

National Biodiversity Strategy and Action plan of The Democratic People's Republic of Korea

DPR of Korea

1998

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FOREWORD

Biodiversity is closely related to the existence of human and their activity. Plants, animals and micro-organisms that make up biodiversity are components of natural ecosystem, which provide the basis for sustainable economic development.

Biodiversity refers to all the varieties of biology that consist of genes, species, communities, populations and ecosystems. And they are closely linked with each other making life support system of the earth. This is the off-spring of the long time earth evolutionary processes. The losses of biodiversity throughout the world force the basis of natural ecosystem and of economic development destroyed, while giving threats to the survival of human life.

Biodiversity conservation (biodiversity conservation) is one of the important tasks faced to the government of DPRK. The reason lays to that improving management of land and environment protection to reduce the damages of biodiversity is an important work to fulfil the responsibility of the present generation to develop economy and hand over the beautiful land and rich resources to the coming generation. It is generally understood that there are three main components of biodiversity: ecosystem; species; and genetic diversities.

An ecosystem diversity is a complex of living species and their non-living environment. All species are part of an ecosystem, playing an unique role in maintaining ecological processes, and at the same time, it requires sound ecosystem composed of cycling of chemical elements and flow of energy necessary for life support. These ecological processes are essential for evolution and development for all living things. Consequently, to maintain diversity of ecosystem is essential to maintain diversity of species and genes.

Species diversity is the richness or the number of animals, plants and micro-organisms. As this is the richness or the number of one area, this can be accessed as a criteria of taxanogical diversity which takes into account of relationship between species. Biological species takes a place of basic materials contributing to the industrial development for agriculture, stock breeding, forestry, fishery and also, medicaments for human health.

Genetic diversity refers to varieties of genes that are present within individual and single species and between species. Genetic variability of species determines the potentials for evolution of species. Genetic diversity has great practical importance in breeding of new varieties for developing agriculture and fishery. Thus, biodiversity has uncountable values including supply of food, medicine, energy, clear air and water for human-being.

Biodiversity conservation can, therefore, be of importance to the sustainable development of economy and environment protection of each country and play an important role in protection of environment of a given local or the globe from the concern of series of global ecosystem.

As a signatory to the Convention on Biological Diversity which adopted at the United Nations Conference on Environment and Development (UNCED), Rio, in 1992, the government of DPRK has reflected the programme for nature protection area for biodiversity conservation into the "General Plan for Land Management"(GPLM), and saw to it that the nature protection areas be

newly established.

The great leader Kim Jong Il, recently, put forth several times on improving and strengthening the work of land and environment protection for the richness of our country. The government of DPRK, recognizing the work to be driven in nationwide scale, established in 1996 the environment protection term for a month in spring and autumn every year, and pushed this work with great effort since the autumn of 1996

The DPRK has not large territory but has unique biodiversity for it occupies a peninsula in north East Asia. There are 3,943 species of higher plant so far surveyed, among which 315 species are endemism accounting for 12% of whole species. Although endemic fauna species takes a small number, its formation is diversified in species as a result of active migration of northern and southern type of animals during glacial and interglacial epoch. Particularly, it has great importance as migratory route, a transit site for internationally rare birds such as cranes and Black faced Spoonbill.

The biodiversity for DPRK has suffered severe damages during the half century of Japanese colonialist rule and 3 years of Fatherland liberation War between 1950~1953. And the rapid growth of population and irrational exploitation of resources and destruction of ecosystems through frequent natural damages have resulted great losses of biodiversity.

The biodiversity conservation in DPRK faces numerous blocks for the reason of special features of and historic consequences to the country's biodiversity. This requires better prospective programmes be developed for DPRK biodiversity conservation. The key issues that need attention in country's biodiversity conservation are:

- Scientific research for biodiversity conservation including investigation on bio-resources and main habitats to be expanded and improved;
- Management of existing protected areas to be improved by integrating reserve network system comprising areas significant to the biodiversity conservation;
- To restore the natural damaged ecosystems and to make close combination of the plan for biodiversity conservation and the plan for land use.
- To increase the bio-resources such as forestry, fishery and herbs, and establish sustainable use system.
- Biodiversity experts to be trained in short period.
- Laws and regulations for biodiversity need to be enforced.

The Biodiversity Strategy and Action Plan for DPRK (BSAP) has been drafted with the consideration of above mentioned. The action plan is prepared to be reflected to the framework of GPLM, as well as to the general economic development plan.

This paper has compiled all the available existing data and knowledge of DPRK biodiversity, so to be prepared in line with the principles and guidelines provided by Convention on Biological Diversity. The paper can generally take into 2 parts; giving description of present status of DPRK biodiversity and efforts for its conservation; giving description of plan of action, the steps to be taken for its conservation.

