS works to protect natural ecosystems, scenery, and historical sites in national parks and to control visitors. Moreover, KNPS conducts investigation and research on natural resources for effective management of natural ecosystems, and pushes for ecosystem restoration in areas damaged from excessive number of visitors and abusive use. As a part of the efforts, KNPS designates those areas inhabited by a number of endangered species or with an excellent ecosystem as special protection zones and restricts the access. As visitors of national parks multiplied with the abolition of the admission fee in 2007, visitor management staffs were allocated in principal areas to reinforce prohibition of using by-paths and crackdown on illegal acts. To ensure visitors' pleasant tour, upgraded tour guide services have been provided while more amenities are secured in the parks. According to the statistics published in 2013, 11 Visitor Information Centers, 86 Tour Support Centers, 78 Nature Observation Trails, 2 Nature Learning Facilities, and 300 Eco-guides are in service, while various ecological interpretation programs are provided. Additionally, enhanced explanation is available on the historical and cultural resources in national parks, while special programs themed to the characteristics of each park are provided.

National parks in Korea include private lands by 19% and a number of developed areas. Through the adjustment of the national park areas between 2010 and 2011, 207 km^2 of the already- developed private land was excluded while 130 km^2 of state-owned or public land with excellent vegetation was newly included. In the meantime, the purchase of the privately-owned land within the parks has been continued, resulting in the acquisition of 6 km^2 for last six years.

In addition, Geopark certification program was introduced in 2011 to ensure a systematic conservation of topographical and geological resources. With regard to Geopark, i) certification standards will be established to assess candidates, ii) a system will be set up for monitoring and follow-up management of certified Geoparks, and iii) Geotourism programs tapping into topographical and geological resources will be developed and distributed. The government designated 5 national geological parks, consisted of Jejudo, Ulreungdo-Dokdo(designated in 2012), some area of Busan city(in 2013), DMZ region and Cheongsong city (in 2014).

The 1st Master Plan on Natural Parks was completed in 2012 to prepare for a decade from 2003 to 2012, and the 2nd master plan was established for the next decade starting in 2013. As the goal to be achieved in 2022, a decade from now, the current master plan presents the following goals: 159 m^2 as national park area per capita as compared to the current 139 m^2, 63.29 million visitors to national parks as compared to the current 40.80 million visitors, and 45,000 persons employed from surrounding area as compared to the current 29,000 persons.

Construction of ecological networks in the Korean Peninsula

The government has established a nationwide ecological network in order to enhance ecosystems which were damaged by large-scale development and intensive growth strategies. Three Major Ecological Networks in the Korean Peninsula - Baekdudaegan mountain range, demilitarized zone (DMZ), and coastal and island areas - have been established to restore damaged and disconnected habitat patches, which are exposed in a fragile condition. In particular, conservation of ecosystems and development of eco-tour are promoted through the establishment of management plan for ecosystem conservation and sustainable use in DMZ, which represents great historical and ecological sites.

Meanwhile, the National Comprehensive Environmental Plan (2006-2015) divides the territory into five regions and conceives five wide-area ecological axes based on the five regions in connection with the three core ecological axes. Afterwards, to specify boundaries, years of research were carried out and 'the Plan for Building Ecological Axes on the Korean Peninsula' was established in 2010. According to the plan, the five wide-area ecological axes were designed to manage forest (50,198km²), aquatic ecosystem (5,196km²), and areas with wild animals (3,745km²), and it has developed to the conception of ecological networks on the Korean Peninsula connecting mountains, rivers, and seas.

For the ecological networks in Korea, protected areas will be expanded and the restoration of damaged ecosystems will be reinforced. In this respect, ME is pushing for the following: purchase and restoration of damaged or disconnected areas on principal ecological axes, restriction on development, inclusion of Baekdudaegan and habitats for migratory birds into protected areas, creation of eco-tour routes that connect wide-area ecological axes and urban ecological axes, and creation of urban biotopes such as ecological ponds, green alleys, and green roofs.

Biodiversity and research institutions

Biodiversity

In mid-1990s, about 30,000 species were recorded to inhabit in the Korean Peninsula. Korea is implementing a national project for surveying and listing the species in order to identify the species living across the Korean Peninsula and to upgrade the capacity for biological classification. Since 41,483 species were identified in Korea as of the end of 2013, a total of 60,000 species is expected to be recognized by 2020. In 2007, ME established the National Institute of Biological Resources (NIBR), which over 60 taxonomists work for. As NIBR complies past researches and intensifies the survey on biodiversity, the number of identified species in Korea is sharply increasing. Furthermore, NIBR contributes to capacity building on biological classification by carrying out survey and research on biodiversity in Cambodia, Laos, China, Mongolia, and Russia and fostering specialists in each of the countries through bilateral cooperation.

The Korean government is increasing its investment in expanding the infrastructure for biodiversity research. In addition to NIBR established by ME, three biodiversity research institutions are scheduled to be built with one under construction in Sangju City, and MOF is building Marine Biodiversity Institute of Korea (MABIK). With these research institutions going into service starting in mid-2010s, it is expected that Korea's biodiversity research capacity will be greatly upgraded, thereby contributing to the conservation of biodiversity in neighboring Asian countries.

Natural environment

The survey and research on natural environment has a great significance as a basis for establishing and implementing policy for conservation of natural environment. Currently conducted surveys and researches on natural environment are divided into national ecosystem survey, intensive surveys of valuable ecosystems, survey of endangered species, and NLTER, which are led by National Institute of Environmental Research (NIER) through partnership with NIBR.

As a comprehensive country-wide survey of natural environment performed every five years based on ‘Natural Environment Conservation Act’, 'National Ecosystem Survey' proceeds in the way of investigating certain segments of the country covering total nine categories: landforms, vegetation, flora, benthic macro-invertebrates, terrestrial insects, freshwater fish, amphibians and reptiles, birds and mammals. First started in 1968, the survey will finish its third round by 2013. The fourth survey will be started in 2014 and conducted for the following five years.

However, the map-based national ecosystem survey does not qualify as in-depth survey of specific ecological areas or endangered species. Accordingly, 'Intensive Surveys of Valuable Ecosystems' and 'Survey of Endangered Species' are separately conducted. Intensive Survey of Valuable Ecosystem is a close examination based on the characteristics and location of ecosystems covering nine areas; starting in 2002 with Survey on Natural Caves, it is expanded to National Coastal Dunes Survey, Estuary Ecosystem Survey, Inland Wetland Survey, Survey on Baekdudaegan Mountains Reserve, Survey on Wetland Protected Areas, Ecosystem Survey on Uninhabited Islands, Special Islands Survey, and Survey on Areas of Valuable Ecosystem and Landscape. Survey of Endangered Species targets 246 currently designated species as it continues to monitor the location of habitat, size of distribution area, population and threats for each species. The results of the investigation are reflected in designation and un-designation of legally protected species.

The ME has built GISDB on natural environment based on research results drawn from natural environment survey. Notably, by using actual vegetation map and distribution map of flora and fauna, the ministry has classified the entire territory into three categories according to ecological value, based on which the national map of the ecology and nature with the scale of 1:25,000 has been created. The GIS-DB is open to the public on the internet (Environmental Geographic Information Service (EGIS); http://egis.me.go.kr). It is used as basic data for environmental impact assessment in various development projects.

Establishment of an advanced management system of sustainable land management

Environmental impact assessment and procedural rationalization should be combined as one consultation system. Even if two prior consultation systems are same in purpose, they are recognized as two different systems because the environmental review and environmental impact assessment are operated on independent legal grounds, ‘Framework Act on Environmental Policy’ and ‘Environmental Impact Assessment Act’. Duplicated consultation or role division is pointed out to be uncertain; therefore, two systems were suggested to integrate into one system. Accordingly, a bill was established based on service results (2007) for revision of integrated Environmental Impacts Assessment Act, submitted to National Assembly in 2008; finally the Integrated Environmental Impacts Assessment Act was proclaimed on July 21, 2001, started to enforce on July 22, 2012.

Integrated, revised Environmental Impact Assessment Act could keep its consistency in the system by reforming environmental review on administrative plan on the existing Framework Act on Environmental Policy to a strategic environmental assessment and development project for environmental sensitive area to a small scale environmental impact assessment.

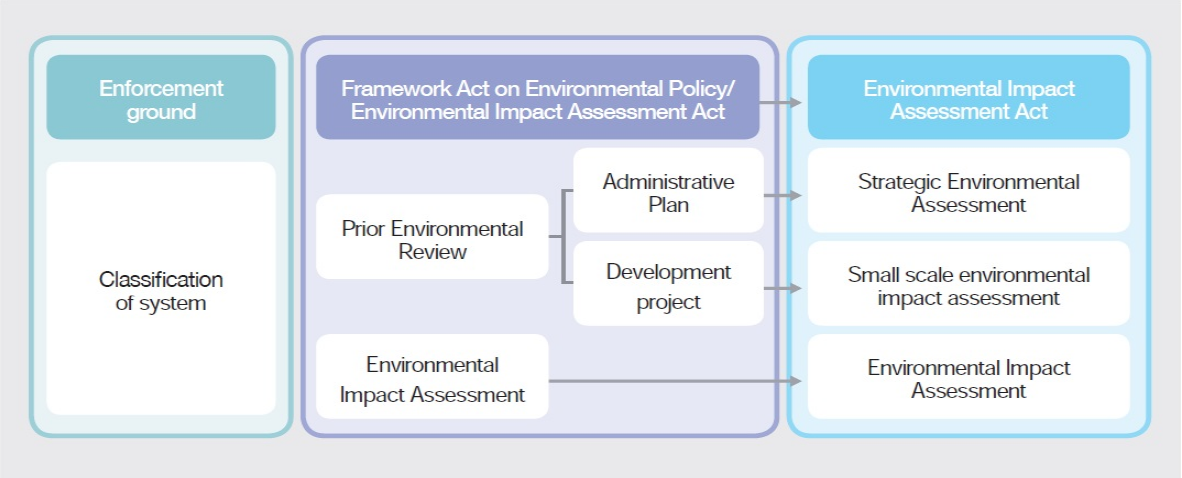

Figure 7. Comparison of integrated environmental impact assessment system.

2.4.3 Mainstreaming of biodiversity

Since the issue of biodiversity is one of crucial subjects in overall socio-economy as well as natural environment, Korean government has been pursuing mainstreaming of biodiversity not only in making policies in the country but also in planning the structure of whole society. The central government has been preparing the implement system to achieve the goals of conservation, but it has been insufficient to expand at local government level. The ME will be providing the guidelines for local biodiversity strategies to local governments to promote them to set up and implement local biodiversity strategies. From 2014, all relevant agencies of the central government are also to reflect possible measures for the conservation and enhancement of biodiversity in official plans. By introducing the linkage system between land use and environment plan at the stage of establishing policies and plans, the Korean government is targeting to prevent biodiversity loss and to achieve sustainable use of national land.

In Korea, poaching, illegal collection and trafficking of wild plants and animals are still continued in occasions although most people are well aware of the importance of biodiversity conservation. Therefore, Korean government tries to raise the public awareness by operating the public participating programs such as BioBlitz and Forest Care Movement, and running various programs at special occasions as Biodiversity Day, Fascination of Plant Day, World Wetland Day, Ocean Day, World Wildlife Day, etc.

The CBD COP 12 to be held in Pyeongchang, Korea in 2014, will be an invaluable opportunity to raise the public awareness on the biodiversity and to promote the participation of various stakeholders in biodiversity programs. The KBON has been established to monitor biodiversity for long-term at national level. For its operation, various NGOs and experts are encouraged to participate in the program. The ME has established the partnership with business sector in September of 2013 to raise and promote the biodiversity programs in private business sector, and provides detailed guideline for action and invites more companies to participate. The partnership named Korea Business and Biodiversity Initiative (KBBI) was officially enrolled to Global Platform run by SCBD. The representatives from business sector also participate in the National Biodiversity Committee, which comprises of officials from relevant government agencies, experts from academic societies and NGOs.

Eco-tourism based on the ecological resources due to rising income levels are emerged as an alternate action plans on the conservation of the natural environment as well as the activation of local economy. The 79% of Korean agreed that the eco-tourism can not only conserve natural environment but also develop the local economy. Through the collaboration between ME and MCST, a pan-society promotion system has been built for eco-tourism with close cooperation of KNPS and Korea Tourism Organization, local people of the tour places and local governments. Especially, eco-tour voucher is provided for vulnerable social group to promote eco-tour for the equitable benefits of ecosystem service. One hectare of well-managed forest in Korea is reported to absorb 16 ton of CO_2 and to emit 12 tons of O_2. Changes in natural environment conservation demand as Korea is becoming a developed society structure. In addition, raising the public awareness, ME foster experts on biodiversity in various area: (1) Unexplored taxonomy group, (2) International (environmental) law, (3) Sustainable management and (4) Environmental economics

As increases the economic effect resulted from the rediscovery of the value of biodiversity, continuous effort is needed to enhance the market value for the ecosystem. It becomes more important to enhance social awareness of biodiversity and expand community participation and activity. It is crucial for the achievement of national biodiversity goals to improve social awareness for the value of biodiversity and expand the actions of each social sector such as citizens and business practices to improve social awareness on the value of biodiversity.

Table 8. Major areas related to biodiversity and the government agencies in charge

Priority Areas in CBD	Government agency
Conserve biodiversity elements	Ministry of Environment Korea Forest Service Ministry of Oceans and Fisheries Ministry of Science, ICT and Future Planning Rural Development Administration
Promote sustainable use of biological resources	Ministry of Environment Korea Forest Service Ministry of Oceans and Fisheries Ministry of Science, ICT and Future Planning
Act towards the biodiversity threats	Ministry of Environment Ministry of Trade, Industry and Energy Ministry of Oceans and Fisheries Korea Forest Service Ministry of Science, ICT and Future Planning Ministry of Agriculture, Food and Rural Affairs Rural Development Administration
Maintain biodiversity for welfare	Rural Development Administration Ministry of Environment Ministry of Oceans and Fisheries Ministry of Culture, Sports and Tourism Korea Forest Service
Protect traditional knowledge, innovation and custom	Ministry of Environment Ministry of Oceans and Fisheries Korean Intellectual Property Office Rural Development Administration Korea Forest Service

Ensure the fair and equitable sharing of benefits derived from genetic resources	Ministry of Environment Ministry of Science, ICT and Future Planning Ministry of Foreign Affairs Rural Development Administration Korean Intellectual Property Office Ministry of Oceans and Fisheries Korea Forest Service Ministry of Trade, Industry and Energy
Construct financial, technical and human support	Ministry of Environment Ministry of Science, ICT and Future Planning Ministry of Foreign Affairs Ministry of Education Ministry of Oceans and Fisheries Korea Forest Service
Monitor and evaluate biodiversity	Ministry of Environment Ministry of Oceans and Fisheries Korea Forest Service

2.5 Achievement of NBSAP

Acknowledging the need for a new strategy, the 3rd national strategy for next 5 years for 2014-2018 was established in March of 2014. Based on the strategy, detailed action plans are under construction. The action plans would be focused on making concrete strategy including budget plan to achieve 2020 global Aichi targets.

