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National Biodiversity Strategy and Action Plan of DPR Korea

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Contents

Preface

There have elapsed as long years as 15 since the adoption of the Convention on Biological Diversity (CBD) at 'Rio Summit' on environment and development, and as a decade since the preparation of the first "National Biodiversity Strategy and Action Plan" (NBSAP) of DPRK, a party to the CBD, in accordance with the provisions of Article 6 of the CBD, which are related to the preparation of national strategies for the conservation and sustainable use of biodiversity.

Biological diversity, biodiversity, is the term referring to the entire biological world on earth, including genes, species, populations, communities and ecosystems, and all the components, of which it is composed, constitute the life-sustaining system on earth and lay a foundation for the sustainable development of the economy.

It has been formed through as long history as 4 billion years since the birth of living things on earth.

The increase in population, rapid development of economy and extensive consumption of natural resources have seriously damaged the biodiversity which forms the foundation of the survival of mankind and the economic development.

It was the urgency of the conservation and sustainable use of biodiversity and its components for the present and future generations that led to the adoption of the Convention on Biological Diversity at Rio Summit in 1992.

During the last decade of the 20th century since its adoption and even at the dawn of the new millennium, the biodiversity has been, however, still menaced seriously with the destruction of ecosystems, environmental deterioration, loss of wild animals and plants as well as their habitats due to regional disputes, poverty and unsustainable consumption of natural resources in developed countries, despite the active efforts of international community for conserving biodiversity.

In order to meet its own commitment as a party to the CBD, the DPR Korea made two rounds of increases in number and acreage of nature protected areas according to Article 8 of the Convention since the Rio Summit.

At present, the acreage of nature protected areas reaches 7.27% of the territory of DPRK.

While integrating biodiversity conservation into the Master plan for Land Development, the DPR Korea set the General Mobilization Period for Land Development for each month in spring and autumn since 1996, and has pushed forward it as an all-people campaign.

Biodiversity in DPR Korea suffered serious damages due to the massive exploitation of natural resources during the Japanese colonial rule protracted for about half a century and the indiscriminate bombing during the Fatherland Liberation War (1950-1953).

Since then, the rehabilitation of the land and natural environment has been promoted

according to several national measures, resulting in the considerable recovery of destructed land and nature.

However, the intensified economic sanction and severe natural disasters continued for several years led to the over-exploitation of forest resources for firewood, the deforestation of not a few mountains and hills due to the burnt-field farming for food, and the considerable destruction of inland water ecosystem caused by the accumulation of mud and pebbles on rivers.

With full understanding of the actual situation, the great leader Comrade Kim Jong Il gave, on March 6, 2002, a vital teaching to make the whole country as beautiful as a golden tapestry in the Workers' Party era by strongly promoting the forest and water conservation, so as to take national measures to mobilize the entire party, the whole country and all the people to its implementation.

At present, the Government of DPRK is closely combining the biodiversity conservation with the afforestation and gardening of the whole country at country level, to promote the rehabilitation of degraded forests and the transformation of the whole territory into a golden tapestry in the Workers' Party era in conformity with the requirements of the new century.

In this context, there was a need of updating the strategies and action plans on biodiversity in DPR Korea, as required by developing situations.

In accordance with Article 6 of the Convention, the first "National Biodiversity Strategy and Action Plan" was prepared in 1998, with its focus on followings:

- *Establishing* the protected area network system involving areas of key importance in the biodiversity conservation and *improving* its management;
- *Recovering* ecosystems damaged by natural disasters and *implementing* the biodiversity conservation plan in close combination with the land use plan;
- *Increasing* actively bio-resources and *establish* the system for their sustainable use;
- *Reinforcing* laws and regulations on biodiversity conservation;
- *Intensifying* the scientific research on biodiversity conservation;
- *Promoting* the training for experts and officials on biodiversity, etc.

Based on the review and assessment of national progresses in the implementation of the convention for the last decade, the updated NBSAP mentions the issues to be conducted in accordance with the requirements of the convention in the field of biodiversity conservation and sustainable use within the coming decade at least, in consideration of the decisions adopted at the meetings (4^{th} ~8^{th}) of the Conference of Parties (COP) to the CBD.

It also keeps some issues, though not achieved in the last decade, for new possible progresses likely to be made through its further promotion.

Chapter 1 of the updated NBSAP gives an outline of the status of biodiversity in DPR Korea in all aspects of ecosystem, species and genetic diversity and describes the features of

biodiversity in the country, the threats to biodiversity and their reasons, and the needs and urgencies of biodiversity conservation.

Chapter 2 evaluates the conservation and sustainable use of biodiversity in DPR Korea from the aspects of *in-situ* and *ex-situ* conservation, sustainable use of biodiversity components and their identification and monitoring.

Chapter 3 includes the detailed description of cross-cutting measures including legislation, institution, scientific research, communication, education and incentives, and also does the creation of models based on the ecosystem approach and the international cooperation.

Chapter 4 provides the strategy for biodiversity conservation in DPR Korea in the aspects of conservation, sustainable use, benefit-sharing and cross-cutting measures, while taking the original one into account.

Chapter 5 includes priority projects and action plans in biodiversity conservation and sustainable use.

The updated version of the NBSAP reflects the urgent need to further develop the conservation and sustainable use of biodiversity in DPRK to meet the new century's demands.

It will be a milestone for further successful implementation of the CBD in DPR Korea, making an active contribution, via its implementation, to the conservation of biodiversity at country, regional and global levels.

2007.

Introduction

Geographical background

DPR Korea is a peninsula located in the east of the Asian continent.

It is flanked to the east and west by the Korean East Sea (KES) and the Korean West Sea (KWS), and bordered on the north by China and Russia across the River Amnok and the River Tumen.

Korea has a typical temperate climate with the average annual temperature of around 8 ~12℃, which has a considerable variation from region to region and from season to season.

The average annual precipitation is 1,000 ~ 1,200mm.

Dry season is from April to May and the rainfall during the rainy season from June to August is over the half of the annual precipitation.

Mountainous areas take almost 80% of the whole territory and the climate in DPR Korea is influenced by such topographical conditions.

With many mountains and rivers, the topography of DPR Korea is characterized by deep valleys and steep slopes.

The territory is divided into 15 large catchment areas clearly demarcated and the rivers have fairly large outflows for its size.

DPR Korea has very diverse phases and distinct horizontal/vertical zonal characteristics of soil, which can be divided into 12 types, for its size as large as 122,762km^2.

The vegetation zone can be divided into 3 types: subarctic coniferous forest zone (including polar plant zone in the alpine zone) and middle and southern temperate forest zones of coniferous and broadleaved (latifoliate) trees.

In DPRK, there are more than 100 natural lakes and 1,700 artificial ones or reservoirs.

The water area including lakes, reservoirs and rivers covers about 6% of the territory.

It has long coastline and about 340 islands. The seas are occupied mostly by the continental shelf and in particular the KWS completely.

The surrounding seas are strongly affected by the Pacific Ocean via several straits.

There appears the wide tideland due to high tidal range in the KWS, which is greatly different from the KES in its oceanographic features.

During the 4th (Quaternary) glacial period, DPR Korea had not been directly influenced by glacier in most areas except some mountain areas, thus preserving “living fossils” of the Mesozoic era and the 3rd (Tertiary) glacial period to a considerable extent. And during the glacial and interglacial periods, there had been numerous migrations of northern and southern animals and plants.

Since then, animal/plant species settled in the Korean peninsula had gradually adapted to the complex physiographical conditions and evolved into new species and/or varieties,

resulting in the enriched biodiversity.

Physiographical conditions of the Korean peninsula with changeable climate, topographical complexity, ramified river network, numerous lakes, long coastline and vast territorial waters provide various habitats for the existing fauna and flora. And that is why DPR Korea has rich diversity of fauna and flora and takes a high place in number of species per area among the northeast Asian countries.

Objectives of updating the NBSAP

At the meetings of COP to CBD since the preparation of National Biodiversity Strategy and Action Plan of DPRK with support from GEF and UNDP, important decisions and recommendations have been adopted on 2010 Biodiversity Target, Global Strategy for Plant Conservation, Ecosystem Approach and thematic programmes of works related to the forest biodiversity, inland water biodiversity, coastal and marine biodiversity and agricultural biodiversity.

The 2010 Biodiversity Target stresses 4 strategic problems related to:

- *Mainstreaming* the Convention in international processes related to biodiversity;
- *Improving* financial, human, technical and technological capacity of the parties;
- *Role* of the NBSAP as an effective framework to implement the Convention;
- *Raising* public awareness and understanding of the significance of biodiversity and the Convention, to make broader participation across society in its implementation.

And the 8th meeting of COP stressed the importance of communication, education and information exchange relevant to biodiversity.

Since the publication of NBSAP in 1998, DPR Korea has been still faced with challenges such as the decrease in forest resources, deterioration of eco-environment and unsustainable use of natural resources caused by the adverse economic conditions.

For implementing the CBD, DPR Korea has taken state measures to expand protected areas, improve the basin management and develop agricultural production, and during the period, established the national framework for bio-safety.

The Government of DPR Korea updated the NBSAP with support from UNEP, aimed at assessing progresses made in the past decade and further promoting the conservation and sustainable use of biodiversity in accordance with the requirement for the sustainable development in the new millennium.

Relations between the NBSAP and sectoral plans of national economy

The NBSAP of DPR Korea is closely relevant to national economic plans of several sectors, *inter alia* forestry, fishery, Koryo medicine manufacturing and agriculture with major

relation to the use of natural resources, and also to the scientific research development plan, energy development plan and Master Plan for Land Development, as already mentioned in the former version.

In the past decade, the implementation of the NBSAP has been promoted in close relation with the Master Plan for Land Development (MPLD). The general mobilization for land development in both spring and autumn every year from 1996, as an all-people campaign, has played a significant role in the land management and biodiversity conservation.

In the fields of forestry, fishery and Koryo medicine manufacturing, programs were or are being prepared and now undertaken to establish the systems and processes for the conservation and sustainable use of ecological environment, mainly focused on the creation of resources. In particular in fishery, there was a firm conversion from catching fishery into cultivating one with great emphasis on the conservation of coastal ecosystem.

In the scientific research work on biodiversity conservation, considerable progresses have been made during the period of 5-Year Plan for Science & Technology Development (2003-2007), on the basis of which the following 5-Year plan (2008-2012) is being prepared with great efforts on the research and technological development for the conservation and sustainable use of biodiversity.

At present in the field of education, the action plan is under preparation to improve the education on biodiversity and environment.

Relations of the NBSAP with other international conventions

The Convention on Biological Diversity (CBD) is one of the 3 major conventions related to the global environment along with the FCCC and CCD. DPR Korea is one of the parties to the 3 above-mentioned conventions.

In recent years, international efforts have been made for preventing global warming.

At the UN Inter-governmental Group Meeting on Climate Change in 2007, it was suggested that over 90 % of major reasons of sudden rise in atmospheric temperature has origin in manmade greenhouse gases from the middle of the 20^{th} century, and that the increased consumption of fossil fuel caused the global temperature rise in the last 50 years, which is two times higher than that in the former 100 years. It was also warned that, serious environmental disasters would be inevitable without any approach to the global warming.

For preventing the global warming, it is urgent to:

- *Decrease* the greenhouse gas discharge by 6 % of that in 1990 until 2012 and then implement the Kyoto Protocol;
- *Increase* the proportion and effect of renewable energy consumption such as wind and solar energy, and bio-fuel;
- *Enhance* the ecological service function of forest storing CO_2.

The improvement of biodiversity and ecological services of forest ecosystem is also

closely related to the implementation of the CCD.

In DPR Korea, the National Capacity Needs Self-Assessment (NCSA) project for the implementation of 3 major conventions on environmental management had been undertaken under the support from GEF and UNEP from July, 2004 to December, 2005.

The report on the NCSA project analysed the cross-cutting issues of 3 major agreements which constraints capacity, and identified priorities for capacity building as follows:

- Simultaneous implementation of the build-up and management of forest resources and the introduction of renewable energy in rural areas;
- Monitoring network system for observing biodiversity components and land status;
- Regular updating of national inventory development system and the inventory of greenhouse gases;
- Development of technologies for organic farming and eco-farming and their application;
- Identification of criteria, indicator and method for EIA;
- International cooperation and exchange for the implementation of Rio Convention in training, technical transfer, information exchange and planning.

In its strategy for capacity building, it also suggested 6 following targets to implement the conventions:

- Establishment of effective institutional system for implementing the Rio Convention;
- Development of information system for environment management;
- Development of the operating methods and means;
- Intensification of the transfer and development of technologies for environment management;
- Strengthening environmental education and the human resources exploitation;
- Raising the public awareness on environmental issues.

Process of updating of the NBSAP in DPR Korea

Updating of the NBSAP of DPR Korea was conducted by the State Academy of Sciences (SAOS) with the support from UNEP from December, 2006 to September, 2007.

During the project, main emphasis had been put on the taxonomic need, protected areas, alien species, traditional knowledge, sharing of benefits from gene resources, conservation of agricultural biodiversity, etc.

There had been several rounds of meetings, consultations and technical workshops on the updating of NBSAP.

Authorized by the NCCE of DPR Korea, the State Academy of Sciences organized the 1st consultation to update the NBSAP on December 3, 2005.

Agreement on the organization of the expert group was made at the consultation, which was participated by many agencies and stakeholders related to biodiversity conservation and

sustainable use, including:

- State Academy of Sciences (SAOS);
- Ministry of Land and Environment Protection (MLEP);
- Ministry of Forestry (MOFr);
- Ministry of Fishery (MOF);
- Ministry of Education (MOE);
- Ministry of Public Health (MOPH) (*inter alia* Bureau of Koryo Medicine);
- Ministry of Culture (MOC) (*inter alia* Cultural Relics Conservation Administration);
- Mt. Daesong Management Bureau, etc.

During the period from Jan.30 to Feb.2, the expert group made an in-depth discussion about the content of updated NBSAP and ways of access to and analysis of information by items and allotted responsibilities according to each items.

Based on information collected by the expert group, the NCCE arranged the national workshop on updating of NBSAP in Sep.20-21, 2006.

The workshop, participated by 10 relevant agencies including SAOS, MOFr, MOF, MOPH, discussed specific approaches to NBSAP.

The NCCE authorized the expert group to prepare the draft of updated NBSAP until February, 2007, arranged a review on NBSAP updated in March, 2007 and allowed to complete the preparation until June, 2007.

Chapter 1

Status of biodiversity in DPR Korea

1.1 Outline

1.1.1 Ecosystem Diversity

The CBD defines the ecosystem as a dynamic complex of plants, animals, and micro-organisms and also non-biotic environment interacting as a functional unit with them.

The ecosystem diversity could be considered one of the major components of biodiversity, the conservation of which leads the biodiversity conservation.

Special attention in conservation of ecosystem diversity should be paid to conserving properly and improving the service function of ecosystem.

Generally, natural ecosystems in DPR Korea can be categorized into 4 types; forest ecosystem, agricultural ecosystem, inland water ecosystem and coastal and marine ecosystem.

1.1.1.1 Forest ecosystem

The forest ecosystem holds an important place in the conservation of biodiversity in DPR Korea, where the forest land covers about 73% of the territory.

Forests in DPR Korea belong to the Northern Temperate Zone forest, which are divided into 3 types; coniferous forest, broadleaved forest and coniferous-broadleaved mixed forest.

1) Coniferous forest

About 41% of forests in DPRK are covered by the coniferous forest, the representatives of which are forests of *Abies nephrolepis-Picea jezoensis,* larch (*Larix olgensis*), *Pinus densiflora* and pine (*Pinaceae*).

- *Abies nephrolepis - Picea jezoensis* forest

The forest is a typical subarctic coniferous forest, and the main tree species are *Abies nephrolepis, Picea jezoensis* (spruce), *P.koraiensis,* etc.

It is mainly distributed in the areas 700-1,800m high, including Paektu Plateau and Kaema Plateau. It takes about 14.5% of coniferous forests.

- Larch *(Larix olgensis)* forest

The larch forest, a typical subarctic coniferous one, is distributed mainly in alpine regions 1,000~1,900m high in Ryanggang Province and south and north Hamgyong provinces, the representatives of which are *Larix olgensis var, Koreana* and *Larix olgensis*.

It forms single or mixed forests, and takes considerable proportion of coniferous forests.

- *Pinus koreaiensis* forest

It is distributed in very wide area covering all over the country except some areas in Paekmu and Kaema plateaus. It is native to our country.

Its distribution stretches to the areas 1,200m high in Ryanggang Province and Jagang Province, and intensively in the area around Mt. Oga.

- *Pinus densiflora* forest

It consists of *Pinus densiflora*, and is added with the artificial forest of *P.rigida* and the natural one of *P.thunbergii* in some areas.

It is distributed in most areas except the northern uplands below the altitude of 1,000m.

The productivity of the forest, the 2nd one, differs greatly from area to area.

2) Broadleaved forest

By the climate zone and biological characteristics, it can be categorized into subarctic, temperate and subtropical deciduous broadleaved forests.

The subarctic deciduous broadleaved forest consists mostly of *Poplus koreana, Betula platyphylla, B. eramani, Acer palmatum, Phellodendron amurense* and *Pinus koraiensis*, and is mixed with *Pinus koraiensis* and *Aies holophylla*.

The temperate one consists mainly of oaks (*Querqus* sp.), and is mixed with *Tilia amurensis, Acer coreanum, Acer triflorum, Juglans mandshurica,*

The subtropical one consists of *Rosa multiflora var. pilosissima*, *Cyclobalanopsis vibrayana*, oliv tree, etc.

The broadleaved forest covers about 35.6% of the forest, and mostly consists of oak (approx. 52.4%). The oak forest is a forest community mainly composed of *Querqus mongolica, Q. dentata* and *Q. acutissima*.

The main type of oak forest is the *Querqus mongolica* forest distributed widely to areas with an altitude of 1,400m, so that the temperature broadleaved forest of our country might be regarded to be a community of *Querqus mongolica.*

In addition to oak forest, the broadleaved forest includes forests of *Betula platyphylla* (altitude of 800-2,000m), *Poplus davidiana* (altitude of 800-1,600m), *Eurya japonica* (1,000-2,500m), *Carpinus laxiflora*, *Cyclobalanopsis myrsinaefol*, etc.

3) Coniferous and broadleaved mixed forests

It can be classified according to climatic zone into:

- Subarctic evergreen mixed forest of coniferous/broadleaved ones, *Poplus davidiana*, *Betula platyphylla*, *Quercus serrata*;
- Subarctic deciduous mixed forest of coniferous/broadleaved ones, *Larix olgensis*, *Poplus davidiana*, *Betula platyphylla*;
- Temperate evergreen/deciduous mixed forest of coniferous/broadleaved ones, *Pinus*

koraiensis, Quercus serrata, Pinus densiflora, Quercus acutissima;

- Subtropical evergreen mixed forest of coniferous/broadleaved ones, *Pinus densiflora, Cyclobalanopsis myrsinaefol, Rhus javanica, Torreya nucifera, Carpinus laxiflora*, etc.

It covers about 22% of the whole forest area.

Main types of coniferous and broadleaved forests are*:*

- *Pinus densiflora-Quercus serrata* forest, distributed in mountainous areas of north and south Hamgyong provinces, Kangwon Province, north and south Hwanghae provinces and Jagang Province below 800m;
- *Pinus koraiensis - Betula platyphylla - Poplus davidiana* forest, distributed below 1,000m;
- *Abies nephrolepis - Pinus Koraiensis - Tilia amurensis* forest, in areas 800-1,200m high around Mt. Oga;
- *Larix olgensis - Betula platyphylla - Poplus davidiana* forest 1,000-1,200m high in Paektu, Pujonryong, and Hamgyong ranges;
- *Pinus densiflora – Abies nephrolepsis - Betula platyphylla* forest in subarctic forest and temperate forest of *Pinus densiflora*.

DPR Korea is covered by mountain ad agricultural ecosystems but not any typical grassland ecosystem of large-scale.

Originated from and surrounded by forests, grasslands, if any, is subject to the change into forest via natural processes without artificial management.

Therefore, grasslands in DPR Korea could be considered as forest-type grassland ecosystem and their species are *Miscanthus sinensis, Lespedesa crythopotria, Themeda japonica, Artemisia montana* and *Senecio nemorensis.*

In DPR Korea, forest resources are distributed from the south to the north and from the lowland to the upland with clear features of horizontal zone and vertical zone.

In particular, it is diverse in topography and ruggedness and bordered by seas on 3 sides, thus subject to oceanic climate.

The isotherms are, therefore, U-typed, not parallel to latitude, so that the horizontal distribution limit of plant resources according to the climate zone is a bit upwards to the north in coastal areas of the Korean East Sea and Korean West Sea with clear verticality for many high mountain regions.

Rich in acreage and stock of forest resources are, in general, uplands, northern areas in Ryanggang Province, Jagang Province and north and south Hamgyong Provinces.

On the other hand, forests on lowlands in South Pyongan Province and north and south Hwanghae Provinces are very poor in forest stock for serious impact by human. Especially, the ones near populated areas are greatly degraded. As a result, heavy rains due to climate change caused serious soil erosion in mountains and failure in flood mitigation.

In this context, it is urgent to recover the forests degraded and also strengthen forest

conservation, to maintain and enhance the fertility of forest soil.

In general, the more fertile the forest soil, the richer diversity it may have; the lower fertile, the poorer it may have. In this aspect, assessment should be conducted on biodiversity within forest ecosystem in DPR Korea.

1.1.1.2 Alpine ecosystem

Alpine plant communities in DPR Korea are distributed like spots along high peaks over 2,000m high.

The vegetation of alpine ecosystem is alpine meadow shrub forest distributed in peaks over 2,000m high, in an alpine zone, arctic floral zone.

Such mountains with developed alpine plant communities are Mt. Paektu (2750m), Mt. Pukpotae (2288m), Mt. Nampotae (2433), Mt. Sobaek (2171), Mt. Kanpaek (2162m), Kwanmo Peak (2540m), Mt. Duryu (2309m), Chail Peak (2505m), Mt. Buksubaek (2521m), Mt. Ryonhwa (2355m) and Mt. Rangrim (2186m).

There are some 250 species of alpine plants of Arctic origin in alpine floral zone, which is represented by *Pinus pumila, Thuja koriensis, Rhododendron confertissimum, Rhododendron faurei* and *Oxytropis anentii* and also includes 30 endemic and 50 medicinal plant species.

Below the alpine plant communities, sub-alpine ones are distributed like spots on the peaks 1300-2000m high in north and south Pyongan provinces, Jagang Province and Kangwon Province.

The alpine ecosystem in DPR Korea is of great value as tourist resources for its particular scenic beauty.

It is, however, subject to degradation, so it is an important object of conservation.

The global warming brings about rapid changes in the alpine ecosystems worldwide.

The alpine ecosystem in DPR Korea is changing in species composition as well, and so requires more intensified research.

1.1.1.3 Inland water ecosystem.

Rivers, lakes and reservoirs are important as habitats for aquatic life, including fishes, and sources of industrial and agricultural waters.

DPR Korea has well-developed drainage network with density of 0.4~0.6km/km^2.

In general, rivers which empty into the KWS are long with well-developed tributaries and have wide catchment area compared to their length, while rivers into the KES are short with steep declivity.

Vegetations in catchment area have functions of water catchment and soil protection.

In management of catchment ecosystem, it is, therefore, very important to ensure the

stability of the ecosystem as much as possible by closely combining the basic studies on its plant communities with the afforestation and management of catchment area, and in particular, to promote the conservation of biodiversity by restoring degraded forest and river ecosystems as soon as possible.

Inland water ecosystems are of great significance in conservation of endemic fish species and production of freshwater fish production, and also as a habitat for birds. So it is important to improve the management of inland water ecosystem subject to pollution and other human activities. In particular, crossing waters of fresh water and sea is of special significance for its rich biodiversity.

On the whole, the conservation of biodiversity in the inland water ecosystem should be integrated closely into the sustainable management of water basins.

1.1.1.4 Marine and coastal area ecosystems

The KWS and KES are influenced by Pacific Ocean through several straits.

The Rivers Amnok, Chongchon and Taedong from DPR Korea and Rivers Yellow and Yangtze from China are flowing into the KWS, carrying enormous amount of deposits.

The KWS has high tide (a maximum of 11.02m high). The offshore of the KWS is known to have 250 species of fish. Average depth of the KWS is 39m, and therefore, it is important to protect the water environment of the KWS.

The KES has long length (from north to south) over the width (from east to west).

About 600 fish species are found to be in waters of DPRK of the KES.

The KES has very favourable conditions for shallow-sea culture. The coast is estimated to have 546 species of seaweeds. Northern and southern species of seaweeds intermingle at the east coast of the DPR Korea.

The KWS has large area of tideland and many islands and islets. And in the seaside regions lie the major granaries. On the other hand, the KES is deep and has low tide, and most of its coastline is rocky except some estuaries.

From these topographical differences, they have different biota from each other.

Since the rise of sea level is predicted as a result of global warming, the investigation and research on changes in costal ecosystems of DPRK are suggested to be extremely important.

In DPR Korea, wetlands are generally distributed in the coast.

Of course, there are alpine wetlands in the marshlands and peat lands of high mountain areas, but not so large. In particular, the tidelands along the whole coast of the KWS have rich biodiversity.

The tideland plant communities are distributed along the west coast from Islands Bidan and Dasa at the estuary of River Amnok with its width of 300~500m at the mouth of the bay, and at the estuary of River Kumya in the east coast.

Being related to the formation history of the KWS, the history of tideland vegetation is

not so long. Therefore, there is little different in the composition and distribution of plant species. The major plant species are *Salicornia europae, Suaeda japonica, S. glauca,* and reed *(Phragmites communis)* of high bio-mass productivity.

The tideland has diverse species of invertebrates with high distribution density.

In particular, the tidelands in the coast of the KWS provide major habitats for shells of industrial value including clam worms and *Metrix lamacki,* main feeds for water-birds including snipes.

The wetlands along the east and west coasts are important transit and wintering places for migratory birds in the northeast Asia. The main areas are: Dongrim ri, Mundok County, South Pyongan Province at the estuary of River Chongchon; Haejung ri, Kumya County, South Hamgyong Province at the estuary of River Kumya; Daedong bay between Ryongyon, Taetan and Ongjin Counties, South Hwanghae Province; the 9.18 Reservoir in Chongdan County, South Hwanghae Province; lake area in Rajin-Sonbong City, North Hamgyong Province.