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The BSAP consists of four chapters:

Chapter 1 provides an assessment of present status of biodiversity in DPRK; it summarizes biodiversity features and extent to which it is threatened and the urgency of biodiversity conservation and for its sustainable use.

Chapter 2 presents a description of the conservation in ex-situ and protected areas, the sustainable use of bio-resources in areas of agriculture, forestry, fishery, traditional medicine and tourism, and policies and legal basis, administrative and institutional systems, scientific and technological abilities for biodiversity conservation and its sustainable utilisation, and investment and international cooperations to this field.

Chapter 3 shows the description of strategy, conservation and sustainable utilisation, benefit sharing and general measures for biodiversity conservation in DPRK.

Chapter 4 addresses the action and priority projects for biodiversity conservation and its sustainable use:

The BSAP is of great importance for the DPRK itself. It is also an important component of the government's action for fulfilling its obligations to the Convention on Biological Diversity. And it will have a significant and positive impact to the contribution of north-east Asia and global biodiversity conservation.

INTRODUCTION

Country Background

DPRK is located in eastern part of Asia continent between 37°41'~41° 01' in northern latitude and 124°10'~130°41' in eastern longitude. The DPRK has two seas; the Korean East Sea (KES) and the Korean West Sea (KWS). And it borders with China and Russia by two rivers in north-west; Amnok river and Tuman River. It belongs to a typical temperate zone with distinct seasonal changes of climate. Its annual temperature is 8°C~12°C. The normal change of annual temperature is between 0°C~15°C. And it has regional and seasonal differences in climate, comparing to the size of its territory.

The average annual precipitation is 1,000~1,200mm. April~May is dry season, whereas June~August is rainy season which accounts 50% of total annual rainfall. 80% of territory is mountain and this mountainous topographical condition gives great impacts on climate. The average height above sea level is 583m. The topography of DPRK is characterized by developed and stiff valleys for covering many mountains and rivers. There are many mountains of over 2000m high including Mt. Paekdu and 1,000m high areas which account for 20% of the whole territory. The territory of DPRK can be clearly divided into 15 big basins and have large quantity of runoff compare to the size of rivers.

The DPRK covers an area of 122,762,338km². It has diverse type of soil and distinct horizontal and vertical zonation. There are 12 types of soil. Plant cover zone can be divided into 4: subarctic coniferous forest; temperate northern broad leaved forest; temperate midland coniferous and broad leaved mixed forest, and temperate southern coniferous and broad leaved mixed forest.

The DPRK has more than 100 natural lakes and 1,700 artificial lakes and reservoirs. Such kinds of water areas occupy 5% of territory.

The coastline of DPRK stretches 2,891.5km long and there are 180 islands in KES and 560 islands in KWS. Most of sea areas are continental shelves, and the whole of the west sea is continental shelf. Seas around DPRK are strongly influenced by the Pacific Ocean. The KWS and KES have different oceanographic features. Especially, the KWS has ebb and flows that expose long tideland. Consequently, preserved some relic species, "living fossils" of tertiary period and mesozoic era. And there were many moving of northern and southern type of fauna and flora during glacial and interglacial epoch. Since then, fauna and flora settled in the peninsula adapted to complex physio-geographical conditions and underwent an evolution into new varieties which diversified the biology of DPRK.

The peninsula has strong climate change and very intricate geography- mountain ranges, ramified river networks, numerous lakes, long coastline and vast seawater. This complicated physical condition provides various habitats for the existing fauna and flora. Therefore, the DPRK not only sustains the richness of fauna and flora, but also takes a place of high in number of species per unit of area in north east Asia.

Relationship of BSAP with National Developing Plan and Other Planning Process

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The BSAP is developed through several consultations among planning staffs and scientists and between central bodies and local administrative bodies relevant to the biodiversity conservation and its sustainable use. BSAP has reflected issues of international communities.

The biodiversity conservation and its sustainable use has many problems that need integrated measures, and therefore, can have a successful promotion only when close link between development plans of several sectors of national economy is provided.

The relationship of BSAP with national developing plan is as follows;

► **Plan in Forestry**

Great part of BSAP is nearly considered with plan of afforestation and use of forest of the country. Especially, efforts to restore the damaged forest ecosystem due to the recent natural disasters and convert Balded Mountains into thick forest so to promote afforestation throughout the country and sustainable forest development plan take great part of BSAP.

► **Plan in Agriculture**

The principle subject for agriculture is to protect agricultural eco-environment in order to improve the soil quality of farmland to provide safe agricultural production. From this point since most terrains are montane, to deduce the loss of soil and to conserve the biodiversity of agro-ecosystem that lead to the development of agriculture with environmental protection and agriculture with recycling of resources have close relationship with BSAP.