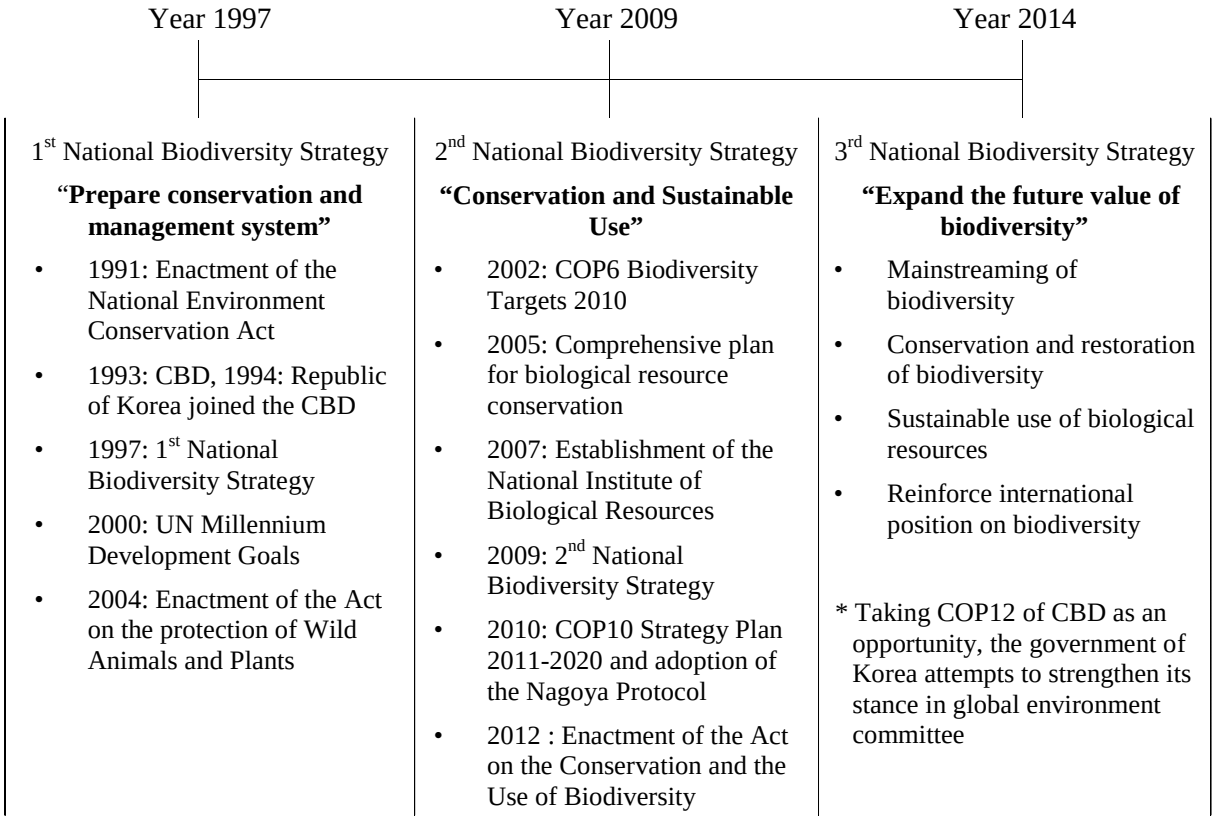

Figure 8. The trend of biodiversity policy in Korea

Korea's efforts and future prospects

Korea's efforts towards the biodiversity targets and NBSAP

Major achievements made with two previous national strategies are expansion of biodiversity conservation infrastructure, diffusion of sustainable use of ecosystem, and management system of biological resources and international cooperation.

- Construction of ecology network and expansion of biodiversity conservation infrastructure

  - Expansion of major protected areas (ecological landscape protected area, coastal wetland protected areas and forest genetic resource reserve, etc.) such as Baekdudaegan. National protected area was increased from 1,297 places in 2008 to 1,402 places in 2013.

  - Expansion of national biodiversity research/management organizations such as opening the National Institute of Ecology in 2013, the MABIK and the National Institute of Nakdong River Biological Resources in 2014, the National Baekdudaegan Arboretum in 2015, National Sejong Arboretum in 2017, and National Institute of Biological Resources in Honam and Gangwon region is under planning. In March 2013, ME established National Biodiversity Center based on Act on the Conservation and the Use of Biodiversity enacted in February of 2013, which implies the nation's strong willingness to manage biodiversity systematically.

  - 2,620 ha of urban forests, 957 forests in schools and 35,601 km of street trees was developed and constructed in 2011 to expand ecosystem restoration within urban community.

  - Establishment of species and genetic resource database and promotion on endangered species restoration and research on their distributions. In late 2010, expansion in restoration and proliferation on 36 different species such as Asiatic black bear and fox was made. Recently the government expands Crested Ibis restoration with inter-nation collaboration between Korea and China. Also, from the record in August of 2012, Korea have obtained diverse genetic resources such as 51,445 items of wildlife genetic resources, 307,973 items of agricultural genetic resources and 246,182 items of marine genetic resources.

- Establishment of sustainable use of ecosystem
  - Improvement on ecosystem service by expanding eco-tourism infrastructures such as national parks, recreation forests, etc., and diversifying the eco-tourism programs led to increase in the number of visitors to national parks.
  - Conduction of biodiversity management agreement, purchase of private lands in protected areas and residents support programs. For example, 156 cities and districts have joined in biodiversity management agreement by 2012, with a funding of 10.3 billion KRW, 69.2 billion was funded from 2006 to 2011 to support neighborhood income, 0.13 billion was funded for income compensation from 2007 to 2012, and within 2006 to 200, 12,690 ha of protected area was expanded in Baekdudagan by purchasing a private land.

Table 9. Visitors to national parks (Unit: million persons)

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
No. of Visitors	23.0	25.0	25.8	26.9	24.9	38.0	37.7	38.2	42.7	40.8	41.0	47.0

- Construction of biodiversity management system and strengthening international cooperation
  - Legislated 'Act on the Conservation and the Use of Biodiversity' to improve biodiversity and to construct biodiversity management system. Support of industrialization and expansion on Korean traditional information databases (such as traditional medicine, food and etc.) were made. As a result, 99,000 cases of traditional information and database were found and various global meetings such as UNCCD COP 10 and IUCN World Conservation Congress were held in 2011 and 2012, respectively, to strengthen international cooperation.

- Implementations for the green growth
  - By analyzing the trends of 28 green growth indicators within last 5 years, 19 indicators including greenhouse gas absorption of forest, renewable energy, ratio of the green R&D, ISO14001 certified firms and etc. has been developed, however, 4 indicators such as emission rate of greenhouse gas and degree of food self-support has been worsened.
  - According to OECD Green growth Indicators, the area of forest in Korea was in high level (64%) compared to OECD countries (OECD average 30.6%).

Table 10. Green growth indicators

Main parts	Direction of Policy	Particular Indicator	Trend for last 5 years	Status		Units
Climate change and energy self-supporting	Greenhouse gas reduction	Greenhouse gas emission per GDP unit	→	0.641	2010	kg CO_2/1000 KRW
		Total greenhouse gas emission	↗	668.8	2010	million tons CO_2
		Greenhouse gas absorption of forest	↗	39.6	2010	million tons CO_2
Improving the quality of life and strengthening national status	Constructing green land and green traffic	Area of urban neighborhood forest per person	↗	7.95	2011	m^2/person
		Burden rate of train and metro passenger service	↗	25.9	2011	%
		Ratio of expenditure on the environmental protection compared to GDP	→	2.73	2011	%
	Green life revolution	Household energy consumption per person	→	0.434	2011	TOE/person
		Daily water consumption for living per person	↘	335	2011	L/person/day
		Daily household waste per person	↘	0.95	2011	kg/person/day
	Implementing Korea as the best country on green growth	Ratio of ODA compared to GNI	↗	0.14	('12)	%
		Ratio of Green growth ODA in ODA	→	21.35	('11)	%

Direction for improvements

Korean government had expanded the biodiversity conservation infrastructure, but it is necessary to broaden the general understanding throughout the society by improving management and conservation systems of biodiversity, securing biological resources, and enhancing nation's awareness to become a leading country in the environmental issues.

Ecosystem changes due to climate change are expected to proceed so dramatically that the biodiversity is also expected to shift from temperate ecosystem to subtropical ecosystem in Korea. Response plans for the ecological threats and establishing the importance of the ecological awareness are needed. It is strongly required to plan the scientific conservation and management system with the strengthened monitoring of the vulnerable areas and species, and the analysis of the impact of climate change.

The role of local governments and the private sectors, such as academia, NGO, business and local representatives, is very important in policy making , but there are insufficient institutional arrangements such as public-private partnership systems. Therefore, it is required to expand the local governments and the private sector's participations in making biodiversity policies and during its implementation process and it is necessary to enhance the social awareness of biodiversity conservation.

Expanding protected areas and ecosystem restoration to preserve ecosystem and natural environment is under promotion, but it is insufficient to reach the level of developed countries. The ratio between the protected area and total land area is less than OECD average (16.4%). Hence, it is necessary to expand protected areas consistently and strengthen the management program to connect conservation and management systems of protected areas. Furthermore, identifying current status of indigenous species, which is the basis for the policy and construction of information sharing system are urgently needed. The estimated number of indigenous species in the Korean Peninsula is 100,000. There has been a delay in searching for indigenous species due to insufficient professional manpower.

Biological sovereignty tends to be strengthened internationally according to the adoption of the Nagoya Protocol and the competition on securing the biological resources will become intensified. However, the preparation for those new practices has not been sufficient. Since most of domestic pharmaceutical, cosmetics and food companies or industries are dependent on the international biological resources, industries will largely burden with the effectuation of Nagoya Protocol. Therefore, it is highly requested to strengthen the foundation of the sustainable use of biological resources and to establish institutional and legal system for implementing Nagoya Protocol with ongoing capacity building.

2.6 International cooperation

Response to CBD

The ME has discussed how to respond to the Nagoya Protocol by establishing a pan-government level cooperation system named National Biodiversity Committee through the organization of task force team consisting of experts from all relevant ministers led by ME vice minister. The government also drew up 'Pan-National Countermeasures to the Nagoya Protocol' in 2011 and established detailed action plans of relevant ministries for materializing and practicing the Pan-National Countermeasures in 2012. The national forum on the Nagoya Protocol was organized by the government, and has been held seven times since 2012.

Ramsar Convention

Delegates from the government, KNPS, local governments and NGOs led by international cooperation officer from ME participated at the COP 11 of Ramsar Convention in 2012. At the Ramsar COP 11, the international cooperation officer from ME chaired the first day's meeting and operation committee as chairperson of the previous conference, and presided over the 44th and 45th standing committees held during COP 11 as chairperson. Korea, which was elected as a standing committee member country from 2008 to 2012, was reelected as a member country of Ramsar Convention Asia Standing Committee from 2013 to 2015, implying Korea's lead in the international community.

Hosting CBD COP12

At the CBD COP 11 held in 2012, Korea was selected as a host country for CBD COP 12. The CBD COP 12 in 2014 is expected to possess remarkable significance due to the fact that global strategies for achieving Aichi Target including raising financial resources is expected to begin in earnest. The Government of Korea recognizes that CBD COP 12 will be very important in meeting the internationally agreed goals and targets for biodiversity.

The COP 12 provides the mid-term review on progress in achieving the Global Biodiversity Targets, on the basis of the 5th national reports and the 4th edition of the GBO. Thus, hosting COP 12 is both opportunities and challenges to Korea from perspective of domestic and international biodiversity policy. From domestic policy perspective it is a great opportunity to upgrade and enhance more systematic national biodiversity policies as well as enhancing public awareness on biodiversity through the 3rd NBSAP 2014-2018. From the perspective of international cooperation, as an incoming presidency of the Convention, Korea has to revisit the current practice of biodiversity international programs, further streamlining them from the perspective of exerting leadership in facilitating the implementation of the Strategic Plan for Biodiversity 2011-2020.

2.7 Contributions from business sector

Korean business sector engagement

The government of Korea presented the efforts of Korean stakeholders for biodiversity and the plan establishing 'Korea Business and Biodiversity Initiative (KBBI)' in the 2nd Meeting of Global Platform for Business and Biodiversity held in Hyderabad, India in 2012. In the 3rd meeting held in Montreal, Canada in 2013, the government presented the launch of KBBI and the roles of Korean stakeholders for CBD COP 12.

Korean government has hosted various workshops and dialogues among related stakeholders. The international workshop for Business and Biodiversity Initiative in 2012 was the first move forward launching of KBBI in success with some 20 companies and business associations. In the workshop on Business' role for Biodiversity, Keidanren of Japan and the Secretariat of CBD shared their experience and knowledge. The government has pursued to establish partnerships among related business associations such as Secretariat of Green Companies designated by ME, Korean Biotechnology Industry Organization (KBIO), Korea Business Council for Sustainable Development (KBCSD), and the regional partner for World Business Council for Sustainable Development (WBCSD). Since 2012, Korean government and these organizations have discussed to increase the memberships of KBBI and to expand cooperative biodiversity conservation activities.

Launch of Korea Business and Biodiversity Initiative

As a result of the successive efforts, Korea successfully finished 'Signing ceremony of Korean Business and Biodiversity Declaration.' On September 26, ME hosted a signing event, which is a kick-off for a national initiative in Korea. The ceremony was successfully finished having some 70 participants, including 27 CEOs and executives of various companies and organizations. The Japanese Business and Biodiversity Partnership, the CBD Secretariat, KBCSD, Korea Biotechnology Industry Organization and Secretariat of Green Companies also supported this event. The launching of Korean initiative was built on several previous workshops and policy gatherings held in Korea before and after COP 11. The Korean initiative will be undertaking a number of activities in 2014 to help raise awareness of this issue amongst the Korean business community, and will be planning several functions in cooperation with partners for CBD COP 12.

KBBI and CBD COP 12

In parallel with mainstreaming sustainable development through biodiversity, main themes of CBD COP 12 have been drafted. Three messages are planned to be delivered by Korean government in CBD COP 12: (1) Biodiversity and sustainable development, (2) Biodiversity and peace and (3) Biodiversity and job creation. It is necessary to develop concrete methods to achieve sustainable development as well as biodiversity conservation, and Korean government is striving to keep pace with global mainstream such as harmony of conservation and development. Until COP 12, KBBI and Korean government will go extra miles and suggest concrete sustainable development methods via environmental welfare.