Wetlands along the shore of DPRK are placed on the flyway from the East Asia to Australia, one of 8 global flyways of migratory birds.

In this context, coastal wetlands of DPR Korea, especially in the estuaries and the coasts of Rivers Amnok, Chongchon, Daedong and Kumya are of great regional/global significance.

1.1.2 Species diversity

Species is a main part of biological evolution and the species diversity is the whole of all biological species and their transformation.

Important in species diversity are to mitigate threats to species diversity and also to resolve mechanisms of its formation, evolution and conservation.

DPR Korea, located in the northeast Asia, is characterized by relatively diverse species of animals and plants thanks to its formation history and geographical location.

Having taken a shape of peninsula in the northeastern region, the land of DPRK had been subjected to frequent changes from the strait to the land or sea during the glacial and interglacial periods repeated 4 times, which had been followed by migration of plants and animals from the continent and southern region.

In this process, there had occurred the extension, retreat or separation of distribution of fauna/flora, enabling diverse species of plants/animals to inhabit and consequently leading to their differentiation into native species, survival of living fossils, etc.

Also, it has made mountain topography complex, habitat circumstance variable and rich fauna/flora maintained.

1.1.2.1 Plant

In DPR Korea, about 10,000 plant species are recorded as of the late 2006, among which

the vascular plants are 3,623 species, spermatophytes 3,364 species, bryophytes 781 species and lichens 583 species, respectively. In addition, about 2,300 species of fungi and 2,700 species of algae are known.

Lower plants take the place of primary producer among the components of ecosystem and are important for the conservation of terrestrial and marine ecosystem biodiversity. In DPR Korea it is anticipated that more species of lower plants will be found through intensified survey and research.

1.1.2.2 Animal

Vertebrate animals recorded in DPR Korea by the end of 2006 are 1,435 species of 472 genera of 151 families.

1) Mammals

Mammals are 107 species of 69 genera of 28 families, among which terrestrial ones are 79 species of 48 genera of 20 families, composed of 11 species of *Insectivora*, 24 of *chiropter*, 2 of *lagomorph*, 18 of *Rodentia*, 15 of *Carnivora* and 7 of *Artiodactyla*.

The representatives of mammals are tiger, leopard, jackal, grey wolf, brown bear, bear, sable, common otter, deer, musk deer, water deer, roe deer, goral and so on.

2) Birds

420 species of 190 genera of 61 families of birds have been recorded in DPR Korea, among which non-migrant, winter migrant, passing-by and stray birds have 64, 106, 83 and 73 species respectively. These figures show the high proportion of migratory birds among them.

The migratory ones are represented by cranes, egrets, spoonbills, storks and swallows.

3) Amphibians and Reptiles

Reptilians involve 26 species represented by the *Eumeces coreensis*, *Ancistrodon halys*, mud turtle, etc.

Amphibians comprise 17 species, represented by *Bufo bufo*, *Rana temporaria ornativentris*, *R. chosenica*, *R.coreana*, etc.

4) Fishes

Up to date, there have been records of 865 species of fishes including marine ones, which consist of 111 of freshwater, 59 of brackish and 15 of anadromous species, with lots of endemic freshwater species.

5) Invertebrate

8,360 species of invertebrate including about 5,970 species of insects have been recorded so far and its number is anticipated to increase 3~4 times as much as the current one via

ongoing detailed study.

1.1.2.3 Microorganisms

In DPR Korea 1,005 species of 140 genera of microorganisms were isolated from various ecological environments, and preserved, including taxonomical groups of bacteria (227 species of 50 genera), *Actinomyces* (316 species of 6 genera), yeasts (203 species of 35 genera) and molds (259 species of 49 genera).

The investigation on the microorganisms in Mt. Paektu area recorded 306 species of 43 genera, among which molds (113 species of 15 genera) predominated, followed by yeast (81 species of 18 genera), *Actinomyces* (71 species of 2 genera) and bacteria (41 species of 8 genera).

By the further intensified taxonomical research on microorganisms, increase in the number of species is anticipated and their regional characteristics will be revealed more clearly.

1.1.3 Genetic diversity

Genetic diversity is one of main components of biodiversity, forming the basis of ecosystem diversity and also species improvement including for crops, domestic animals, trees and fishes.

All the genetic resources are originated from wild animals and plants adapted to physiographical/ecological conditions of relevant local areas, and inter alia, wild relatives of cultivated plants and livestock.

In the field of breeding, genes of wild species find active use to breed high-yield varieties resistant to diseases and pest, which provides economic benefits to a great deal.

It is nature reserves that play a significant part in the conservation of genetic resources of wild plants/animals.

Genetic resources of crop plants and domestic animals are of great significance, which have been selected, bred, cultivated and raised during the long course of history.

Our ancestors with a long history of over 50 centuries have cultivated/raised various kinds of cops and domestic animals.

Since 6000 years ago, they have cultivated rice, beans, foxtail millet (*Seratia italic*), millet (*Panicum miliaceum*), Sorghum (*Sorghum bicolor*), which are proved with many evidences in historic relics.

Data shows that they cultivated rice, millets, foxtail millet, sorghum and barley early in 1500-1000 B.C., and the Korean rice different from foreign ones was found in the Namgyong Relic of Honam ri, Samsok District, Pyongyang, a relic of New Stone Age.

At the centre of the site of an old building № 36 in the relic, there were 5 kinds of cereals

including rice, bean, millet, foxtail millet and sorghum inside soil.

The rice grains took the same type of short-grain as the earliest rice from Japanese relics, proving that our ancestors did advanced rice farming and disseminated the rice farming techniques to inhabitants of neighbor areas including Japan early at the period.

Our ancestors have used abundant plant/animal resources as raw medicinal materials for traditional medicine from ancient times.

They were the first in the world that used wild insam (*Panax schinseng*) as a medicine, and established its cultivating method including right place for its cultivation, to begin cultivating an insam ("*Bonchokangmok*", an outlook of medicinal plants, vol.16, 122p). Koryo Insam is now as famous in the world as ever.

The Koryo age had encouraged to cultivate *Rehmannia glutinosa* (the "History of Koryo Dynasty" vol.9, Segamunjong 33, July) and been famous for matrimony vines of Is. Jindo.

The Geography of "Chronicles of the Sejong Dynasty" (issued in the 15th century) contains the names, distributions and varieties under cultivation of 400 kinds of medicines to be taken and used in different areas, while the "Handbook of Korean Traditional Medicine" (published in 1433) does 699.

Many books related to medicine including "*Wuibangryuchi*" (1477), "*Tonguibogam*" (1611) and "*Dongwuisusebowon*" (1894) made contributions to disseminate the cultivation of medicinal plats across the country.

Now in the world, the conservation and sustainable use of genetic resources are very important for developing all branches of economy including agriculture, livestock and public health.

In particular, continuing loss of biodiversity at global level is addressing the conservation of genetic resources of countries and areas rich in biodiversity as a special priority related to livelihood of native/minority peoples (referred to 1st part of Chapter 2 on fair and equitable sharing of benefits from genetic resources).

1.1.3.1 Wildlife

DPR Korea is relatively rich in wild plants and animals for its size.

It has more than 900 species of medicinal plants, including *Panax ginseng*, *Schizandra chinensis*, *Rheum coreanum*, *Taxus cuspidate*, and lots of medicinal animals like *Gervus nippon, Moschus moschiferus, Hydropotes inermis, Rana temporaria ornativentris* and so on.

In addition, it has many species of crop-relatives like *Glycine soja.*

1.1.3.2 Cultivated plants

Genetic diversity of cultivated plants is the valuable component of biodiversity with great practical significance.

At present, DPR Korea has about 55,840 kinds of plant genetic resources in total, among which cereal, vegetable and industrial crops are about 41,700, 10,900 and 3,240 kinds respectively.

In particular, the cultivation of medicinal plants is being encouraged.

1.1.3.3 Domesticated animals

DPR Korea has 57 breeds of 7 species of livestock (including 8 cultivars of cattle, 8 of sheep, 11 of pig and 13 of rabbit), 31 breeds of 7 species of domestic fowl (including 8 breeds of chicken, 7 of duck and 6 of goose). In addition, it has 246 breeds of 3 species of silkworms and 3 breeds of honeybees.

The breeding of medicinal animals is also promoted and in particular there are 45 stock-farms for deer and 1 for musk across the country.

1.1.3.4 Aquatic organisms

Surrounded by seas on 3 sides and characterized by dense drainage network and lots of lakes and reservoirs, the DPR Korea is rich also in aquatic organism species. There are 185 species of freshwater fish and 59 of coastal brackish-water fish.

Great efforts in the field of fishery are being recently made to rear marine animals like *Haliotis gigantea* and lobsters of high economic value and to cultivate marine algae like *Laminaria japonica*, *Undaria pinnatifida*, and laver.

Considering the physiographical conditions of DPRK, the genetic diversity of aquatic ecosystem has a great significance in the economic development and improvement of people's livelihood through eco-environment preservation and fishery development.

As for the conservation of genetic resources of our country, agricultural resources are administered by Institute of Crop Variety, Academy of Agricultural Science(AAS), livestock resources by Institute of Stockbreeding, microbiological resources by Institute of Crop Variety and Institute of Fermentation, Branch Academy of Light Industry, SAOS, forest resources by the Institute of Forest Breeding, Branch Academy of Forestry, SAOS, fishery resources by institutions under Branch Academy of Fishery, SAOS (including Institute of Fishery, Shore Institute and Institute of Fish Farming, and other resources by relevant institutions (ex. silkworms by Institute of Sericulture, AAS, and bees by Institute of Bee, AAS).

During the last half century, lots of varieties of crops, domestic animals high in yield and adapted to natural features of our country have been bred and introduced in several fields, with many strains of microbes developed and applied.

For successful promotion of conservation and use of genetic resources, it is necessary to:

- *Strengthen* and *modernize* the capacity of depositories for genetic resources, and

construct the databases and information system for genetic resources obtained and preserved, so as to establish the regular information service system for producers from several fields of national economy;

- *Establish* the new conservation system in undeveloped fields as soon as possible;
- *Study* and *develop* many application aspects of genetic resources including survey of resources, breeding of new varieties and production of bio-actives by advanced bio-technology, so as to make those resources effectively available for improving people's livelihood;
- *Promote* the survey and preservation of wild relatives and the conservation of local varieties.

1.2 Features of biodiversity in DPR Korea

1.2.1 Ecological and evolutionary features of biodiversity

1.2.1.1 Ecological and evolutionary features

DPR Korea is not only rich in the number of plant/animal species for its size but also surpasses the neighboring countries in the rate of species per unit area, e.g. 3,943 species of higher plants with the rate of 0.03 species/km^2 and 420 of birds with 0.003 species/km^2.

It is also characterized by the diverse composition of biological species.

The territory of DPR Korea is a peninsula located in the east of Asian continent that was not directly influenced during the tertiary glacial era. And also, northern species from Arctic, northeast China and Mongolia, southern species of temperate and subtropical origin and cosmopolites from northeast Asia and Eurasian continent had migrated and distributed intensively during the glacial and interglacial era.

And another reason is put to that the animal/plant species survived have developed into endemic species through evolutionary processes adapting to the diverse physiographical conditions of the country after the glacial period.

The main living plant fossils in the country are *Magnolia sieboldii, Nelumbo nucifera, Ginkgo biloba, Myrica rubra* and *Diapensia japonica.*

Mergus squamatus, Tadorna cristata and *Emberiza jankowskii* are the typical avian living fossils of Tertiary period, and *Hydronotes inermis* for mammalian ones.

Among freshwater fishes, *Gonoprokopterus mylodon* and *Microphysogobia koreensis* are endemic fishes differentiated during the time when the KWS was the tributary of palaeo-Yellow River, and *Thymallus jaluensis, Lota lota* and *Hucho ishikawai* distributed in the northern highland are also the living fossils of Tertiary period, related to the paleo-Amur hydrosphere.

Fauna and flora of DPR Korea has special significance in view of the evolutionary

history of bio-species in northeast Asia.

1.2.1.2 Endemic species

DPR Korea has endemic species of high rate in the total plant species.

According to the proven data, there are 14 species of Pteridophyta (7 varieties), 3 species of gymnosperms (5 varieties, 1 forma), 198 species of angiosperms (197 varieties, 17 forma), totalling to 315, which account for 10% of total vascular plant species.

There are 6 endemics (with single species and single genus in the world): *Abeliophyllum disticum*, *Eeshinosophora koreensis*, *Pentactina rupicola*, *Megaleranthis saniculifolice*, *Caelopleurum nakaianum* and *Coreanomecon hylomeconoides*. And there are also 2 species of single genus: *Keumkangsania asiatica* and *K. latisepala*.

There are many endemic species with high medicinal value such as *Rheum coreanum* and *Astrogaalus setsureianus.*

As for endemic animals, the vertebrate is known to have 33 species/subspecies of fish, 3 of amphibian, 2 of reptile, 2 subspecies of bird and 1 subspecies of mammal, which account for 2.9% of total vertebrate species. The representatives of them are: grayling (*Thymallus jaluensis*), *Hucho ishikawai*, Urrmchy (*Gonoprokopterus mylodon*) and *Microphysogobio koreensis*, *Parasilurus microdorsalis* for Pisces; *Rana coreana* and *R. chosenika* for Amphibians; *Eumeces coreensis* for Reptilians; white-bellied black woodpecker (*Doryocopus javanensis*) for Aves.

The reason of richness of DPRK in endemic species is that the complex physiographical conditions and biological isolations in some areas had facilitated the formation of endemic species. That is, topographical conditions of DPRK with some 10 mountains over 2,000m high and high density of mountain ranges and valleys and their complicated intersection resulted in great differences of microclimate and eco-environmental conditions which have restrained the seed distribution and pollen exchange of plants.

It is expected that more endemic species in DPRK will be discovered via the taxonomical research on lower plants and invertebrates to be deepened.

1.2.2 Diversity of economic species

Most animals and plants distributed in DPRK have high economic values.

The number of plant species of economic value in regard to use is given in table 1-1.

In DPR Korea, there are:

- Tree species of high value as a timber including *Abies nephrolepis*, *Picea jezoensis*, *Larix olgensis var.koreana*, elm and linden (*Tilia amurensis*);
- Oil plants including walnut, Juglans cordiformis, black(wild) walnut, *Pinus*

koreaiensis and *Evodia daniellii*;

- Medicinal plants including wild insam, *Schizandra chinensis*, *Rheum coreanum*, forest asiabell (*Codonopsis pilosula*), *Atractylodes japonica*, barrenwort(Epimedium Koreanum) and *Eleutherococcus senticosus*;
- Wild fruit trees including wild grapes(*Vitis coignetiae*), *Actinidia arguta*, bilberry (*Vaccinium uliginosum*), chestnut (*Castaena*) and oaks;
- Wild edible greens including Quercus serrata, bracken (*Pteridium aquilinum* var *japonicum*), royal fern (*Osmunda regalis*), *Aralia elata* and broad bellflower (*Platycodon grandiflorum*);
- Mushrooms including songi mushroom (*Armillaria*), *Lentinus ecodes*;
- Aromatic plants including lilac (*Syringa dilatata*), thyme (*Thymus vulgaris*), *Agastache rugosa* and *Ledum palustre*.

Table 1-1 Number of plant species in DPRK by usage

Usage	**Species Number**
Medicinal plant	About 900
Wild edible grass	200
Wild fruits	30
Forage plant	160
Timber plant	100
Fiber plant	100
Oil plant	50
Aromatic plant	60
Melliferous plant	170
Garden plant	300
Sugar source plant	10
Total	2,080

As for wild forest animals with economic value, there are *Caprecolus caprecolus, Hydropotes inermis, Nemorhaedus goral, Sus scorfa, Lepus mandschuricus, Cervus nippon, Moschus moschiferus, Ursus thibetatnus, Meles meles, Nyctereutes procyonoides, Martes zibellina, Lutra lutra, Phsianus colchicus, Coturnix xoturnix, Tetrastes bonasia* and *Lyrurus tetrix.* And in winter, hundreds of thousands of ducks-wild gooses (*Anatidae*) migrate along the coastal plains and wetlands of the KWS and KES.

In the inland waters there are 185 species of freshwater, brackish water and anadromous (or catadromous) fishes and in the coastal waters, innumerable seaweeds and invertebrates

with high industrial value such as *Haliotis gigantea, Stichpus japonicus, Echinoidea, Erimaculus isenbeckii, Neptunus trituberculatus, Chionoecetes opilio.*

In the KES only, 329 species of *Rhodophyta,* 130 species of *Rhaeophyta,* 87 species of *Chlorophta* and in total 546 species of seaweeds are known. Among them, 309 species of Algae including 63 species of high medicinal value have high economic values.

Microorganism resources have high economic and environmental values as well.

The investigation on the microorganisms in the area of Mt. Paektu recorded 306 species of 43 genera, among which molds (113 species) predominate.

Over 2,310 species of fungi include 170 species of *Myxomycetes,* over 820 of parasitic species, 870 of mushroom and 290 of soil-fungi species. And there are more than 2,700 species of Algae, including over 2,050 of microalgae.

1.2.3 Threatened species

The 2010 Biodiversity Target, adopted as a decision(VI/26) of the meeting of Convention of Parties to the CBD, stresses the importance of identifying the change in status of threatened species for identifying the status of selected ecosystems and habitats and the trends in abundance and distribution of selected species as well.

The threatened plant species (seed plant) in DPR Korea account for about 4.54% of the total number of species thereof.

Threatened plants can be classified, according to the criteria of IUCN, into extinct (EX), critically endangered (CR), endangered (EN), vulnerable (VU) and near threatened (NT) species as follows (Table 1-2).

Table 1-2. Threatened plants of DPR Korea, classified according to the criteria of IUCN

Taxon	CR	EN	VU	NT	Total
Gymnosperm	1	2	3	3	9
Angiosperm	15	29	48	52	144
Total	16	31	51	55	158

Representatives of threatened species of animals and plants in DPRK are as Table 1-3.

Table 1-3. Threatened species of animals in DPRK

Grade	Endemic for our country	Endemic for east-Asian region
CR (8)	*Quercus neoglandulifera* *Celtis cordifolia* *Stewartia pseudo-camellia* *Megaleranthis saniculifolia* *Deutzia peniculata*	*Neottianthe cucullata* *Goodyera repens* *Lilium dauricum*

Grade	Endemic for our country	Endemic for east-Asian region
EN (7)	*Celtis edulis* *C. choseniana* *Drosera anglica* *Forsythia densiflora* *Abelia tyaihyoni*	*Pseudostellaria sylvatica* *Viola websteri*
VU (9)	*Nymphaea minima* *Lindera salicifolia* *Syringa fauriei* *Abelia mosanensis*	*Taxus cuspidate* *Lilium hangonii* *Gastrodia elata* *Rhododendron micanthum* *Brasenia schreberi*

Threats to plant species are caused by changes in habitat environment, over-exploitation and deterioration of the general eco-environment due to decrease in forest land.

The threatened animal species in DPR Korea cover approx. 21% of vertebrate species, as follows:

Table 1- 4 Threatened animals of DPR Korea

Taxon	Species	Number of threatened species	Rate of threatened species (%)
Mammalia	107	28	26.2
Aves	420	76	18.1
Reptilia	26	13	50.0
Amphibia	17	9	75.0
Piscea	185	33	17.8
Total	755	159	21.0

The threatened animal species are classified into 4 categories, i.e. EX, CR, EN and VU as follows (Table 1-5).

Table 1-5. Threatened animals of DPR Korea according to the criteria of IUCN

Taxon	EX	CR	EN	VU	Total
Mammalia		3	9	16	28
Aves	2	2	26	48	76
Reptilia			4	9	13
Amphibia			3	6	9
Piscea		3	4	26	33

Total	2	8	46	105	161

They can also be classified according to the criteria of CITES, as follows.

Table 1-6. Relation between threatened anima species and Washington Convention

Taxon	Threatened species	CITES	
		Annex I	Annex II
Mammalia	28	4	7
Aves	76	15	21
Reptilia	13		
Amphibia	9		
Total	126	19	28

1.3 Main factors of threats to biodiversity in DPR Korea

Generally, factors of threats to biodiversity are population increase, habitat destruction, invasive alien species, environmental pollution and over-exploitation of resources.

All of 5 above-mentioned factors give, though to different extents, threats to biodiversity in DPRK as well

In this context, the main factors of threats to biodiversity in DPRK are the overuse of natural resources, loss of habitats due to deforestation and fragmentation and deterioration of environment. Of course, the invasive alien species and environmental pollution also exert influence to a certain extent.

1.3.1 Excessive use of natural resources

The excessive use of natural resources over its reproduction capacity causes depletion of natural resources and loss of biodiversity.

The excessive use of natural resources is closely related to population increase.

The DPR Korea is relatively high in population density for its territory.

The degradation of forest ecosystem is caused by overuse of forest resources, inter alia firewood due to acute rural energy problem according to population increase.

The degradation of forest ecosystem due to overuse of its resources causes the decrease in animal/plant resources.

The overuse of fishery resources causes rapid fall in relevant species. In particular, the overuse of seaweeds leads to the loss of fishes.

1.3.2 Deforestation and loss of habitats

In DPR Korea with over 80% of its territory covered by mountains, the conservation of forest holds an important place in the biodiversity conservation.

The increase of treeless areas caused by the excessive use of forest resources deteriorates the ecological service of forest. In particular, the denudation of sloping land gives rise to the loss of soil and water, and exerts subsequently great influence to water ecosystem.

Tense food problem due to difficult economic deadlock in 90's of last century made sloping forests subjected to the transformation into agricultural land, resulting in serious loss of biodiversity. Reckless deforestation followed by its fragmentation causes loss of habitats for wild animals and plants.

It is large-sized animals like *Urus tibetanus* that are most impacted by the fragmentation of habitats.

Fragmentation of habitats for *Lutra lutra* due to change in rivers and streams caused rapid decrease in its population. Loss of wetlands is a threat to global threatened species including *Grus japonensis* and *G. vipio*, and not a few waterfowls.

The 2010 Biodiversity Target stresses the importance of mitigating the destruction of ecosystems and habitats, and of reducing the rate of loss of species, community and genetic diversity.

Important for the conservation of ecosystem and habitats in DPRK are;

- to promote the conservation of forest biodiversity by blocking the destruction of forest ecosystem and actively recovering the degraded ones, taking into account the mountainous land covering over 80% of the territory,
- to make great efforts to conserve the coastal ecosystem with its focus on wetlands, main habitats for migratory birds in view of peninsula-shaped territory, and
- to strengthen the conservation of agricultural biodiversity within rural areas covering about 17% of the territory in the consideration of regional characters.

1.3.3 Environmental deterioration

The loss of water and soil and the accumulation of sands and pebbles in rivers, lakes and reservoirs due to the destruction of forest, followed by increase in flood damage cause serious losses not only to the economic development but also to habitats for animals and plants, thus leading to loss of biodiversity.

The main problem in environmental deterioration is the water pollution due to massive waste waters from industry and populated areas, which causes a serious decrease in self-purification function of the lakes and reservoirs themselves and eutrophication and consequently damage to human health and loss of biodiversity in inland water ecosystem as well.

In shallow-sea-culture also cause, excess of its purification capacity would cause the appearance of red water due to extra nitrogen and phosphor to be followed by serious

damages to the culture.

The acid rain due to air pollution damages forests, and also acidifies lakes and reservoirs, to threaten survival of aquatic biomes.

The prevention of the environmental deterioration in DPRK is linked to the prevention of flood damages due to the frequent heavy rains that is caused by abnormal weather due to the climate change. In this context, it is necessary to take measures to block the vicious cycle of ecosystem and mitigate damages from natural disasters by actively promoting the afforestation and gardening of the whole country to recover the degraded forests as soon as possible.

And it is also important to assess the comprehensive impacts of introduction of alien species on loss of biodiversity to conserve biodiversity inherent in DPR Korea.

1.4 The necessity and urgency of biodiversity conservation

1.4.1 Necessity

Biodiversity forms the most important material base of humanity's subsistence and development. Prospective economic development, improvement of life environment, material and cultural life are closely related to various human activities of using biological resources in the economic fields like forestry, agriculture, fishery, etc.

The CBD defines the biological resources to include genetic resources, organisms or parts thereof, populations, or any other biotic components of ecosystems with actual or potential use or value for humanity.

Overuse of biological resources, beyond its reproductive ability, for immediate benefits would lead to the exhaustion of biological resources and irreparable destruction of habitats.

Hence, the conservation of biodiversity, removal of the factors of threats to biodiversity and promotion of the sustainable use of biodiversity components, in accordance with the Millennium Development Goals, are literally the moral duty of the present generation for the next generations.

In this regard, it is still necessary to increase public understanding and appreciation of the direct economic benefits from and indirect and logical value of biodiversity and to enhance the institutional, human, technical and technological capacity for the conservation and sustainable use of biodiversity.

1.4.2 Urgency

Following issues are urgently requesting DPR Korea to take new innovative measures for the conservation of biodiversity:

- Excessive exploitation of forest resource for firewood and timber;

- Loss of forest land due to reclamation and infrastructure construction;
- Destruction of forest due to excessive grazing;
- Erosion and degradation of soil, decrease of water resources, loss of forest biodiversity and the adverse impact on inland water biodiversity;
- Loss and fragmentation of habitats attributable to unsustainable management of ecosystem.

The Government of DPRK has conducted several activities to support the implementation of the CBD adopted at Rio Summit in 1992, but the obstacles by economic blockade, in particular energy deficiencies, exert adverse impact on the biodiversity conservation as well.

In this context, it is important to actively develop and use renewable energies, to halt land degradation and to convert agriculture into sustainable one, to integrate the biodiversity conservation into the sustainable development of local economy with respect to local features and to raise the ecosystem services, so as to improve eco-environment fundamentally.

Chapter 2

Assessment of Conservation of Biodiversity and Its Sustainable Use in DPR Korea

2.1 *In-situ* Conservation

DPRK has taken a series of measures for the *in-situ* conservation, including expanding of the nature protected areas.

2.1.1 Protected Areas

For conservation of the habitats, it is important to expand the protected areas and establish framework of their management and net to manage them on scientific line and establish the monitoring system for conservation of biological diversity in the protected areas, and to increase the whole biological resources in the protected areas and to sustainably use them.

2.1.1.1 Designation of Protected area

Since DPRK has signed to CBD in 1995, the government made national measure to expand protected areas to 696,927 ha, 5.68% of the territory.

In addition, the government took measure to expand to 879,275 ha, 7.2% of the territory.