► **Plan in Fishery**

The major task for fishery is to provide the sustainable productivity of water area to ensure the full production of fish. From this point, the conservation of fish resource should be pushed in advance and strengthen the regulations for preventing the malpractice that lead to a immolation of development benefit for the sake of target benefit. Therefore, the BSAP reflects the programme to alternate the general fish industry into fishery with resource management while composing proliferation of fish resource with mariculture ahead.

► **Plan in Koryo medicine (traditional)**

The major task in Koryo medicine which has long historical traditions in DPRK is to provide full conservation and sustainable use of Koryo medicinal resource. The BSAP reflects the programme to promote the creation of Koryo medicinal resource, newly establish the protection areas; encourage the cultivation of domestic herbs and artificial propagation of animals for use of Koryo medicine.

► **Plan in Energy**

General Plan for Land Management(GPLM)

The GPLM is a integrated and prospective plan of land management to develop and use of land rationally in consideration of the development of national economy and welfare of our people and to improve the environmental protection. The BSAP is closely coordinated with all the plans related with natural environment protection and sustainable use of land and bio-resources, and great part of BSAP is reflected in GPLM.

► Plan in Scientific Research

The scientific survey and review on status and changes of country's biodiversity is a primary process for the conservation of biodiversity and its sustainable use. This led to comprise the scientific research programme for biodiversity conservation and its sustainable use as a major component of BSAP.

Process of Biodiversity Strategy and Action Plan

The BSAP of DPRK is developed with aid of GEF through UNDP in 1998. This project accepted the international consultants Mr. Manave Chacrabarti and Mr. Xue Dayuan since this project is under the Enabling Activity Project of GEF in 1997. For the preparation of BSAP, held there a training course by international consultants in Feb. 1998, and opened two times of national workshops for biodiversity conservation capacity building in April and November. Also, have had consultative meetings of local administrative bodies at major sites for biodiversity conservation.

The formulation of BSAP involved experts from Ministry of Land and Environment Protection, Academy of Sciences, Ministry of Agriculture, Ministry of Forestry, Ministry of City Management, Ministry of Fishery, Ministry of Public Health, Ministry of Education, Ministry of Finance and Korean Natural Conservation Union.

In November 1998, 2nd national workshop on biodiversity conservation capacity building had been held and there came on the carpet of BSAP draft. In February 1999, the DPRK Government endorsed the BSAP.

The BSAP shall take great significance to ensure the conservation and sustainable use of biodiversity in DPRK and to add lustre to the beautiful golden mountains and rivers of the country with full of animals and birds, and to overhand rich bio-resources to the coming generation. And also, it contributes to the global biodiversity conservation.

Chapter 1. THE STATUS OF BIODIVERSITY IN DPRK

1.1 Biological Resources

1.1.1. Ecosystem Diversity

The natural ecosystem of DPRK can, generally, be divided into 6 types: forest ecosystem; alpine ecosystem; wetland ecosystem; agricultural ecosystem; river ecosystem; and marine ecosystem.

1.1.1.1 Forest ecosystem

The forest ecosystem can be said to be the habitats for various animals and plants and micro-organisms including trees as a major component. The forest ecosystem in DPRK can take division into 3 kinds; coniferous forest, broad leaved forest and coniferous-broad leaved mixed forest.

Coniferous forest accounts for 41.9% of whole forest area. The representative forest types are; forests of *Abies nephrolepis*-*Picea jezoensis*, larch/*Larix olgensis*, *Pinus densiflora* and pine/*Pinaceae*. The *Pinaceae* forest accounts for 45.1% of coniferous forests. *Abies nephrolepis* - *Picea jezoensis* forest is a typical of subarctic coniferous forest, and the main tree species are *Abies nephrolepis*, fir/*A. holophylla*, spruce/*Picea jezoensis* and *P. koraiensis*. *Abies nephrolepis*-*Picea jezoensis* forest is mainly distributed in Paekdu Plateaus and Kaema Plateaus in the north of DPRK. *Abies nephrolepis*-*Picea jezoensis* forest takes 9.8% in coniferous forest. Larch/*Larix olgensis* is also a typical subarctic coniferous forest and distributed mainly in alpine area of Ryanggang Prov. and South and North Hamgyong Prov. This is distributed in areas of 1,000~1,900m high above sea level. The main tree species of this type are *Larix olgensis* var, *Koreana* and *Larix olgensis*.

The DPRK is a original place for *Pinus koreaiensis*. *Pinus koreaiensis* is distributed in broad areas except Paekdu Plateaus and Kaema Plateaus and in 1,200 m high area above sea level of Ryanggang Prov. and Jagang Prov. Especially, it is distributed, extensively, in the area of Mt. Oga.