Korean government will suggest 'Peace based on Biodiversity.' As well known, Korea is a divided country. In 2012, Korean government planned to establish DMZ World Peace Park, which is expected to facilitate peace building through the conservation of biodiversity in DMZ region. Expanding efforts of joint conservation in the region between South and North Korea, Korean government will present a new model on peace through biodiversity. Korean government also plans to suggest 'Job Creation through Biodiversity.' Industrial extension and technology innovation based on biological resources will lead to more practical and effective biodiversity conservation and sustainable use of components of biodiversity.

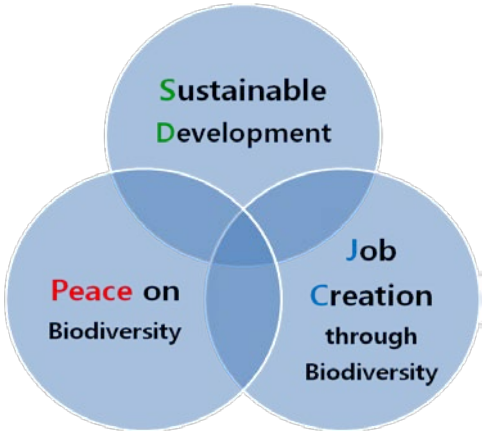

Figure 9. Three core messages to be delivered by Korean government in CBD COP 12.

Korean business sector's practice

The Korean peninsula is faced with various environmental challenges such as the increase of endangered species, the rise of average temperature and the decrease of forests. In order to prevent the loss of biodiversity, Korean government designates endangered species through species identification and develops conservation measures. Meanwhile, industries continue to voluntarily engage in biodiversity conservation activities which are being encouraged by recent global guidelines. Global Reporting Initiative emphasizes the importance of strategy, action, and plan for biodiversity conservation while ISO26000 is recommending companies to integrate biodiversity into their business activities. As part of the efforts to conserve biodiversity, DJSI World Index was developed as well.

Biodiversity in business by Samsung Electronics

Established in 1969, Samsung Electronics has produced home appliances, semiconductors, and mobile phones. In 2010, the company was ranked first in terms of sales (USD 134 billion) among electronics companies in the world. In addition, it was named as the world's most sustainable technology company in the Dow Jones Sustainability Index (DJSI) in 2011.

The Samsung Electronics has informed employees about the importance of biodiversity conservation and has officially announced the establishment of a course of action for the business plan.

- A course of action for biodiversity conservation
  1) Recognition of value: Employees must realize the biodiversity conservation activities as an important value of green management.
  2) Evaluation and reduction of environmental effects: Evaluate and analyze the effects on ecosystem and biodiversity in the whole production process and strive to minimize the negative effects.
  3) Implementation of biodiversity conservation activities: Biodiversity conservation by regional circumscription.
  4) Communication: Communicate consistently with employees, local communities, NGO and other stakeholders, and contribute to improve biodiversity conservation activities in the community.

The company has been also developing various efforts to implement actions.

- Aquatic ecosystem conservation activity: Samsung Electronics, in collaboration with local universities, has identified the impacts on aquatic ecosystems such as water quality and discharge to river, and been working on the improvement activities. Effluent water discharged from the factory in winter generates steams due to the temperature difference between the discharged water and surrounding areas. By dropping the temperature of the effluent water below 10 ^{o} C, an ecosystem disturbing invasive species (*Oreochromis niloticus*) could be eradicated in addition to the reduction in steam generation.
- Biodiversity conservation activity by minimizing the resource consumption: Samsung Electronics is indirectly working on biodiversity conservation mainly through reducing resource consumption and wastes. Samsung Electronics is currently recycling 94% of resources, especially recycling the ashes formed during the incineration of wastes and sludge. Also, Samsung Electronics is consistently reducing landfill waste generation.

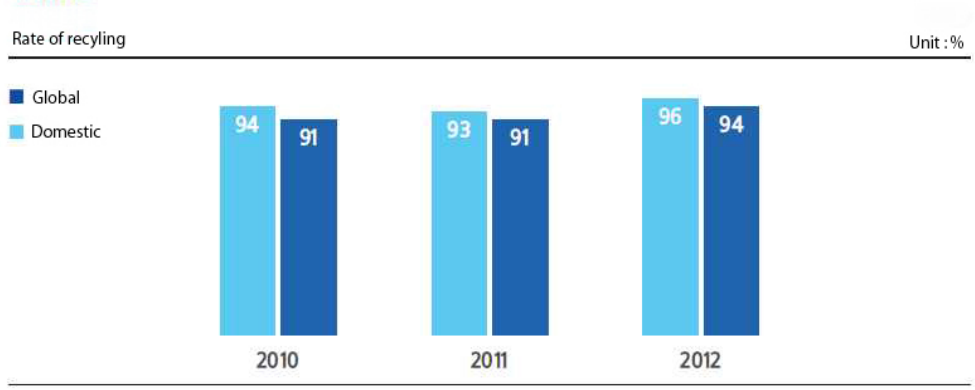

Figure 10. Rate of recycling resources.

Any environmental influence is to be minimized in entire process to manufacture the product (e.g. developing, producing and discarding) through Life-Cycle Assessment and Eco-design process. For all products, Samsung Electronics is carrying out the assessment of environmental effects based on resource efficiency, energy efficiency and environmental hazards, and is trying to minimize the impacts on the ecosystem throughout the entire process from production to disposal, by increasing environment friendliness through assessing 40 items based on specific environmental performances.

Samsung Electronics identifies that the company is exposed to three kinds of risks in terms of biodiversity as follows: i) Physical risk - operation disruption and resource cost, ii) Market risk - changing of consumer preferences, and iii) Other risk - supply chain and reputational risks. Under these circumstances, Samsung is pushing ahead with eco-friendly management under the slogan of 'Planet First'. More specifically, the company has a plan to mitigate 84 million tons of CO_2 emissions in the process of production in 2013.

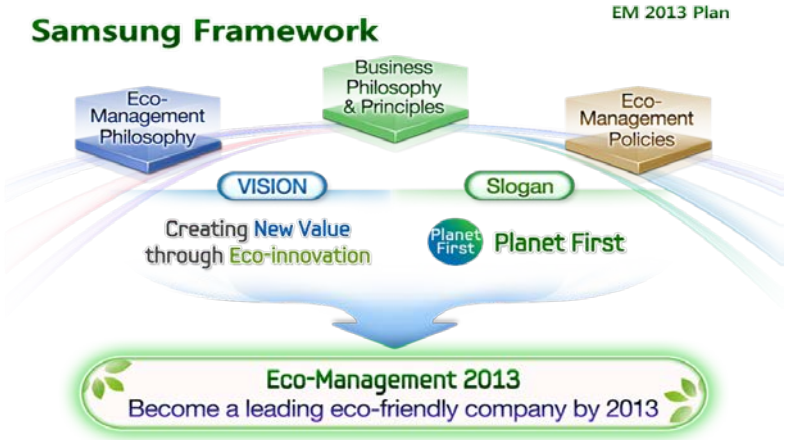

Figure 11. Eco-friendly management pursued by Samsung.

Eco-friendly products by Amore Pacific

Since Amore Pacific was established in 1945, the company has become one of the largest cosmetic producers in Korea under the motto of 'Global Total Care Provider of Beauty & Health'. Leading the initiative in biodiversity conservation, the company has been included DJSI World, Asia-Pacific, Korea for the two consecutive years. Amore Pacific aims to deliver products that pursue the harmony with the community by enhancing customer's relief sentiment and minimizing the influence on the environment by innovated activities.

The company targets that sustainable products should be customer-, environment-, and society-friendly by establishing internal guidelines based on strict principles equivalent to external certificate criteria. This policy makes customers identify sustainable products by putting 'AMORE PACIFIC Promise' certificate on the products. The company is expanding its activities not only for biodiversity conservation but also for traditional knowledge protection and local communities' development. Moreover, Amore Pacific has engaged in establishing greenhouse gas inventory and reducing Green House Gas emissions since it launched climate change Cross Functional Team in 2007.

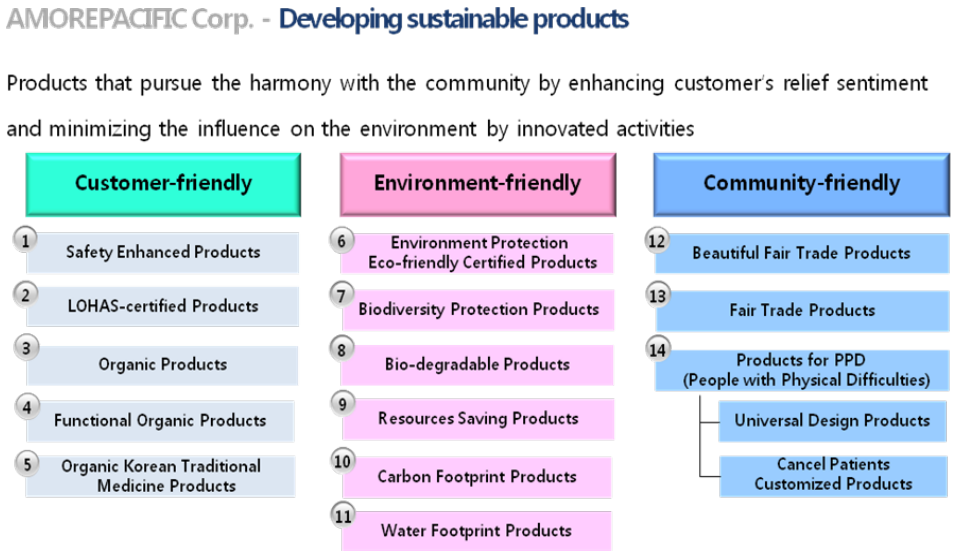

Figure 12. Eco-friendly policies adopted by Amore Pacific.

Korean government will continue to encourage and support Korean companies' activities for biodiversity conservation. Moreover, the government will entice companies to voluntarily engage in conservation activities by issuing biodiversity conservation company certificate. Korean government is committed to enhance global partnership by linking various partnerships in the world.

Restoration project of marine forest: Triton by POSCO

In late 1970, the whitening occurred in Korean offshore, which expanded to the east and south, and up to Jejudo coast, causing problems in biological resources and self-purification ability of the marine ecosystem. In the study on the use of steel slags in restoring the marine environment, POSCO and Research Industry of Science and Technology have found how steel slags to be used eco-friendly. Artificial fish-reef made of steel slag is rich in minerals such as metals and calcium. The pilot project of Triton showed that there were 2.5 times more various fish and shellfish species in the artificial forest of steel slags in comparison to its surrounding bedrock. Due to the increased photosynthesis of growing algal population, carbon dioxide is expected to be reduced by 10-20 tons/year/1 ha. In addition, the income of fisherman will grow with the increase of the fish and shellfish species.

POSCO has signed MOU with MOF in Feb. 2012 and constructed Triton marine forest in 12 areas. About 10 times more algae biomass has been observed in 0.5 ha Triton marine forest constructed in 2007 at Kyungnam Namhae-gun coast than in the surrounding bedrocks. In 2010 IUCN WCC, "The construction of marine forests by Triton project will be one of the most important projects in restoring environment that Korea has pursued," the president of IUCN said.

Figure 13. Triton marine forest program by POSCO.

Protection of endangered species by S-OIL

S-OIL is in the process of promoting protection activity for rare and endangered wild species in Korea. S-OIL has made agreements on the guardians of national natural monuments with Cultural Heritage Administration (CHA) in May, 2008, and has designated otters, cranes, cyprinid fish and others as protected species. Also, S-OIL has been supporting the research for restoration of biological species by contracting partnership with professional organizations. S-OIL is also implementing projects for various stakeholders including employees, customers, and local community to be participated in protection programs to advertise the importance of biological diversity and endangered species protection.

S-OIL's major project on biodiversity conservation:

- Has chosen social welfare institution as a partner and operated a programs such as 'Ecosystem camp' and 'national natural monument class' for children from low-income families to provide useful experiences with natural treasures.
- Improve specialty of national natural monument protection activity, S-OIL is operating the program of 'student guardians for national natural monuments' annually to foster future environmental leaders, and this enhances the progress of habitat protection activities, such as object exploration activities to increase the species population, and national promotion campaign for the protection of natural treasures.
- Ecosystem conservation activities are held regularly in four times a year in Chungpyung, Hwacheon and Cheolwon (and other areas) for employees and customers to participate.
- S-OIL is actively participating in a clean-up campaign and consistently promoting in ocean waste removal activities.

Conservation of freshwater ecosystem by K-water

K-water is helping to restore habitats and wetlands with water purification. K-water has campaigned to restore the natural ecosystem of rivers to provide the habitats for the protected species such as reptile, insects, birds and otters. They have been installing fish spawning ground and a fish-way for the protection of fish shocks. The natural fish way similar to Gunnam natural river is installed and has been operated since 2011. As a result of the monitoring system, almost all the species used the fish way of Imjin river water system.

Part 3 Progress towards the 2020 Aichi biodiversity targets and contributions to the 2015 targets of the Millennium Development Goals

3.1 Mainstreaming biodiversity

3.1.1 Strengthening the foundation to execute biodiversity policies

Related Aichi Target: 2, 17

(1) Current status
Given the significance the biodiversity holds in preserving the environment, society and general health of our economy, it is necessary to pursue mainstreaming biodiversity when policy making and planning. Korean government had prepared implementing systems by setting up National Biodiversity Strategy twice in past, but it has been somewhat insufficient to service as a detailed guideline for the local governments. The 3rd NBSAP, as the most significant legal plan so far, is expected to help integrate and harmonize existing biodiversity plans. The action plan of the 3rd NBSAP will be implemented in reflection with related policies with an aim to be effective at local as well as at central level.

According to Local Action for Biodiversity by International Council for Local Environmental Initiatives (ICLEI), Gyeongnam and Gangwon Provinces have adopted biodiversity strategy in 2013 and 2014, respectively.

(2) Action plans
2-1) Harmonized biodiversity strategies in place for both central and local governments
- Promoting the 3rd NBSAP 2014-2018
    - The ME provides ‘Guidelines for Planning Local Biodiversity Strategy’ to local governments (2014, ME), and promotes the local governments to set up and to implement local biodiversity strategies (one province in 2013 → 8 metropolitan cities/province in 2018)
    - Establishing a legal basis for metropolitan cities/provinces to set up biodiversity strategies in Act on the Conservation and the Use of Biodiversity.
    - Local governments should reflect practical biodiversity targets in setting up related official plans such as Practical Plan of Conservation of Natural Environment, Detailed Plan to Protect Wild Life, etc.

2-2) Pan-government cooperation
- MSIP: Establishing ‘the 2nd Master Plan for Management of the Bio-resource for Research to promote utilizing bio-resource for research and to manage related information (2016)
- MAFRA: Practicing ‘Agriculture Life Science Resource Master Plan (2014-2018)’ and drawing up the yearly practical plan for ‘Seed Industry Promotion Master Plan’
- ME: Establishing ‘the 2nd Natural Environment Conservation Master Plan (2016-2025)’, ‘the 3rd Wild Life Protection Master Plan (2016-2020)’ and implementing official plans such as ‘the 2nd Natural Park Master Plan (2013-2022)
- MOF: Evaluating and establishing the revised 2nd plan for ‘Conservation and Management Basic Plan for Marine Ecosystem (2009-2018)’ by 2018.