The nature protected areas were expanded to 7.2% of the territory according to types of the protected areas(Table 2-1).

Table 2-1. Protected Areas in DPRK

№	Classification	Name	Number	Area (ha)
I	Strict nature reserve	Mt. Oga & Kwanmo Peak Nature Reserves and others	4	63,912
		Core areas of Biosphere Reserves of Mts. Paektu and Kuwol	2	24,247
II	Nature park	Mt. Kumgang Nature Park, Mt. Myohyang Nature Park, Mt. Chilbo Nature Park, etc.	21	167,900
III	Natural monuments area		127	191,157

№	Classification	Name	Number	Area (ha)
IV	Habitat/species reserve	Plant reserve	25	25,698.2
		Animal reserve	25	58,973.4
		Migratory bird(wetland/breeding area) reserve	24	26,917.5
		Sea-bird reserve	7	214.5
V	Landscape reserve		60	223,667
VI	Resources reserve	Marine resources reserve	26	50,690
		Plant resources reserve	4	6,659
		Buffer zones of the Mt. Paektu Biosphere Reserve	1	36,000
		Total		879,275.2

There would be shown the new designated protected areas in table 2-2.

Table 2-2. New designated protected areas of DPRK

№	Protected areas	IUCN Criteria	Acreage	Remarks
1	Core area of Mt. Paektu Biosphere Reserve	I	24,000	
2	Mt. Kuwol Biosphere Reserve	I	1,245	
3	Mt. Oga Nature Reserve	I	4,286	
4	Mt. Rangrim Nature Reserve	I	21,615	
5	Peak Kwanmo Nature Reserve	I	3,407	
6	Kyongsong Nature Reserve	I	29,604	
7	Monggumpho Nature Park	II	7,340.4	
8	Songdowon Nature Park	II	410	
9	Lake Supung Nature Park	II	50,722.7	
10	West Sea Barrage Nature Park	II	5,163	
11	Lake Kumsong Nature Park	II	19,786.3	
12	Mt. Kumgang Nature Park	II	47,838	
13	Mt. Myohyang Nature Park	II	33,313.2	
14	Mt. Chilbo Nature Park	II	27,754	
15	Songchon Chestnut Tree Natural Monument Reserve	III	3	Songchon Chestnut Tree
16	Maengsan Otter Natural Monument Reserve	III	40	Otter and its habitat

№	Protected areas	IUCN Criteria	Acreage	Remarks
17	Osudok Pinenut Tree Natural Monument Reserve	III	64	
18	Kwanmo-ri Char Natural Monument Reserve	III	40	Char and its habitat
19	Is. Sinmi Plant Reserve	IV	2,283.3	
20	Cape Jangsan Plant Reserve	IV	1,791.5	
21	Mt. Suyang Plant Reserve	IV	487.2	
22	Chail Peak Plant Reserve	IV	4,366	
23	Hwasong Thyme Plant Reserve	IV	7.8	Thyme
24	Mt. Obong Animal Reserve	IV	3,088.4	
25	Mt. Suryong Animal Reserve	IV	1,348.7	
26	Mt. Taegak Animal Reserve	IV	3,239	
27	Kumsok Animal Reserve	IV	13,507	
28	Rinsan White-Bellied Black Woodpecker Reserve	IV	1,006.5	White-bellied black woodpecker
29	Mundok Migratory Bird (Wetland) Reserve	IV	3,715	
30	Is. Sin Migratory Bird (Wetland) Reserve	IV	2,500	
31	Ongjin Migratory Bird (Wetland) Reserve	IV	2,500	
32	Kumya Migratory Bird (Wetland) Reserve	IV	2,000	
33	Waudo Big Water-Hen (Breeding Place) Reserve	IV	1,000	
34	Is. Tok Marine Birds Reserve	IV	10	
35	Is. Rap Marine Birds Reserve	IV	20	
36	Yangdok Armillaria Resources Reserve	VI	2,427	Armillaria
37	Buryong Armillaria Resources Reserve	VI	2,290	
38	Orang Armillaria Resources Reserve	VI	1,291	

The government made plans to establish management framework of the designated protected areas and strengthen their functions and to extend the protected areas to 8 percent of the territory area toward 2010.

Successful progresses in this work will lead to follow the decision of the 7th COP to the CBD on the effective conservation of at least 10% of every ecological areas of the world.

The protected areas of DPRK, at present, help to establish framework for conservation of 50 percent of the most important areas in plant diversity conservation as one of the Global Strategy of Plant Conservation, which was suggested in the 6th COP.

Followings are status of the protected areas in DPRK according to types:

Strict Nature Reserves

In strict nature reserves, designated at some areas of natural regions in the original state of natural forests and primary forests, all activities of destroying nature are strictly prohibited.

They involve the areas with alpine and sub-alpine vegetations, with typical natural forests, spectacular landscapes and special topographical, geographical and natural phenomena and with congested habitats of threatened plants and animals.

Strict Nature Reserves in DPRK cover 88,159ha including the core areas of the Mts. Paektu and Kuwol Biosphere Reserves and other 6 areas of Mts. Oga, Kwanmo, etc.

Further measures are necessary to establish specific monitoring system for thorough isolation and improve its management.

Nature parks

At present, many nature parks including at Mts. Kumgang, Myohyang and Chilbo, have been designated as the nature protected area, which account for 3.2% of the territory.

It will be necessary to investigate and monitor ecosystems and wildlife and to prepare management plans and detailed measures for nature parks, and especially to intensify the public awareness, propagandas and dissemination of value of biodiversity via the nature parks.

Habitat reserves

Every wildlife species are the component of ecosystem as the essential element of biodiversity conservation.

The reduction of wildlife, *inter alia* the extinction of threatened species is a global issue.

In DPR Korea, the priority areas in conservation of wildlife, especially threatened species, are designated as animal/plant reserves.

At present there are 25 animal reserves (58,973.4ha) and 25 plant ones (25,698.2ha) in the country.

In particular, in view of its situation in the East Asia-Australia flyway, one of 8 global flyways, the DPRK has designated 12 wetlands (about 10,000ha) as migratory bird(wetland) reserves including the estuary of Chongchon River in Mundok County, South Pyongan Province, tideland around the 9.18 Reservoir (South Hwanghae Province), etc.

These migratory bird reserves aim to mainly protect the global threatened species, cranes, *Platalea minor, Anser cygnoides, Anas formosa* and so on.

Natural monument reserves

The DPRK designated the precious scientific natural entities with rich biodiversity and related to the formation of proper national culture as the living monument, which is being protected.

The designated areas as the living monument play significant roles in conservation of ecosystems and species in our country.

Regular survey, preparation of preservation plans and management of protected areas are processing for the protection of natural monuments.

Resource reserves

Resource reserves of DPRK, established for the conservation of forest, inland and coastal water resources, includes 26 aquatic resource reserves (11 for inland and 15 for coastal waters totaling 50,690ha), 4 plant resource reserves (6,659ha) and the buffer zones around biosphere reserves in Mts. Paektu and Kuwol, covering 96,588.6ha in total.

For the fishery resource reserves, some measures are taken to protect water environment, such as the preparation of spawning ground and resource survey.

2.1.1.2 Various Kinds of Protected Forests

In DPRK, various kinds of protected forests, except the nature protected areas, cover 343,200ha (2.8% of the territory), including hygienic and scenic forests, protective forests for river banks, reservoirs and farmlands, and windbreak forests.

Various kinds of protected forests are significant in conservation of eco-environment, wildlife and genetic resources, and in the national conservation net of protected areas.

2.1.1.3 Problems for Designation of the Protected Areas

It needs to provide the minimum area for the minimum viable population (MVP) in conservation of biodiversity, especially preservation of wildlife in the protected areas.

As it is difficult to expand each protected area in our country, small in size of the territory and high in population density, it is necessary to designate buffer zones around protected areas and create the ecological corridors linking each other, while expanding each area as much as possible.

In addition, it is indispensible to prepare and reinforce the laws and regulations relevant to its conservation and management and rearrange the institutional management systems for protected area.

As several ministries and agencies such as the Ministry of Land and Environment Protection (MLEP), Ministry of Forestry (MOFr) and Cultural Relics Conservation Administration (CRCA) are now involved in protected area management, it is necessary to establish an independent institution in protected areas and define the demarcation of its responsibilities and to ensure the liaison between agencies concerned.

Moreover special attention should be paid to improving qualifications of officers.

The settlement of management personnel is desirable in the areas where it is unreasonable to set up management institution.

It is also important to do systematic investigations on and to set up monitoring system for protected area, including:

- To conduct regular survey on resources and systematic research on the conservation and sustainable use of biodiversity and on the preservation and multiplication of threatened species;
- To investigate economic and medicinal animals and plants, and sustainable tourism;
- To make local power organs pay great attention to the management of protected area and make the investigation results contribute to the vitalization of local economy;
- To regularize the ecological monitoring and to promote the establishment of information system for protected area.

In order to promote the education and communication via protected areas, public awareness and understanding of the importance and value of biodiversity should be increased through their visits to protected areas, and various types of media products (book, cahier, magazine and CD) should be manufactured based on the data obtained from systematic investigation and research for the communication and dissemination of the importance of biodiversity.

For this purpose, the national investment for protected area construction and management should be increased to perfect the infrastructure of protected areas for the integration of management, research, monitoring, education and communication.

2.1.2 Management of the Protected Areas

The protected areas in DPRK have been in charge by Ministry of Land and Environment Protection, Ministry of Forestry, Ministry of Agriculture, Revolutionary Facts Guidance Bureau, Cultural Relics Conservation Guidance Bureau.

The institutions for conservation have been established in the protected areas and scenic spots, including Mts. Paektu, Myohyang, Kumgang, Chilbo, Kuwol etc, to manage by expert managements. In addition, the protected areas are managed by the protectors from forest-management authorities.

But the nature protected areas have no-arrangements of the management structure for preparation of the unified planning, collaboration between sectors and synthetic management to face the increasing protected areas, including some defects of the collaboration/coordination between central agencies and between central and local organs of power and lack capacity of the lowest managing units.

It needs to retrain the personnel of the lowest managing units, with factual measures, to encourage the active scientific research for improving the management of protected areas and

to reinforce the education and propaganda for public awareness, basing on results of the scientific research work.

2.1.3 National Legislations

National laws related to the habitat conservation are as follows:

"Law on Environment Protection" (1986);

"Law on Forest" (1992);

"Law on Protection of Scenic Spots and Living Monuments" (1995);

"Law on Soil" (1997);

"Law on Water Resources" (1997);

"Law on Prevention of Marine Pollution" (1997);

"Control Law on Environment Protection" (1998);

"Law on Agriculture" (1998);

"Law on Conservation of Useful Animals" (1998);

"Law on Medicinal Plants" (2004);

"Law on Land Planning" (2006);

"Law on Environmental Impact Assessment" (2006);

In line with the proclamation of laws and regulations on habitat conservation, national measures including regular explanations of law and regulation are being undertaken to raise public awareness and to establish the atmosphere of law observance.

The units that are active and successful in observance and execution of laws and regulations are awarded the title of "Model Law-abiding County" and the generalization of their examples is gaining more impetus.

However, the laws that entirely deal with the conservation of protected area and wild plants are not formulated yet.

In this context, it is important to recheck the existing laws and management regulations for protected areas and make them more detailed to ensure the conservation and sustainable use of biodiversity.

2.1.4 Scientific Research

Notable successes have been achieved in the scientific research on protected areas during the past decade, for instance:

- Classification of the forest ecosystem of Mt. Paektu Biosphere Reserve and their historic succession process (1995-2000);
- Assessment of and protection measure for the eco-environment of Mt. Paektu area (2000-2006);

- Assessment of the diversity of plant/animal species and ecosystems at priority areas of the country (2003-2007);
- Protective biological study on major protected areas and on rare/threatened species of plant and animal (1999-2002).

In addition, a data book, "Protected Areas in DPR Korea", was prepared in collaboration with UNESCO in 2005 and collective investigation was performed on Mt. Kuwol area which was registered as international biosphere reserve after the Mt. Paektu Biosphere Reserve.

However, there are still many holes in the detailed investigation and research on protected areas in general.

In the investigation and research on protected areas, it is important to closely combine investigation and research with management and to establish observation stations and monitoring spots at key protected areas to conduct regular investigation and monitoring.

Necessary in the investigation and research on protected areas are as follows:

- Study on the structure and function of ecosystem, on the population ecology, reasons of extinction, protection measures and artificial propagation of threatened species;
- Study on the targets and ways of, and environmental impact assessment on, resource exploitation and use, based on the investigation in protected areas;
- Study on the cooperation between the protected area management and local socio-economic development;

For the protected area management, application studies are also needed on:

- Development of evaluation indicators and bases, standards for ecological monitoring, database and information system, management styles;
- Establishment of ecological corridors outside protected areas;
- Functional classification of protected areas and the ways how to ensure the satisfactory conservation and sustainable use of protected area in conformity with their features

2.1.5 Alien Species

The Article 8 of the CBD stipulates that the alien species threaten to ecosystems, habitats and species should not be introduced and be eradicated or controlled.

The 2010 Biodiversity Target also stressed the control of the threats from invasive alien species.

As being high in dissemination ability, adaptability to environment and viability, invasive alien species have high risk to cause genetic pollution, predation of and habitat concurrence with other species and ecosystem disturbance. Particularly, invasive alien species are threatening the ecosystems and species specific to the country and also causing large damage to agriculture, stockbreeding and forestry.

At present, the border transit of invasive alien species is checked by the Central Plant Prevention Center and Central Veterinary Prevention Center under the Ministry of Agriculture (MOA) and customhouses.

The National Committee for Emergency Quarantine has the functions of arranging collaboration between sectors at every stage of check, early warning, control and eradication of invasive alien species and of rapidly corresponding to emergency.

According to the data surveyed so far, more than 60 invasive alien species of plant have been rooted in our country. Pigweed (*Ambrosia artemisifolia*), the representative of invasive alien species, is notorious for its pollen that causes allergic diseases and for its threats to indigenous plant communities.

As for animal, *Lecidomja brachyntera* and *Matsucoccus pini* are major invasive alien species harmful to forest, and *Lissorhoptrus oryzopholis* to paddy rice.

The assessment on the impact of alien species to the whole biodiversity of the country including protected areas is still in its infancy. In particular in the fishery, assessment of the impact from the aquatic animals and plants introduced for higher productivity has been sparsely conducted.

Followings are suggested to be priorities for the conservation of ecosystem, habitat and species and the sustainable use of bio-resources in DPR Korea:

- *Preparing* overall inventory of alien species in the country to evaluate their eco-environmental and economic threats;
- *Enhancing* the monitoring capacity on invasive alien species;
- *Making* the relevant legislations perfect;
- *Establishing* a national database on alien species;
- *Raising* public awareness of the impact of alien species;
- *Promoting* the training of experts concerned.

It is particularly important to maintain red alert on avian influenza and take measures for its prevention.

2.1.6 Biosafety

The Article 8 of the Convention on Biological Diversity stipulates that each contracting party shall, as far as possible and as appropriate, establish or maintain means to regulate, manage or control the risks associated with the use and release of Living Modified Organisms (LMOs) resulting from biotechnology which are likely to have adverse environmental impacts.

DPR Korea signed the Cartagena Protocol on Biosafety in April 2001 (ratified in July 2003). It had implemented the UNEP/GEF-supported project “Development of National Biosafety Framework” during the period of 2002 to 2004. Through the process of that project, framework of the national work system for research and development, production, export and

import and treatment of GMOs was provided in conformity with the demand of the Cartagena Protocol.

DPR Korea adopted the 'Law on the Biosafety of GMOs' on December 22, 2004 and prepared regulations and by-laws for its enforcement.

In March 2005, National Committee for Biosafety was established as a leading organ for biosafety management, and under the control of the State Academy of Science, National Management Center of Biosafety was inaugurated.

At present, DPR Korea has the system and process in place to meet the demands of the Article 8 of the CBD and be able to prevent the threatening factors of GMOs to the conservation and sustainable use of biodiversity and human's health.

In future, it is necessary to guarantee the smooth operation of national biosafety system and to build biosafety-related capacity including the regular identification and monitoring of the potential factors of threat to habitat and human's health.

2.2 *Ex-situ* Conservation

It is the important solution to conservation of animals and plants to ensure stable life of the species population. But only the conservation and improvement of habitats are not just solution for species conservation, among the extinction species. Therefore, it needs to take measure for *ex-situ* conservation to reintroduce the proliferated populations to nature.

Ex-situ conservation of wildlife and valuable biological resources as well is quite important to development of the whole bio-industry including agriculture, fishery and forestry.

Application of bio-engineering is significant in *ex-situ* conservation as well.

2.2.1 *Ex-situ* Conservation of Wildlife with Priority to Threatened Species

Zoos and aquaria, botanical gardens and arboreta have equipments and experts for breeding, cultivation and propagation of wildlife, and play important role in controlling hazardous degree for maintenance of populations and maintaining the local modified organisms.

2.2.1.1 *Ex-situ* conservation in Zoos and Aquaria

The Central Zoo is located at the foot of Mt. Daesong in Pyongyang with an area of 100 ha and more than 650 animal species.

DPRK has the zoos in every provincial capital where the local animals are kept in.

The Central Zoo with good experiences in breeding of extinction species including tiger, leopard and red-crowned crane, is intending to expand the area as much as twice for future.

It is essential to take measures to strengthen the capacity of ex-situ conservation of extinction species in the Central Zoo, to register the pedigree of extinction species in close contact with the local zoos, and to improve breeding and management of tame animals to make greater capacity of ex-situ conservation.

2.2.1.2 *Ex-situ* Conservation in Botanical Gardens and Arboreta

The Central Botanical Garden, established in Pyongyang, Capital of DPRK, with the area of 270 ha, and the local botanical gardens, the nature reserves in Mts. Paektu, Oga, Yangdok, Ongjin etc, the botanical gardens under the research institutes and flower gardens are key base for ex-situ conservation of the threatened species plants and industrial plants.

In the Central Botanical Garden, more than 6,500 species of plants are being cultivated (2,500 species of them inhabited in our country). It functions, in particular, as a breeding ground for "*Dendrobium Kimilsung flower*", bred in the Bogor Botanical Garden of Indonesia, and "*Begonia tuberhybrida Uoss cv. Kimjongilhwa*" bred by a Japanese horticulturist..

Therefore, it needs to improve function and role of botanical gardens and arboreta for *ex-situ* conservation of critically endangered species.

2.2.2 Conservation of Genetic Resources

Conservation of genetic resources is posed to be an urgent task, considering the global loss of biodiversity.

It is essential to take measures of collection, character assessment and rationalistic conservation of genetic resources which are contributable to agriculture, fishery, herbs and food industry for the industrial development of using of biological resources.

In DPRK, the conservation of crop and husbandry genetic resources is put under the charges of the Agricultural Gene Bank of Pyongyang Crop Genetic Resources Institute and the Research Institute of Zootechnics of AAS, respectively.

In addition, the Branch Academy of Forestry Science, SAOS, is a focal point for the conservation of arboreta, the Branch Academy of Fishery Science for aquatic life genetic resources, and the Korean Center for Culture.

It needs to keep the various conservation types proper to genetic resources according to the long-term plans, including in type of seed, *in-vitro*, pollen, spore, DNA, and in-field, with material and technical, financial support for these works.

International cooperation is also significant for genetic resources conservation. In 2004, 'National Workshop on the Conservation and Use of Plant Genetic Resources in DPR Korea' took place in Pyongyang with the support from the International Plant Genetic Resources Institute (IPGRI).

2.3 Sustainable Use of Biological Resources

Sustainable use of biodiversity component is key problem in the ecological environment conservation as well as development of agriculture, fishery, public health, food industry and bio-technology.

In recent years, the government of DPR Korea, taking account of the decisions of the World Summit on Sustainable Development, took a series of national measures for the conservation of biological diversity and the sustainable use of its components.

Sustainable use of biodiversity components, in particular bio-resources, is very significant for developing local economy and for improving the agricultural eco-environment and the livelihood of local people and farmers.

2.3.1 Forestry

2.3.1.1 Status and Progress

The DPR Korea, in which over 80% of territory is mountainous, has relatively an wide area of forest land, but is small in a per-person area and poor in forest accumulation.

The majority of its forest resources are concentrated in the northern part of the country, while seas and hillocks are poor in forest accumulation. Particularly considering the forest destruction due to recent economic difficulties of the country, it is urgent to intensify the actions in order to halt the deterioration of eco-environment, conserve forest biodiversity and raise the ecological service of forest.

In 2005, forest land area in DPR Korea was 8,927,300ha, which accounts for about 72.5% of territorial area. Among forest land, treed forest land is 7,643,200ha wide, treeless forest land reaches 876,800ha and remains for others. During the past decade, treeless forest land area had increased as wide as 496,800 ha from 380,000 ha (in 1996).

Main factors for the expansion of treeless forest land are excessive felling due to firewood shortage in rural areas and the unsustainable land reclamation for the cultivation of crops. Moreover damages by pest and disease related to the change of forest ecosystems and by fire are not ignorable.

Without active measures to the protection of soil erosion, it takes long time to recover the forests, once destroyed, in our country of having dry spring, rainy summer (more than 60% of annual precipitation), steep and rugged mountains.

In this context, the government of DPR Korea has put forward the policy for tree-planting and afforestation to increase forested area and to improve the structure and ecological function of the forest. Nationwide campaign for implementing this policy has been strenuously promoted.

The MLEP arranged the restoration of destroyed nurseries and the establishment of a new Central Nursery with an area of 100 ha in 2000, and also organized the construction of mother nurseries of 20-25 ha at municipal and county levels, which resulted in the increase of sapling production capacity in 2002 four times as much as that in 1994. since 2002, annual reforestation of over 900,000,000 trees has been organized as a nationwide campaign.

The creation of firewood forests (total area of 800,000 ha) to solve the problem of wood for fuel, which is to blame for forest destruction and soil degradation, is gaining more and more impetus.

On the other hand, the government of DPR Korea has quadrupled the number of forest rangers in order to strengthen legal controls on the lawless deforestations and to improve forest management.

In the field of forestry for lumber production, active reforestation has been promoted at deforested areas in compliance with the principle of cyclic felling, and forest transformation and afforestation for erosion control have been energetically driven at the areas low in productivity and extraordinary high in soil erosion.

In particular, it is recommended to correct the tendency to concentrate felling at the areas with favorable cutting conditions, and actively apply the methods of lumber transportation which cause less forest and land destruction.

2.3.1.2 Assessment and Task of Sustainable Use

In DPR Korea, forest land area is 0.4 ha per capita and average accumulation of forest tree is about a half of worldwide average.

Expansion of sparsely wooded or treeless areas, in particular, at the hillocks around populated areas exacerbates the loss of soil and water and thus exerts negative influence on agricultural ecosystems. In this context, it is important to promote afforestation preferably of hillsides and to take measures for the sustainable use of forest as well.

It is important to actually promote the restoration and maintenance of degraded forests (740,000ha) through afforestation and succession, sustainable management of industrial forests (2,000,000 ha), introduction of agro-forestry management into sloping lands (340,000ha) and effective management of co-operative farms' forests (200,000 ha.)

In relation to this, it is urgent to:

- *Develop* and *disseminate* effective technologies for the recovery of degraded and destructed forest;
- *Apply* sustainable management approaches for national forest reserves and industrial forests, including intensive forestation of firewood forests with high productivity and eco-protective forests, and their sustainable use;
- *Improve* the catchment area management fundamentally;

- *Expand* the size of protected areas and improve their conservation for both present and future benefits;
- *Remove* or *mitigate* the threats to forest biodiversity through the establishment and management of protected areas.

The Global Strategy for Plant Conservation adopted at COP7 (*decision VI/9*) stipulates as its 6th target that at least 30% of production lands should be managed consistent with the conservation of plant diversity.

For the proper balance between lumber production and forest biodiversity conservation, it is imperative to create, disseminate and generalize the model of applying ecosystem approaches to flexible conservancy and management.

For the conservation and sustainable use of forest resources, it is also important to establish and intensify the inter-sectoral relations; and as cornerstone thereof the perfection of the monitoring systems and activities for public awareness should be promoted with specially paying attention to maintenance of sound forest ecosystem and improvement of eco-service function.

2.3.2 Agriculture

2.3.2.1 Status and progress

Soil is one of the main means of production in the agriculture which is generally carried out at natural environment. Since this is so, agriculture is not only for crop production, but also closely related with land protection and other many functions.

In 2005, agricultural land of DPR Korea was 2,042,100 ha, which accounts for 16.6% of the land area, with dry field (1,005,000 ha), paddy field (574,000 ha), orchard (144,000 ha) and mulberry field (85,000 ha).

During the past decade, by the various kinds of construction, about 60,000 ha of agricultural land have been vanished.

Paddy-field farming is a traditional method of agriculture in DPR Korea.

It is free from damages of repeated cultivation and from soil erosion, and does little harm to the underground water. Paddy-field farming, however, requires durable and stable water supply, for which the conservation and management of forest are prerequisite.

As 80% of the whole territory of the country is mountainous, dry-field farming is always subject to soil erosion.

At present, the area of sloping fields over 5° reaches 61% of whole dry-field area, while the arable sloping land over 16° covers 18% of the territory.

Sloping land management is as important as ever for ensuring the stability of agriculture. As for the arable sloping land, soil erosion, closely related to the covered status, is almost twice around the deforested hillsides as severe as that of well-covered ones.

Flood damages in 1995-1996 and difficulties in the country by economical sanctions have decreased the agricultural productivity and lowered the crop yields. Decrease in the fertility of soil, due to the loss of nutrients by soil erosion and deficiency of organic sources, hampers the increase of agricultural production.

In view of these conditions, the government of DPR Korea is taking measures for securing the conservation, management and sustainable use of land resources administratively and in a scientific and technical way, and mobilizes the whole country and all the people for it.

In DPR Korea all the land properties are in possession of state or social and cooperative organizations, and the use and management of land resources are strictly in conformity with the 'Land Law of DPR Korea'.

During the "General Mobilization Period for Land Development" every spring and autumn, the cooperative farms make great effort to promote reforestation and conservation of forests.

On the other hand, the government of DPR Korea has injected new vigor into the nationwide dissemination and application of scientific farming, in which whole farmland is integrated into ecological regions on the basis of physiographical assessment and land productivity evaluation and the agricultural structure is improved on the principle of cultivating the right crop at the right place.