The main tree species of the pine forest is *Pinus densiflora*, and this is distributed in every part of DPRK except northern alpine terrain. This is mainly distributed bellow 1,000m high above sea level and grow with *Larix olgensis* and oaks. It forms simple forest bellow 600m above sea level. The mean temperature of subarctic coniferous forest with *Abies nephrolepis*-*Picea jezoensis* and *Larix olgensis* forest is -5°C. This area is covered with distribution of animals such as; *Ursus arctos*, *Cervus nippon*, *Cervus elaphus*, *Martes zibellina*, *Lyrurus tetrax* and *Dryocopus Martius*.

The broad leaved forest covers an area of 35.6% of the whole forest area of the country which can be breakdowned into as subarctic deciduous broad leaved forest and temperate deciduous broad leaved forest. Subarctic deciduous broad leaved forest is consisted of *Populus koreana*, *Betula platyphylla*, *B. eramani*, *Acer palmatum*, *Phellodendron amurense* and *Pinus koraiensis* and also, *Abies holophylla*. The oak tree is the main species in temperate deciduous broad leaved forest which includes *Tilia amurensis*, *Juglans mandshurica*, *Acer palmatum*, and *Acer mandshuricum*. In southern terrain, *Carpinus laxiflora* and *Styrax japonica* are included. The oak forest is a typical forest community of temperate deciduous broad leaved forest in DPRK. The main tree species are *Quercus mongolica*, *Q. dentata* and *Q. acutissima*.

The annual average temperature in area of this community is 6°C~10°C and the precipitation varies around 700~1,400mm. The oak forest accounts for 52.4% of broad leaved forest and this is distributed even in the area of 1,400m high above sea level barring some alpine terrains. The broad leaved forest has about 90% of wild animals distributed. The representative species are *Sus scrofa*, *Hydropotes inermis*, *Vulpes vulpes*, *Nyctereutes procyonoides* and *Lepus mandchuricus*. And also, many birds including *Dryocopus javensis richardsi*, the indigenous species of our country are inhabiting in the broad leaved forest. The coniferous and broad leaved mixed forest in DPRK can be classified into; subarctic evergreen coniferous forest-deciduous broad leaved forest, subarctic deciduous coniferous and broad leaved mixed forest, temperate evergreen and deciduous coniferous and broad leaved mixed forest according to the climate zone. The coniferous and broad leaved mixed forest takes 22.5% of the whole forest areas.

As for forest type, we can take *Pinus densiflora-Quercus serrata* forest, *Larix olgensis-Betula er, amii-Populus davidiana* forest, *Pinus koraiensis-Betula platyphylla-Populus davidiana* forest, *Abies nephrolepis-Pinus Koraiensis-Tilia amurensis* forest, *Pinus densiflora-Betula platyphylla* forest. In addition to this, we can take *Pinus densiflora* forest as for artificial forest. 56.4% of wild animals are distributed in coniferous and broad leaved mixed forest. The main species are *Capreolus capreolus*, *Felis linx*, *Pteromys volans*. Also inhabit here spring birds including woodpecker.

- * The DPRK has no typical grassland ecosystem of large area, but only distributed in forest and agricultural ecosystem. All of the grasslands are originated from change of forests and since each grassland is surrounded by forests, they are easily alternated into forests if no attention for management is paid. Therefore, grassland in DPRK can be referred as forest type grassland ecosystem.

The main species of grassland ecosystem are *Miscanthus sinensis*, *Lespedeza crythoptria*, *Themeda japonica*, *Artemisia montana* and *Senecio nemorensis*. The DPRK has little experience of grassland ecosystem research. Recently, the efforts for creating grassfield of large area to breed grass animals such as goat is being deployed extensively. This lays weight to the improvement of formation and management of grassland ecosystem.

1.1.1.2. Alpine ecosystem

The alpine vegetation community in DPRK is distributed in areas along the peaks of above 2,000m high mountains. Mountains typically developed with alpine ecosystem are; Mt. Paekdu (2,750m), Mt. Pukpotae (2,288m), Mt. Nampotae (2,433m), Mt. Sobaek (2,171), Mt. Kanpaek (2,162m), Mt. Kwanmobong (2,540m), Mt. Duryu (2,309m), Mt. Chailbong (2,505m), Mt. Buksubaek (2,521m), Mt. Ryonhwa (2,355m) and Mt. Rangrim (2,186m). There distributed 250 species of alpine plants in alpine vegetation zone.