- CHA: Practicing and evaluating ‘Cultural Heritage Preservation, Management and Use Five-Year Master Plan (2012-2016)’ on natural monuments and national scenic places, and establishing the plan for next phase
- KFS: Practicing ‘the 2nd Forest Biodiversity Basic Plan (2013-2017)’ and ‘Arboretum Promotion Master Plan (2014-2018)’ for ex situ conservation of forest botanical resource. Establishing ‘Master Plan for the Management of Protected Area’ (from 2014)’

2-3) Linkage system between land management and environment plans
- Preventing biodiversity loss by introducing the linkage system between land use and environment plans at the stage of establishing policies

- Series of legal amendments to be applied to the linkage system; ‘Framework Act on Environment Policy’ and ‘Framework Act on the National Land’ (submitted to National Assembly in 2014 and effected in 2016)

- Modifying various laws and regulations on conservation, restoration and management of water ecosystem; revision of the present ‘Act on Water Quality and Water Ecosystem,’ which is operated through the management of pollutant element, with emphasis on the conservation of biodiversity

(3) Implementation targets

Action plan	Program	Index	Achievement		Administering Agency
			2013	2014-2018	
Establishing and practicing biodiversity strategy by central government and local government	Promoting National Biodiversity Strategy	Yearly establishment of action plan	-	Yearly	Related government agencies
	Promoting Local Biodiversity Strategy	Number of establishment	1	8	Metropolitan cities/provinces
Reflecting conservation and enhancement of biodiversity in establishing legal plans of related sectors of government	Establishing executive plan for each sector (minister) of government	Establishment	-	Ministry	MAFRA, ME, MOF, MSIP, CHA, KFS
Enhancing biodiversity through linkage between national land and environment plan	Modifying related laws and regulations	Number of legislation	-	1	ME, MLIT

3.1.2 Raising public awareness and participation

Related Aichi Target: 1

(1) Current status
It is important to raise public awareness for promoting active voluntary participation of the general public. Although relatively high level of social awareness on biodiversity is present in

Korean society, poaching, illegal collection and traffic of wildlife are still occurring in this day and age. The CBD COP 12, which will be held in Korea in 2014, will be a good opportunity to raise the public awareness and to promote the participation of stakeholders in biodiversity programs

* Public awareness of biodiversity in Korea is 70% according to the survey of public awareness: Brazil 96%, France 96% China 94%, Japan 62%, and US 54% (Biodiversity Barometer, 2013)

(2) Action plans

2-1) Raising public awareness on biodiversity and education

- Conducting surveys on public awareness of biodiversity (2014)
    - 'Biodiversity Index Initiative (BIP)' of the Convention, feedback the result of public awareness survey of biodiversity into biodiversity policy

- The public participating programs to raise awareness of biodiversity such as BioBlitz, Forest Care Movement, etc.
    - Running various public participating programs such as Biodiversity Day, Fascination of Plant Day, World Wetland Day, Ocean Day, BioBlitz, etc.
    - Establishing 'Master Plan to Promote Awareness of Marine Ecosystem' and yearly action plan considering mid- and long-term roadmap
    - Raising public awareness on forest protection; 'Forest Care Movement' with the collaboration of government and the public, and expanding the program of 'Forest Care Leader' (currently, more than 24,000 students are participating in this program).

- Expanding education and publicity to promote biodiversity awareness
    - Operating Biodiversity Education Network through the biodiversity management institutions and developing the qualification and training programs for biodiversity education specialists
    - Publication of education materials including documentaries on biodiversity Expanding the exhibition tour 'Visiting Biological Resource Exhibition Center'; from 13 times a year to 18 times a year
    - Collaboration among related organizations of biological resource (National Biological Resource Center, Exhibition Tour of 'Our land, our living organisms', etc.)
    - Expanding the operation of 'Biological Resource Youth Leaders' and 'Green Reporter Corps' for educating the youth, and promoting customer-built education and exhibition function of National Biological Resource Center and National Institute of Ecology

2-2) Stakeholders participation programs

- Establishing and operating network among stakeholders such as local governments, NGOs and Business sector.
    - Expanding civilian roles in CBD COP12, forming 'National Biodiversity Civilian Acting Consultative Group' in 2014
    - Inviting more private companies in the 'ME – Business Sector Partnership' program formed in 2013 and providing detailed action guidelines
    - Detailed guidelines for private sector participation to be released in the first half year of 2014

- Establishing guidelines for the participation of civil groups with the aim to encourage civilian actions by 2015

- Empowering local stakeholders
  - Establishing ‘Metropolitan City/Province Biodiversity Action Network’ and expanding the support for the action of civic sector in collaboration with National Biodiversity Committee and National Biodiversity Center.

*According to Article 17 of the Act on the Conservation and Use of Biodiversity, National Biodiversity Center was established in National Biological Resource Center in March, 2013.

- Establishing network of research institutions of metropolitan cities, provinces and experts in 2014 for information sharing and distribution to develop local action guidelines

(3) Implementation targets

Action plan	Program	Check index	Achievement		Administering Agency
			2013	2014-2018	
Raising awareness, education on biodiversity	Survey of public awareness of biodiversity	Awareness of biodiversity	73% (47%)	90% (60%)	ME, MSIP, KFS
	Marine Ecosystem Awareness Master Plan	Y/N	-	Establishment	MOF
Encouraging stakeholder participation	Forming and operating Biodiversity Partnership	Number of participating companies	-	50 in total	ME

3.1.3 Expanding the budget

Related Aichi Target: 3 and 20

(1) Current Status

It is necessary to establish adequate financial measures by accurately understanding the current status of biodiversity. Existing state-funded subsidies on agriculture, fishery, transport or energy, etc. could provide short-term economic benefit, but may well be harmful to the health of biodiversity due to environmental damage and resource depletion. OECD countries are still providing environment harmful subsidies of over 400 billion US dollars per year to traditional industries such as agriculture and energy. However, actions to bring reforms on this damaging practice are now in place, imposing ecosystem conservation cooperation charges (KEI 2006).

Thorough examination on the state funded subsidies and their impact on environment must be carried out. Also needed is step by step approach to increase government subsidies that are beneficial to biodiversity.

Exemplary case of beneficial subsidies: 'Biodiversity Management Contract' was developed by local governments and residents. Under this contract, farmers left some crops for migratory birds and then local governments compensated them for the loss (6.66 billion and 3 billion KRW in 2011 and 2012, respectively).

(2) Action plans

2-1) Understanding the status of state subsidies related to biodiversity

- Since contracting parties of CBD were requested to submit reports on biodiversity fiscal expenditure, problems, priority, etc. by 2015, related reports will be completed by 2015. Furthermore, the state funds and budget will be regularly monitored.
- Listing categories: 1) ODA, 2) State budget, 3) Civic sector, 4) NGO, foundation, academic societies, 5) International financial organization, 6) UN organization, fund, program, 7) Public fund except for ODA, 8) South-South Cooperation Initiative, 9) Technical collaboration

- Examining the effect of state subsidies on biodiversity (2014-)

- Studying harmfulness extant, biased influence, improvement effect, etc. of subsidies on each major industrial field such as agriculture, fishery, etc.
- Preparing a roadmap to improve state subsidies (2015)
- Subsidies harmful to biodiversity are to be classified and suspended immediate suspension and conversion, and then gradual solutions and mid-term roadmap will be designed.

2-2) Gradual expansion on subsidies beneficial to biodiversity

- Continuing efforts to expand subsidies beneficial to biodiversity

- Expanding Water System Management Fund for strengthening health of water ecosystem (21.7 billion KRW in 2013 → 30 billion KRW in 2018)

- Improving the system to impose ecosystem conservation cooperation charge

- In consideration of ecosystem service value, similar charging system will be expanded. More projects will be targeted and the financial charge will also be increased (2014).
- The amount of charge for marine ecosystem conservation will be rescheduled.
- Since the initial decision on ecosystem conservation cooperation charge (Natural Environment Conservation Act, Article 46-1) to be 250 KRW/m^2 in 2001, it has remained unchanged. Considering loss of biodiversity and ecosystem service value due to development, reasonable adjustment is necessary. The amount of charge should be readjusted every year through official notification. Forest Resource Replacement Charge, which has a similar concept to Ecosystem Conservation Cooperation Charge, the charge is 3,070 KRW/m^2 for semi-conservation mountain area, 3,990 KRW/m^2 for conservation mountain area and 6,140 KRW/m^2 for alteration restriction zone. These figures are about 10 to 25 times of that of Ecosystem Conservation Cooperation Charge as of 2013.

2-3) Foundations of financial measures for biodiversity conservation

- Establishing secure foundation for promoting biodiversity policies by launching so-called 'National Biodiversity Conservation Fund' in 2017 with comprehensive efforts of the government, public and private business sectors.

- Using the fund for implementing National Biodiversity Strategy, protection of wildlife and habitat and raising the public awareness
- Studying how to raise conservation fund, how to find corresponding projects, and how to establish operating system with utilizing social contribution of private companies, eco-tourism, individual donation and state fund

(3) Implementation targets

Action plan	Program	Check index	Achievement		Administering Agency
			2013	2014-2018	
Assessing current biodiversity budget	Completing budget status report	Y/N	-	Completing	ME
Evaluating effect of subsidies on biodiversity and establishing improvement plan	Examining subsidies and establishing improvement roadmap	Y/N	-	Establishing	ME
Increasing beneficial subsidies and development charge	Increasing beneficial subsidies	Biodiversity Management Contract	1	1.5 times	ME
	Adjusting ecosystem conservation cooperation charge	Charge adjustment	-	Raising charge	ME, MOF
Securing fund	Finding solutions to secure fund	Promoting the report	-	Completing the report	ME

3.2 Strengthening biodiversity conservation

3.2.1 Protection and management of wildlife

Related Aichi Target: 12

(1) Current Status

Maintaining ecosystem service and sustainable use of ecological resources can be achieved by preventing biological organisms from extinction and enhancing biodiversity through systematic protection of wildlife and its habitat. In spite of diverse programs of wildlife protection and management in Korea, poaching and drastic increase of specific species cause the imbalance of ecosystem. It is necessary to develop wildlife management programs on the topic of wildlife animal disease and treatment.

- Threats against wildlife are continued by increased number of road kills due to habitat fragmentation, poaching and illegal trading

- With the extinction of predators, the population of wild pigs is in rapid increase. They often appear in downtown. Water deer (*Hydropotes inermis*) and roe deer (*Capreolus pygargus*) populations also growing rapidly in Jejudo. This rapid increase of certain species causes disorder in ecosystem balance.

(2) Action plans

2-1) Management and protection programs of wildlife habitat

- Establishing advanced management system for wildlife breeding
  - Installing and expanding the ecological corridor areas for wild animals' welfare by revising related regulations in 2014
- Habitat protection and its management
  - Restoring habitat by expansion of biodiversity management contract area for the protection of migratory birds
  - 'Living together with wildlife project' (2013-) and developing co-existence strategy with wild animals by preparing the manual of behavior in encountering wild animals and prevention program for wild animal appearance
- Prevention mechanisms for damage compensation caused by wild animals
  - Surveying the state of wild pig population in urban areas and continuing the support for installation of damage prevention facility.
  - Increase compensation for the crop damage, introducting the system of 'Wild Animal Damage Compensation Insurance'
  - Some local governments (for example, Taebaek, Kimcheon, Whasoon, etc.) developed a contract for damage compensation. With this in place, insurance companies are to support famers for the crop loss caused by wild animals.

2-2) Ban on poaching and illegal trade of wild animals

- Systematic management of wild animals through examination and evaluation of wild animals every year.
- Through monitoring networks in collaboration with regional environmental office, NGO, prosecutors' office and police department, punishment of poachers and illegal traders will be strengthened along with a national crackdown on this damaging practive. 82% of Koreans replied that the punishment level should be raised in poaching and illegal trading (Wildlife Management Association-Korea Research Survey, 2010)

- Evaluating yearly damage from wild animals.
  - Designating and controlling harmful wild animals (in urban areas) by examination and evaluation damage caused by wild animals every year
  - Establishing mid and long-term enhancement plan such as designing on-line system for identification tag of hunted animals (2014)
- Minimizing incident captures of marine animals and establishing preventive measures.
  - Assessing the current status of incident capture of marine animals, supporting the equipment to prevent incident capture, rewarding for the release of incident captures, prohibiting the sales of incident captures.
  - Raising the level of penalty for incident capture of whales and illegal trading

2-3) Wild animal rescue and disease control

- Enhancing wild animal rescue and treatment plans and national animal monuments
  - Operation of wild animal rescue centers, with more centers in major cities to be opened in Seoul, Incheon, Daegu and Gwangju (from 12 centers to 16 centers

nationally by 2018)
  - Supporting and increasing the treatment centers of national animal monuments from 238 branches to 250 branches
  - Supporting the rescue and treatment of marine animals (9 institutes)

- Research on wild animal diseases
  - 'National Wild Animal Health Research Institute' to be founded in 2018.
  - Epidemiological surveys and disease diagnosis by the revision of 'Act on Wild Animal Protection and Management' in 2014
  - Preparing mid and long-term plan of 'Wild Animal Infectious Disease Research' and pre-feasibility study in 2015
  - To effectively identifying the cause, responding to outbreaks and preventing the spread of Avian Influenza, 'Research/Development Promotion Plan Responding AI' (Feb. 2014, MAFRA, ME and MOHW) to be in place.

*Five major development: Pre-recognition and monitoring technology, diagnosis and prevention technology, prevention of outbreaks and post-management technology and development of drugs for animals

  - Establishing the National Migratory Bird Research Center and regional centers to identify birds' migration route

(3) Implementation targets

Action plan	Program	Check index	Achievement		Administering Agency
			2013	2014-2018	
Promoting wildlife protection programs	Legislating/revising regulations related to zoos and botanical gardens	Regulation overhaul	-	1	ME, MOF, KFS
	Preventing incident capture of marine animals	Measures established	-	1	MOF
Enhancing rescue, treatment and disease management of wild animals	Expanding wild animal rescue and management centers	Number of established centers	12	16	ME
	Founding 'National Wild Animal Health Research Institute'	Y/N	-	1	ME

3.2.2 Protecting species of major importance

Related Aichi Target: 12

(1) Current status

As the vulnerability of endangered species in Korea becoming an alarming issue, institutionalized protection and management are necessary. With the potential value of

biodiversity in mind, an intensive level of care should be given to endemic species of Korea. According to the Red List of Korea, 27 mammals, 58 birds, 5 reptiles and amphibians, 27 fishes and 224 vascular plants are extinct or critically endangered, and the number of species needed to be protected is 2,177, which is 5.6% of total species in Korea.