In the scientific farming, followings are essentials:

- improvement of crop structure;
- rearrangement of crop varieties;
- optimization of fertilizer distribution;
- selection of the right soil for double cropping and its expansion;
- effective use of fertilizers and agrochemicals;
- improvement of agricultural management;
- sloping land management;
- soil fertility increase;

In 1998, the Ministry of Agriculture (MOA) prepared the strategy and action plan for the conservation of agricultural eco-environment and sustainable agricultural development, and is carrying forward it.

In connection with soil fertility and food safety, active application of organic farming is gaining more attention. And in line with the 'green revolution policy', the MOA is vigorously promoting the highly productive varieties. Steady growth of bean farming, preservation of agricultural gene resources, expansion of microbe manure production and intensification of plant quarantine, especially the control over the genetically modified crops, are all its focal points.

2.3.2.2 Assessment and task for sustainable use

The area of farmland per capita in DPR Korea is 0.09ha and that for grain like rice and maize is not more than 0.06ha.

In this context, protection and sustainable use of farmland emerges as one of the most pressing issues for the increase of agricultural production. Since the DPR Korea is particularly abundant with sloping lands and surrounded by sea on two sides, it is very important for ensuring stable agricultural production to prevent soil erosion and create protective forests for fields of flat area.

In recent years, through the implementation of the FAO-supported project for the application of protective farming, DPR Korea has accumulated considerable experiences. Such experiences should be disseminated extensively as soon as possible.

Ongoing nationwide dissemination of scientific farming should be further accelerated so as to convert the agriculture into sustainable one.

FAO considers sustainable farming to be the basic way of conserving and using natural resources and guarantee for firmly securing the need of present and next generations on agricultural products through the improvement of system and technology.

In DPR Korea, it is considered to be very important to solve the urgent food problem and to meet the growing demand for grains due to population increase,.

In this regard, followings are essential to:

- *Promote* scientific farming and improve agricultural infrastructure;
- *Enhance* the sense of responsibility and role of farmers as the masters of agriculture;
- *Develop* and *disseminate* the agricultural technologies for promoting the conservation and sustainable use of environmental resources related to agriculture such as soil, forest and water resources, for decreasing the consumption of fertilizer and energy for agricultural production, and for guaranteeing high efficiency and large yield with small investment.

For the sustainable development of agriculture, special attention must be paid to the conservation of agricultural biodiversity.

For the conservation of agricultural biodiversity, research and development on the following items should be promoted.

- Establishment of comprehensive agricultural production system, especially the integration of agriculture and forestry;
- Type, structure and functions of complex agricultural ecosystem;
- Conservation of crop genetic resources;
- Soil organisms in farmland and enhancement of soil fertility;
- Biological control of harmful insects to crops and livestock.

Furthermore, the results and fruits of the research and development should be applied in consonance with the realities of the country.

As each of these projects is still in its infancy, to establish a unique system comprising all the processes and to make it effective in the reality, are particularly important. Through these courses, systems and processes for the organic, ecological and environment-protective farming, suited for the reality of the country, should be established.

Along with this, rearrangement of farm villages and reforestation of rural areas, in view of the environmental conditions, should be promoted. To increase the proportion of fruit trees in tree planting at rural areas is very useful for scenery, for farmers' real profit and for the general improvement of agro-ecological environment.

In our country, intensive reforestation of fruit trees and establishment of agro-forestry ecosystems in farm villages and rural hillsides will exert positive influences on the following two problems:

- *Raising* public awareness and deepen the knowledge and understanding of the goods and services from biodiversity;
- *Increasing* the quality of people's living;

In relation to the conservation of agricultural biodiversity, special attention should be paid to the conservation and sustainable use of pollinators, which were mentioned at COP5.

The total area of orchards is 144,000ha in DPR Korea and the pollinators play great role in the increase of productivity of many fruits and vegetables. In consideration of the position and of pollinators in the food chain of agro-ecosystem, it is important to evaluate their role and promote their conservation and sustainable use.

2.3.3 Fishery

2.3.3.1 Status and Progress

It needs to take synthetic measures to ensure and sustainably increase production of seafood for effective using in the people's livelihood.

It is very important for the DPR Korea with dense drainage network and surrounded by sea on two sides to conserve and make of sustainable use inland water, coastal and marine ecosystems.

In recent years, hard economic conditions in DPR Korea have hampered the growth of fisheries production.

Waters area of DPR Korea reaches 737,400ha, about 6% of total area.

Inland water ecosystem biodiversity in DPR Korea is rich with 185 species of freshwater fishes, in addition to shellfish, lobster, aquatic plant, freshwater planktons and so on.

Because of forest destruction in recent years, the environment of inland water ecosystems has undergone extensive changes. Water pollution by organic wastes makes the situation worse.

Marine condition changes, decrease in aquatic resources due to excessive use in coastal areas and particularly the reduction of pelagic fishery by recent hard economic conditions have hampered the growth of fisheries output.

In this context, the Ministry of Fishery (MOF) and the Department of Fish Farming concentrate on expanding inland water fish farming and on the development of coastal cultivation, inter alia of seaweed.

In consideration of the current economic conditions, the Ministry of Fishery (MOF) has adhered to the conversion of fishery from only catching fishery into cultivating one and achieved considerable successes therein.

The Yanghwa Fishery Station and many others of the KWS and KES are equipped with breeding facilities for the aquatic plants and animals of economic value, and much engaged in the creation, maintenance and management of coastal fishery.

On the other hand, reformation of fishery structure toward the conservation and propagation of coastal non-migratory fishes is gaining more attention as a new orientation for fishery development.

In the inland water areas, extensive construction and enlargement of fish farms, and scientification and modernization of their management are being energetically promoted in order to meet the demands of the people for freshwater fishes.

In accordance with the national measures, promotion of fish farming is gaining impetus as a movement of the whole masses. In DPR Korea with limited area for cultivation, the main direction of fish farming development is to make best use of natural feeds and to expand the multi-dimensional fish breeding.

In compliance with the legal requirements of the ‘Law on Fishery’ and the ‘Law on Fish Farming’, state control for the conservation of aquatic resources has further tightened. The MLEP is in charge of the management of 11 freshwater aquatic resource reserves and 15 coastal ones.

2.3.3.2 Assessment and Task of Sustainable Use

In DPR Korea, resource-preservative fishery at the coastal areas is still in its infancy and thus unable to satisfy the demand for fisheries products.

In the field of fishery, proper balance between high productivity and biodiversity conservation of water ecosystems still remains unsettled.

First of all, the preparation of comprehensive plan for coastal management is imperative for the coastal fishery. For the promotion of this, it is important to establish a system for regularly investigating and monitoring coastal biodiversity in consideration of the importance of creating the framework of cultivating fishery and of modernizing the shallow-sea farm management by scientific means.

For the conservation and sustainable use of coastal bio-resources, the followings are also important:

- Intense activities for communication and public awareness;
- Legislation of laws and regulations on resource management and pollution prevention;
- Establishment of systems and processes for coastal bio-resource management;
- Improvement of the management of coastal biodiversity reserves;
- Rearrangement of protected area system and enhancement of its functions;
- Assessment of the threats from alien species to coastal biodiversity and establishment of appropriate tracing and monitoring system.

In line with the expansive development of seaweed farming and cultivating fishery, a great deal of efforts should be directed to the conservation and sustainable use of marine bio-resources.

Above all, it is necessary to improve the resource management, to assess and develop the potentiality of marine bio-resources and to respect international conventions and agreements.

It is a prerequisite for converting inland-water fishery into a sustainable one to conserve Inland water biodiversity on the basis of ecosystem approaches closely integrated with the conservation and management of water resources and catchment area

More attention should be paid as focal points to recover degraded inland water ecosystems, to establish a tracing and monitoring system on alien species, and to mitigate negative impacts on inland water ecosystem like habitat destruction and pollution,. In particular, the conservation of threatened species of aquatic animals and plants in inland water area is very much important.

For the conservation and sustainable use of inland water biodiversity, cross-sectoral integration, perfection of laws and regulations, and public awareness of its importance are of great importance.

In the development of fish-culture, followings are regarded as essential factors:

- Elevation of scientific level of fish farming;
- Normalization of fish farm operation;
- Perfection of the facilities for supply, drainage and recycling of water, and for waste treatment;
- Protection and improvement of the environment of fish farms.

On the other hand, enhancement of the productivity of natural waters via the fish farms, e.g. the incubation and stocking of fishes like salmon, trout, sweet fish, etc., should be energetically promoted.

2.3.4 Public Health (Traditional Korean medicines)

2.3.4.1 Status and progress

In DPR Korea, the pharmaceutical industry of Koryo medicine is one of traditional ones, which comprises profound knowledge, abstruse expertise and mysterious recipes accumulated for a long time.

In DPR Korea, the production of Koryo medicines is under the direct control of the Management Bureau for Koryo Medicine Production (MBKMP), which is in charge of herb farms, stations for the protection and propagation of medicinal animals, and deer and musk pastures. Along with this, there are herb management stations at municipal and county levels.

The cultivation and use of medicinal plants in DPR Korea are subject to the Law on Medicinal Plant (Dec. 29, 2004) and its enforcement regulations.

Under the control of the MBKMP, the Prospecting Team for Koryo Medicine Resources (PTKMR) undertakes the periodic nationwide investigations on Koryo medicine resources, inter alia of medicinal plants. By relying on these investigation data which are classified by region and species, Designing Office for Koryo Medicine Resources (DOKMR) prepares plans relevant to Koryo medicine resources. Technology development for and dissemination of Koryo medicines are in charge of Korea Koryo Medicine Technology Center (KKMTC).

Recent decrease in forest resources brought about the changes of mountain ecosystem, which consequently made a great impact on the production of natural medicinal herbs. These conditions make it difficult to meet growing demands for Koryo medicines.

2.3.4.2 Assessment and Task for Sustainable Use

There are about 900 species of medicinal plants in DPR Korea, 170 of which are widely used in traditional Koryo medicine. 70 of them are being cultivated.

From the viewpoint of the conservation and sustainable use of natural medicinal herb resources, parts of herbs with medicinal value are of great importance. At present, 33% of the medicinal plants are for whole use, 30% for root, 5.7% for fruit and seed, 2.6% for leaf, 1.8% for bark, 1.3% for flower, 1% for stem and twig and 0.8% for others.

As to medicinal plants for the use of whole body, root or bark, excessive picking has a risk of exhausting their resources.

In this regard, general investigation of medicinal herb resources and creation of its data base, conservation and creation of natural herb resources and active role of herb farms, are indispensable for satisfying the growing demands for Koryo medicines. It is very important to improve the management of existing herb farms and to increase the species and production of cultivated medicinal plants

The MBKMP, KKMTC and the Pharmacology Institute of the Academy of Medical Sciences under the Ministry of Public Health are focal points of these operations. It is thus important to strengthen their capacity for resource conservation and medicine development.

The establishment and management of protected areas are very important for the conservation and sustainable use of Koryo medicines.

Special attention should be paid to the conservation and sustainable use of the threatened species with high economic value as Koryo medicine resources, e.g. *Panax ginseng, Rheum coreanum, Astragalus setsureianus, Dioscorea nipponica* and *Scopolia parvifolia*, which are listed in the "Inventory of Threatened plants of DPR Korea" (2005).

As for the conservation and sustainable use of Koryo medicine resources, high sense of responsibility and active role of the local institutions concerned and strict trade control are of great importance. In this regard, rigid enforcement of regulations and control for the strict observance of the Law on Medicinal Plants is imperative. Moreover, it is important to protect the habitat environment of Koryo medicine resources and promote its creation. At the same time, researches on the medicinal herb cultivation should be intensified and efforts should be directed to satisfying growing demands.

Special attention should be paid to the conservation and sustainable use of medicinal plant resources that are widely used in the Koryo medicines. With this view, the mixed management of forestry and herb cultivation, i.e. intercropping of trees and medicinal plants, should be promoted and models suited to the geographical characteristics should be developed and generalized.

And furthermore, *ex-situ* conservation of the genetic resources of Koryo medicine should be given great importance.

Genetic resource conservation capacity of botanical gardens and arboreta should be intensified; and by the re-equipment and expansion of conservation facilities, a new turn should be brought about in the conservation of Koryo medicine resources that is the basis of traditional medicine.

2.3.5 Rest, recreation and tourism

2.3.5.1 Status and progress

Rest, recreation and tourism, especially eco-tourism, are the parts of sustainable use of biodiversity that make people understand the importance of biodiversity, and of gaining benefits from biodiversity.

In DPR Korea, the areas with excellent scenic beauty, e.g. Mts. Paektu, Myohyang, Kumgang, Chilbo, Kuwol, etc., are very famous as the center of rest, recreation and tourism.

Sanatoria and recreation centers are placed at the areas with diverse scenic beauties. Particularly, in the nature parks and scenic spots, the Children's Union camps are built for rising generations. Every year, hundreds of thousands of people visit the revolutionary battlefields and historic sites, at where the camping places and lodging houses are provided.

Recently, each county is preparing the recreation centers for farmers at its places of scenic beauty to promote their rest and recreation.

2.3.5.2 Assessment and Task for Sustainable Use

In DPR Korea, there are a lot of recreation facilities, Children's Union camps and lodging houses at old revolutionary battlefields, but the education and communication for public awareness of the conservation and sustainable use of biodiversity are still in their infancy. The lack of personnel who can be in charge of those responsibilities is one of the most important factors and thus training and securing of the talented personnel are considered to be very much important.

It is also important to prepare action plans, to provide necessary information, to reinforce insufficient infrastructure and to establish a unified network, especially, to provide the expanded nature parks with necessary facilities.

According to the recent state measure that all students are recommended to make excursion to Mt. Chibo, proper campaign has been conducted for preparing appropriate conditions. In this context, further promotion of the field education on biodiversity is indispensable.

Peoples' contact with nature through public gardens and surrounding forests of cities, beaches and riversides should be promoted according to the actual conditions of rural and urban communities and costal and mountainous villages. For this purpose, the creation and operation of working space for the education and communication of the value and importance of biodiversity and its sustainable use should be given foremost importance.

2.3.6 Bio-engineering by using of genetic resources

It is one kind of sustainable use of biodiversity components.

In recent days, biotechnology plays a great role in agriculture, public health and environmental conservation.

Biotechnology is applied to rearing of the new high anti-harmful insect, species resistant to drought and salt in agriculture, to the production of growth hormone with transform technique of nucleic acid and of gene therapy drug in the public health and to the improvement of food industry with using of microbial gene resources including amino acid, lactic acid, and vitamin, hormone and anti-biotic materials in food industry etc.

Biotechnology in the environmental protection is also significant, including techniques of pollution abatement and purification of environment with treating with salvages and waste water.

DPRK has been advancing Research and development of bio-engineering at the national level.

The fair and equitable sharing of benefits arising from genetic resources is arising from utilization of genetic resources with using of bio-engineering. For this, it needs to establish the legal framework of benefit sharing arising from the genetic resources and to promote the international collaboration.

2.4 Identification and monitoring of components of biological diversity

Field investigation, inventory preparation and monitoring of the distribution, actual state and utilization of bio-resources should be conducted in order to identify the components important for the conservation and sustainable use of biodiversity.

Particular attention should be paid to the elements requiring urgent conservation measures and those which offer the greatest potential for sustainable use. It is also important to identify processes and categories of activities which have or are likely to have significant adverse impacts on the conservation and sustainable use of biodiversity, and to monitor and reduce their effects. (Article 7 of the CBD)

A great deal of importance should be attached to the identification and monitoring on the components of biodiversity, which constitute the basis of the Millennium Ecosystem Assessment it.

2.4.1 Identification and monitoring

In DPR Korea, the subsidiary institutes of the SAOS are responsible for the investigation on natural environment.

In recent years, the SAOS has carried out over-all investigations on the main nature reserves of the country for biodiversity conservation.

The “Encyclopedia of Mt. Paektu” was published as a result of the comprehensive investigation over the area of Mt. Paektu in the 1990’s. And in the early 2000’s, a series of biodiversity investigation data on nature reserves was published as follows;

“Biodiversity of Mt. Kumgang” (with support from UNESCO in 2000)

“Threatened and Rare Species of Animals of DPR Korea” (in 2000)

“Threatened and Rare Species of Plants of DPR Korea” (in 2005)

Further intensification of the basic surveys for natural environment protection and biodiversity investigation should be promoted. In this regard, the establishment of the information network for gathering information and data about biodiversity conservation and supplying them to the authorities concerned is indispensable. With this view, more progress should be made in the scientific research work in the field of taxonomy and ecology.

2.4.1.1 Needs and capacity building in the field of taxonomy

For the identification of and monitoring on the components of biodiversity, the preparation of the biodiversity inventory should be conducted, which will conduct synthesis and analysis of the information about the status and trends of gene, individual, population, community, habitat and ecosystem through the processes, such as investigation, classification, quantification, mapping and so on.

In this context, active role of the taxonomists is indispensable.

In DPR Korea, taxonomic study on the higher plants and vertebrates has progressed comparatively well, but the research on invertebrates (estimated number of species reaches over 200,000, but only 10,000 species were recorded) and lower plants (esp. *Ascomycetes*) has many holes.

Moreover, the enhanced role of specimen gallery as an infrastructure of taxonomy is posed to be urgent.

Herbaria at the Institute of Botany under the SAOS (with about 130,000 specimens of higher plants and 200,000 of lower ones) and the Central Botanical Garden (with over 300,000 of higher plants) are the centers for the conservation of botanical specimens, while the Institute of Zoology under the SAOS (2000 specimens of vertebrates and insects and 100,000 of others) and the Nature Museum of the **Kim Il Sung** University are for zoological specimens. However, these facilities have the low-level technical equipments for specimen conservation.

And the training of talented taxonomist is also important. At present, the institutions and organizations engaged in the taxonomic study and research are as follows:

- SAOS
  - Institute of Botany and Institute of Zoology under the Branch Academy of Biology;
  - East Sea Fishery Institute and West Sea Fishery Institute under the Branch Academy of Fishery;
  - Economic Forest Institute and Breeding Science Institute under the Branch Academy of Forestry;
- Ministry of Education (MOE)
  - **Kim Il Sung** University;
  - Kim Hyong Jik University of Education;
  - The universities and colleges of education and agriculture at provincial level (esp. Wonsan University of Agriculture);
- Mt. Daesong Management Bureau (MDMB)
  - Central Botanical Garden;
  - Central Zoo.

But all these facilities and organizations are considerably lacking in the reserve taxonomists. In this regard, retraining of present research personnel, education and training of

the new ones and education on the fundamentals of taxonomic study at the higher education system, are very important.

On the other hand, it is important to establish a central institution which will coordinate the taxonomic research work in a unified way.

It is a prerequisite for pushing forward the taxonomical investigation and research, expert training, information exchange and infrastructure construction at the same time.

For the conservation and sustainable use of biodiversity, database of classified information is also indispensable.

In addition to the above-mentioned issues, international exchange and collaboration with DIVERSITAS, BioNET, etc. should be intensified for the further development of taxonomic research in our country.

Through these processes, the modernization of taxonomic methodology and the improvement of the capacity of taxonomic institutions should be promoted, so as to make the taxonomy more contributable to the identification of biodiversity components.

2.4.1.2 Monitoring of Biodiversity

It is of great urgency to set up regular and/or irregular monitoring system on the status and change of biodiversity.

The priority targets of this system are the forest, inland water and coastal area ecosystems.

The Branch Academy of Forestry under SAOS, the MLEP and the Ministry of Forestry (MOFr) are conducting irregular monitoring on the forest ecosystems respectively.

In this context, it is necessary to perfect the facilities for regular monitoring of typical forest ecosystem, to improve the evaluation indicators and to intensify monitoring activities.

Since the disturbance of ecosystem due to forest destruction affects not only forest itself but also inland water and coastal area ecosystems, following measures are necessary to:

- *Set up* the monitoring system on protected areas urgently and expand it gradually to a comprehensive one on the typical water ecosystems and finally to a national network.
- *Perform* regular, continuous and comprehensive investigation and monitoring on the biodiversity of reservoirs, rivers and coastal areas with high productivity.

2.4.2 Identification and monitoring of the activities affecting biodiversity

In DPR Korea, following processes and activities have or are likely to have significant adverse impacts on the conservation and sustainable use of biodiversity:

- Excessive exploitation of natural resources causing the destruction of ecosystem and habitat (firewood cutting, load construction and so on);

- Development projects (land reclamation, construction of hydraulic structures and industrial plants, etc.) causing the loss of ecosystem and habitat;
- Activities (discharge of sewage and waste water, inappropriate consumption of chemical fertilizers and agrochemicals) that cause the degradation of ecosystem and habitat;
- Uncontrolled introduction of alien species and irresponsible picking and hunting of particular species (medicinal herbs, large animals, etc.) that might cause the ecosystem disturbance.

Since over 80% of territory is mountainous in DPR Korea, forest and sloping land management is one of the most vital problems in maintaining the ecosystem stability.

In recent years, the greatest challenges to the components of biodiversity are over-felling of trees for firewood and lumber, reclamation of forest land and the subsequent soil erosion, e.g. decrease of organic matters in forest land, aridity of forest land and decline of water accumulation.

The defects in sloping land management consequently exert influence on inland water and coastal ecosystem biodiversity.

On the other hand, over-exploitation of coastal aquatic resources has adverse impacts on the coastal biodiversity. Hence, it is of great importance to set up a monitoring and information system to prevent excessive forest exploitation, discriminative felling, damage by pest and diseases, forest fire, avalanche and overuse and pollution of coastal aquatic resources.

2.4.3 Environmental impact assessment (EIA)

Article 4 of the Convention on Biological Diversity stipulates that each Contracting Party should introduce appropriate procedures requiring environmental impact assessment of its proposed project that are likely to have significant adverse effects on biodiversity with a view to avoiding or minimizing such effects and, where appropriate, allow for public participation in such procedures.

DPR Korea has been constantly taking measures to decrease or eliminate the factors that are likely to have adverse effects on land and environment through the legislation of following laws:

"Law on Soil" (1977);

"Law on Environment Protection" (1986);

"Law on Construction" (1993);

"Law on the Prevention of Marine Pollution" (1997);

"Law on Land Planning" (2002);

"Law on City Planning" (2003);

Relying on these bases, DPR Korea formulated the ‘Law on Environmental Impact Assessment’ in 2006 to assess beforehand the environmental impact of the various sectorl plans of national economy including construction.

The Ministry of Land and Environment Protection (MLEP) is a supervisory body for its enforcement.

Environmental impact assessment (EIA) is one of the components of environment assessment together with the environmental pollution and environmental quality assessment.

Smooth performance of EIA requires the selection of evaluation factors, establishment of indicator system and the preparation of reliable report based on proper evaluation method. The Institute of Environmental Protection under the MLEP is responsible for the scientific and technological research work for this purpose.

In our country, it is very important to see to it that all the projects are observant of state standards which have, already, been formulated for the prevention of environmental pollution.

Regional assessment of the adverse effects to ecological state and security and ecosystem services should be conducted to promote the general improvement of regional eco-environment.

In this context, the public education and communication of EIA should be attached great importance as a prerequisite for the voluntary observance of state laws and regulations.

Chapter 3

Cross-cutting measures for the conservation of biodiversity in DPR Korea

Successful conservation and sustainable use of biodiversity requires its integration into the national economic plans simultaneously with establishment of the legal framework for biodiversity conservation.

In addition, due review and the relevant measures are required on the central and local administrative institutions to ensure the integrated leadership and planning, the cooperation and comprehensive management for conservation and sustainable use of biodiversity, with the creation and provision of financial resources.

And it is also necessary to promote scientific research, to enhance public education and training on the conservation and sustainable use of biodiversity, and to create, generalize and promote the models in this field.

It needs more to promote the cooperation with the international and regional organizations for extension of information exchange and technical and scientific collaboration with the requirement of the Article 17 and 18 of CBD.

3.1 Legislations

The Article 57 of the "Socialist Constitutional Law of DPR Korea" regulates the importance of the state role in environmental protection.

The "Law on Environmental Protection" is the main law for the environmental protection in DPR Korea (issued on April 9, 1986, modified and supplemented on March 4, 1999 and July 4, 2000).

Important laws relevant to the conservation of environment and biodiversity are as follows:

"Law on Land" (1997);

"Law on Public Health" (1980);

"Law on Customs" (1983);

"Law on Forest" (1992);

"Law on City Management" (1992);

"Law on Construction" (1993);

"Law on Underground Resources" (1993);

"Law on the Protection of Cultural Relics" (1994);

"Law on the Protection of Scenic Spots and Natural Monuments" (1995);

"Law on Fishery" (1995);
"Law on Hygienic Quarantine" (1996);
"Law on the Boundary Inspection of Animals and Plants" (1996);
"Law on Trade" (1997);
"Law on Quality Supervision" (1997);
"Law on Veterinary Quarantine" (1997);
"Law on the Prevention of Marine Pollution" (1997);
"Law on Water Resource" (1997);
"Law on Fish Farming" (1998);
"Law on the Protection of Useful Animals" (1998);
"Law on Agriculture" (1998);
"Law on Public Hygiene" (1998);
"Law on Protection and Control for Land and Environment" (1998);
"Law on Science and Technology (1998);
"Law on Lock Gate" (2001);
"Law on Rivers" (2002);
"Law on Land Planning" (2002);
"Law on Mt. Kumgang Tourist Area" (2002);
"Law on Fruit Farming" (2002);
"Law on City Planning" (2003);
"Law on Provenance" (2003);
"Law on Medicinal Plants" (2004);
"Law on Bio-safety" (2004);
"Law on the Prevention of the Pollution of River Taedong (2005);
"Law on Environmental Impact Assessment" (2005);
"Law on Organic Industry" (2005)

In recent years, various sectoral and thematic laws, regulations and specific rules for the conservation of environment and biodiversity have been legislated.

Although there are laws and regulations closely related to biodiversity conservation, DPRK has no laws on the conservation of wild plant and threatened species and the comprehensive biodiversity conservation and therefore, still some challenges remained. But further reinforcement of legal system is expected for the conservation of eco-environment and biodiversity.

In this context, it is necessary to supplement the relevant laws and regulations and take the measures to strictly keep them for the biodiversity conservation and its sustainable use.

The nationwide movement for winning the title of "Model Law-abiding County (City)" is gaining more impetus as an effective way for raising the spirit of law observance.

3.2 Administrative institutions

The National Coordinating Committee for Environment (NCCE) under the Cabinet of DPR Korea is a non-permanent organization for environmental protection and the Ministry of Land and Environment Protection (MLEP) is a representative one in this field.