The representative community species are *Pinus pumila*, *Thuja koriensis*, *Rhododendron confertissimum*, *Rhododendron faurei*, *Oxytropis anentii* and *cladonica*. There are 30 species of endemic plant and 50 species of medical plant in alpine ecosystem. *Rheum coreana* is endemic species with high economic and medical values. Alpine ecosystem, also, have animals such as *Ochotona hyperborea*, the living fossils of glacial epoch and *Neomorpha goral* and *Cervus elaphes* and as for *Laves*, *Apus pcificus*, *Hirundoapus eaudacuta* and *Monticola gularis*. The

alpine ecosystem of the country has unique landscape and high value of tourism resource. However, the alpine ecosystem is under condition of easily destructible; is laid as an important object for its conservation.

1.1.1.3 Wetland ecosystem

Wetland ecosystem in DPRK is generally distributed in tidelands, estuaries and large lakes and some are found in marsh land and peat land. The vegetation community in tideland is distributed in belt-shape of 50~200m width from Bidan island and Dasa island of Amnok river to the whole coast of west sea. And the mouth of bay is 300~500m width. In east coast, they are distributed at estuaries of Kumya river. The formation history of vegetation community of tideland in DPRK is not so long. Therefore, there is little differences in plant species component and distribution. The main plant species are *Salicornia europaea*, *Suaeda japonica* and *Phragmites*.

The biological productivity in tideland plant community is every high, and comes 60t/ha in reed community. The number of invertebrate species and its density is high in tideland. Especially, various kinds of shells including *Metrix lamacki* are being inhabited in the coast of KWS.

The wetlands in east and west coast are the lead transit sites for intermediation habitat of migratory birds of north east Asia. The main tracts are: Dongrim ri, Mundok county of South Pyongan Prov. the mouth of Chongchon river; Haejung ri, Kumya county, South Hamgyong Prov. the mouth of Kumya river; Daedong bay between Ryongyon county, Taetan county and Onjin county, South Hwanghae Prov.; September, the 18th Reserve of Chongdan county, South Hwanghae Prov; and lake area of Razin-Sonbong, North Hamgyong Prov.

1.1.1.4 River ecosystem.

The DPRK has densed river network. The density of river network is 0.4-0.6km/km² and river basins account for 3.0% of whole territory. The rivers to flow into Korean West Sea(KWS) have their length very long as well as developed river branches, and the width of basins are wide compared to their length. The rivers to flow into Korean East Sea(KES) have their flow steep slope and short length.

The main plant species living in river basins are *Populus maximowiczii*, *Poncirus koreana* Rend, *Populus davidiana* and *Salix koreensis*. The vegetation community in river basin is playing a function of water catchment and land protection. Therefore, to provide the linkage between the basic study on plant community and river basin reforestation and management so to ensure the safe of ecosystem is regarded very important subject for river ecosystem management. Especially, to restore the recent flood damaged forests and river ecosystem to improve the biodiversity conservation is being raised as an urgent issue.

There are 30 species of endemic fish in rivers of the country such as; *Gonoproktopterus mylodou*, *Coreolueciscus splendidus* and *Thymallus articus*. The management of river ecosystem, therefore, has great significance in fresh water fish production. This lays necessity to the improvement of river ecosystem management which is being affected of human activities such as pollution.

1.1.1.5. Marine and coast ecosystem

The Korean West and East Seas are influenced by Pacific Ocean through several channels. Rivers of Amnok, Chongchon and Taedong from DPRK and rivers of Hwanghwa and Janggang from China are flowing in to the Korean West Sea carrying enormous amount of residue and deposits. The KWS has high ebb and flow.(maximum 11.02m high)

According to preliminary statistic, 250 species of fish are in offshore of KWS. The average water depth is 39m and the deepest one is 118m in west sea. It is, therefore, important task to protect water environment of KWS. Whereas, the average depth of KES is 1,668m, the deepest is 3,699m and the length (from north to south) is longer than the width (from the coast of DPRK to the coast of Japan). There are 600 species of fish in waters of KES. Deep and high transparency and salty water it has, not so affected by waters flowing down from inland.

The KES has very favourable conditions for mariculture. The coast is estimated to have 546 species of seaweed (*rhodophyte* 329, *phaeophyte* 130, and *chlorophyte* 87). The seaweed is being mixed with northern and southern species (factors). The KWS has its topography with tideland and many islets. And its inland has major farmland area. Whereas, KES has deep water and low ebb and flow, and most of tracts are rock areas except some big river estuaries. From these topographical differences of east west, they have distinct biological features. Since it is predicted the sea level rise following the global warming, survey study on marine ecosystem variability of the country is suggested absolutely necessary task.

1.1.2 Species Diversity

The species is the basic unit in the sense of biological evolution, and the species diversity takes the central position in the role of biological diversity. The DPRK is characterised with rich species of fauna and flora in light of its territory size.