- Since the number of critically endangered species are increasing due to catch, overhunting, poaching and loss of habitats, mid and long-term conservation plan for endangered species and marine organisms are strongly requested to be established at national level.

* Protection systems for endangered and legally protected species by relevant government agencies: Endangered species (249 species by ME), rare plants (571 species by KFS), wildlife protected by local governments (305 species by municipal governments; Seoul 49, Daegu 47, Incheon 24, Gwangju 56, Daejeon 41, Ulsan 49, Gyeonggi 29, Chungbuk 10)

The protection and management plan should be established on the basis of the surveys of endangered species periodically and endemic species annually, overcoming the extinction crisis and conserving biodiversity by in situ and ex situ conservation measures for critically endangered and endemic species

(2) Action Plans

2-1) Endangered species in Korea: monitor and restoration

- Scientific investigation and management by publishing Red List of Korea, etc.
    - Designation and revision of the legal list of endangered species in every 5 years
    - National distribution survey for endangered species (every 3 years in 2018 → yearly monitoring for each species)
    - Operating systematic, ecological and genetic research programs for endangered species (2014-)
    - Publication of Red List of Korea (7 volumes → 12 volumes)
- Designation of statutory protected species and protection of habitats
    - Consistent monitoring; by periodically designating and revising statutory protected species, protected marine organisms, rare plants, specially protected forest species will be monitored and systematically preserved.
    - Designating at least one special protected area for wildlife per each endangered species, and expanding the designation of special protected area in national parks for endangered species
- Mid and long term conservation plan for statutory protected species and related programs
    - Promoting mid and long-term conservation plan for endangered species (2012–2016) and conservation plan for marine protected species (2014–2018)
    - Revising the 2nd breeding and restoration comprehensive plan for endangered species (2013–2017), and establishing the breeding and restoration plan for marine protected species
- Strengthening ex situ conservation of endangered species
    - Promoting overall management to restore endangered species and executing restoration projects for extinct large animals in Korea.

* Acquisition of additional 14 individuals of species under breeding programs; Asiatic black bear, mountain goat, fox and crested ibis (2014)

- Expanding institutions for ex site conservation and breeding of endangered species from 23 to 28, and conservation centers of rare plants from 3 to 10

2-2) Dissemination of globally endangered species and CITES implementation
- Improving management and information system of endangered species listed in CITES
    - For efficient management of export/import of CITES species, information and DB sharing with relevant agencies, classification and identification manuals for frequently traded species required to be developed (2015–).
- Facilitating public access to search for CITES species by linking Wildlife Export Import Civil Service System of ME and Korea Customs Clearance System (2015–)
- Tightening related regulations to promote healthy breeding facilities of CITES species
    - Defining registration of species in breeding facilities, installation standards for breeding facility, animal management standards, etc. in sub-regulations of ‘Act on Wildlife Protection and Management’

2-3) Investigation and research on biological resources
- Revising and improving ‘Korean Peninsula Endemic Species Search Mid and long-term Roadmap (2011)’, and raising the ratio of endemic species by systematizing the search for endemic species
    - Searching for endemic species in parallel to ‘Native Species Search Project’, and raising the ratio of endemic species from 5.2% (2,177 species) to 7% in 2018
    - Preparing identification and classification standards for endemic species and publishing revision of comprehensive manual of endemic species
- Strengthening protection measures of endemic species by ex situ conservation
    - Expanding ‘Endemic Plants Conservation Institute’ for conservation of endemic plants from 3 to 10
- Improving management system of national natural monuments and scenic areas by establishing ‘Act on Natural Heritage’

2-4) Planning restoration and management measures of endemic species of Ulleungdo Islands and Dokdo Islands
- Examining the current distribution and status of endemic species in the areas of Ulleungdo Islands and Dokdo Islands
    - Identifying remaining individuals for endangered species and surveying the current status of habitats
    - Identifying endangered species such as seals and sea lions to secure national level of protection in Korea
    - Creating protection and management measures for their habitats in case of confirming their existence

(3) Implementation targets

Action Plan	Program	Check index	Achievement		Administering Agency
			2013	2014-2018	
Monitoring and protection of endangered species in Korea	Expanding designation of special protected forest species	No. of species	53	63	KFS
	Publishing Red List of Korea	No. of publication	7	12	ME
	Founding National Restoration Center of Endangered Species	Y/N	-	Y	ME
Improving implementation of CITES	Providing information and DB on CITES species	No. of published manuals	-	1/year	ME
	Improving breeding facilities of CITES species	Establishing related official regulations	-	Y	ME
Enhancing management of endemic species and national natural monuments	Improving search for endemic species	Ratio of endemic species	5.6%	7%	ME
	Founding endemic plants conservation institutes	No. of institutes	3	10	KFS
	Enacting Natural Heritage Act	Y/N	-	1	CHA

3.2.3 Expansion and efficient management of protected areas

Related Aichi Target: 11

(1) Current Status

Strategic Plan for Biodiversity 2011-2020 suggests that 17% of world terrestrial and inland water areas and 10% of coastal and marine areas be conserved through designation of protected areas. Korea's current ratios of protected areas of 12.25% for terrestrial and 1.2% of marine areas are far below the suggestion, and it is necessary to improve effectiveness in evaluating in order to monitor the management progress of protected areas.

(2) Action Plans

2-1) Expanding protected areas

- Designating 17% of terrestrial and inland water areas and 10% of coastal and marine areas as protected areas

Table 13. Target of designation and management of primary protected area by 2020

Category of designation		2014	2020
Natural parks (county, province, nation)		132 m^2/person	153 m^2/person
Terrestrial ecosystem	Ecosystem and landscape conservation area	234 km^2 (32 sites)	600 km^2
	Baekdudaegan mountains reserve	2,634 km^2	3,300 km^2
	Wetland protected area	155 km^2	250 km^2
Marine ecosystem	Marine ecosystem protected area	213 km^2 (9 sites)	600 km^2
	Coastal wetland protected area	219 km^2 (12 sites)	500 km^2
Wildlife protection	Wildlife special protected area	920 km^2 (377 sites)	2,750 km^2
	Forest genetic resource reserve	1,318 km^2	1,500 km^2

- Operating integrated conservation programs: using development restriction zone (greenbelt), protected areas of water source, marine resource protection zone and community based conservation area, which contribute biodiversity conservation

2-2) Designation and management of protected areas
- Establishing 'National Master Plan for Protected Areas' in 2014 to achieve targets of protected areas
- Strengthening 3 major eco-belts of Korea (Baekdudaegan, DMZ and islands-coast)
    - Restoring over 60% of 175,000 km^2 damaged areas in national parks of Baekdudaegan Eco-belt.
    - Executing ecological survey and enhancing biodiversity of the major wetlands in DMZ area.
    - Designation of marine protected areas at islands and coasts, while extending the number of Ramsar designated wetlands in Korea.
- Improving the management system of marine protected areas
    - Notifying 'Guidelines for management and operation of marine protected areas' (official order) and strengthening the function of Marine Protected Areas Center in Korea Marine Environment Management Cooperation (KOEM)

2-3) Promoting effective management of protected areas
- Expanding management effectiveness evaluation of protected area from 42% to 70% and from 20% to 70% for marine protected areas
- Publishing report on the management effectiveness evaluation of national parks (2014)

- Enhancing the health of habitat
    - Expanding the designation of special protection zone in national parks from 3.5% to 5%

(3) Implementation targets

Action Plan	Program	Check index	Achievement		Administering Agency
			2013	2014-2018	
Expanding the designation of protected areas	Expanding natural parks	Area/person	132 m^2/person	148 m^2/person	ME
	Expanding marine protected areas	No. of sites	21	31	MOF
	Expanding forest genetic resource protected areas	Designated area	1,318 km^2	1,400 km^2	KFS
Establishing foundation of protected area management	Establishing National Master Plan for Protected Areas	Y/N	-	Implementation of plan	Related government agencies
Effective management of protected areas	Management effectiveness evaluation of protected areas	Ratio of evaluation	42%	70%	ME, MOF, CHA, KFS
	Designation of special protection zone in national parks	Ratio of designated areas	3.5%	5%	ME

3.2.4 Conservation of genetic diversity

Related Aichi Target: 13

(1) Current status

Genetic resources such as seeds indigenous to the region and strains of breeding of long history have great potential values to play a vital role to the human survival. Collection of genetic resources is weighted toward some specific crops and the collection of native genetic stocks has been poor. It is also urgent to analyze economically valuable characters even for the collected genetic resources. The foundation for the beneficial use of genetic resources should be established by examining and studying genetic resource preferentially, collecting, conserving and managing genetic resource from native organisms and operating genetic resource banks systematically.

* The collection of agricultural plant genetic resource is ranked 6th in the world in quantity. However, it is much weighted towards food crops resulting in low diversity in the collection of horticultural/special crops. It is expected to face difficulties in taking a lead in the international discussion on the right of genetic resources because native genetic stocks comprise only 20% of seed collection.

* According to ‘Master Plan for Agriculture and Fisheries Genetic Resource (2009–2018), achieving the 5th country of power in genetic resource through securing 330,000 collections for 6,000 species of agriculture plant resource and completing examination of characteristics for 77% of genetic resources

(2) Action plans

2-1) Examination, research and conservation of genetic diversity

- Examining phylogenetic relationships of native species by the analyses genetic information
    - Elucidating phylogenetic relationships among native species by the analyses of genetic information with the foundation of big data from 3,000 species to 6,600
    - Establishing convenient identification system using genetic ID by constructing DNA barcode system for 660 species to 2,500 species
- Promoting protection measures for special habitats of abundant biodiversity
    - Strengthening examination and research of genetic diversity for important biological resource (2014–) and establishing improvement by inspecting actual condition of conservation policy and examining the areas of high genetic resource (2016)
    - Protecting the habitats of good genetic diversity of wildlife by designating as new protected areas in connection with previously designated areas

2-2) *Ex situ* conservation and development of management system of genetic resource

- Expanding collection, storage, and *ex situ* conservation of genetic resource
    - Collecting genetic resource and natural products by intensive examination of special habitats for collecting diverse genetic resource
    - Promoting native plant seed collection project and expanding the examination of seed characteristics to raise the ratio of collection of native plant seeds from 40% to 60%
    - Collecting and listing agricultural plant genetic resource from 2,000 collections to 10,000 and expanding integrated management system for livestock genetic resource from 1,000 to 5,000 resources by live and frozen storage method
- Strengthening management technology such as evaluation, management and preservation of useful genetic resources
    - Developing the discriminating criteria for useful and rare genetic value and revising the related official regulations, promoting developments of management manual for genetic resources of vital importance, and developing the technique of cryogenic frozen storage for wild animals, seeds, vegetative body and archaebacteria

2-3) Expanding establishment and operation of genetic resource banks

- Expanding establishment of genetic resource management banks
    - Genetic resource bank of wild animals, Korean Collection for Type Cultures operated by Korea Research Institute of Bioscience and Biotechnology, Agriculture Genetic Resource Bank, Registration Authority for Marine Life Resource Deposition, and Pathogen Resource Bank
    - Establishing new genetic resource banks for wild plant seeds, natural products, and seed vault for long-term storage
- Establishing the system for strengthening roles and activating operation of genetic resource banks
    - Resolving problems in overlapping collections and similarities among banks, and establishing ‘Development Plan for Genetic Resource Banks’

(3) Implementation targets

Action Plan	Program	Check index	Achievement		Administering Agency
			2013	2014-2018	
Research to assess genetic diversity	Reconstructing phylogenetic trees for species of particular importance in Korea	No. of species	3,000	6,600	ME, MSIP, MOF, KFS
Ex situ conservation and management of genetic resource	Collecting seeds of endemic forest plants	Ratio of seed collection	40%	60%	MSIP, MOF, KFS
	Collecting live materials from special habitats	No. of collections	400	1,600	ME
	Collecting genetic resource of useful plants	No. of nationally registered resources	2,000	10,000	RDA
Expansion of establishment and management of genetic resource banks	Expanding Registration Authority for Marine Life Resource Deposition	No. of institutions	13	17	MOF
	Establishing Development Plan for Genetic Resource Banks	Y/N	-	All related government agencies	MSIP

3.3 Reducing threats to biodiversity

3.3.1 Safeguard for IAS and LMOs

Related Aichi Target: 9

(1) Current status

Climatic change and modification of the landscape have a potential to cause the unexpected spread of alien species, aggravating the original biodiversity and ecosystem. It is necessary to practice adequate management of LMOs as concerns grow on the release of LMOs to nature. The total of 2,167 IAS has been listed in Korea, and it is reported that IAS have caused the environmental and economic damage of 22.6 billion KRW for disturbing ecosystems (NIER, 2013).

*Agricultural alien pests introduced in Korea are about 320 species, and it is necessary to assess the precise current status of alien pests with the emphasis on pests of particular economic importance.

* The incidental release of LMOs to natural environment is of great concern considering the fact that the total imported LMOs reached 784 metric tons (Korea Research Institute of Bioscience and Biotechnology, 2012). It is necessary to periodically monitor the effects of alien species and LMOs on natural environment, while promoting to secure biosafety.

(2) Action plans

2-1) Joint response with neighboring countries for the survey of spread and influence of the alien species

- Establishing the risk assessment system
    - Isolating and identifying alien pathogens introduced by international travelers
    - Listing alien species by surveying yearly the area of distribution, and operating monitoring program of alien species
- Monitoring organisms disturbing ecosystem and making digital maps of national parks
    - Regularly monitoring organisms disturbing ecosystem (2014–)
    - Sharing information with neighboring countries on distribution and growth of invasive alien species through the research programs; prediction and analysis of distribution and migration pattern (2015–)
    - Establishing digital map system of the distribution and change of alien species in national parks

* Establishing the office of exclusive responsibility and recruiting human resources for the management of alien species in national parks (38 staffs → 200)

2-2) Risk assessment and relief projects of alien species

- Establishing and executing management plan of alien species
    - By the establishment of ‘Comprehensive Plan for Management of Alien Species (2014–2018), carrying out designation and management, monitoring, and determining and executing the eradication measures
- Proactive management system for the import of alien species
    - Designating authorized government body to examine the current status and operate risk assessment system.
    - Officially designating the harmful species of concern
- Expanding risk assessment and designation of alien species
    - Expanding the designation of IAS by conducting annual risk assessment (18 → 25 species)
    - Expanding risk assessment of alien pests, and designating invasive and migratory pests as ‘pest of prior great concern and eradication’ (40 → 100 species)
    - Establishing risk assessment framework for harmful introduced plants, and evaluating the grade for each species
- Developing management technique of IAS and promoting the relief and eradication programs
    - Promoting researches and techniques to control alien species; development of various equipments and techniques capturing fish disturbing ecosystem, management of alien species in national parks, control techniques for forest pests and agricultural alien pests and measures to control invasive alien marine species
    - Control programs for alien species or pathogens of primary concern such as nutria (*Myocastor coypus*), bullfrog (*Rana catesbeiana*), bluegill (*Lepomis macrochirus*), largemouth bass (*Micropterus salmoides*), burcucumber (*Sicyos angulatus*), and *Bursaphelenchus xylophilus* causing pine wilt disease

- ME gradually expands the budget to investigate and eradicate invasive alien species (1.5 billion KRW → 5 billion).