Under the unified coordination of the Cabinet, following central organizations and institutions are engaged in the conservation and sustainable use of biodiversity:

Ministry of Land and Environment Protection (MLEP);

State Planning Commission (SPC);

State Academy of Sciences (SAOS);

Ministry of Agriculture (MOA);

Ministry of Fishery (MOF);

Ministry of Forestry (MOFr);

Ministry of Education (MOE);

Ministry of Public Health (MOPH);

Ministry of City Management (MOCM);

Ministry of Trade (MOT);

Ministry of Construction Supervision (MOCS);

Ministry of Finance (MOFn);

Ministry of People's Security (MOPS);

Cultural Relics Conservation Administration (CPCA);

Management Bureau of Revolutionary Site

Mt. Daesong Management Bureau (MDMB, administrative organ over the Central Botanical Garden and Central Zoo)

People's committees at provincial, municipal and county levels are the regional power and administrative organs in DPR Korea and they are focal points of environmental protection activities conducting at local levels.

As there is no central or local administrative institution in charge of biodiversity, the collaboration is indispensable between various organizations concerned (forestry, agriculture, environmental protection, fishery, construction).

The Cabinet is responsible for the coordination of the concerted activities of central organizations.

Scientific research work for the conservation and sustainable use of biodiversity is directed by the State Academy of Sciences (SAOS) in a unified way.

The Korea Nature Conservation Union (KNCU) and Korean Federation of Science and Technology (KFST) are main non-governmental organizations which play active role in the biodiversity conservation. The KNCU, responsible for public education and communication, has sectoral and thematic subordinate associations such as the Korean Association of Plant Protection, Korean Association of Animal Protection and Korean Association of Water

Resources, etc. The Korean Federation of Science & Technology (KFST) is in charge of the transfer and dissemination of science and technology on resource management and eco-environment conservation.

Academic institutions such as the Society of Biology, the Society of Zoology, the Society of Botany, the Society of Agriculture, the Society of Forestry and the Society of Horticulture, are all engaged in the research, communication, education and scientific exchange.

For the conservation and sustainable use of biodiversity, it is desirable to establish an institution with authority to direct the activity of relevant organizations, and also to strengthen the systematic guidance and control over the assignment and execution of responsibilities.

3.3 Science and technology

The SAOS is the focal point of research and development for the conservation and sustainable use of biodiversity.

Related to biodiversity conservation and sustainable use are:

- Branch Academy of Biology (Institute of Botany, Institute of Zoology, Institute of Experimental Biology, Biodiversity and Eco-engineering Center, Institute of Mushroom and Koryo Pesticide Center);
- Branch Academy of Cell and Genetic Engineering;
- Branch Academy of Fishery (Institute of Marine Cultivation and Institute of Fishery at both seas);
- Branch Academy of Forestry (Institute of Economic Forest, Institute of Forest Management, Breeding Institute, Institute of Plant Protection, etc.);
- Institute of Microbiology and Institute of Geology.

It is responsible for the supervision and control over the scientific research and technological development not only in its affiliated bodies, but also at the Academy of Agricultural Sciences, Academy of Medical Sciences, Environment and Development Center under the MLEP, Kim Il Sung University (Department of Bio-Sciences and Department of Global Environment), Kim Hyong Jik University of Education (departments of Biology and Geology).

Representative research projects (1995-2006) for environmental protection and biodiversity conservation are as follows (except for the research projects on protected areas mentioned at Part 1.4 of Chapter 2 related to scientific research):

- Forestry

- Reasonable forest management at the catchment area of River Taedong;
- Rapid afforestation of lowland mountains by the improved sapling production and planting method;
- Assessment of the water-regulation function of main forest tree species;

- Creation of forest tree resources with economic value (e.g. yew of Jagang Province);
- Sapling propagation of rapid-growing poplar;
- Improvement of planting method and after-planting care of trees;
- Practical use of willow (*Salix andersoniana*) for firewood;

- Fishery
  - Investigation on the distribution and quantity of industrial non-migratory aquatic resources at the coast of South Hwanghae Province;
  - Clarification of migratory characteristics and resource structure of anadromous and catadromous fishes via the fish-way of the West Sea Barrage;
  - Assessment of the impact by over-exploitation of the major productive species of shellfish resources in the Korean East Sea and the prescription of the reasonable production limitation;
  - Estimation of the recovery status of deep-sea fish resource in the KES;
  - Factors on shellfish resources and its conservation;
  - Artificial fishing reef for the increase in aquatic resources;
  - Application of cultivating fishery [stocking of sea cucumber (*Stichopus japonica)*, echinus and haliotis];
- Agriculture
  - Research on the microflora of soil applied with microbial fertilizers;
  - Establishment of organic-oriented fertilizing system correspondent to soil status;
  - Genetic resources of crops;
  - Application of botanical chemicals for the prevention of mulberry insects and mulberry silkworm grasserie (nuclear polyhedrosis);
  - Production and application of biological phosphate fertilizer;
- Environment protection
  - Impact of sandy dust phenomena on growth and yield of crops;
  - Distribution of sandy dust phenomena in DPR Korea and its impact on eco-environment;
  - Development of environment cleansing techniques by using effective microorganisms;
  - Waste water purification and substitution of paper material by Water hyacinth (Eichhornia crassipes);
  - Waste water purification of high grade by biological method;
  - Industrial waste water purification and metal reclamation by microbes;
  - Eco-environment preservation at the downstream area of River Tumen;
- Geographical Information system (GIS)
  - GIS for the selection of right soil for crops and forest;

- Forest resource estimation system via GIS;
- 3S system and information processing for the effective development and use of national resources;
- Mapping of vegetation by analyzing satellite information;
- Natural resources estimation system via satellite information;

- Taxonomy
  - Taxonomical research on the plant communities of DPR Korea
  - Preparation of thematic floras
  - Preparation of thematic faunas

Remarkable achievements have been registered in the R&D for the conservation and sustainable use of biodiversity.

Various kinds of books have been published, such as “Flora of Korea”, “Spore-bearing Plants of Korea”, “Flora of Provinces”, “Avifauna of Korea”, “Mammalia of Korea”, “Amphibians and Reptiles of Korea”, “Pisces of the Korean West Sea”, “Pisces of Korean East Sea” and “Freshwater Fishes of Korea”, etc.

Conservation of threatened species, including crane and black-faced spoonbill, has been considered as an important research project and comprehensive investigation and research have been recently conducted on the Mundok Migratory Bird Reserve, situated at the estuary of River Chongchon, which is a significant spot on the East Asia-Australia flyway.

The Branch Academy of Cell & Genetic Engineering (BCGE), SAOS, is the focal point of the R&D for bio-safety and the establishment of national bio-safety system.

However, there are still many holes in the R&D for the conservation and sustainable use of biodiversity.

Representative research projects and development items are as follows:

- Basic researches on phylogeny, inventory preparation and taxonomy so as to fill the holes in taxonomic study on the diversity of animals, plants and microorganisms
- Ecological research into the factors which have or are likely to have significant impacts on the function of biodiversity
- Systematic study on the conservation, restoration and sustainable use of biodiversity;
- R&D for the establishment of biodiversity monitoring system and information network. (Importance of biodiversity inventory and information gap between areas are considered)
- Rearrangement of microorganism inventory
- Gene analysis for inter-specific biodiversity and research item for bio-safety.

International cooperation for the joint research and global information network is very much contributable to the conservation and sustainable use of biodiversity.

In this regard, it is likely to be necessary to set up a specialized institution under the SAOS, so called 'Biodiversity Committee', which will coordinate the R&D for biodiversity in a unified way. The far-sighted and future-oriented combination of basic and applied researches for the conservation and sustainable use of biodiversity, and the close collaboration between research institutes, universities and field institutions to avoid duplication and wasteful repetition will be its main responsibility.

On the other hand, the dissemination of biodiversity-related knowledge and information should be promoted and data sharing system established.

Measures for the development of science and technology related to the conservation and sustainable use of biodiversity should be taken to improve human, technical and technological capacity in support of the implementation of the strategic objectives of the 2010 Biodiversity Targets.

3.4 Education and communication

3.4.1 Education

The 11-year compulsory education system of DPR Korea comprises 3 stages of kindergarten (1-year preschool education), primary school (4-year) and middle school (6-year).

The education on environment protection begins at the stage of kindergarten and continues through the stage of primary education (Nature Observation during the 1st and 2nd grades and Nature subject during the 3rd and 4th grades). At middle school, Biology and Geography subjects are providing students with the knowledge of animal and plant conservation and environment protection.

14 teacher-training colleges and 19 universities of education are conducting the teacher training for primary and middle school.

At the stage of higher education, subjects related to environmental protection have been taught since 1993 in consonance with the actual condition of every unit.

The Faculty of Biology and Faculty of Geography of the Kim Il Sung University were renamed Faculty of Life Science and Faculty of Global Environment, respectively, at the early 2000's.

Agricultural universities and fisheries colleges at provincial level, especially Hyesan Agro-Forestry College in Ryanggang Province and Pihyon Land Administration College in North Pyongan Province, are attaching great importance to the education on the conservation and sustainable use of biodiversity.

In every province (including municipality), there are school children's palaces that play the role as a center of extracurricular education for primary and middle school pupils. In its science education, special attention is being paid to nature conservation.

Care-for-the-homeland Teams in every primary and middle school, whose mission is to maintain the cultural and sanitary conditions of their villages, streets and towns, are conducting various activities for biodiversity conservation, especially during the period of 'Month for Beneficial Birds' in April and 'Month of Tree Planting' in March and November.

Further improvement of the quality of education on biodiversity conservation and its sustainable use should be promoted at the stages of middle and higher education.

In this regard, it is necessary:

- for the stage of secondary education, to promote the in-service training of teaching staff, and to author and spread multimedia products related to biodiversity in accordance with actual conditions of primary and middle schools;
- for higher education, to foster manufacture and disseminate multimedia teaching aids suited to the condition of university and college, and to intensify data collection of advanced technologies related to biodiversity and its wide spread.

Preparation of Action Plan for the information sector of environment and biodiversity education, and the active operation of its focal point are very important for above-mentioned purposes.

3.4.2 Dissemination and communication

Communication for public awareness, as well as professional education, is very important for the conservation and sustainable use of biodiversity.

Various kinds of communication media such as TV, radio, newspaper and magazine, are engaged in the dissemination of the basic knowledge of biodiversity and the communication of its importance. The Korean Natural Conservation Union (KNCU) is the focal point of these communication activities.

Either the international days like "Day of Global Environment" and "Day of Biodiversity" or national occasions such as "Month of Tree-planting", "Month of Bird Conservation", "Month of Mountain Animal Conservation" and "Month of Medical Herb Cultivation" are representative periods for the communication campaign on biodiversity

Moreover, communication related to biodiversity conservation and nature protection is actively undertaken at natural parks, scenic spots, city parks, zoological and botanical gardens and arboreta, in close relation with extracurricular education at schools.

Along with the active role of the KNCU, joint effort and coordinated operation of the working people's organizations such as the General Federation of Trade Unions of Korea, the Union of Agricultural Working People of Korea, the Kim Il Sung Socialist Youth League and the Korean Democratic Women's Union, are very important for the planning and implementation of social activities for public awareness and enlightenment on ecological safety.

On the other hand, active participation of the Korean Federation of Science and Technology (KFST) for disseminating techniques related to biodiversity is very much desirable.

For the promotion of communication, education and public awareness, as mentioned at COP8, implementation structure and processes should be established and action plan for this should be prepared.

In particular, measures for establishing e-infrastructure and network in harmony with the IT era should be taken. They will provide more favorable conditions for promoting public participation in the implementation of the 2010 Biodiversity Target

3.5 Training

It is important to train experts competent to the conservation and sustainable use of biodiversity and to reeducate public officials of the authorities concerned and teaching staff.

In this regard, more experts in environment, biology and resource management should be trained by improving the capacity of the Kim Il Sung University and other universities and colleges of agriculture, fishery, education and construction & building materials.

Along with this, retraining of the protected area management personnel for their better quality is indispensable. In particular the role of the University of National Economy, central reeducation institution for administrative staff of national and local levels, is vital to promote understanding of the importance of biodiversity and to improve capacity of the incumbent officials with respect to the conservation and sustainable use of biodiversity. Action plan comprising all these problems should be prepared and implemented.

3.6 Model creation

To make models for protected area management, sustainable use of bio-resources, restoration and sustainable development of degraded ecosystem and creation and management of agro-forestry ecosystem and to generalize them are of great significance for the conservation and sustainable use of biodiversity.

3.6.1 Development of Models of Nature Reserves

Through the implementation of the projects, “Conservation of Biodiversity at Mt. Myohyang Nature Park” (2000-2003) and “Coastal Biodiversity Management at the Korean West Sea” (2003-2006), GEF had supported the management of Mt. Myohyang Nature Park and Mundok Migratory Bird Reserve (Wetland).

Generalization of the experiences from these projects is very important.

On the other hand, management of the Mt. Paektu Biosphere Reserve and Mt. Kuwol Biosphere Reserve which have been registered in the biosphere reserve network of UNESCO

should be promoted and models of scientific research, diversification and resource management should be developed and propagated.

3.6.2 Development of Models of the Sustainable Use of Biodiversity

Following items should be considered as main subjects of model development for the activation of local economy and income increase of rural population by means of simultaneous seeking of economic and eco-environmental profits.

- For forestry: catchment area management, restoration of degraded forest ecosystem and its sustainable use;
- For fishery: cultivating fishery and seaweed cultivation;
- For medicinal plant cultivation: resource creation and sustainable use of medicinal herbs
- For agriculture: creation of agro-forestry ecosystem and mixed management framework.

3.6.3 Application of Ecosystem Approach to Model Development

For the conservation and sustainable use of biodiversity, which is conducted at different socio-economic conditions, adaptable management methodologies are indispensable.

Ecosystem approach, based on modern comprehensive management methodology, integrates appropriate technologies and innovative approaches for the effective management of protected areas, conservation of species and sustainable use of bio-resources, and is applied to the adaptable management practice which is ensuring cross-sectoral cooperation.

Via the development of models, how the comprehensive management methodology is applied to the management activities of proper scale in complicated practical situations will be demonstrated.

For the present, models of ecosystem approach applied to the sustainable management of forest, coast and agro-forestry should be developed immediately.

3.7 Incentive Measures

'Each Contracting Party shall, as far as possible and as appropriate, adopt economically and socially sound measures that act as incentives for the conservation and sustainable use of biodiversity.' (Article 11 of the CBD)

The subsidies from the Government and local power organs for the development of above-mentioned biodiversity models are examples of economical incentive measure.

Capacity-building of the tree nurseries of central and local levels for the reforestation of destroyed forest is being promoted by the state budget of the Government of DPRK.

The Korean Natural Conservation Union (KNCU) has, recently, established the "Korean Nature Conservation Fund" to encourage nature conservation.

In the DPK Korea, various social incentive measures are also promoting nature and biodiversity conservation. They include national commendation for excellent activities related to wildlife protection and tree planting, award and prize for all sorts of symposia.

For the conservation and sustainable use of biodiversity, adoption of social and economical incentives should be further extended and strengthened.

3.8 International Cooperation

Since the conservation of biodiversity is a regional and global problem beyond the boundary of one nation, DPR Korea attaches great importance to the international cooperation in this field.

3.8.1 Cooperation with International Organizations

During the past decade, GEF-supported projects, "Conservation of Biodiversity at the Mt. Myohyang Nature Park" (2000-2003) and "Coastal Biodiversity Management at the Korean West Sea" (2003-2006), have been undertaken in DPR Korea for the implementation of the CBD. Through these courses, considerable progresses have been made in the management of protected areas and forestry ecosystem and the conservation of wetland ecosystem biodiversity.

Since 2003, as partial projects of the "Plan for Agriculture Restoration and Environmental Protection', 'Comprehensive Catchment area Management at Highlands' and some other projects have been undertaken in DPR Korea under the auspices of the FAO. Those projects were particularly significant for DPR Korea where the mountain forestation and safety of agricultural production are closely related.

From 2006, FAO, through its supports for the projects of forestation and protection of agricultural production in plains, has been and is still promoting the development of models for small basin management at hill areas, riverside protection and construction of agro-forestry ecosystem. Protective agriculture projects were also conducted with the assistance of FAO.

On the other hand, several cooperation projects for seed improvement, food supply, vermin control, grazing and small-scale animal husbandry, have been conducted by various international organizations including UNDP.

DPR Korea signed the Cartagena Protocol on Biosafety in 2001 and ratified it in July, 2003. For its implementation, UNEP-supported project, 'Development of National Biosafety Framework in DPR Korea', was executed (2002-2004). The implementation of this project was geared to the establishment of national system for boisafety, resulting in the fundamental

framework of legislative and administrative system, application and approval system, risk assessment system, public education system and data exchange system for biosafety.

GEF and UNEP have supported, in 2004, the implementation of the project, "National Capacity Needs Self-Assessment for Global Environment Management in DPR Korea" (NCSA), through which the assessment of constraints and need of capacity-building and priority order for the implementation of 3 major conventions was carried out.

3.8.2 Bilateral Cooperation

Swiss-supported project, "Sloping Land Management in Suan County" (from 2000), can be cited as an example of bilateral cooperation in the field of biodiversity. Main aim of the project is to develop a model of agro-forestry management.

Agriculture-related cooperative projects have also been promoted energetically. The representative one is "Leguminous Manure Crop and Its Minimum Plowing for Rice/Corn-centered Grain Cultivation" (2000) with the support from the International Agricultural Research Centre in Australia.

In particular, the "National Workshop on Conservation and Use of Plant Genetic Resources" was held under the auspices of the International Plant Genetic Resources Institute (IPGRI) in 2001.

3.8.3 International Joint Research

In close cooperation with UNESCO, the MAB International Joint Research Project had been successfully conducted, resulting in the registration of the Mt. Kuwol area as an International Biosphere Reserve following the Mt. Paektu Biosphere Reserve.

The conservation and management of the Mt. Paektu and Mt. Kuwol Biosphere Reserves which are included in the East Asia Network of International Biosphere Reserves is of great significance for biodiversity conservation. In this regard, the establishment of field facilities for long-term survey, research, education and enlightenment in the both biosphere reserves is vital.

3.8.4 Others

During the past decade, the collaboration with NGOs of several countries has been very active in DPR Korea. The representative ones of NGO-supported projects are as follows:

- "Introduction of organic farming and green manure crops" by the American Friends Service Committee (AFSC);
- "Grassland Creation, Goat Rearing and Milk Processing" by the Campus for Christs;
- "Operation of the Environmental Information Centre" by the Environmental Education Media Plan (EEMP).

3.8.5 Promotion of International Cooperation

In 2006, strategic framework for the cooperation between DPR Korea and United Nations was created, in which the biodiversity-related environment management was considered to comprise the development of environment-concerned laws, strategies and programs, capacity-building, sustainable use of environmental resources, prevention of environmental pollution and ecosystem management.

Taking the strategic framework into consideration, the arrangement of domestic conditions, active information exchange and more regular and harmonious contacts with international and regional organizations are vital for the promotion of international cooperation with respect to the conservation and sustainable use of biodiversity.

Through the international cooperation, access to and transfer of advanced technologies, technical and scientific cooperation, expert training and inter-governmental exchange should be promoted in accordance with the requirements of the Articles 16 and 18 of the CBD.

Chapter 4

National Strategy of DPR Korea for Biodiversity Conservation

The President **Kim Il Sung**, father of socialist Korea, had often given earnest instructions to make our country as a tapestry-like land teeming with birds and animals and set forth directions and ways of improving the people's livelihood by making better use of mountains and seas.

The great leader Comrade Kim Jong Il said that our country, so blessed with scenic beauty and natural resources as to be called 'golden tapestry of three thousand *ri*', should be further protected and elaborated, and thus transformed into a socialist paradise and golden tapestry of the Worker's Party era with picturesque landscape and all kinds of fruits.

The national strategy for biodiversity conservation is geared to make the whole country as a tapestry-like land teeming with birds and animals and to make people lead an affluent and civilized life by thoroughly implementing the last instructions of President Kim Il Sung and the plan and intention of the great leader Comrade Kim Jong Il. It will also serve the perfect implementation of international obligations required by CBD.

4.1 Strategic goals

The biodiversity conservation in DPR Korea is aimed at transforming the country into a socialist paradise and golden tapestry of the Worker's Party era, to promote the conservation of wild animals/plants and their eco-environment and make sustainable use of mountains, rivers, coasts and seas, thus enabling people to enjoy substantial benefits from biodiversity.

The strategic goals of biodiversity conservation and sustainable use make it a principle to:

- *Give* precedence to the conservation;
- *Put* an emphasis to priorities while improving eco-environment as a whole;
- *Make* sustainable use of natural resources, as to ensure the sustainable development in good harmonization with natural resources, environment and industry.

In this regard, the long-term objectives of the national biodiversity strategy are:

- to enhance the conservative ability of protected areas including nature reserves and to establish protected area networks, so as to complete national protected area system;
- to make efforts to conserve ecosystem, species and genetic resources and establish the system for sustainable use of biodiversity components while, thus enabling the

present and coming generations to enjoy the rich and civilized life with benefits from biodiversity.

The immediate objectives are:

- to restore degraded ecosystems, halt the deterioration of ecological environment, reduce the rate of loss of biodiversity components and improve the whole ecological environment;
- to improve the management of nature reserves for raising the effectiveness of the system;
- to increase bio-productivity and service function of ecosystem and establish the system for the sustainable use of bio-resources, thus enabling people to gain both environmental and socio-economical benefits via biodiversity conservation and sustainable use.

For these purposes, it is necessary to improve the legal, human, institutional, scientific, technical, and financial capacity for the conservation and sustainable use of biodiversity, and also to raise public awareness and understanding of the CBD, thus ensuring that all the people will participate in biodiversity conservation and its sustainable use in a manner of masters.

4.2 Specific goals and targets

The specific targets and objectives for biodiversity conservation and sustainable use in DPRK are as follows.

Goal 1: Establish national nature reserve network system, comprehensive protected area networks

Objective: By 2010, the size of protected areas is increased to 8% of the territory (at present 7.2%) and a comprehensive protected area network system established in a far-sighted-way with a linkage to national nature reserve network system.

1) Rearrangement of existing protected areas to improve capacity and effectiveness.
   - Site-based protected area management plan is in place to establish appropriate institutions and to complete management systems.

     In particular, the infrastructure of comprehensive conservation and management at the areas of Mts. Kumgang, Chilbo, Chail and Oga, of key importance in biodiversity conservation, is reinforced.
   - Protected area management personnel should be re-educated to enhance their leading role in biodiversity conservation.
   - National system is established to enable regular resource survey and effective monitoring of protected areas.
2) Establishment of new nature reserves in areas of great significance in the biodiversity

conservation.

By 2010, the size of protected areas is increased to 8% of the territory by improving the management and conservation of nature reserves and establishing new protected areas and management system in key areas in biodiversity conservation, in consideration of possibility to increase to 10%.

3) Establishment of a comprehensive national conservation network with its centre on nature reserve system

It is important to establish the national network connecting nature reserves *via* ecological corridor.

National network is planned, designed and established in harmonious connection, via ecological corridors, between nature reserves and various types of environmentally-friendly forests including scenic forest, windbreak forest, bank-protecting forest and field-protecting forest)

Goal 2: Strengthen the conservation of threatened species, animals and plants of economic value and genetic resources

Historically, the Korean peninsula in the northeast Asia has played an important role in the immigration and exchange of plants and animals. Now it is situated on the East Asia-Australia flyway, one of the 8 global flyways of migratory birds.

In this context, the first and foremost priority should be given to the conservation of universally threatened species (threatened bird species, large/medium-size endangered mammals like tiger, panther, bear and otter) and endemic plant species of single-genera-single-species (like *Pentactina rupicola* and *Kumkangsania asiatica*), and also the conservation of medicinal herb resources for traditional medicine.

In particular, it is necessary to further survey and monitoring of status of threatened species and to make an effort to conserve natural habitats perfectly and remove and/or mitigate factors of threats.

The capacity and role of ex-situ conservation facilities (botanical garden, arboretum, medicinal herb garden, zoological garden and aquarium) for the conservation of threatened and economic species should be enhanced.

It is also important to return and reintroduce into original habitats threatened and economic species multiplied by *ex-situ* conservation, focusing on plants including *Taxus cuspidate* and *Stewartia pseudo- camellia* and animals including *Grus japonensis, G. vipio, G. monacha, Platelea minor* and otter (*Lutura lutura*).

The conservation of genetic resources of crops, domestic animals and micro-organisms should be further strengthened, with its special attention to indigenous genetic resources of our country (like Kaesong *Panax ginseng*, Pungsan dog).

It requires the establishment and effective application of the national database of species

and genetic resources.

Monitoring and control should be enhanced to ensure that relevant national and international laws and regulations are strictly observed in trade with wild flora and fauna in accordance with the international conventions.

Goal 3: Establish a system for sustainable use of biodiversity components.

It is urgent to establish systems for sustainable use of biodiversity components in various industrial fields such as forestry, agriculture, fishery, traditional medicine and tourism, in which socio-economic activities are based on the value of biodiversity components.

Recent economic difficulties have caused considerable deforestation which is the main factor of soil degradation and water resource deficiency.

In this context, the quantitative increase of bio-resources, its effective, reasonable and sustainable use, and the comprehensive solution to the rural energy problem are vital for ecological security and sustainable development of the national economy.

It is, therefore, necessary to:

- For forestry
  - *Promote* afforestation to restore degraded forests and halt forest destruction;
  - *Maintain* the capacity of forest ecosystem to deliver goods and services and support livelihoods;
- For agriculture
  - *Conduct* the conservation of soil biodiversity and agro-biodiversity to protect agricultural eco-environment;
  - *Develop* the organic farming, both indigenous and ecologically-friendly, ensuring high and stable harvest yield;
- For fishery
  - *Give* priority to the conservation of inland water and coastal area ecosystem biodiversity;
  - *Develop* the cultivating fishery and fish farming, to satisfy increasing demands on aquatic products;
- For traditional medicine materials
  - *Promote* the creation, conservation and management of medicinal herb resources so as to meet the increasing demands in sustainable way;
- For recreation and tourism
  - *Increase* significantly public awareness and understanding of the importance of biodiversity;
  - *Maintain* and *improve* the status and service of the ecosystems in recreation and tourist centres and scenic spots;
- For sustainable solution to the rural energy problem

Considering that the destruction of eco-environment in rural areas is caused mainly by the lack of energy,

Towards the comprehensive system and processes for rural area energy supply and further sustainable development of rural economy,

- *Increase firewood forest creation and the production of renewable energy such as methane gas, hydraulic power, wind and solar energy and bio-fuel;*
- *Reduce the consumption of biomass fuels via the development and application of fuel-saving oven;*

this improving the people's living standard and promoting the biodiversity conservation.