1.1.2.1 Wild plants

The plant species recorded so far in DPRK are 8,758; among which 3,167 species, 690 genera, 204 families are vascular plants. The moss has 767 species, 243 genera, 80 families, and the lichen has 436 species, 59 genera, 28 families. And there are also lower plants of 4,406 species, 959 genera, and 269 families. The lower plant becomes the first step of producible biology among component of ecosystem and so takes basic place in biodiversity conservation of land, freshwater and sea water. It is predicted that the number of species in the country will be increased for there is on-going investigation of lower plant.

1.1.2.2 Wild animals

The vertebrates recorded up to 1997 in DPRK are 1,431 species of 472 genera of 151 families.

◆ Mammals

Among vertebrate, mammalian has 107 species of 69 genera of 28 families, among which terrestrial mammalian has 7 species, 48 genera, 20 families which composes 11 species of insectivores, 24 species of chiropter, 2 species of lagomorph, 18 species of rodents, 15 species of carnivores and 7 species of perissodactyls etc. Representative mammals are tiger, leopard, jackal, grey wolf, brown bear, bear, sable, common otter, deer, musk deer, water deer, roe deer and goral, and so on.

◆ Aves

Bird has 64 species of 190 genera of 61 families, among which, migratory birds are 64 species, summer birds 92 species, winter birds 104 species, passers 83 species and lost birds 73 species and most rate of birds are dominated by migratory birds. The representative birds are *Grus*, *Egrett*, *Cyconidae*, *Platalea*, *Limicolae*, swallow, cygnus including duck,goose, limicolae.

◆ Herpetofauna

Amphibian has 26 species of 17 genera of 11 families and the representative species are *Eumeces coreensis*, *Ancistrodon blomhoffi*, toad and so on. Reptilia has 17 species of 8 genera of 6 families, and *Rana nigromachlata*, *Rana temporaria*, *Rana coreana*, *Hynobius onychodactylus* are the representative species.

◆ Fish

According to the preliminary survey, the country has 865 species of fish including sea fish, among which, pure freshwater fish are 111 species, fish living in mixed of salt and fresh water 59 species and anadromous fishes 15 species. The endemism present most in freshwater fish.

◆ Invertebrates

The invertebrate animals so far recorded are 8,360 species, among which 5,965 species are insects. Presently, the study on this field is undergoing and predicts to be increased 4~5 times.

Table 1. Number of Species of Major Groups of Animals and Plants in DPRK

Taxa	Species	Genera	Families
Vascular Plant	3,176	690	204
Bryophyta	767	243	80
Lichennophyta	436	59	28
Eumycophyta	1,685	384	80
Myomycophyta	169	35	12
Chlorophyta	444	115	36
Rhaeophyta	129	60	21
Bacillariophyta	615	70	21
Mammal	107	69	28
Aves	416	190	61
Reptile	26	17	11
Amphibian	17	8	6
Pisces	865	188	45
Mollusk	518	227	123
Insect	5,965	2,157	327

1.1.2.3 Micro-organisms

There are 1,005 species of 140 genera of micro-organisms known in DPRK upto 1997 that isolated from variable ecosystems. Considering data on Mt. Paekdu, those micro-organisms isolated in this tract are 306 species of 43 genera. The order of rate is seen as; fungi (113 species of 15 genera), yeast (81 species of 18 genera), Actinomycetes (71 species of 2 genera), bacteria (41 species of 8 genera). It is

foreseen to discover more species and to elucidate more clearly of regional features following the intensified taxonomical research on micro-organisms.

1.1.3 Genetic Diversity

Genetic diversity is the main factor of biodiversity and becomes the basis of ecosystem diversity through species to species. Most of wild fauna and flora known in DPRK are the species with high economic and scientific values. And these species play a significant role in maintaining sound ecosystem of the country. Therefore, there must be new progress in protection of genetic resource diversity of wild fauna and flora by establishing protection areas considering the distributional features of wild fauna and flora.

1.1.3.1 Domestic plants (crop germplasm)

The DPRK has rich genetic resources of crops and livestock as it has 5,000 years of history. *Oryza sativa*, *Glycine max*, *Panicum miliaceum* and *Sorghum sp.* have been cultivated for about 6,000 years and this is identified by excavation of old historical relics. The domestic plants of the country have special features of high rate for medicinal plant. This is related with the long history of Koryo medicine, the traditional medicine of DPRK.

The representative herb species is *Panax schinseng*(Insam). Today, Kaesong Koryo Insam cultivated in Kaesong, is recognized for its higher medical value than other countries in the world. The representative taxa are those genera of; *Prunus Allium*, *Pyrus*, and *Ribes*.