2-3) Safeguards for effective management of LMOs
- Improving management policy of LMOs
  - Promoting effective safety management based on 'the 2nd Biosafety Management Plan of LMOs (2013–2017).
  - Boosting research, import/export, production, distribution and consumption through collaborative measures with other government agencies.
  - 'Nagoya – Kuala Lumpur Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Biosafety' adopted in Oct. 2010, to be fully reflected. Coordination countering measures by analyzing the international trends, establishing implementation system.
- Safety management of LMOs
  - Improving risk assessment system for effective safety management of LMOs
  - Developing post management such as environmental effects evaluation
  - Developing screening technology of LMOs by gene analysis (33 → 60 items) and consistent monitoring system (the No. of secured samples of presumed LMO, 626 → 700)
  - Mandatory reporting system of imported LMOs for researches and tests.

(3) Implementation targets

Action Plan	Program	Check index	Achievement		Administering Agency
			2013	2014-2018	
Examining distribution and effects of alien species	Listing alien species	Building DB (No. of species)	1,109	List completion	ME
	National evaluation and monitoring of alien pests	No. of survey	-	4/yr	RDA
Risk assessment and management	Expanding the designation of alien species disturbing ecosystem	No. of designated species	18	25	ME
Effective management of LMOs	Institutionalization of the supplementary protocol	Improving institutionalization	-	legislation	ME, MSIP, MOHW, MOF, RDA, KFS

3.3.2 Biodiversity conservation system in response to climate change

Related Aichi Target: 10

(1) Current status
Climate change can cause the extinction of critical species as well as a huge impact in our environment. The changes in vegetation patterns, the loss of biological resources, sudden increase of southern alien species and changes in fishery resources are some of the major challenges the globe is facing. It is necessary to establish a long-term conservation plan in order to assess and monitor the effect climate change has on biodiversity, and respond to the fast changing situation in an efficient manner moving forward into the future.

(2) Action plans
2-1) Ecosystem monitoring system in response to climate change
- Monitoring the changes in species distribution
    - Operating Korea Biodiversity Observation Network to monitor species sensitive to climate change, increasing the target species up to 150 (currently 130 species designated)
    - Selecting and monitoring national forest species sensitive to climate change (100 species)
    - Collaborative investigation projects and monitoring network with affiliated national agencies to look out for the introduced species of primary importance

- Fostering the long-term monitoring project of ecosystem changes
    - Analyzing the effect of the climate change; the 2nd long-term ecology research project (2014–).
    - Establishment of the long-term ecology supersite for intensive monitoring (2018)
    - Agricultural species assessment including the populations of agricultural species sensitive to the climate change.

2-3) Developing measures for adaptation to climate change to conserve biodiversity
- Developing forecasting system to detect changes of native species as part of Eco-Innovation run by ME
- Counteracting measures for adaptation to climate change
    - Implementing programs of transplantation at arboretums and botanical gardens as suggested in ‘The 2nd Arboretum Promotion Master Plan’
    - National arboretums to be established in different part of the country, Sejong City, Yang-gu and Bongwha, to enhance the plants’ adaptation in different climate zones and vegetation zones.
    - Countering measures to be devised in response to invasive natural enemy of marine organisms.
    - Developing new cultivars of major crops including rice, barley, wheat, vegetable and grains that are adaptable to different climate (27 cultivars)
    - Further enhancing cultivation technology of subtropical vegetables (5 species)

(3) Implementation targets

Action Plan	Program	Check index	Achievement		Administering Agency
			2013	2014-2018	
Promoting long-term ecosystem monitoring for climate change	Operating long-term ecosystems super sites	Establishment	-	1 site	ME
	Monitoring sensitive species to climate change	No. of species	130	To be continued	ME
			100	To be continued	KFS
Forecasting change and effect of climate change	Forecasting change in vulnerable species to climate change	No. of forecasted species	20	40	ME
			20	50	KFS
Developing adaptation measure to climate change	Establishing national arboretums for various climates and vegetation zones	No. of new arboretums	-	5	KFS
	Developing new cultivars adaptable to climate change	No. of cultivars	-	27	RDA

3.3.3 Biodiversity evaluation and restoring efforts

Related Aichi Target: 5, 8 and 15

(1) Current status
The destruction of habitats caused by development and industrialization is the primary threat resulting in biodiversity loss. Given the high population density in Korea, the need for sustainable development for shelter and social advancement is extremely crucial. Although various environment conservation programs have been carried out nationally, there still prevail the conflicts between conservationists and those in favor of continuing economic development. Strengthening environment policies such as environmental impact assessment and discharge system for pollutants in order to minimize the effects on natural habitats, and promoting the integrated national plans for the restoration of ecosystems will be essential.

(2) Action plans
2-1) The ME notified the legislation to expand the current 101 administrative plans to 155 to strategically evaluate the effects on environment. This task can now be more efficiently carried out through the additional revision of Environmental Impact Assessment Act made on the 17th of September, 2013.

2-2) National environment maps such as ecological zoning maps to be further developed which will contribute to highly accurate analysis of current ecological status in Korea.

2-3) Ecological restoration effort allows all of the vital ecosystem belts to have a better connectivity.

- 'Mid and long-term Promotion Plan for Restoration Programs of Ecological Rivers (2011–2015)'
  - 'National Ecosystem Restoration Plan': In cabinet meeting on the 6th of Aug, 2013, Restoration Plan of Vital Ecosystem was reported.
  - Establishing restoration strategies in reference to 'Promoting Plan of Integrated Strategy for Natural environment Restoration (ME, Sept., 2007)'
  - Creating guidelines for mountain range development and the use (in 2014)
  - Restoration of the 50 fragmented areas in vital ecosystem belts by constructing ecological corridors, and monitoring 100 ha/year of damaged forests in Baekdudaegan and DMZ area

(3) Implementation targets

Action Plan	Program	Check index	Achievement		Administering Agency
			2013	2014-2018	
Expanding the range of environmental evaluation	Administrative plan to be applied	No. of plans	101	155	ME
Use and support of biodiversity value in establishing policy and plan	Developing national environment map	Y/N	-	Completion of development	ME
Promoting of ecosystem restoration of vital ecological belts	Establishing national ecosystem restoration program	Y/N		Completion of development	ME
	Restoring damaged areas of Baekdudaegan and DMZ	Restored area	67 ha/yr	100 ha/yr	KFS

3.4 Sustainable use of ecosystem

3.4.1 Biodiversity for agriculture, fishery and forest

Related Aichi Target: 4, 6 and 7

(1) Current status

Agriculture and fishery, which have extremely high level of dependence on the ecosystem, require special measures to protect biological diversity. Environmental changes due to the loss of species and reduction of genetic diversity can bring catastrophic results. Due to degradation of traditional agriculture, the destruction of habitats and excessive inshore and coastal fishing, biodiversity essential for human livelihood has been threatened. The food

security and sustainable use of biological resources must be executed through safe use of biodiversity, and excessive harvesting and catching in agriculture and fishery must be refrained.

(2) Action plans

2-1) Eco-friendly agriculture practices

- Data collection to accurately understand the soil condition, examining the boundaries of safe agricultural land use.
- Eco-friendly agriculture practices and the introduction of natural enemy on biological diversity

2-2) Conservation of fishery stock, biological resources and marine recovery plans

- Establishment of systematic approach to evaluate current marine ecosystem such as Total Allowable Catch system
- Selection of restoration target species by promoting preventative measures for incidental catches of protected species
- Expansion of fish cultivation projects

2-3) Protections of forest biological resources

- Upgrading eco-friendly forestry practices, one of the major projects named 'Forest Care' is highly anticipated to bring about positive effect. It is with six categories: production of timber, retention capacity of water supply, conservation of living environment, forest recreation, and conservation of natural environment and prevention of mountainous disasters
- Strengthened management of regional endemic plants and expanding Seed Collection Centers. Seed Collection Centers have been operated since 1968 at six locations in Korea. The centers produce and supply seeds of genetically excellent plant populations by inhibiting the introduction of foreign pollen grains to keep genetically excellent traits.

(3) Implementation targets

Action Plan	Program	Check index	Achievement		Administering Agency
			2013	2014-2018	
Expanding the eco-friendly agriculture and restoring agricultural biodiversity	Inventorying biodiversity in organic agriculture lands	No. of registered biological resources	365	2,000	RDA
	Developing organic agriculture cultivation technique for biodiversity conservation	No. of techniques developed	2	7	RDA
Strengthening the conservation management of fishery biological resources	Participation of fishermen for the conservation of fishery biological resources	Composition of committee	-	Committees at provincial level	MOF

Conservation and use of forest biological resources through eco-friendly forestry	Acquisition of useful forest plant resources	The ratio of acquisition to the total forest species	50%	60%	KFS

3.4.2 Traditional knowledge on biological resources

Related Aichi Target: 18

(1) Current status
To the present, projects on traditional knowledge have been carried out in several research institutes such as Korean Intellectual Property Office. However, systematic management and streamlined research attempts have so far been insufficient. Korea is moving toward developing a nationally unified approach on the protection and use of traditional knowledge that are fully in line with the Nagoya Protocol.

(2) Action Plans
2-1) In-depth research on Korean traditional medicine
-Further investigations on traditional knowledge on endemic species, completing the representative list of traditional knowledge through the national agriculture and fishery heritage system

-The collection of traditional knowledge on agricultural biological resources orally transmitted or recorded in the ancient literature up to 600 items (currently 250 items).
-Further investigation of traditional knowledge on marine biological resources to be conducted (100 findings).
-Compiling a new Manual of Oriental Medicine, called ‘Dong-eui-bo-gam’ in Korean, by reviewing the traditional knowledge on Korean Traditional Medicine for 2012–2017. Dong-eui-bo-gam was also enlisted in UNESCO Memory of World in 2009.
- ‘Experts forum on the traditional knowledge and biological resources’ composed of experts in related organizations. This forum was initially established in 2012, has held 4 times a year.

2-2) Establishing mid to long-term plan to conserve traditional knowledge
- Acts on Biological Diversity Conservation and Use of Biodiversity tool effect in Feb, 2013.
- Building verification system and DB of information on traditional knowledge
- Establishing the international protection platform of traditional knowledge
- Developing intellectual property right of traditional knowledge so that it can be internationally acknowledged. Moreover, Korea Traditional Knowledge Portal by Korean Intellectual Property Office provides services in English as well as in Korean for better access by global citizens.

2-3) High value of traditional knowledge
- Distribution of techniques and contents for the modern applications of traditional knowledge
- Appointing 100 traditional species of high value and 100 pieces of traditional knowledge on biological resources of which application to agricultural field is verified (2015–)

- Fostering Bio-industrial field with the application of genetic resources based on traditional knowledge

(3) Implementation targets

Action Plan	Program	Check index	Achievement		Administering Agency
			2013	2014-2018	
Expanding research and findings of traditional knowledge	Expanding investigation and research of traditional knowledge on native species	No. of research/investigation sites	2	4	ME
	Findings of traditional knowledge on marine biological resources	No. of cases	-	100	MOF
	Collecting and finding traditional knowledge recorded in ancient literature	No. of cases	100	500	KFS
	Findings and research of traditional knowledge on agro-biological resources	No. of cases	250	600	RDA
Building DB and conservation system of traditional knowledge on biological resources	Establishing mid-/long-term plan of traditional knowledge	Y/N	-	Y	ME, MSIP, MOHW, MOF, RDA, KFS
	Building DB of traditional knowledge	Y/N	-	Y	ME, MSIP, MOHW, MOF, RDA, KFS
Establishing application platform of high value of traditional knowledge on biological resource	Expanding budget of traditional knowledge on biological resources	Amount of budget	250 mi KRW	800 mi KRW	ME
	Securing budget for traditional knowledge on marine biological resources	Amount of budget	-	500 mi KRW	MOF
	Developing cultural contents by the application of traditional knowledge on biological resources	No. of cases	5	25	RDA
	Bio-industry R & D based on traditional knowledge	No. of cases	-	2	MSIP

3.4.3 Optimizing ecosystem services

Related Aichi Target: 14

(1) Current status
In Korea, like other countries, ecosystem service has decreased due to the overuse of natural resources. The national efforts to evaluate and integrate the value of ecosystem service have been lacking, which generates the need to foster the industries related to ecosystem with high priority; supporting to make right decisions on investments based on evaluation of the right value of ecosystem service, improving the function of the environment regulating services in the urban areas of high population, and executing eco-tourism by making good use of cultural service.

(2) Action Plans
2-1) Evaluation system of ecosystem service value in support of making decision on development plan
- Platform to evaluate the value of ecosystem service
    - Classification system and basic data system to support the accurate evaluation of ecosystem service value.
    - Evaluation analysis to be applied in development in policy making procedures, which will eventually connect ecosystem, society and economy

2-2) Enhancing biodiversity in urban areas
- Conservation measure of urban biodiversity
    - Eco-city map development through biodiversity survey led by local governments and eco-city map
    - Conducting comprehensive research on the ecosystem service in urban residential areas
    - Building green network in urban area such as urban forest and continuing support for restoration project

2-3) Fostering eco-tourism in collaboration with government agencies and providing support in farming and fishing villages with excellent ecosystem zone
    - By expanding the collaboration eco-tourism system between ME and MCST in 2013, the Korean government is aiming for a pan-society promotion system for eco-tourism. With the participation of related government agencies, public institutions such as KNPS and KTO, local residents and regional governments, more systematic approach will be made.
    - Expanding of eco-tour areas from 12 sites to 30 sites, and enlarging the eco-tour resource of ME and MCST. Eco-tour invigorating policy, monitoring of eco-tour resources, operating joint award system of eco-tour every year, certificating eco-tour guides (rearing 200 guides), constructing the integrated eco-tour information system, etc will also be set up.
    - Eco-sharing Project such as offering eco-tour vouchers for vulnerable social group (38,000 persons cumulative by 2012 → 160,000 persons cumulative by 2018)
    - Promoting Eco-/Farming tourism Complex Model Projects in collaboration between ME and MAFRA (5 sites to be designated in 2014)

- Developing assessment indicators of sustainable eco-tourism in reflection of ecological capacity from 2014.