Goal 4: Manage forest, inland water and coastal area ecosystems in comprehensive and sustainable ways

In consideration of topographical and meteorological conditions of the country with over 80% of the territory covered by mountainous areas, its drainage network very dense and the most precipitation converged during July-August, it is necessary to:

- *Improve* fundamentally the catchment area management and prevent the soil degradation and water loss;
- *Promote* the agro-forestry management at the deforested hillocks and afforestation of steep slopes, to halt soil loss and prevent natural calamities;
- *Plant* the protective forests for riverside and lakeside extensively and actively conserve the inland water ecosystem biodiversity by applying nature-friendly construction methods on small rivers and streams;
- *Prevent* the deterioration of coastal area and wet land ecosystem and *establish* comprehensive development and management system, to effectively conserve the biodiversity in coasts and wetlands;
- *Control* the threat from invasive alien species to ecosystems;
- *Establish* the comprehensive management system adaptable to ecosystem, the ecosystem approach, *establish* the early warning system of natural calamities and *give* precedence to the integral ecosystem monitoring system and environmental impact assessment (EIA) of construction and development.

Goal 5: Prevent impacts of environmental pollution on biodiversity

For further mitigating and reducing impacts of environmental pollution on biodiversity, it is necessary to:

- Further *strengthen* national regulations and controls on environmental pollution;
- *Introduce* clean production technologies and ecological techniques into the national

economy;

- Strictly *prevent* the effluence and discharge of pollutants into nature;
- *Promote* the reclamation and recycling of organic wastes;
- Actively *promote* the forestation and gardening in the urban and rural areas, the infrastructure construction for sewage treatment and waste disposal, and the improvement of eco-environment in towns and villages.

Goal 6: Create, disseminate and generalize demonstrations of biodiversity conservation and sustainable use

Biodiversity conservation and sustainable use could be ensured only by voluntary and conscious activities of broad masses.

The most effective ways of promoting public participation is to:

- *Create* and extensively *generalize* demonstrations of the conservation and sustainable use of biodiversity, in many aspects (including the management of nature reserves and its vicinity, forestation and sustainable management, agro-forestry complex management, organic farming and comprehensive solution to rural energy problems), at various levels (family, ri, county);
- *Encourage* prudent introduction of foreign experiences in conformity with actual situations of the country.

Goal 7: Strengthen scientific research on conservation and sustainable use of biodiversity

Scientific research is an important way for the successful promotion of biodiversity conservation and sustainable use. It is necessary to:

- *Promote* the general investigative study on the type, feature, function and value of ecosystem, as well as changes in its status, and the monitoring and assessment of biodiversity, technology development for the restoration of degraded ecosystem, and the sustainable use of biodiversity components;
- *Encourage* the continuous introduction of advanced technologies such as satellite information analysis and GIS;
- *Develop* the EIA of economic activities, including construction and development, and ecological techniques to mitigate their impacts;
- *Intensify* research on the prevention of the threats, *inter alia*, from invasive alien species and on the bio-security of GMOs;
- Closely *combine* the research on the forestry, agriculture and fishery with practices related to use of bio-resources so as to contribute to its sustainable use, and
- Further *strengthen* the international joint study on the biodiversity conservation and

sustainable use and substantially improve the transfer of advanced technology.

Goal 8: Strengthen communication, education and training on conservation and sustainable use of biodiversity

For improving biodiversity conservation and sustainable use, it is necessary to:

- *Promote* mass communication activities for public awareness of and general participation in the conservation and sustainable use of biodiversity;
- Actively *promote* public communication in various forms and diverse ways, i.e. on the occasion of several commemoration periods and the period of general mobilization for land development, and by means of all sorts of mass media (newspaper, TV, etc.);
- *Enhance* the school education on biodiversity at primary and middle school stages and encourage the extracurricular activities for better understanding of the nature;
- *Manufacture* and *disseminate* various types of educational multimedia products in accordance with each stage of education on the conservation and sustainable use of biodiversity, and substantially improve the re-education of the teachers of biology and geography at primary and middle schools;
- *Raise* the level of education on environment and biodiversity significantly at universities and colleges of education, science and technology, and also *train* a wealth of talents with profound expertise and practical ability in the land management, environmental management and sustainable use of biodiversity;
- *Strengthen* the vocational education aimed at improving the qualification of the protected area and forest rangers, and the re-training and social education of the state officials, *inter alia* engaged in the bio-resource development.

Goal 9: Integrate biodiversity conservation into the Masterplan for Land Development (MLD) and other sectoral plans of national economy

It is important to:

- Integrate biodiversity concerns into the Masterplan of Land Development (MLD), comprehensive national plan related to land, resources and environment, to significantly promote the conservation and sustainable use of biodiversity at various levels (state, province, city and county), thus enabling to obtain environmental and socio-economical benefits and contribute to improving the local economy and people's livelihood;
- *Integrate* the conservation and sustainable use of biodiversity closely into relevant sectoral plans of the national economy (forestry, agriculture, fishery…), and in this regard, to take comprehensive approaches in support of the implementation of the

objectives via setting the objectives and identifying priorities from the stage of planning as to ensure the biodiversity conservation and sustainable use and to integrate priorities into national plans.

Goal 10: Expand International exchange & cooperation for biodiversity conservation

Followings will be helpful to promote biodiversity conservation and sustainable use and implement the Convention:

- *Making* active efforts to implement the CBD and its related conventions, FCCC and CCD, and to promote the conservation and sustainable use of biodiversity as required by the conventions;
- Further *strengthening* the South-South cooperation for biodiversity conservation and regional cooperation including agreements between neighbouring countries for the conservation of migratory birds;
- Further *promoting* the multilateral exchange & cooperation and the prudent transfer of advanced technology to DPR Korea, to significantly contribute to the biodiversity conservation at global and/or regional levels.

Chapter 5

National Biodiversity Action Plan of DPR Korea

5.1 Principles of Biodiversity Action Plan

The principles of the National Biodiversity Action Plan of DPR Korea are as follows:

- To reinforce national laws and regulations related to biodiversity and ensure the conservation and sustainable use of biodiversity in accordance with the political requirement of the construction of self-supporting national economy;
- To promote the conservation of forest, inland water, coastal and marine ecosystem biodiversity and to enhance the functions and services of ecosystem so as to get more environmental and socio-economic benefits;
- To encourage the close combination of the conservation and reasonable use of biodiversity and thus contribute to the sustainable economic development;
- To attach great importance to the main or priority activities, while developing and generalizing their models;
- To fully respect the requirements of the CBD and fulfil international obligations and responsibilities.

5.2 Action plan

5.2.1 Actions for conservation

Action 1: Identify and monitor the components of biodiversity important for its conservation and sustainable use

Proper establishment of the system and process to identify and monitor the biodiversity components important for its conservation and sustainable use is still of great significance for the biodiversity conservation in DPR Korea. It is also a major content of Millennium Ecosystem Assessment.

In view of the physiographical conditions of DPR Korea, the forest, inland water, coastal, wetland and agricultural biodiversity are particularly important areas for biodiversity conservation as well as essential substances for the Millennium ecosystem assessment.

For the sound identification and monitoring, listing, assessing and monitoring the biodiversity of forest, inland water, coastal, wetland and agricultural ecosystems are conducted at regional levels by using national indicators. In particular, it is imperative to list and identify the activities by indices which have or are likely to have significant adverse

impacts on the conservation and sustainable use of biodiversity of pertinent areas, and assess and systematically monitor those impacts.

Active application of the remote sensing (RS) and GIS will be encouraged for the identification of and monitoring on ecosystem diversity.

As for the species diversity, enhanced monitoring will be done on threatened, key, alien, protected and indicator species.

Biodiversity monitoring system in DPR Korea with small territory should be established in harmony with early warning system of natural calamity so as to minimize the economic loss thereby.

Based on the identification and monitoring, more effective legislative measures and public awareness programs will be conducted to establish a comprehensive management system for the conservation and sustainable use of biodiversity.

Action 2: Promote the conservation of ecosystem and habitat biodiversity

Conservation of ecosystem and habitat is the most vital for biodiversity conservation.

Key point of ecosystem and habitat conservation is the establishment of protected areas and protected area system.

For DPR Korea, of importance is to improve the management quality of already established protected areas that has stretched 7.25% of the whole territory since 2003.

Site-based biodiversity objectives for each protected area will be identified, corresponding management institutions and regulations be established and legal control and protective management be improved.

Restoration of the recently degraded ecosystems will be encouraged. Bio-resource management in the protected areas and their vicinity should be improved in respect to the high population density of the country. With this view, education & public awareness will be enhanced, and the model of participatory management of protected area will be created and generalized, where reserve's industry will be found while local residents will obtain eco-environmental and socio-economic benefits from reserve.

Acreage of protected area is intended to be enlarged to 10% of the whole territory of DPR Korea.

Action 3: Strengthen the conservation of species diversity

Special attention should be paid to the conservation of the threatened species of worldwide significance in DPR Korea. In consideration of the position of DPR Korea located on the East Asia-Australia flyway, one of 8 major global flyways of migratory birds, the conservation of global threatened species including cranes and Platelea minor which migrate via this flyway will be improved. The list of threatened species (Red Data Book) will be

continuously supplemented and their status will be substantially improved.

In consideration of the topographical condition of DPR Korea where 80% of the territory is mountainous, the species and habitat conservation of threatened and valuable species in forest will be promoted. Of great importance herein are to stop habitat fragmentation, conserve forest biodiversity, and improve habitat quality.

Public awareness on the conservation of species diversity will continuously enhanced and the conservation of threatened and valuable species will be converted into participatory work.

Restoration of animal and plant species to the nature, in particular of threatened and economic ones propagated through ex-situ conservation, will be performed, where relevant scientific and technological problems are solved and its model will be developed and disseminated.

Wildlife trade will be conducted strictly as required by national laws and regulations, especially the trade of threatened species as required by the international agreements on trade of endangered species including CITES, so as to make no impact on species diversity conservation.

Action 4: Strengthen the conservation of genetic diversity

Conservation of the genetic diversity of wild and cultivated/bred plant and animal species of socio-economical value is very important both for biodiversity conservation and for economic development of the country.

As to wild animal and plant species, assessment will be performed on the relations between viability of endangered species and genetic diversity in DPR Korea and between size and survival probability of populations, and on the basis of it, appropriate conservation measures will be designed and implemented.

As to cultivated/bred plant, livestock, aquatic organisms and micro-organism of economic value, identification and management of their genetic resources will be improved and strengthened.

Enough measures will be taken to conserve genetic diversity of bio-species and fully exert its capacity. Particularly, genetic assessment will be performed on population viability and minimum viable population.

Proper framework for the collection, storage, regeneration, recording, information system, improvement and exchange of genetic resource will be established and the work of halting genetic resource loss in the nature will closely be integrated to *in-situ* and *ex-situ* conservation.

Traditional knowledge that has been accumulated for a long historic period of time will be protected.

Special attention will be paid to bio-safety and the function and role of current bio-safety system will continuously be enhanced

Action 5: Build up *ex-situ* conservation capacity

Facilities and their sound operation for ex-situ conservation of animal, plant and micro-organism are of great significance for biodiversity conservation.

It is very important for DPR Korea who has already a certain capacity of ex-situ conservation to build up the capacity and enhance function and role.

For ex-situ conservation of wildlife, of importance is the role of botanical and zoological gardens and arboreta.

In this context, facilities for building up the conservation capacity of threatened species will be expanded, a genealogical registration system will be set up for major threatened species, and the conservation, breeding and cultivation techniques for them will be developed.

Capacity building for ex-situ conservation for plant and micro-organism is of great significance for the development of bio-technology and moreover the national economy. In this regard, the conservation mode from seed, in-vitro, pollen, and in-vivo conservation will wisely be selected in accordance with the characteristics of the species, and the capacity of conservation facility will be enhanced.

Setting-up the database and information system related to ex-situ conservation will be promoted so as to facilitate their sound use by scientists, technicians and producers.

5.2.2 Actions for sustainable use

Action 6: Improve the conservation and sustainable use of biodiversity in forestry, agriculture, fishery and Koryo medicine, and reduce unsustainable consumption of bio-resources

Active creation, conservation and sustainable use of biological resources by the main sectors of national economy that have intensive use of bio-resource, such as forestry, agriculture, fishery and Koryo medicine (traditional Korean medicine), are essential in meeting the demand for bio-products and sound protection of the eco-environment of the country. They are also closely related to the sustainable development of national economy and the improvement of people's livelihood, in particular at rural areas.

In DPR Korea, socio-economic activities have already been performed under the national policy that intends to develop the national and local economy and improve the people's livelihood by making effective use of mountain in mountainous area and sea in coastal area.

From the viewpoint of biodiversity conservation, these activities have close relation with the conservation of forest, agricultural coastal and inland water biodiversity.

In the forestry sector, intensive measures will be taken on reforestation of degraded forests, transformation of forest of low productivity into one of high productivity, increase in total quantity and improvement in quality of forest bio-resources, strict adherence to cyclic

felling and sustainable forest management.

In this regard, followings will be performed:

- to prevent and mitigate the negative impacts of main threats on forest biodiversity by means of reforestation, improvement of basin management, creation of firewood forest and establishment/management of protected area;
- to provide institutional and socio-economic environment for the conservation and sustainable use of forest biodiversity;
- to establish assessment/monitoring system on forest biodiversity, including designating at least 30% area of productive forest as protected area;
- to ensure fair and equitable sharing of benefits arising out of the use of forest genetic resources;
- to apply ecosystem approach to forest management, and create and generalize models of sustainable management, in close relation with reducing unsustainable consumption of forest resources, e.g. over-felling of firewood forest and with continuously increasing the public awareness of the importance of forest biodiversity

In the fishery sector, giving top priority to the conservation of inland water and coastal biodiversity, more intensive activities of converting fishery mode from spending to breeding and culturing will be executed so as to meet the need of fishery product while improving fundamentally waters eco-environment.

In the agricultural sector, special attention will be paid to the conservation of agricultural biodiversity, while soundly meeting the demand of national economy on agricultural products.

With this view, agricultural economy will in overall be activated in the way that pressure of agriculture on environment will be decreased while maximizing agricultural product and improving livelihood of farmers. In this context, integrated agricultural system will be hopeful where seed treatment, soil management, nutrition administration and insect & disease control will be collectively promoted, capacity of rural energy will be built up, rural eco-environment conserving, organic farming will be expanded etc.

Responsible attention will be paid to the conservation of agricultural genetic resources and the fair and equitable sharing of benefits from the use of agricultural genetic resources.

In the Koryo medicine production sector, promoting the creation and conservation of mountain medicinal herb resources, capacity building will be conducted on the *in-situ* and *ex-situ* conservation system for genetic resource of medicinal plant. Both production per area and quality will be raised for meeting the increasing need of Koryo medicine resources indispensable for public health.

By encouraging artificial propagation of medicinal animal resource, its need will be soundly met and field collection in the nature will be adjusted and controlled.

In the biological resource-consuming industrial sectors, the system for sustainable use of

bio-resources based on their reproductive capacity should firmly be established to reduce the unsustainable consumption and waste of bio-resources.

Action 7: Encourage sustainable recreation and tourism, inter alia eco-tourism

Recreation and tourism, *inter alia* eco-tourism, play significant role in satisfying the demand for public health and cultural & emotional life of people, and in increasing public awareness of the conservation and sustainable use of biodiversity.

Recreation and eco-tourism are also considered to contribute significantly to the local economy development and bring great profits to local community in pertinent areas.

In this regard, enhanced education and public awareness of the value of and benefits from biodiversity will be provided by making effective use of recreation and tourism facilities currently available in DPR Korea.

A guide for sustainable eco-tourism suited for domestic conditions of DPR Korea will be prepared and indigenous specialities peculiar to scenic spots will be developed and commercialized, the benefits from which will furnish with funds to local economy development and ecosystem management.

Action 8: Recover degraded ecosystems and halt habitat loss

Afforestation should be integrated with indigenous species-centred forestation and the recovery of degraded forest by means of succession. Since the deterioration of forest ecosystem is exerting adverse impact on the biodiversity of inland water, coastal and agricultural ecosystems, forest recovery is one of the top-priorities for biodiversity conservation.

In this regard, destruction of eco-environment should be halted and ecosystem recovery techniques to achieve ecological equilibrium should actively be developed and transferred.

In the recovery of forest ecosystem, priority order will be identified for catchment area management including inland water ecosystems on the basis of integrated survey and assessment on the catchment area. Plan for land use in catchment area will be prepared and examples for sustainable use of water and soil resources, pollution prevention and monitoring systems & processes in catchment areas will be created.

Habitat loss will also be respected.

Giving priority to improving the management of reserves and eco-environment protective forest, national protection network will be formed, which will be composed of eco-environment protective forests and reserves connected with buffer zones around them and ecological corridors, so that habitat fragmentation can be halted and the function and services of ecosystem can also be exerted fully.

Action 9: Promote socio-economic measures that act as incentives for the conservation and sustainable use of components of biological diversity.

Various kinds of incentive measures such as publicity, commendation and reward for units and individuals exemplary in the conservation and sustainable use of biodiversity will be taken.

The creation and expansion of models in which local residents are able to get both eco-environmental and socio-economic benefits from the conservation and sustainable use of biodiversity, esp. of biological resources will actively be promoted.

In this context, the dissemination of eco-engineering that enable the synchronous creation of eco-environmental and socio-economic benefits by the integrated use of mountain, river and sea and resource recycling will be encouraged so as to make all counties activate their local economy and improve people's life by their own incomes.

Action 10: Control threats from invasive alien species

Overall assessment of alien species' impacts on biodiversity will be conducted and capacity building will be performed to prevent or control the threats from introduction and invasion of alien species is.

With this view, inventory of alien species will be prepared and system will be set up to develop, expand and share the database on invasive alien species.

EIA systems will be built on the introduction of alien species, *inter alia*, in waters, and human and institutional capacity will also be built up.

Action 11: Strengthen biodiversity-inclusive environmental impact assessment (EIA)

Including assessment on quality and pollution of environment, impact assessment of human activities such as development on the environment will be further strengthened.

Considering the legislative base on EIA already in place, of importance is human and institutional capacity building.

All units that are engaged in development and exploitation will be obliged to submit authentic report on EIA and to monitor the impacts on biodiversity even after development.

In this regard, public awareness on the importance of EIA in biodiversity conservation will be encouraged.

Action 12: Build up capacity in biosafety

Further capacity building is needed in legal and institutional framework for national

biosafety and the application & approval system for biosafety which are already in place.

Inspection and verification system will be set up for alien genes contained in the seed, foodstuff and processed goods of GMOs that are introduced by import and *via* other pathways.

Strict safety guarantee on the industrial use of GMOs will get ready by improving quantitative evaluation of alien genes in GMOs, risk assessment of GMOs and supervision and control on the treatment of GMOs.

Measure will be taken for improving public awareness on biosafety.

Action 13: Cope with challenges from climate change, and pollution to biodiversity

It is important to take measure for coping with changes of the components of biodiversity.

First of all, capacity of sustainable land management will be built up.

With this view, current state of land degradation will be assessed, scientific research to halt land degradation and recovering degraded forest will be strengthened, through which the sustainable management of forest resource will be promoted. Sustainable development of agriculture will be encouraged, including dissemination of organic

Secondly, improvement will be achieved in basin management and in the protection of land and water resources, and enlargement in eco-environment protective.

Next, endeavours will be given to reduce the factors that accelerate climate change, especially the global warming in various sectors of national economy including industry, agriculture and forestry, and *inter alia* to diminish the to-atmosphere emission of methane gas in stockbreeding.

Continuous efforts will be paid to reduce the impact of environment pollution on biodiversity.

National criteria for the control of environment pollution will strictly be obeyed.

Wide application of clean production technologies in industrial sectors will be done and a waste monitoring system will be set up on the basis of Life Cycle Analysis (LCA) which assesses the potential impacts of the whole production process from raw material procurement, *via* manufacture and use, to waste treatment.

Green technology and eco-engineering will actively applied, afforestation in urban and rural area will be promoted, environmentally-friendly building and will be promoted and anti-pollution infrastructure will be rearranged to fundamentally improve the eco-environment of urban and rural area made.

5.2.3 Benefit sharing

Action 14: Preserve and encourage traditional knowledge, innovations and practices

It is of great importance for the conservation and sustainable use of biodiversity to preserve and encourage traditional knowledge, innovation and practices that human has developed and maintained for a long time in various sectors including agriculture, animal husbandry, fishery, forestry and public health.

To scout out and collect traditional knowledge on indigenous biological resources such as crops, medicinal herbs etc. as well as the genetic resources that have come down from way back of local communities and residents in accordance with diverse physiographical characteristics of our country are of great significance not only for the activation of national tradition, but also for the development of modern science.

Local specialities will intensively activated through the preservation and encouragement of traditional knowledge, including furnishing needed facilities and training manpower, and thus local economy will be activated and farmer's life will be elevated.

Action 15: Ensure the fair and equitable sharing of benefits among areas and communities

Local residents and communities are obtaining enormous benefits from biological resources, which are local in its nature. However, the quantitative assessment of these benefits is still in its infancy and so are the understanding and awareness on the immediate and long-range benefits.

In this context, promoted study and assessment will be performed on the immediate and long-range benefits of recycling bio-resources, measures will be taken to ensuring the fair and equitable sharing of benefits from bio-resources, among local residents, communities and agencies.

The research on, development and in-proper-price commercialization of local specialities from biological resources will be encouraged and thus they will make significant contribution to earnings to individual's livelihood and local budgetary income.

Action 16: Complete biodiversity information system and build up the capacity of CHM

Information sharing is one of ways of ensuring the conservation and sustainable use of biodiversity.

In this regard, it is indispensable to complete the biodiversity database with such information that is high in quality and rich in quantity.

In view of the depressiveness of biodiversity-related information, the database will be established in such a way that sectoral ones will be created according to unified plan and they will further integrated at national level. It will cover a wide range of fields from species, *via* threatened species, genetic resources, *in-situ* and *ex-situ* conservation, ecosystem, habitat,

nature reserve, economic bio-resources and alien species, to socio-economic development and population.

The creation of database will be followed by integrating the comprehensive systems of analysis, planning, assessment and management, and ultimately resulted in a national biodiversity information network.

Along with this, the capacity of CHM through which data related to the conservation and sustainable use of biodiversity will be shared will be built up so as to fully play its effective role in the introduction and transfer of advanced technology.

Action 17: Promote the joint development and transfer of the technologies related to the conservation and sustainable use of biodiversity

Active transfer of advanced technologies and joint development of new ones for the conservation and sustainable use of biodiversity are of great significance in reducing the waste of labour and fund, in developing economy and in enabling people to get substantial benefits for their livelihood.

In this context, sharing, joint-study and joint-development of technology and technique between the institutes of developed and developing countries are the effective ways of technology transfer.

DPR Korea will promote the joint study of its research institution on the common objects for the conservation and sustainable use of biodiversity with ones of neighbours like China and Russia and of other Asian countries.

It will also encourage the joint research programs at global levels in close relation with UNESCO, IUBS and SCOPE.

Special attention will be paid to developing the new technologies with national and international significance in the conservation and sustainable use of biodiversity, e.g. effective forestation method in dry land, and to continuously developing the South-South cooperation in all fields of biodiversity conservation and sustainable use.

Action 18: Create and generalize models of the conservation and sustainable use of biodiversity

To create models for each sector and project related to the conservation and sustainable use of biodiversity where local communities and residents are able to get eco-environmental and socio-economic benefits is very important in promoting public participation in the conservation and sustainable use of biodiversity.

In this regard, nature reserves will be transformed into the utilitarian models of scientific research, education and communication, sustainable use of resource and diversified management. The model of participatory protected area integrating wild animal conservation

and sustainable agriculture, around the wintering places of crane and breeding places of black-faced spoonbill will be created.

Models for forestry, agriculture and fishery will be encouraged to be created, propagated, disseminate and generalized with the subjects of restoration of degraded forest ecosystem, catchment area management on various scales, sustainable forest management and agro-forestry management on the sloping land of village hillocks, organic and ecological farming, protected forest, rural energy construction, cultivating fishery and the creation of medicinal herb resources and its sustainable use.

5.2.4 Cross-cutting measures

Action 19: Integrate biodiversity concerns into the National Economic Plan (NEP) and the Master Plan for Land Development (MPLD)

R&D, expert training, institutional capacity-building, financial support and EIA concerning the conservation and sustainable use of biodiversity will be integrated into the National Economic Plan (NEP) through participatory discussion processes.

Plan-maker will identify obvious objectives and priority actions of biodiversity.

Priority actions will be integrated into the sectoral and cross-sectoral plans of national economy, with much consideration of their implementation and its monitoring.

The Master Plan for Land Development is a unified and comprehensive plan for reasonable exploitation, utilization, improvement and beautification of land in accordance with prospective development of national economy, promotion of people's well-being and general improvement of economic life of the country. In this regard, the conservation of biodiversity carries great weight in planning the MPLD at national and major-local levels.

The MPLD will be prepared, by means of sound link between several sectors in plan making stage, so reasonably that land can intentionally utilized and managed with the conservation and sustainable use of biodiversity while eliminating the waste of materials and funds. In preparing the land use plan, special consideration will be taken into the conservation of biodiversity so as to reduce the biodiversity loss in land construction.

Action 20: Strengthen scientific research on biodiversity conservation and its sustainable use

Investigation and development study on biodiversity should be strengthened for the conservation and sustainable use of biodiversity.

With this view, following works will be performed.

Study will be enhanced on classification, distribution and ecology of wild fauna/flora and microorganism, structure and function of every kind of ecosystem, assessment of biodiversity

and its conservation mechanism, interrelation between the components of biodiversity and monitoring and reviewing methodology, particularly on the completeness of national inventory of biodiversity.

Beside basic research, development of bioengineering in several sectors including environment, agriculture, forestry, fishery, public health and food industry, and the development and transfer of technologies for comprehensive use and conservation of environmental resources will be strengthened.

The DPR Korea will encourage the joint research and development between domestic research institutions and universities as well as with other countries including neighbouring ones.

Action 21: Strengthen education, training and public propaganda on biodiversity

The c education, training and public propaganda should be promoted on the conservation and sustainable use of biodiversity in order to facilitate the public participation thereto.