The main crops cultivated in DPRK are; maize, potato, wheat, barley, millet, sorghum and beans for vegetables are; Korean cabbage, radish, cabbage, spinach, cucumber, pumpkin, egg-plant, pepper, red beet, carrot, lettuce, garland chrysanthemum, garlic, leek, stone-leek, and onions. The total national registered indigenous species are about 1,110. There are about 250 indigenous species of fruit and they are apple, pear, peach, plum, cherry, jujube, persimmon, chest-nut, apricot, strawberry, grapes and so on.

1.1.3.2 Domestic animals (livestock breeds)

The representative domestic animals that are breed in DPRK are 16 species which are; cow, pig, goat, sheep, rabbit, horse and donkey, and the races are 80. The representative husbandry are 8 species which are; hen, goose, duck, turkey and quail, and the races are 30. Many indigenous breeds are of high production to adapt to the relevant climate and soil.

1.1.3.3 Aquatic animals and plants

The DPRK puts great efforts to the mariculture to improve dietary life of people. As for sea weed in mariculture, we have 6 main domestic species which are; kelp, seaweed, sea lettuce, *Chorda filum*, *ahnfeltia*, *Gelidium amansii*. For sea invertebrate, 8 main species which include *Meretrix lamarki*, short neck clam, *Mactridae*, surf clam, oyster, abalone, sea urchin, sea cucumber, are being cultured.

Recently, expansion is found in breeding, hatching and artificial propagation of fish such as flatfish,

sole carp, silver carp, *kinyom* fish, grass fish, rainbow trout, *Osmerus spp.*, char, *Brachymystax lenok*.

The main fish breeding targets are carp, silver carp, *kinyom* fish, grass fish, rainbow trout, *Osmerus spp.*, char, *Brachymystax lenok*. The fishes for breed are being produced by intensive breeding in hatchery, which are provided with artificial hatching techniques. And carp, silver carp, sweetfish, *Osmerus spp.* are artificially hatched and released into the rivers and streams so to bring up the productivity of the water area. Therefore, conservation of gene resource to prevent degeneration of breeding fishes and species of mariculture.

1.2 Special Features of DPRK Biodiversity

1.2.1 Ecological and Evolutionary Features of Biodiversity

The DPRK is rich of fauna and flora species compare to the territorial size and even more than other neighbouring countries in the rate per area. As far as higher plant is concerned, the DPRK has 3,9943 species which accounts 0.03 species/km² and as for bird, has 420 species which accounts 0.003 species/km². Also, the DPRK is characterized to have diversity in the formation of bio-species.

The reason falls to that DPRK is a peninsula situated in the east of Asian continent that has not directly influenced much by tertiary glacial epoch. And also, northern type of species from north-east China and Mongolia and southern type of species of temperate and subtropical origin and Kwangpo species from north east Asia and Eurasian continent had migrated and distributed actively during the glacial and interglacial epoch. And another reason is put to that the fauna and flora survived upto now have developed to endemic species through dynamics to the diverse natural and geographical conditions of the country after the glacial epoch.

The main relic species, "living fossils" for plant 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* is the typical mammalian living fossils of the same above period. Among fresh water fish, *Gonoprokopterus mylodon*, *Microphysogobia koreensis* are endemic fishes that evolved in the time of paleo Amnok River system and those distributed in northern alpine terrsin such as *Gonoproktopterus mylodron* and *Microphysogobio koreensis* are the endemic species related with paleo Amur river system. To this end, the DPRK fauna and flora has special important position in view of the evolution history of bio-species in north east Asia.

1.2.2 Species of Endemism

The DPRK has high rate of endemic species in total plant species. According to the analysis of data informed todate, 14 species in fernbrake plant (variety 7species), 3species in *Gymnosperniniphyta* (variety 5species, modification 1species), 298 species in *Angiospermophy*(variety 197 species, modification 17 species coming total of 315 species which account 8% of total higher plants.(Annex 1-1)

There are 6 endemic genera (that of 1genus of 1species in the world): *Abeliophyllum Nak* of *Abeliophyllum Nak* genus; *Eeshinosophora Koreensis* of *Eeshinosophora Koreensis* genus;

Pentactina rupicola of *Pentactina rupicola* genus; *Megaleranthis saniculifolice* of *Megaleranthis saniculifolice* genus; *Caelopleurum Nakaianum* of *Caelopleurum Nakaianum* genus; and *Coreanomecon hylomeconoides* of *Coreanomecon hylomeconoides* genus. And there are also, 2 species of one genus which is *Keumkangsania asiatica* (*Keumkangsania asiatica* and *Keumkangsania latisejala*). Economic species of medical value such as *Rheum coreanum*, and *Astroagalus setsureianus* are also in place of endemism. As for endemic animals, the vertebrate is known to have 33 species/sub species of fish, 3 species of amphibian, 2 species of reptile, 2 sub species of avez, 1 species of mammalia which account for 2.7% of total vertebrate(Annex 1-2).