(3) Implementation targets

Action Plan	Program	Check index	Achievement		Administering Agency
			2013	2014-2018	
Establishing evaluation system of value of ecosystem service	Developing evaluation and application techniques of ecosystem service	Y/N	In progress	Completed	ME
Enhancing urban biological diversity and improving the quality of ecosystem service	Forming urban forest	Size	3,002 ha	3,191 ha	KFS
	Restoring forests in traditional towns	No. of sites	59	117	KFS
Expanding eco-tourism and supporting farming and fishing villages	Expanding the designation of eco-tourism areas	No. of designation	7	30	ME, MCST
	Promoting 'Eco-sharing Project'	No. of beneficiaries	Ca. 38,000 (2012)	160,000 cumulative	ME, MCST
	Developing model projects of eco-farming-tourism	No. of sites	-	5	ME, MAFRA

3. 5 Research and management mechanism of biodiversity

3.5.1 Evaluating and monitoring biodiversity

(1) Current status

Since the evaluation and the monitoring of biodiversity are the basic tools for the conservation and management of biodiversity, the results of a wide range of biodiversity surveys have been used as evaluation measures for ecological zoning maps and conservation policy making in Korea. The number of native species in Korea is reported to be over 41,483, and the surveys and studies on biodiversity have been actively pursued, targeting 60,000 native species to be accurately recorded by 2020. Changes in domestic biodiversity should be monitored regularly, which will be used for the establishment of conservation plan.

Several national researches in place include Survey on Current Inhabitation of Wild Animals (1967–), National Natural Environment Survey (1986–), National Distribution Survey of Endangered Wildlife (2001–) and Survey of Native Species (2006–).

(2) Action plans

2-1) Completion of the national list of biodiversity

- Increasing the number of designated indigenous species, currently 41,483 species reported by the end of 2013, to 50,000 by 2018 and 60,000 by 2020 through the survey of terrestrial native species
- Building survey system of in-shore marine biological resources
- Revising the national list of species.
- The publication of Korean biota which includes integrated biological information on each taxon through the comprehensive studies on native species.
- Completion of the research projects such as the 4th National Nature Environment Survey (2013–2017), National Inland Wetland Survey (annually), the 7th National Forest Resource Survey (2016–2020), the 1st Marine Biological Resource Survey (2014–2018), Marine Ecosystem Survey (2006–), Coastal Wetland Survey (1999–), Monitoring on Marine Protected Areas (2011–), Marine Biodiversity Survey (2006–), Marine Fishery Resource Survey (annually), Agriculture Ecosystem Biota Survey (annually), Joint Survey of National Biodiversity Institutes (annually), etc.
- Collecting biological specimens; 2.34 million terrestrial specimens to be increased up to 2.74 million and 0.46 million marine specimens to become 0.80 million

2-2) Advanced research centers for each types of ecosystem such as terrestrial, freshwater, coast, etc. by location feasibility study in 2014

-‘Mid and long-term Action Plan of Ecological Researches (2014–2020)’

- Promoting ecological research plan for 6 areas: basic ecological study, ecological evaluation analysis, climate ecology study, ecological damage study, etc.

2-3) Expanding the participation of regional experts and civilians in biodiversity research

- The public participation in ecological surveys by designating small-scale ecology observation sites in schools, parks, etc., and developing web programs for civilian observation
- In 2013, 49 sites are in operation, and gradual expansion is in progress
- Operating KBON with local environment experts and local residents who are familiar with regional biodiversity. Currently, the number of participating organizations is 18 with the aim to increase to 25 by 2018

2-4) Constructing Korea Biodiversity Information Map

- Constructing ecological zoning maps on the basis of biodiversity survey

- Regular revision of the ecological zoning map so that it can be effectively applied to the city planning and development projects
- Marine ecological maps are designed and officially notified, further application of the maps in various marine ecosystem survey programs
- These maps are to become fully available for the public.
- Distribution map of Korean plants, map of current states of urban ecosystem, ecological

(3) Implementation targets

Action Plan	Program	Check index	Achievement		Administering Agency
			2013	2014-2018	
Surveying Korean biota and expanding list of species of Korea	Search for native species	No. of species	41,483	50,000	ME, MAFRA
	Publication of Korean biota	No. of publications	90	130	ME
	Biodiversity survey and specimen collection	No. of specimens collected	Terrestrial 2.34 mi., marine 4.6 mi.	Terrestrial 2.74 mi., marine 8 mi	ME, MAFRA, MSIP
Establishing advanced research centers for ecosystems	Establishment of advanced research centers	Y/N	-	Regional level	ME
Activating civilian participation	Monitoring the civilian participation in regular	No. of participating groups	In progress	25	ME
Constructing biodiversity information map	Revising ecological zoning map	No. of maps	398	794	ME
	Notifying marine ecology map	Y/N	-	Notification	MAFRA

3.5.2 Capacity building in biodiversity management

Related Aichi Target: 19

(1) Current status
Korean government is fully recognizing the importance of developing techniques and training professional manpower to achieve the conservation and sustainable use of biodiversity. By establishing NIBR in 2007 and National Ecology Institute (NEI) in 2013, the information sharing system as well as the workforce training has seen significant improvements. The dependence on some of biological resources such as agriculture, health and medical care, and forest resource is quite high in Korea compared to low level of existence of biological resources.

(2) Action plans
2-1) National biodiversity research institutes
- Promoting the establishment of national biodiversity research institute
    - MABIK and National Institute of Nakdong River Biological Resources, and Baekdudaegan Arboretum to be established in 2014 and 2016, respectively.

- Central Arboretum and research institutes in other regions (Honam, Gangwon, and Jejudo)
- Effective management through clearly separating the roles and functions of each institutes
- Research activities at national level also have been nurtured with the Operating National Information Center of the Bio-resource for Research established in 2013 and National Conservation and Management Center of Natural History established in 2011.

- Fully functioning conservation facilities for biological resources
  - Expanding the establishment and operation of biological resource center and competent authority of the bio-resource for research according to Act on Acquisition, Management, Utilization of the Bio-resource for Research
    * Designating and managing biological resource conservation facilities, *ex situ* conservation institutes and wildlife rescue centers under ME, and national, public and private arboretums under KFS as the deposit registration conservation agency (2014–), Expanding network of KBIF (46 organizations to 50)

2-2) Expanding research development for the conservation of biodiversity
- Vitalizing collection and search of endemic biological resource
  - Expanding analyses of genetic information on biological resources through comparative analyses of genetic characters
  - Development of DNA markers of endemic biological resource to in 2014, introduction of genetic barcode system for marine organisms in 2015, and the application of genomic analysis technology such as NGS in 2014.
- Comprehensive evaluation of the information of biological resources

  - Evaluating characteristics of agricultural genetic resource
  - 'Certification System of Biological Resource' to be established in 2015. Wide range of information will be provided for the system including scientific names, distribution and habitat status
  - Promoting to develop technology related to useful organisms in charge of each government agency
  - Expanding the linkage among Korean Bio-resource Information Service (KOBIS, www.kobis.re.kr), Korean Biodiversity Information Facility (KBIF, www.naris.go.kr), Bio Resource Information Service (BRIS, www.bris.go.kr), National Biodiversity Information Sharing Mechanism (KBR, www.kbr.go.kr) and Marin Bio Resource Information Service (MBRIS, www.mbris.kr), and information systems of biological resource of related government agencies, local governments and private sectors

Table 12. Current status of establishment of biodiversity research institutes

Institute	Major function	Year founded	Construction cost (billion KRW)
National Arboretum (Gwangreung)	Research on forest species such as rare and endemic species, conservation research of Gwangreung forest	1987	3.5
National Institute of Biological Resource (Incheon)	General management of biodiversity science institutes, national species and information, supporting of the policy	2007	59.6
National Science Museum (Daejeon)	Collecting specimens, conservation, exhibition, education and research on biodiversity	1945	30 *
National Ecology Institute (Seocheon)	Long-term ecology research, climate change adaptation, natural ecosystem survey project, ecology education	2013	326.4
Marine Biodiversity Institute of Korea (Seochoen)	Survey, research and development of marine biological resources	2014	127.9
National Institute of Nakdong River Biological Resources (Sangju)	Research and development of biodiversity, freshwater organizms and genetic resource in Yeongnam region; management, exhibition and education of Ulleungdo and Dokdo	2014	108.5
National Baekdudaegan Arboretum (Bongwha)	Long-term seed storage (Seed Vault)	2016	251.5
National Central Arboretum (Sejong)	Research and education of Korean gardens, urban forest	2021	137.4
Research institute in Honam region (Mokpo)	Biodiversity of islands and shore, establishing platform of materials for bio-industry	Promotion decided	50 *
Research institute in Gangwon region	Terrestrial biological resource, biodiversity of Baekdudaegan and DMZ, Cooperation between South and North Korea	Decision pending	120 *
Research institute in Jeju	Integrated management of biodiversity in Jeju area	Decision pending	50 *

* Estimated cost

2-4) Training professional manpower

- Raising masters and Ph.D.'s for biodiversity researches
  - Through 'Professional Manpower Training Program for Unstudied Taxa (2012–2021)', the education of academic professional manpower for unstudied taxa or taxa will be conducted with the aim to have at least 100 masters or Ph.D.' qualified professionals trained.
  - Training professionals for analyses of ecosystem service. Between 2014 and 2021, 60 students are expected to complete either master's degree or Ph.D.'s.
  - Training professionals for the conservation and the sustainable use of biodiversity for biodiversity survey (40), arboretum gardeners and forest insect industry

(3) Implementation targets

Action Plan	Program	Check index	Achievement		Administering Agency
			2013	2014-2018	
Expanding research institutes and reshaping function	Establishing and operating related institutes	No. of institutes established	4	7 in operation	ME, MAFRA, KFS
Expanding research and development of biodiversity conservation	Promoting research and development projects for the biodiversity conservation	Y/N	-	Promoting	ME
Information sharing system of biodiversity	National information sharing mechanism of biodiversity	Connecting KOBIS	N	Y	ME
Training professionals	Training professionals for unstudied taxa	No. of masters or Ph.D.'s	-	100	ME, MSIP

3.5.3 Mechanisms for the access and benefit sharing of genetic resource

Related Aichi Target: 16

(1) Current status

Korea has established a pan-government measure for the Nagoya Protocol in 2011 and has been pursuing implementation legislation to rectify the Protocol. It is also necessary to provide information and to improve awareness among stakeholders such as government agencies and private sector for the implementation of the access and benefit sharing. Reshaping the national legislation on the access to genetic resources and equitable benefit sharing seems to be a crucial task for the country. Establishing genetic resource information system to promote foreign parties to gain an access to Korean generic resources holds significant importance as well.

(2) Action plans

2-1) Measures for the access to genetic resource and benefit sharing

- Enactment of ‘Act on the Access to Genetic Resource and Benefit Sharing (tentative)’ for rectification and implementation of the Nagoya Protocol
    - Preparing detailed regulations and enforcement decrees on principles of access to genetic resource and benefit sharing, compliance of duties, designation of related agencies, etc.
- Consolidating acts related to genetic resources in relevant ministries such as MSIP, MAFRA, MOHW and MOF
- Strengthening the awareness of stakeholders to comply with the implementation of ABS
    - Promoting information sharing mechanism for the access to genetic resource and benefits sharing (2015)
    - Investigating cases of benefit sharing and developing the standard model
    - Expanding the provision of information with the help of the Nagoya Protocol help desk (from 8 cases in 2012 to 20 in 2014) and holding ‘Korea ABS Forum’ regularly 3 times per year, which is composed of experts from academic, industrial and legal experts.

2-2) Expanding and linking existing biodiversity database

- ME: Expanding to share information based on the national sharing mechanism of biodiversity information, from 1.2 million cases to 2 million
- MOF: Operating marine bio-resource information system, starting from 2014
- KFS: Expanding national biological species knowledge information system from 4.12 million to 4.2 million
- MSIP: Expanding national integrated system of information on the bio-resource for research (1.62 million data to 1.7 million), and operating inventory of natural history resource and national integrated information system of natural history research
- MOHW: Building total information management system of pathogens
- MAFRA: Expanding integrated information system of agriculture biological resource from 11,147 data to 14,150
- RDA: Building DB of useful traits of agricultural genetic resource (70,000 data/yr)

- Establishing management system for genetic resources with high economic value
    - Registering traditional stocks and breeding genetic resources of conservative needs in national system, and strengthening their management to prepare for the claims from the countries of origin. Nationally managed registration system are also forecasted to be expanding from 65,000 cases to 85,000, increasing deposition of native strains, wild species and endemic species. The compulsory national management registration and conservation of breeding varieties and parental stocks are also to be further cultivated.
    - Protecting genetic resources of ecological and economic importance using strengthened management such as export permission of biological resources from 1,971 species to 4,300 species
    - Obligatory prior approval for export of biological resource in place in an effort to regulate marine bio-resource and fishery bio-resource
    - Encouraging deposition of species information and specimens owned by individuals and private organizations to the biological resource center according to Act on Acquisition, Management, Utilization of the Bio-resource for Research

(3) Implementation targets

Action Plan	Program	Check index	Achievement		Administering Agency
			2013	2014-2018	
Reshaping the preparatory system for ABS	Implementing system for the access to genetic resource and benefit sharing	Legislation	-	Y	ME, Related governments
Coordination of genetic resources and enhancement of sustainable use	Registration of genetic resource for national management	No. of registration	65,000	85,000	RDA
	Designating (wild) species for the permission of export	No. of species	1,971	4,300	ME

3.6 International collaboration on biological diversity

3.6.1 Cooperation between South and North Korea

Since diverse plant and animal resources inhabit in the Korean Peninsula, the collaboration between South and North Korea holds inevitable significance for the conservation and sustainable use of biodiversity. Especially, DMZ, as one of three core eco-belts in Korea, attracts attention globally as the symbol for the peace and biodiversity.

Currently, comprehensive data collection will be useful for biodiversity cooperation between two Koreas. It is reported that forests have been largely damaged in North Korea due to rapid deforest activities.

(2) Action plans

2-1) Exploring joint collaboration tasks

- Establishing the platform, where feasible, to promote the collaboration between South and North Koreas by examining current biodiversity status, management and use of biological resources in North Korea
- Generating research projects between South and North Koreas in the dimension of ‘Green Détente’ and DMZ, if feasible.

2-2) Raising the public involvement and awareness in DMZ

- Sustainable use of ecological and environmental resources of DMZ for regional and communal development
- Organizing international conference to draw more attention at home and abroad
- Developing education programs for strengthening the participation of various local members
- Strengthening DMZ related R&D programs

(3) Implementation targets

Action Plan	Program	Check index	Achievement		Administering Agency
			2013	2014-2018	
Explore for collaboration between South and North Koreas	Studies on biodiversity in two Koreas	Y/N	-	Y	ME
Conservation measure of DMZ eco-belt	Monitoring current status and changes in ecosystem of DMZ area	Y/N	-	Y	ME
Conservation and sustainable use of DMZ, and awareness enhancement	Education program and international conference	Y/N	-	Y	ME, local governments

3.6.2 Enhancing international collaboration for biological diversity

Related Aichi Target: 19 and 20

(1) Current status

Korea is actively participating in international activities for the conservation of biodiversity by maintaining close relationships with other countries and relevant organizations for multilateral agreements such as CBD, Ramsar Convention, UNCCD, etc. as well as regional collaborations with the countries of the East Asia. Korea is also strengthening international partnership through multilateral discussions on biodiversity with international organizations, regional cooperation of Northeast Asia, forest resource cooperation, etc. By hosting COP 10 of Ramsar convention and COP 10 of UNCCD in 2008 and 2011, respectively, and CBD COP 12 in 2014, Korea is emerging as a strong partner for multilateral agreements. Recently, Korea is seeking out to share the experience and knowhow of economic growth with developing countries. It is largely in response to the request of expanding ODA with the recent participation in OECD DAC in 2010. Biodiversity issues must be considered at both global and national level through the implementation of international agreements to further enhance effective international partnerships.