DPR Korea will prepare and implement the national action plan for the biodiversity education at school level. With this view, it will facilitate re-qualification training for the teachers of primary and middle school, while raising the level of education programs on biodiversity and environment protection at higher education stage.

It will also promote the nature study and extracurricular education on biodiversity at primary and middle school stages, manufacture and disseminate various types of teaching aids related to conservation and sustainable use of biodiversity, especially multimedia products in keeping with demands of IT era and actual condition of educational institutions, and establish e-infrastructure and network for this purpose. For the social education on biodiversity, dissemination and propaganda *via* newspaper, television and other various publications will be strengthened.

It will expand the training of experts engaged in the conservation and sustainable use of biodiversity as well as the re-qualification training of reserve rangers and bio-resource-related technicians, and public officials and management staffs.

Action 22: Provide necessary financial support to the institutions related to the conservation and sustainable use of biodiversity

Since the conservation of the natural environment and animal & plant species is the prerequisite of sound ecosystem management and sustainable development of the national economy including forestry, agriculture, fishery etc., financial support for the conservation and sustainable use of biodiversity is of great significance for both immediate and future benefits

However, the continuous natural calamities and economic difficulties in recent years hindered the growth of investment and financial support.

In this regard, DPR Korea will identify clear financial output scale for priority actions related to the conservation and sustainable use of biodiversity and take measure to cover them with national and local budget.

With this view, it will let biodiversity experts, planning and financial experts actively support the Ministry of Finance and local administrative organizations, while integrating a series of additional financial measures necessary for promoting biodiversity into existing budget plan.

Action 23: Improve international cooperation for the conservation and sustainable use of biodiversity

Fundamental aim of the Convention on Biological Diversity (CBD) is the sound conservation e global ecosystem, a base of human existence. However, each country has sovereign rights over their own biological resources and components of biodiversity like habitat, species and gene resources.

Because of its geographical position and the formation history of species diversity, DPR Korea is in a special position in East Asia.

In this context; various types of joint research and cooperation will be promoted in support of the implementation of the Convention at regional and international levels, including jjoint research and cooperation with China for the management of the Mt. Paektu Biosphere Reserve and inland waters ecosystem of the River Amnok, joint research and collaboration with China and Russia on the conservation of estuary ecosystem of the River Tumen and wetland, collaboration on the conservation of migratory birds with Russia, China, Japan and Southeast Asian countries.

There are several conventions related to CBD, such as the Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention, 1971), Convention on International Trade in Endangered Species(CITES, 1973) and Convention Concerning the Protection of the World Cultural and Natural Heritage(WHC, 1972)

Taking into consideration the geographical conditions of the Korean Peninsula, on where wetlands of regional and international significance in the migration of birds are located, DPR Korea will pay particular attention to the international collaboration for the conservation of migratory birds and their wetland habitats and the endangered plant & animal species of regional and global significance.

5.3 Priority actions for biodiversity conservation

Priority action for the conservation and sustainable use of biodiversity is identified

according to the following criteria:

- Whether it is of national or international & regional significance for biodiversity conservation;
- Threatened status of ecosystem, species and their habitat;
- Immediate and future benefits from the sustainable use of bio-resource;
- Precedence of conservation over development and their integration;
- Effect of creation and its generalization of the model for the conservation and sustainable use of biodiversity;
- Economic effectiveness of the investment of financial, material and manpower resources etc.

5.3.1 Priority actions for ecosystem conservation

5.3.1.1 Forest ecosystem

Among the protected areas of DPR Korea, the priority is given to 10 reserves and nature parks of, *inter alia,* forest ecosystem.

1) Mt. Paektu area

At present, the whole area of Samjiyon County, Ryanggang Province, is designated as an international biosphere reserve. Its vegetation consists of 830 species of higher plants, 270 of Bryophyta, 190 of Lichens, 370 of Fungi and 160 of Algae, among them over 30 endemic species. It has obvious vertical zones, majority of alpine boreal coniferous forest, with alpine plant communities distributed beyond the upper limit of forest. Fauna is consists of 54 species of mammals, 189 of birds, 13 of amphibian & reptiles and 11 of fishes.

2) Mt. Kumgang area

Mt. Kumgang Nature Park, situated in Kosong and Kumgang counties in Kangwon Province, covers 47,838 ha, with 60km of the length from north to south and 40 km of width from east to west. It has vegetation composed of 1,228 species of higher plants (67 of *Pteridophyta*, 15 of gymnosperms and 1,146 of angiosperms) and numerous endemic species (20% of total 315 endemic species nationwide) thanks to the long formation history of flora and diverse ecological environment. Its fauna is composed of 39 species of mammals, 174 of birds, 21 of amphibians & reptiles and 24 of fishes.

3) Mt. Myohyang area

It covers wide area of 33,313.2 ha, across Hyangsan and Kujang counties in North Pyongan Province, and Huichon City, Jagang Province. It has the vegetation consisting of 1,066 species of higher plants and the forest of typical zone composed of low-mountain, sub-alpine and alpine plant communities. Its fauna is known to have 208 species of vertebrate.

4) Mt. Chilbo area

Mt. Chilbo Nature Park, located in Myongchon County, South Hamgyong Province, is 27,754 ha in area. It is characterized by pine community, pine-majored coniferous-latifoliate mixed tree community and Mongolian oak-majored latifoliate mixed tree community, by the vegetation with 827 species higher plants including 25 varieties and 3 formae and by the fauna with 227 species of vertebrates.

5) Mt. Oga area

Mt. Oga Nature Reserve is situated in primeval forest area between Hwapyong County, Jagang Province and Kimhyongjik County, Ryanggang Province. Flora is composed of 688 species of higher plants with 45 varieties and 6 formae, and characterized by the mixed forest of temperate and boreal vegetation contains 1,000 year-old yew trees (*Taxus cuspidate*), 700 year-old pine-nut trees (*Pinus koraiensis*) and fir trees (*Abies holophylla*). Fauna has 235 species of vertebrate.

6) Mt. Kuwol area

Mt. Kuwol area, being 52,715 ha wide and situated across the boundary between Unryul, Unchon and Samchon counties in South Hwanghae Province, is designated as an international biosphere reserve. 4700 ha of the area is forestry which is composed of pine community, pine-Mongolian oak communities and Mongolian oak community, and known to have 742 species of higher plants with 39 varieties and 5 formae. In addition to above-mentioned areas, the forest ecosystems of Kwanmo Peak, Chail Peak, Wagal Peak and Mt. Turyu areas also belong to priority areas.

5.3.1.2 Wetland ecosystem

5 wetland ecosystems among 11 bird reserves around the estuaries and field areas of the Korean West Sea and Korean East Sea, which are located on the East Asia-Australia flyway, one of the major flyways of migratory birds worldwide, has been identified to be priority objects.

1) Estuary of River Chongchon

Wetland at the estuary of River Chongchon in Mundok County, South Pyongan Province, is an important transit place for East Asian migratory birds.

At present, it serves as a periodic habitat for 12 species among 28 globally threatened bird that dwell in DPR Korea, including *Anser cygnoids, Anas formosa, Grus japonensis, G. vipio* and *G. monacha*. 180 species of birds are observed at the estuary of River Chongchon. This area is blessed with high productivity of invertebrates and wetland plant.

2) Estuary of River Amnok

The area around the Silk Island of Sindo County, North Pyongan Province, situated at the

estuary of River Amnok, serves as major transit place for threatened bird species including *Grus japonensis, G. vipio, G. monacha,* Spotted Greenshank(*Tringa guttifer*) and Spoon-billed sandpiper (*Eurynorhynchus pygmaeus*). About 170 species of birds are observed in this area.

3) Taedong Bay area

This area, situated between Ryongyon and Ongjin counties, South Hwanghae Province, is major wintering place for *Grus japonensis* and swan, important transit site for white stork, wild geese and longbill, and main habitat for shellfish.

4) 9.18 Reservoir area

The 9.18 Reservoir in Chongdan County, South Hwanghae Province and its vicinity, in particular islands along its seashore are breeding place for Black-faced spoonbill (*Platelea minor*), globally endanged species, and major transit sites for crane, duck, wild goose and longbill.

5) Estuary of the Tumen River

The wetland of Tumen River in Rason City, North Hamgyong Province, situated in border area with Russia, is a transit site for migratory birds including *Grus japonensis, G. vipio,* moorhen and swan which migrate along the coast of the Korean East Sea. And over 200 species of birds have been recorded so far.

5.3.1.3 Coastal and Marin ecosystem

Among 10 coastal aquatic resource reserves, the coastal ecosystems of Monggumpo and Ongjin areas of South Hwanghae Province, Riwon area of South Hamgyong Province, Tongchon area of Kangwon Province and Mts. Chilbo and Kumgang are given priority.

Among 15 marine resource reserves, 7 areas of waters have taken of priority, including Hwangjin Bay waters in Myongchon County and Sinchang Bay waters in Pukchong County of North Hamgyong Province; Kosong Bay waters in Kangwon Province, offing waters of Kangryong, Ongjin and Kwail Counties of South Hwanghae Province; offing waters of Cholsan County of North Pyongan Province.

5.3.2 Priority for the conservation of species diversity

5.3.2.1 Plant (24 species)

- Critically endangered species (CR): 8 species
  Quercus neoglandulifera
  Celtis cordifolia
  Stewartia pseudo-camellia

Megaleranthis saniculifolia
Deutzia peniculata
Neottianthe cucullata
Goodyera repens
Lilium dauricum

- Endangered species (EN): 7 species

Celtis edulis
C. choseniana
Drosera anglica
Forsythia densiflora
Abelia tyaihyoni
Pseudostellaria sylvatica
Viola websteri

- Vulnerable species (VU): 9 species

Nymphaea minima
Lindera salicifolia
Syringa fauriei
Abelia mosanensis
Taxus cuspidate
Lilium hangonii
Gastrodia elata
Rhododendron micanthum
Brasenia schreberi

5.3.2.2 Animal

1) Mammals (13 species)

- Critically endangered species (CR)
  Phanthera tigers
- Endangered species (EN)
  Pauthera pardus
  Cuon alpines
  Ursus arctos
  Cervus Nippon
- Vulnerable species (VU)
  Ursus arctos
  Martes melampus
  Martes zibellina
  Lutra lutra

Vulpes vulpes
Felis lynx
Moschus moschiferus
Nemorphaedus goral

2) Birds (22 species)

- Critically endangered species (CR)
  Dryocopus jarensis
  Tadorna cristata
- Endangered species (EN)
  Platalea minor
  Ciconia boyciana
  Grus japonensis
  Mergus squamatos
  Anser cygnoides
  Tringa stagnatilis
  Tringa guttifer
- Vulnerable species (VU)
  Egretta eulophotes
  Anser erythropus
  Anas formosa
  Aythya baeri
  Grus vipio
  Grus monacha
  Haliaeetus pelagicus
  Aquila clanga
  Coturnicops exquitus
  Eurynorhynchus pygmeus
  Larus saundersi
  Megalurus pryer
  Emberiza jankowski

3) Reptiles (5 species)

- Endangered species (EN)
  Pinodon rufozonatus
  Eumeces coreensis
- Vulnerable species (VU)
  Flaphe schrenskii
  Couber spinalis

Geodemys reevesii

4) Amphibians

- Endangered species (EN)
  Hynobins keyserling
- Vulnerable species (VU)
  Rana coreana
  Rana shosenica

5) Fish

- Endangered species (EN)
  Acipenser mikadoi
  A. dabryanus
  Coregonus ussuriensis
  Thymallus arcticus
  Phoxinus kumgangensis
  Gonoproktopterus mylodon
  Sarcochellichthys sinensis
  Coreoleuciscus splendidus
  Microphysogobia koreensis
- Vulnerable species (VU)
  Culter brevicauda
  Hemiculter leucisculus
  Phoxinus semotilus
  Leuciscus waleckii
  Phoxinus percnurus
  Phoxinus phoxinus
  Gobiobotia macrocephalus
  Misgurnus buphoensis
  Platichthys stellatus
  Rhodeus sericeus
  Saurogobio dabryi
  Pseudobagrus emarginatus
  Gobiobotia brevifolia
  Parasilurus microdorsalis
  Coreoperca herzi
  Lota lota
  Trachydermus fasciatus

6) Insect

- Vulnerable species (VU)
  Parnassius bremery
  P. nomion, etc.

5.3.3 Priorities for gene diversity conservation

Followings are the traditional genetic resources that have taken of conservation priority for crops, domestic animal, medicinal herbs, fishes, etc.

1) Crops

Following cultivars: Songchon tabacco, Hoeryong tabacco, Dongsin narrow-neck pear, Kilju pear, Pongsan green pear, Sangwon sweet apricot, Kangdong big jujube, Ryonggang white peach, Chongdan big plum, Kalchon watermelon, Uiju groundnut, Changsong red pepper, Anju cotton

2) Domestic animal

Daeguan Korean ox, Jangyon Korean ox, Saebyol sheep, Hwadae sheep, Hoeryong chicken, Onsong chicken, Daehung chicken, Ryongyon chicken, Pungsan dog.

3) Medicinal herb

Wild *Panax ginseng*, *Rheum coreanum*, Kanggye peony, Songha big *Crataegus pinnatida*, Sangwon fowglove, Rangrim *Chodonopsis pilosula*.

4) Fish

Mandarin fish (*Siniperca scherzeri*), *Hucho ishikawai*, ayu (*Plecoglossus altivelis*) in the Chongchon River and Kosong area

5) Others

Taechon rhus, Taehongdan aster, Paektusan cranberry (*Vaccinium uliginosum*).

5.4 Priority projects

Project 1

1) Title: Establishment of management system and building-up management capacity of national protected areas

2) Objectives:

In accordance with the increase in number and acreage of protected areas, to establish a management system and improve management capacity of national protected areas.

3) Justification:

After entering into the CBD, DPR Korea has twice increased the number and acreage of protected areas to 7.25% of the whole territory by the early 2007. In this context,

to establish an adequate system for the conservation and management of protected areas is vital.

At present, the protected areas which have been established long ago are provided with infrastructure for their conservation and management, but not the newly established ones are properly with facilities and personnel for management and consequently very weak in their management capacity.

Therefore, the conservation objectives and plans will be prepared, their function will be distinguished and subsequent measures for conservation management will be taken for the protected areas newly established. Emphasis will be put on the monitoring and management of habitats and wildlife, *inter alia*, of threatened species, and regular assessment will be done on the effectiveness of the management measures. Besides, a series of systems will be set up for nature reserve, including systems of administrative institutions, scientific research, public propaganda and education, finance, industry construction and cooperation with local administrations in nature reserve, on the basis of socio-economic assessment on nature reserve. These systems will be developed into then a regular and integrated one.

4) Activities:

- To identify the general targets of conservation for every protected area and prepare plan
- To reinforce the legislation on protected area management, and monitor and supervise their implementation
- To establish management and scientific research institutions
- To make overall survey of resources in protected areas
- To establish protected area information system
- To develop models for effective management of protected areas
- To increase financial investment in the management of protected areas
- To establish nature management system according to the classified functions of protected areas
- To encourage protected area industry
- To assess socio-economic benefits from protected areas
- To train conservation and management personnel for protected areas

5) Implementation agency:

Ministry of Land and Environment Protection (MLEP)

State Academy of Sciences (SAOS)

Ministry of Forestry (MOFr)

6) Stakeholder involved in the implementation:

Ministry of Agriculture (MOA)

Ministry of Fisheries (MOF)

Cultural Relics Conservation Administration (CRCA)
People's Committees at all levels

7) **Period:** 3 year

Project 2

1) **Title:** Planning and designing of national system of protected area network
2) **Objectives:**

To Plan and design a national system of protected area network in such a way that protected areas are established as node and environmental protection forests as ecological corridor

3) **Justification:**

DPR Korea is willing to enlarge its protected area to 10% of whole territory by the end of a next decade of years. This will have trend of improving *in-situ* conservation out of protected areas and of connecting nature reserves by ecological corridors to set up nationwide network of protected areas.

By transforming all kinds of protection forests scattered outside protected areas into ecological corridors, total acreage of protected areas nationwide will likely to reach about 10% of the whole territory.

Then DPR Korea will consequently be able to achieve the objectives of the 2010 Biodiversity Target and the Global Strategy for Plant Conservation (GSPC). And the whole eco-environment of the country will be improved and the conservation of threatened species having their habitat outside protected areas will be strengthened in accordance with the requirement of GSPC, while providing favorable condition for the conservation of traditional cultivated plants and domestic animals and improving the conservation of insect-pollinators and natural enemies favorable to the conservation of agricultural biodiversity as well.

4) **Activities:**

- To survey and assess the current status and trends of existing environment-protective forests, e.g. windbreak, field protective, hygienic and ornamental, bank protective, and road protective forests
- To apply GIS techniques to positioning and designing ecological corridors
- To identify type and structure of ecological corridors
- To assess regional landscape diversity by means of landscape simulation
- To prepare the plan and design for the national system of protected area network
- To assess the ecological environment of and socio-economic benefits from the national system of protected area network
- To integrate the plan of the national system of protected area network into the Master Plan for Land Development

5) **Implementation agency:**
   Ministry of Land and Environment Protection (MLEP)
   State Academy of Sciences (SAOS)
6) **Stakeholder involved in the implementation:**
   Ministry of Forestry (MOFr)
   Ministry of Agriculture (MOA)
7) **Period: 5 years**

Project 3

1) **Title:** Conservation and management of biodiversity in Mt. Kumgang and Mt. Chilbo Nature Parks
2) **Objectives:**

To build up the conservation and management capacity of these two nature parks which have great significance in the conservation of species and landscape diversity, focusing at creating models of the comprehensive conservation and sustainable use of their biodiversity

3) **Justification:**

In Mt. Kumgang Nature Park, covering the area of 47,838 ha, there are 1,228 species of higher plants. Among them are included 112 kinds of endemic plants (about 20% of the total number), 14.4% of which are the genera of single-genus-single-species indigenous in Korea's flora. The nature park has 46 threatened species, 21.7% of which are indigenous plants, and its fauna has 258 species of vertebrates and 154 of butterflies including globally threatened species.

Mt. Chilbo Nature Park, with the acreage of 27,754 ha, is also rich in landscape and species diversity. The park is known to be inhabited by 855 species of higher plants and 274 of vertebrates.

Both these nature parks have their peculiar landscape diversity not only nationwide, but also worldwide and rich biological diversity as well. At present, they are provided with tourism infrastructure, but having weak capacity at education, mass propaganda and scientific research with regard to biodiversity. In this context, to enhance the capacity of conservation and management of these nature parks is of national, regional and global significance.

4) **Activities:**

- To assess in overall the value of the biodiversity in Mts. Kumgang and Chilbo Nature Parks
- To establish ecosystem observation center and regularly monitor and study their biodiversity

- To establish information systems on biodiversity
- To reinforce facilities for and activities of public propaganda
- To make clear functional classification of the Mt. Kumgang and Mt. Chilbo Nature Parks, and to draw up and implement the function-based plan for the conservation and management;
- To promote eco-tourism and nature park's industry

5) Implementation agency:

State Academy of Sciences (SAOS)

Ministry of Land and Environment Protection (MLEP)

6) Stakeholder involved in the implementation:

The People's Committees of Kangwon and South Hamgyong provinces;

Management Bureau of Tourism

7) Period: 5 years

Project 4

1) Title: Preparation of Wetland Action Plan and restoration of degraded wetland ecosystem

2) Objective:

- To create the national action plan which will serve as a guideline for the improvement of public awareness on the importance of the conservation and sustainable use of wetland ecosystem, and for the scientification, standardization and modernization of the conservation and sustainable use of wetlands;
- To restore the wetlands which are of international significance but have been considerably degraded, on which creating and extensively disseminating the model

3) Justification:

Wetland is one of the significant natural resources indispensable for sustainable development of national economy. The ecological functions and services it offers are various and enormous, including the natural disaster prevention and biodiversity conservation, but public awareness on them is comparatively low.

For DPR Korea, which has high density of drainage and is surrounded with seas at its three sides, it is particularly important to improve the management of wetland ecosystem.

Moreover, the wetlands on the coast of Korean peninsula, being located on the East Asia-Australia flyway that is one of 8 global flyways of migratory bird, serve as important transit sites for the migratory birds.

Such wetlands of global significance are under the high pressure by human's

activities, e.g. overexploitation of coastal aquatic resources. Even though there are many administrative sectors engaged in the conservation and use of wetlands, the inter-sectoral cooperation is not satisfactory, and a strategic plan and guideline to coordinate the conservation and sustainable use of wetland are not in place.

A framework of the conservation and management of wetlands that has already been set up through the implementation of the UNEP/GEF-supported project "Coastal Biodiversity Management of DPRK's West Sea" focusing at the Mundok Migratory Bird Reserve during 2004-2006 will further be enhanced.

4) Activities:

- To develop integrated system for the conservation, management and sustainable use of wetlands
- To study legislative aspect of the conservation and use of wetland resources
- To strengthen the propaganda, education and training with regard to wetland ;conservation and its sustainable use
- To establish a comprehensive assessing and monitoring systems on wetland
- To transfer appropriate technologies for the restoration of degraded wetlands
- To draw up site-based management plan for migratory bird reserves
- To build up the livelihood capacity of residents in wetlands
- To prepare, publish and disseminate wetland action plan

5) Implementation agency:

State Academy of Sciences (SAOS)

Ministry of Land and Environment Protection (MLEP)

6) Stakeholder involved in the implementation:

Ministry of Agriculture (MOA)

People's Committees at provincial, municipal and county levels

7) Period: 5 years

Project 5

1) Title: Updating of "Red Data Book" and capacity-building for conservation of threatened species

2) Objective:

- To update the existing "Red Data Book" (Plant and Animal editions);
- To in overall assess the priority order of threatened species conservation and thus build up capacity for *in-situ* and *ex-situ* conservation of threatened species;

3) Justification:

"Red Data Book" (animal edition in 2000 and plant edition in 2005) was prepared under the supervision of the State Academy of Sciences (SAOS), with the support from UNESCO. It is necessary to update them in accordance with the changes in eco-

environment and to draw up species diversity strategy and action plan by conducting comprehensive assessment to recheck the priority order of protected species from the viewpoint of national and international significance.

In this relation, DPR Korea intends: to reassess the causes of threats to threatened species and their habitats; to evaluate the acreage of the protected area and the minimum viable population (MVP); to strengthen the research on the prevention of habitat loss and habitat diversification, on the ecological corridor between habitats and its establishment, and on the population size and genetic diversity conservation; to organize the conservation allotment for priority species in *ex-situ* conservation facilities including botanical and zoological gardens according to the priority order of threatened species, with actively developing technologies for species conservation and artificial multiplication, and to make a framework for their return to nature.

4) Activities:

- To reinvestigate and reassess threatened species of plant and animal
- To re-identify the priority order of threatened species conservation
- To assess the MVP of main threatened species
- To transfer appropriate technologies for habitat diversification
- To design ecological corridors between habitats
- To prepare, publish and disseminate the updated versions of "Red Data Book"
- To develop and transfer technologies for artificial propagation and cultivation of main threatened species in botanical and zoological gardens
- To establish a species registration system for the threatened species which are under ex-situ conservation
- To make plan and framework for the return of main threatened species to nature
- To reinforce the research for the return of main threatened species to nature

5) Implementation agency:

State Academy of Sciences (SAOS)
Central Botanical Garden (CBG)
Central Zoo (CZ)

6) Stakeholder involved in the implementation:

Ministry of Land and Environment Protection (MLEP)
Cultural Relics Conservation Administration (CRCA)

7) Period: 8 years

Project 6

1) Title: Conservation of black-faced spoonbill and crane

2) Objectives:

To substantially improve the conservation of black-faced spoonbill that is a globally

threatened species and its breeding place is found so far only on the Korean Peninsula and the crane for which the Korean peninsula is an important wintering and transit place

3) Justification:

DPR Korea is the breeding place of black-faced spoonbill, one of the globally endangered species (its total number worldwide is 1,600). And its wintering places cover Hong Kong, Taiwan, the Red Catchment area in Vietnam and Kyushu in Japan. Up to now, its breeding places have reportedly been some uninhabited islands in the Korean West Sea (Taegam and Sogam islets in the offing of Sonchon County, North Pyongan Province, Tok Islet in the offing of Onchon County, South Pyongan Province, and Ryongmae and Hambak islets in the offing of Chongdan County, South Hwanghae Province).

White crane with red crest winters in the central region of the Korean Peninsula. White-necked crane (*Grus vipio*) and hooded crane (*Grus monachus*) migrate from the breeding places in Russia and China to the wintering places in Kyushu area of Japan *via* the Korean Peninsula, in which some of their flocks spend the winter. White cranes with red crest are still under critically endangered state due to the habitats restricted in narrow area and to the other factors like epizootic diseases.

In this context, the improvement of the conservation and management of black-faced spoon bill's breeding places and crane's wintering places is the basic requirement for preventing the extinction of these species.

The habitat conditions of black-faced spoon bill should be improved and the wintering places of crane restricted in narrow area should be dispersed to original wintering places.

4) Activities:

- To overall resurvey the breeding places of black-faced spoonbill and regularly monitor and research their breeding conditions
- To investigate and improve the management of breeding places of black-faced spoonbill
- To re-assess the habitat conditions of wintering and transit places of cranes in a comprehensive way
- To research on and implement the dispersion of white crane's wintering places
- To improve the habitat eco-environment of the areas to where the wintering places of cranes are expected be dispersed
- To strengthen laws and regulations for the conservation of black-faced spoonbill and crane
- To develop the models of community-participatory protected area management

5) Implementation agency

State Academy of Sciences (SAOS)
Ministry of Agriculture (MOA)

6) **Stakeholder involved in the implementation:**
Ministry of Land and Environment Protection (MLEP)
Cultural Relics Conservation Administration (CRCA)

7) **Period: 5 years**

Project 7

1) **Title:** Site-based conservation and management of wildlife in the places close to populated rural areas

2) **Objectives:**

To set up a participatory conservation system compatible with the sustainable agricultural development of pertinent areas for the effective conservation of threatened wildlife species inhabiting in the vicinity of populated rural areas

3) **Justification:**

In DPR Korea where the population density is high, the habitats of many bird species including cranes, one of the globally threatened species, mammal species (e.g. otters), insect species in low hill areas and threatened plant species are located in close vicinity of populated rural area.

In this context, it is urgently requested to:

- *Create* socio-economic conditions which enable to maintain and manage the regional environment *inter alia* the universal foundation of guaranteeing sustainable agricultural development, while increasing public awareness on biodiversity conservation in rural areas
- *Establish* open protected areas which promote the active participation of local communities and residents in the site-based conservation of wildlife
- *Build* the comprehensive management capacity on environment and ecosystem in pertinent areas

4) **Activities**

- To assess the habitat status of the threatened species selected nearby populated rural areas and reasons of threats
- To enhance propaganda, education and public awareness on habitat value
- To transfer protective bio-technologies related to the conservation and restoration of habitat
- To promote the introduction of organic farming to selected rural areas
- To establish the foundation for sustainable agricultural development in selected rural areas

- To provide necessary financial and technical support to the selected rural villages in connection with their conversion into eco-village
- To establish the participatory management system for threatened species and their habitats, and build up the capacity of village custodians
- To establish participatory monitoring system for threatened species and their habitats
- To improve the livelihood capacity of residents in selected rural villages
- To develop and disseminate models of site-based conservation of wildlife

5) Implementation agency:

Ministry of Agriculture (MOA)

State Academy of Sciences (SAOS)

6) Stakeholder involved in the implementation:

Ministry of Education (MOE)

Ministry of Land and Environment Protection (MLEP)

Cultural Relics Conservation Administration (CRCA)

7) Period: 4 years

Project 8

1) Title: Capacity-building for *ex-situ* conservation of genetic resources

2) Objectives:

To enhance the institutional, technical and human capacity of the facilities for *ex-situ* conservation of genetic resources, e. g. botanical and zoological gardens, arboreta and agricultural gene banks

3) Justification:

Now, the artificial propagation of threatened, endemic and economic species is actively undertaken in botanical and zoological gardens and arboreta, but not meeting the international requirements for species conservation including breed registration. And the conservation facilities for the conservation of genetic resources of crops, domesticated animals and microbes are small in scale and weak especially in technical and human capacity.

In this regard, the capacity-building of gene conservation facilities, transfer of advanced technologies, comprehensive development of theory and practice related to the effective use of genetic resources are imperative for the conservation and sustainable use of biological diversity.

With this view, an action plan for the capacity-building of *ex-situ* conservation should be in place so as to facilitate the information exchange and duty assignment among the conservation facilities scattered around the country, and to enhance the role of gene conservation facilities.

4) Activities:

- To prepare an action plan for the capacity-building related to *ex-situ* conservation of genetic resources
- To establish a registration & conservation system for the breeds of threatened species in botanical and zoological gardens and arboreta
- To promote the transfer of advanced technologies related various conservation types of seed, *in vitro*, pollen, spore, DNA and in-field
- To promote the effective management of genetic diversity in *ex-situ* conservation
- To develop technologies for the return or supplementation of threatened species to nature
- To train experts for *ex-situ* conservation of genetic resources

5) Implementation agency:

State Academy of Sciences (SAOS)

Acacemy of Agricultural Science (AAS)

Mt. Daesong Management Bureau (MDMB)

6) Stakeholder involved in the implementation:

Ministry of Land and Environment Protection (MLEP)

Ministry of Agriculture (MOA)

Ministry of City Management (MOCM)

7) Period: 6 years

Project 9

1) Title: Capacity-building for National Biosafety Management Centre (NBMC)

2) Objectives:

To reinforce the capacity of NBMC for establishing the national biosafety system on genetically modified organisms (GMOs)

3) Justification:

The Democratic People's Republic of Korea is making strenuous efforts to discharging its obligations as a party to the Cartagena Protocol on Biosafety.

On December 22, 2004, the "Law on the Management of Genetically Modified Organisms" was adopted and subsequently the enforcement regulations and detailed rules relative to its implementation have been promulgated.

For the regular establishment and sound management of national biosafety system in support of the implementation of national legislations, the country set up the National Biosafety Management Center in September, 2005 as a focal point of biosafety-related issues.

Main areas of NBMC's responsibility are: supervision on and control of the biosafety-related law enforcement; inspection and verification of GMOs-containing

imports and exports; registration and/or deposit of genetic resources and GMOs possessed by institutions and enterprises; study and preparation of biosafety-related legislation; propaganda, education and public awareness; arrangement of qualification examinations of the personnel engaged in gene-handling.

In spite of a series of successes in the general processes related to GMOs, the regular operation of NBMC is still facing many challenges. In this regard, the capacity of National Biosafety Management Centre (NBMC) should be substantially enhanced.

4) Activities:

- To strengthen the supervision and control over the enforcement of laws, regulations, detailed rules in relation to:
  - Observation of application and approval system for genetically modified crops
  - Marking genetically modified crops
  - Registration and deposit of genes
  - Observance of regulations on the grade of gene-related laboratories and their handling procedures
  - Waste treatment
- To promote education, public awareness and involvement in support of the biosafety of GMOs
  - Installation and operation of rooms for visual-education, training center and dissemination halls
  - Installation and operation of consultation offices for facilitating public participation
  - Publication of pamphlets and journals
  - Manufacture of multimedia presentations
  - Propaganda by means of various media, such as newspaper, radio and TV
- To establish inspection and verification system on GMOs
  - Establishment of alien gene detection mechanism
  - Detection of GMOs from food, feed and processed foodstuff
  - Detection of GMOs from arbores, animals and fishes

5) Implementation agency:

National Biosafety Management Centre, as a subsidiary of SAOS

6) Stakeholder involved in the implementation:

Branch Academy of Biotechnology (BAB, a subsidiary of SAOS)

Academy of Agricultural Science (AAS)

Ministry of Agriculture (MOA)

Quality Supervision Administration (QSA)

Ministry of Education (MOE)

7) **Period: 3 years**

Project 10

1) **Title:** Restoration of degraded forests and improvement of catchment area management

2) **Objective:**

To promote the quick restoration of recently degraded forests and integrated it to the catchment area management so as to build up the capacity for sustainable management of catchment areas

3) **Justification:**

Degradation of sloping land forests, due to the topographical conditions of DPR Korea that 80% of its whole territory is mountainous and to the recent economic difficulties, causes subsequent soil erosion and water loss, resulting in further soil desolation, adverse impact on inland water ecosystem and the loss of natural.

In this context, nationwide enlargement of tree nurseries, increase in sapling production capacity and all-people campaign for forest restoration have been and are well under way.

If the restoration of degraded forest is not merely restricted to artificial reforestation, but promoted in a far-sighted way and in close integration with the objectives of catchment area management (e.g. conservation of forest biodiversity, enhancement of water control capacity, prevention of soil degradation, sustainable use of sloping land, inland water ecosystem stability, mitigation of negative impacts on downstream areas etc.), the ecological functions and services of catchment area forests (e.g. prevention of natural calamities, guarantee of ecological safety and so on) will be enhanced, while making contribution to the welfare of rural area residents as well.

The project is aimed at raising public awareness, active transfer of associated technologies so as to build up general capacity for the sustainable management of catchment areas in support of the implementation of above-mentioned objectives.

4) **Activities:**

- To plan and design multi-dimensional and mixed reforestation for the restoration of degraded forests
- To transfer the restoration technologies of artificial forests corresponding to various degrees of their degradation
- To transfer appropriate technologies for the restoration of natural forests
- To collect, classify and assess the information on catchment areas
- To create participatory model on the integrated management of catchment area
- To design and disseminate various types of protection forests for catchment area

- To transfer and disseminate appropriate technologies for sloping land management
- To transfer the monitoring techniques for catchment area management;
- To assess the eco-environmental and socio-economic benefits from the integrated management of catchment area and perform the activities for public awareness

5) Implementation agency:

Ministry of Land and Environment Protection (MLEP)

State Academy of Sciences (SAOS)

Ministry of Forestry (MOFr)

6) Stakeholder involved in the implementation:

People's Committees at provincial, municipal and county levels

7) Period: 10 years

Project 11

1) Title: Model development for the conservation of forest biodiversity and sustainable management of forest

2) Objectives:

To create and generalize the models of sustainable forest management, so as to promote forest biodiversity conservation

3) Justification:

In DPR Korea, 80% of whole territory is mountainous and 73% is forest land. Therefore, forest plays a major role in eco-safety and biodiversity conservation of the country.

Unsustainable forest management accelerates the degradation of forest land and brings about biodiversity loss.

The restoration of degraded forests of 700,000 ha, sustainable management of industrial forests for lumber production (2,000,000 ha) and the management improvement of the forests belonging to cooperative farms (200,000 ha) are urgently requesting the establishment of sustainable forest management system with emphasis on the biodiversity conservation of forest ecosystem.

In this regard, followings issues should be solved:

- Development of criteria and indicators for sustainable forest management
- Organization of optimal production to meet the demand for forest products from sustainable forest management
- Securing the ecological sustainability including the conservation of soil and water resources by the sustainable management of forest land
- Fair and equitable sharing of benefits arising from sustainable management by public participation

- Preparation of forestation plan, selection of tree species, management of forested land, development of pest & disease control technologies
- Conservation of forest resource and key & threatened species in the important areas for biodiversity conservation

4) Activities:

- To enhance the education and public awareness on the conservation of forest biodiversity and sustainable forest management
- To develop action plan for and guide to sustainable forest management
- To reinforce the scientific research on and technology development for the assessment and monitoring of sustainable forest management
- To build up the sustainable management capacity of management offices of protection & industrial forests at municipal and county levels for sustainable forest management
- To develop participatory management technologies of forest and to promote fair and equitable sharing of benefits arising form them
- To create and disseminate the model of sustainable forest management
- To apply cyclic felling method and enhance production efficiency on the basis of conservation technology of forest resource
- To develop and disseminate diversified forest management methods
- To perform consultative service for scientific and technical matters related to the sustainable forest management
- To prepare and implement a plan to manage at least 30% of production forest lands in accordance with the conservation of plant biodiversity

5) Implementation agency:

Ministry of Forestry (MOFr)

Ministry of Land and Environment Protection (MLEP)

State Academy of Sciences (SAOS)

6) Stakeholder involved in the implementation:

People's Committees, Forest Management Offices, Industrial Forest Management Offices, Rural Economy Committees at provincial, municipal and county levels

7) Period: 10 years

Project 12

1) Title: Dissemination of agro-forestry management

2) Objective:

To develop and widely disseminate agro-forestry management methods corresponding to various conditions of location, mainly centered on degraded forest lands of populated area for setting up natural resource management system

ecologically safe and economically beneficial

3) Justification:

Most of the recently enlarged treeless land is located in the vicinity of populated areas. Therefore, the prohibition of cutting and reforestation at forest lands of gradient over 20°, design and model development & dissemination of agro-forestry management at sloping lands of gradient lower than 20°, which prevents soil degradation, guarantees ecological safety and enhances soil productivity, according to various conditions of location, will produce new goods and provide favorable conditions for the promotion of livelihood of farmers and local residents, activation of local economy and improvement of eco-environment.

In this regard, it is important to fix the structural model of reasonable agro-forestry management corresponding to location condition by intensifying scientific research on it and to strengthen education and public awareness, *inter alia* for the management personnel of local economy on purpose to enhance their capacity.

These objectives, if implemented in close combination with the sustainable use of biodiversity components, would be able to give birth to various innovative plans. For example,

Raised socio-economic benefits arising from agro-forestry management can activate the site-based renewable energy development in rural areas and consequently it will be possible to halt the degradation of forest due to overexploitation of firewood and ensure the ecological balance and benign circle of eco-environment.

4) Activities:

- To fix the reasonable model of structure for agro-forestry management and strengthen scientific research on its cultivation technologies
- To develop the methodology of participatory agro-forestry management
- To strengthen the education and expert training on agro-forestry management
- To create models of agro-forestry management and intensify public awareness and propaganda through them
- To build local officials' capacity for agro-forestry management
- To assess eco-environmental and socio-economic benefits arising from agro-forestry management
- To establish the system of processing technology transfer, commercialization and distribution of the goods derived from agro-forestry management

5) Implementation agency:

Ministry of Land and Environment Protection (MLEP)

Ministry of Agriculture (MOA)

Ministry of Forestry (MOFr)

State Academy of Sciences (SAOS)

6) **Stakeholder involved in the implementation:**

People's Committees, Forest Management Offices, Rural Economy Committees at provincial, municipal and county levels

7) **Period: 5 years**

Project 13

1) **Title**: Dissemination of environmentally friendly farming system and conservation of agro-biodiversity

2) **Objective:**

To promote sustainable development of agriculture, with improving agricultural eco-environment and raising farmer's income at the same time, by integrating the introduction & dissemination of organic farming based on the healthy soil with the conservation of agricultural biodiversity

3) **Justification:**

Production and distribution of organic agro-products and green ones arising from both organic farming and eco-farming are one of important ways that make it able to obtain both ecological and socio-economical benefits by improving environment conservation and local economy.

It is also of great significance in the production of and provision people with agro-products high in nutrition and safety.

In order to produce the organic and unpolluted agro-products aiming at environment conservation, safety and health, the assessment on and creation of production environment, establishment of production process in conformity with technical criteria of production and test & verification and so on should meet the international requirements.

Organic farming needs ecological balance and diversity, nutrition circulation and sound soil fertility, and should be closely integrated with the conservation of agro-biodiversity. The conservation of soil biodiversity is particularly important for maintaining and raising soil fertility.

Besides, organic farming is related to the technology transfer and public awareness on the conservation and sustainable use of agro-biodiversity, e.g. the conservation of traditional crop and livestock breeds including ones of pest & insect resistance, the conservation of natural enemies and pollinator insects, nutrition circulation and the safety of productivity and ecosystem etc.

As the organic and green agro-products are competitive with the advantage of overcoming the so-called "Green Barrier" in international trade market, they are of great significance in the development of rural economy, in raising income and livelihood capacity of farmers and in sustainable agricultural development.

4) Activities:

- To prepare and disseminate the guide on organic agriculture
- To assess the environment of production place and to identify environment criteria
- To transfer the technology of soil management at the stages of environment creation for and transition into organic
- To establish production technology for organic and unpolluted agro-products
- To set up the system for the process of and test & verification on organic and unpolluted agro-products
- To create and generalize farm & work-team models of organic farming
- To make farmers be aware of the conservation and sustainable use of agro-biodiversity
- To transfer the technology on the conservation and use of insect-pollinator and natural enemies
- To enhance the study on soil biodiversity conservation.

5) Implementation agency:

Academy of Agricultural Science (AAS)
State Academy of Sciences (SAOS)
Ministry of Agriculture (MOA)

6) Stakeholder involved in the implementation:

Rural Economy Committees and People's Committees at provincial, municipal and county levels

7) Period: 5 years

Project 14

1) Title: Establishment of the system for propagation and sustainable use of coastal aquatic resources, and monitoring of coastal biodiversity

2) Objective:

The system for propagation, sustainable use and monitoring of coastal aquatic resources is established so as to promote the conservation of coastal biodiversity and meet the demands of the people for aquatic products.

3) Justification:

On the Korean Peninsula which is surrounded by sea on three sides, the conservation of marine and coastal biodiversity and sustainable use of aquatic resources have great significance for the self-sufficiency in aquatic products and improvement of water ecosystems.

In consideration of the repeated overexploitation of coastal aquatic resources and stagnation of deep-sea fishery due to recent economic difficulties, the establishment

of a system for the conservation and sustainable use of coastal aquatic resources is emerging as a pressing issue.

In this context, the Ministry of Fishery (MOF) has concentrated on the conversion of fishery from only catching into cultivating one and achieved considerable successes in establishing and readjusting nurseries at several fishery units including Yanghwa Fishery Station and in creating coastal fisheries.

Further expansion of the successes achieved in coastal fishery, inter alia centered on cultivation, is very important in developing major coastal fisheries of the KES and KWS into cultivation-centered fisheries.

For this purpose, it is required to;

- prepare comprehensive plans for coastal water development so as to increase fisheries output by making full and effective use of the biological productivity of coastal waters
- improve the management of coastal aquatic resource reserves in accordance with the demands of the fundamental guide related to coastal aquatic resources
- conduct regular monitoring of the biodiversity of coastal fisheries and coastal aquatic resource reserves by means of advanced technologies such as GIS and RS, and promptly integrate the results thereof into the practice of production and conservation

4) Activities:

- To survey and assess the biodiversity of major coastal ecosystems
- To strengthen regulation and control on the use of coastal aquatic resources
- To promote the transfer of advanced technologies for rearing/cultivation-centered coastal fishery
- To create and generalize the model of rearing/cultivation-centered coastal fishery
- To improve the management of coastal aquatic resource reserves
- To conduct regular assessment and monitoring on coastal fisheries and coastal aquatic resource reserves by using RS system
- To train technical experts in rearing/cultivation-centered fishery
- To assess the impact of alien species on coastal biodiversity

5) Implementation agency:

Ministry of Fishery (MOF)

6) Stakeholder involved in the implementation:

State Academy of Sciences (SAOS)

7) Period: 5 years

Project 15

1) **Title:** Conservation and sustainable use of Koryo medicine resource of wide use

2) **Objective:**

To set up the system for the conservation and sustainable use of Koryo medicine resource so as to satisfy the demand for it

3) **Justification:**

In DPR Korea, there are about 900 species of medicinal plants, 170 of which are major species widely used in traditional medicine.

As for the major species of medicinal plants, followings can be cited:

Panax ginseng, astragalus, forest asiabell(*Codonopsis pilosula*), *Schizandra chinensis*, *Eleutherococcus senticosus* (tonic), *Crataegus pinnatifida*, *Apocynum lancifolium*, *Adonis amurensis* (tonic), wild ginger plant(*Asiasarum heterotropoides var. seoulense*), *Clematis mandshurica*, licorice, *Atractylodes japonica*, *Rheum coreanum*, *Sasamorpha purpurascens* (digestive), *Platycodon grandiflorum*, thyme, *Fritillaria ussuriensis*, *Codonopsis lanceolata* (cough medicine), *Cimicifuga heracleifolia*, *Anemarrhena asphodeloides*, and *Scutellaria baicalensis* (antipyretic).

Young antler, musk, bear's gall, wild boar's gall and soft-shelled turtle are main animal-origin medicinal materials.

In case of the medicinal herbs of being used their whole part or root, priority should be given to the resource creation in consideration of the demand expected, and intensive cultivation and mountain cultivation should properly be combined.

Considering the situation that not a little of medicinal herb resources has seriously been lost by over-exploitation due to the economic difficulty recent years, it is necessary: to conduct the resource assessment of the whole medicinal herbs and based on it to prescribe the exact limit of resource exploitation; to increase the kinds and production scale of cultivated medicinal plant; and to improve public awareness on the conservation and creation of medicinal plant resource.

4) **Activities:**

- To assess the amount of medicinal plant resources
- To promote the scientification and modernization of medicinal herb farms and transfer technologies associated with cultivation;
- To improve the management of medicinal plant resource reserves
- To enhance the conservation capacity for genetic resources of medicinal plants
- To create and generalize the models of integrating the creation of mountainous medicinal plant resource to forestry management
- To conduct technical rehabilitation of artificial propagation facilities for medicinal animals
- To promote propaganda and dissemination on the conservation of medicinal plant resources

5) **Implementation agency:**
   Ministry of Public Health (MOPH)
   Academy of Medical Science (AMS)
6) **Stakeholder involved in the implementation:**
   Ministry of Land and Environment Protection (MLEP)
   Ministry of Forestry (MOFr)
7) **Period: 5 years**

Project 16

1) **Title**: Establishment of the bases and network of ecological observation for the improvement of ecosystem management
2) **Objective:**

To create the bases and network of ecological observation on forest and inland water ecosystems to perform the long-term and comprehensive monitoring and research on the types and environment of local ecosystems and to improve the management of terrestrial ecosystem, and thus to secure the sustainable economic development

3) **Justification:**

Systematic performance of the long-term and comprehensive research and monitoring on forest and inland water ecosystems makes a great contribution to the conservation of forests and rivers and ecological safety and to securing the sustainable development of local economy.

At present, there are stationary observation posts set up at provincial, municipal and county levels and at large catchment area areas and a system of comprehensively analyzing the observed data from the posts and artificial satellite in meteorological and hydrologic sector in place.

However, the comprehensive and long-term observation and research on the biodiversity of forest and inland water ecosystems are still in its infancy.

In this context, it is necessary:

- To observe the changes in terrestrial ecosystems comprising forest, river and agricultural areas, to comprehensively assess the ecological models and statistical figures obtained and to further seek the possibility of integrating them into the network of meteorological observation;
- To establish the ecological observation bases for main forest, inland water and agricultural ecosystems;
- To establish the scientific early warning system on natural calamity and catchment area management system by combining various approaches including RS, GIS and mathematical modeling

4) **Activities:**

- To select the ecological observation bases on forest and inland water ecosystems and draw up the plan for their construction
- To build the selected eco-observation bases and reinforce their facilities and equipments for observation and research
- To train the experts engaged in eco-observation bases
- To ensure the normal operation of eco-observation bases and reinforce their capacity for synthesizing, analyzing and assessing data
- To set up the network of eco-observation centers

5) Implementation agency:

State Academy of Sciences (Branch Academies of Forestry and Fishery Sciences)

6) Stakeholder involved in the implementation:

Ministry of Land and Environment Protection (MLEP)

Ministry of Forestry (MOFr)

Ministry of Agriculture (MOA)

Hydrometeorology Bureau

7) Period: 5 years

Project 17

1) Title: Establishment of national biodiversity information system

2) Objective:

To set up information system based on biodiversity-related data and analysis thereof in order to support monitoring on biodiversity, disseminate scientific knowledge and assure inter-sectoral integration through the exchange of the information on science and economy

3) Justification:

Biodiversity-related database is in the stage of construction, and the CHM has already been established with the support of the UNEP and is in the process of capacity-building.

Arrangement of dispersed databases and supplementation of inadequate ones in accordance with the unified national plan, designing and operating national biodiversity information system are imperative for the smooth exchange of information relevant to the conservation and sustainable use of biodiversity.

4) Activities:

- To construct and integrate the biodiversity databases in terms of:
  - Species, threatened species and protected life;
  - Genetic resources
  - Ecosystem
  - Biological specimen

- *Ex-situ* conservation
- Habitat
- Alien species
- Diagrams and models

- To analyze and assess the needs for biodiversity information
- To design and operate the biodiversity information system
- To operate, maintain and update the biodiversity information system
- To promote the development of biodiversity expert system (in terms of threatened species conservation, protected area planning, restoration of biodiversity, for the conservation of threatened species, nature reserve planning, sustainable use of bio-resources…) and consultation activities.

5) Implementation agency:

State Academy of Sciences (SAOS)

6) Stakeholder involved in the implementation:

Ministry of Land and Environment Protection (MLEP)
Ministry of Forestry (MOFr)
Ministry of Fishery (MOF)
Ministry of Public Health (MOPH)
Cultural Relics Conservation Administration (CRCA)
Mt. Daesong Management Bureau (MDMB)

7) Period: 4 years

Project 18

1) Title: Preparation of provincial biodiversity conservation plan

2) Objective:

To prepare and integrate provincial biodiversity conservation plan into the provincial mater plan for land development and thus enable the conservation and sustainable use of biodiversity hold an overwhelming in the land management at the provincial, municipal and county levels

3) Justification:

Taking the regional character of biodiversity into consideration, the preparation of provincial biodiversity conservation plan and its integration into the provincial mater plan for land development have great significance in defining the responsibilities of each administrative level on and promoting the conservation of biological diversity.

Within the framework of this project, provincial, municipal and county will have the increased understanding and appreciation that the conservation and sustainable use of biodiversity will make it possible to use mountains, rivers and seas in integrated way, to activate local economy and thus to improve people's life of local, and to increase

the creativity and originality of local communities.

4) Activities:

- To synthesize the status and trends in biodiversity conservation and bio-resource use at provincial level into a database
- To identify the priorities of biodiversity conservation at provincial level
- To draw up the provincial biodiversity action plans
- To create and generalize the models of biodiversity conservation at provincial level
- To create and generalize the models of sustainable use of biodiversity components at provincial level
- To establish the provincial biodiversity information system

5) Implementation agency:

Provincial People's Committees

6) Stakeholder involved in the implementation:

Ministry of Land and Environment Protection (MLEP)

State Academy of Sciences (SAOS)

7) Period: 3 years

Project 19

1) Title: Improvement of the education, training and public propaganda relevant to biodiversity conservation

2) Objective:

To enable biodiversity concerns share more proportion in the national action plan for environmental education, so as to improve the expert training in this field and increase public awareness on the conservation and sustainable use of biodiversity.

3) Justification:

Current absence of the national action plan for environmental education requires its prompt preparation. On the other hand, more proportion should be shared by the education on biodiversity and ecology in the action plan, so that enough basic knowledge of the conservation and sustainable use of biodiversity could be implanted at both primary and middle school stages and expert need could fully be met at higher education stage.

In this regard, it is necessary to:

- *Establish* biodiversity-related reeducation system for the teachers of primary and middle schools
- *Manufacture* and *disseminate* various types of teaching aids, including multimedia products, which can supply sufficient knowledge of biodiversity corresponding to every level of education, and *integrate* this process into the

propaganda to increase public awareness on the conservation and sustainable use of biodiversity

- *Reinforce* the e-infrastructure and build the institutional and human capacity for e-media manufacturing
- *Promote* the biodiversity-related education and group activities within the framework of extracurricular education at primary and middle schools

Deep understanding and awareness on the importance and benefits of biodiversity will have great significance in preparing the coming generations so that they can fully demonstrate their creativity as masters.

4) Activities:

- To promote and support the preparation of action plan for environmental education
- To establish biodiversity-related reeducation system for the teachers of primary and middle schools
- To incorporate and supplement the biodiversity-related contents into the teaching materials and curricula of primary and middle schools
- To promote the biodiversity-related education in university and college, and strengthen the training of relevant experts
- To organize the biodiversity-concerned training courses for public officials and administrative personnel
- To manufacture and disseminate various kinds of e-media on the conservation and sustainable use of biodiversity, reinforce the e-infrastructure for this purpose
- To strengthen various activities of public propaganda to increase awareness of the conservation and sustainable use of biodiversity
- To strengthen various types of extracurricular education on biodiversity conservation

5) Implementation agency:

Ministry of Education (MOE)
State Academy of Sciences (SAOS)
Korea Nature Conservation Union (KNCU)

6) Stakeholder involved in the implementation:

Ministry of Land and Environment Protection (MLEP)
Ministry of Forestry (MOFr)
Ministry of Agriculture (MOA)
Ministry of Fishery (MOF)
Ministry of Public Health (MOPH)

7) Period: 3 years