(2) Action plans

2-1) Implementation of international agreements on biodiversity

- Complying with obligations as a contracted party of multilateral agreements
    - Demonstrating the features of national biodiversity report for CBD, CITES, Ramsar, WHC, etc. and presenting implementation measures effectively
    - Building a system for regular monitoring of implementation status for multilateral agreements at national level
- Supporting international implementation in multilateral agreements
    - Not only continuing active participation in UNEP, UNDP, CBD, CITES and Ramsar but also strengthening the response to multilateral discussions through international

organization by implementing resolutions and recommendations adopted 2012 IUCN WCC held in Jeju, etc.

- Participating actively to the discussions on international scientific platform such as IPBES, GBIF, DIVERSITAS, etc.
- Continuing active participation in multilateral collaboration programs such as GTI, GSPC, GEO BON, etc.

- Regional collaboration for biodiversity conservation
  - Continuing the discussion on conservation at regional level through Three Environment Ministers Meeting among Korea, China and Japan (TEMM) and Tripartite Policy Dialogue on Biodiversity annually
  - Strengthening international stance for the initiatives hosted in Korea such as NOWPAP, EAAFP, etc.

2-2) Hosting successful CBD COP12 and efficient follow-ups

- The need of the international roadmap to enhance implementation of the Strategic Plan 2011-2020; Pyeongchang Roadmap of COP12 should generate momentum for the achievement of the Global Biodiversity Targets. For this Korea proposes to agree on a Pyeongchang Roadmap: a series of concrete actions and initiatives necessary to ensure that parties achieve the Aichi Targets by 2020. As the host country and incoming presidency, Korea will make an effort for parties to come up with the roadmap supported by the concrete initiatives and partnership to accelerate and guide the implementation of the Strategic Plan for Biodiversity 2011-2020.

- Pyeongchang Ministerial Declaration on Biodiversity and Sustainable Development

How to mainstream biodiversity into the sustainable development plans and programs is the key mission for biodiversity community to achieve the Convention’s objective. In this vein COP12 will also come at a critical time in the development of the post-2015 development agenda. Discussions on setting new development agenda and Sustainable Development Goals will be getting underway at the same time. Korea views that COP12, and the associated High Level Segment will be an important opportunity for Ministers to transmit a message to the UN General Assembly on the importance of biodiversity for the post-2015 development agenda and the need for biodiversity, and the Global Biodiversity Targets, to be integrated into the SDG framework.

- Korea Biodiversity Initiatives as the follow-up action to support CBD COP 12 outcomes.

Korean Government is fully supporting the Korea Biodiversity Initiative to support the actions contained in the Pyeongchang Roadmap.

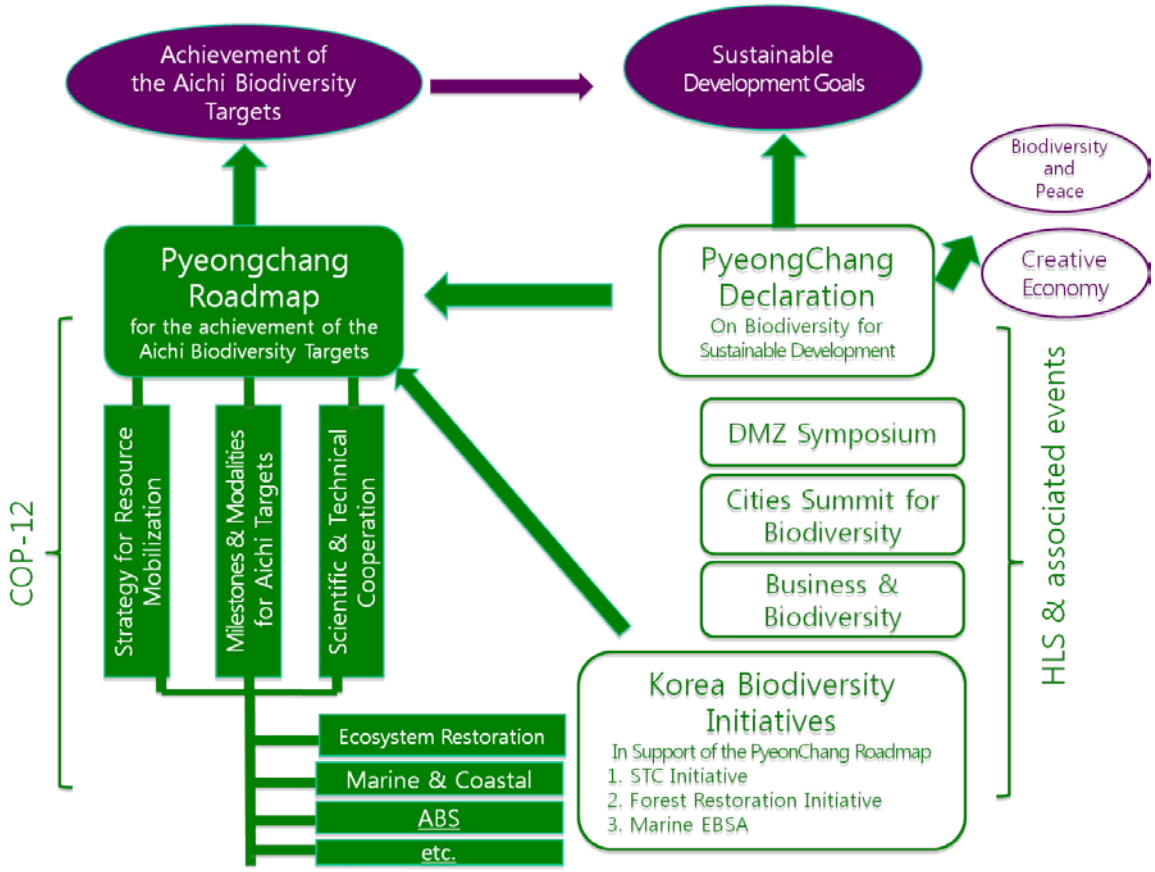

Figure 14. Proposed follow-up actions to support CBD COP 12 outcomes.

Korea also wishes to highlight how biodiversity can contribute to solutions to many of society's sustainable development challenges and this aligns nicely with Korea's call for Creative Economy.

2-3) Expanding supports and collaboration programs for developing countries

- Increasing the amount of financial assistance for developing countries; the Korean government is planning to double the subsidy amount by 2015, with no immediate reduction until 2020
- Expanding science and technology collaboration programs with neighboring nations in Southeast Asia

(3) Implementation targets

Action Plan	Program	Check index	Achievement		Administering Agency
			2013	2014-2018	
Strengthening international collaboration implementation	Submitting national reports of international agreements	Y/N	-	Submission	Korean government
	Korea-China-Japan policy dialogue on biodiversity	Y/N	once	1/yr	ME
Hosting and supporting CBD COP 12	Hosting COP 12	Y/N	-	2014	Korean government
	Supporting follow-ups and establishing master plan	Y/N	-	Y	Korean government
Expanding funds to developing countries	Expanding science and technology collaboration with developing countries	Assistance	-	Twice as annual average of 2006 - 2010	Related government agencies

Acronyms

CBD	Convention on Biological Diversity
CEPA	Communication, Education and Public Awareness
CHA	Cultural Heritage Administration
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COP	Conference of the Parties
DAC	Development Assistance Committee
DMZ	Demilitarized Zone
EAAFP	East Asian-Australasian Flyway Partnership
EIA	Environmental Impact Assessment
GBIF	Global Biodiversity Information Facility
GBO	Global Biodiversity Outlook
GCF	Green Climate Fund
GEO BON	Group on Earth Observations Biodiversity Observation Network
GGGI	Global Green Growth Institute
GSPC	Global Strategy for Plant Conservation
GTI	Global Taxonomy Initiative
IAS	Invasive Alien Species
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IUCN	International Union for Conservation of Nature
KBBI	Korea Business and Biodiversity Initiative
KBCSD	Korea Business Council for Sustainable Development
KBIO	Korean Biotechnology Industry Organization
KBON	Korea Biodiversity Observation Network
KBR	Korean Biological Resources
KFS	Korea Forest Service
KIPO	Korean Intellectual Property Office
KNPS	Korea National Park Service
KOBIS	Korean Bioinformation Service
KOEM	Korea Marine Environment Management Cooperation
KTO	Korea Tourism Organization
LMO	Living Modified Organism
MABIK	Marine Biodiversity Institute of Korea
MAFRA	Ministry of Agriculture, Food and Rural Affairs
MCST	Ministry of Culture, Sports and Tourism
MDG	Millennium Development Goals
ME	Ministry of Environment
MOF	Ministry of Oceans and Fisheries
MOFA	Ministry of Foreign Affairs

MOHW	Ministry of Health and Welfare
MOP	Meeting of the Parties
MOTIE	Ministry of Trade, Industry and Energy
MSIP	Ministry of Science, ICT and Future Planning
NBSAP	National Biodiversity Strategy and Action Plan
NEASPEC	North-East Asian Sub-regional Program for Environmental Cooperation
NGO	Non-Governmental Organization
NIBR	National Institute of Biological Resources
NIER	National Institute of Environmental Research
NIMR	National Institute of Meteorological Research
NLTER	National Long-Term Ecological Research
NOWPAP	Northwest Pacific Action Plan
NRCS	National Research Council for Economics, Humanities and Social Science
ODA	Official Development Assistance
OECD	Organization for Economic Cooperation and Development
OPC	Office for Government Policy Coordination
RDA	Rural Development Administration
ROK	Republic of Korea
SBSTTA	Subsidiary Body on Scientific, Technical and Technological Advice
SIDS	Small Island Developing States
SDG	Strategic Decisions Group
TEMM	The Tripartite Environment Ministers Meeting among China, Japan, and Korea
UN	United Nations
UNCCD	UN Convention to Combat Desertification
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
WBCSD	World Business Council for Sustainable Development
WCC	World Conservation Congress (IUCN)
YSLME	Yellow Sea Large Marine Ecosystem

Appendix I - Information concerning the reporting party and preparation of the fifth national report

Reporting Party

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Appendix II - Major ordinances on biodiversity

Ministry	Act	Date of enactment
ME	Korea Natural Park Act (revised from Park Act, enacted on Mar. 3. 1967)	Jan. 4, 1980
	Natural Environment Conservation Act	Dec. 31, 1991
	Special Act on the Conservation of Ecosystems and Island Regions including Dokdo	Dec. 13, 1997
	Wetland Conservation Act	Feb. 8, 1999
	National Trust Act on Cultural Heritage and Natural Environmental Asset	Mar. 24, 2006
	Act on Protection and Management of Wildlife (Title revised from the Act on the Protection of Wild Animals and Plants, enacted on Feb. 9. 2004)	Jul. 28, 2011
	Act on the Conservation and the Uses of Biodiversity	Feb. 2012
MSIP	Biotechnology Support Act	Dec. 31, 1983
	Act on Acquisition, Management, Utilization for Biological Research Resources	May. 8, 2009
MCST (CHA)	Cultural Property Protection Act	Jan. 10, 1962
MAFRA (KFS)	Seed Industry Act	Dec. 6, 1995
	Act on Building and Promoting Arboretums	Mar. 28, 2001
	Basic Forestry Act	May. 24, 2001
	Forestry Management Act	Dec. 30, 2002
	Act on the Protection of Baekdudaegan Mountain Range	Dec. 31, 2003
	Act on Building and Managing Forestry Resources	Aug. 4, 2005
	Act on the Conservation, Management, and Use of Agricultural and Fisheries Life Resources (title revised from Act on the Conservation, the Management and the Use of Agricultural Genetic Resources, enacted on Aug. 3. 2007)	Jul. 25,2011
	Fisheries Resources Management Act	Apr. 22, 2009
	Act on the Management of National Forests	Aug. 4, 2005
	Forestry Protection Act	Jun. 9, 2009
	Act on Fostering and Supporting the Insect Industry	Feb. 4, 2010
MOTIE	Act on Transfer of Living Modified Organism among Nations	Mar. 28, 2001
MOHW	Act on Promotion of the Research and Development of Natural New Medicine	Jan. 12, 2000
MOF	Wetland Conservation Act	Feb. 8, 1999
	Basic Act on the Development of Marine Fisheries	Mar. 13, 2002
	Act on the Sustainable Use of Dokdo	May. 18, 2005
	Act on the Conservation and Management of Marine Ecosystems	Oct. 4, 2006
	Act on the Securing, Management and Use of Marine Bio-resources	Jul. 26, 2012
	Marine Environment Management Act	Apr. 11, 2007
	Framework Act on Marine Fishery Development	Apr. 23, 2010
	Marine Environment Protection Act	Jan. 19, 2007

Appendix III - National implementation of the thematic programs of work and plans

Ministry in charge	Main institution	Biodiversity conservation related task
ME	National Institute of Biological Resources	General management of biodiversity, establishing national species list, etc.
	National Institute of Ecology	Research on climate change and ecosystem
	Korea National Parks Service	*In situ* conservation (managing national parks)
	Korea Environmental Industry Technology Institute	Technology development
MAFRA (KFS, RDA)	Korea National Arboretum	*Ex situ* conservation (general management of botanical garden, arboretum, etc.)
	National Academy of Agricultural Science	Research on agricultural genetic resources
	Agricultural Genetic Resources Center	*Ex situ* conservation (agricultural genetic resources)
	Korea Seed and Variety Service	*Ex situ* conservation (seeds)
MOF	Korea Institute of Ocean Science and Technology	Research on marine environment conservation
	Marine Biodiversity Institute of Korea	Survey, research and development of marine biological resources
	Korea Institute of Marine Science and Technology Promotion	Technology development
	Korea Marine Environment Management Corporation	Survey on marine coastal and wetland ecosystem, marine protected areas management
CHA	National Research Institute of Cultural Heritage	Natural monument protection
MSIP	National Science Museum	Research, collect and exhibit science and technology data
	General management of biodiversity research and monitoring system	
OPC (NRCS)	Korea Environment Institute	Research on biodiversity and environment policy
	Korea Maritime Institute	Research on biodiversity policy (marine)

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