The representative endemic species are:

Pisces; *Thymallus jaluensis*, *Hucho ishikawai*, *Gonoprokopterus mylodon*, *Microphysogobio koreensis*

Amphibia; *Rana coreana*, *Rana chosenika*,

Reptilia; *Eumeces coreensis*

Avez; white-billied black woodpecker:

The reason of having many endemic species in DPRK is that the complex geophysical conditions forced biological isolation and accelerated the formation of endemic species. That is, the DPRK has 10 mountains of more than 2000m high and high density of mountain ranges and valleys. And the difference at the subtle climate conditions and ecological environmental condition at the topography where high mountain ranges and deep valleys are in complex restrained the exchange of seed distribution and pollen exchange.

It is expected that many endemic species in DPRK will be discovered when the research on the genus of flower plant and invertebrate animals is deepened.

1.2.3 Endangered and Rare Species

Endangered and rare species are very sensitive to the change of ecosystem. The fact that the good survival of well protected endangered species is the evidence that the habitats are well managed, and endangered and rare species themselves play a function of index biology towards the ecological environment changes.

Thus, the protection of endangered and rare species needs the protection of species itself as well as habitat protection. We can divide the species of animals and plants in DPRK in line with the criteria of the World Conservation Union (WCU) as follows;

- a) extinct species
- b) endangered species
- c) vulnerable species
- d) rare species
- e) local populations.

In case of higher plant, endangered species 10 (1 variety), vulnerable species 42, rare species 76 (variety 3), local population 26, comes to the total of 158 species. And this accounts for 4.0% of total number of higher plant. (Table 2)

Table 2. Number of Endangered and Rare Species for Plants in DPRK

Taxum	Endangerd species			Vulnerable species			Rare species			Local populations			Total
	Species	Variety	Morpha	Species	Variety	Morpha	Species	Variety	Morpha	Species	Variety	Morpha	
Gymnospe rniophyt	1			1						5			7
Angiosper mophytina	9		1	41			75		4	21			151
Total	10		1	42			75		4	26			158

As far as vertebrate is concerned, extinct species 2, species threatened with extinction 9, vulnerable species 29, rare species 117, in total 1,431 species, and this accounts for 11.1% of total 1,495 species of vertebrates. (Table 3) (Annex 3)

Table 3. Number of Endangered and Rare Species for Taxa of Vertebrate in DPRK

	Species with extinction	Species threatened with extinction	Endangered species	Rare species	Total
Pisces		3	4	26	33
Amphibian			3	6	9
Reptile		1	4	8	13
Aves	2	2	9	63	76
Mammal		3	9	16	28
Total	2	9	29	119	159

The order of priorities for endangered and rare plant protection is as follows:

Species threatened with extinction and of endemic value such as *Rheum coreanum*, *Diola westerii*, *Ajuga Apectabilis*, *Juniperus coreana*, *Sapium japonicum*, *Panax schinseng*, *Pinguicula vulgaris*, *Pacedria scandens*, *Gastrodia elata* and etc.

The endemic plants of DPRK such as *Echino sophora koreensis*, *Pentactina rupicola*, *Keumkangsania asiatica*. Species of endangered, rare and of endemism such as *Forsythia densiflora*, *F.ovata*, *Ligustrina faurei*, *Saussurea rectinervis*, *S.calicola*, *Abelia mosauensis*, *Iris minitorea* and *Goodyera repeus*.

As for the priority of animal protection: in *Disces*; *Gonoproktopterus mylodou*, *Coreoleuciscus splendidus*, *Thymallus* and in *Amphibia*; *Rana coreana*, in *Reptilia*; *Eumeccs coreensis*, in *Avez*; *Dryocopus javensis richardsi*, *Platalea minor*, *Egretta eulophotes*, *Grus japonensis*, *G. vipio*, *G. monacha*, *Dendrocopus martius*, *Ciconia byciana*, *Aythya baeri*, *Larus sasundersi* and birds of prey, and in mammal; *Pantera tigris*, *Cervus nippon*, *ursua arctos*, *Martes zibelline*, *Lutra lutra*, *Moscshsu moschiferus*, *Nemorhaedus goral*.

According to the criteria of IUCN and CITES, vulnerable and rare species of vertebrate can be

divided as follows;

Table 4. Relationship between DPRK and CITES for Endangered and Rare Animals

Taxa	Endangered & rare species in DPRK	Species in CITES	
		Annex1	Annex2
Amphibian	9		
Reptile	13		
Aves	74	15	21
Mammal	28	4	7
Total	124	19	28

1.2.4. Economic Importance of Wild Species.

Most animals and plants distributed in DPRK have high economic values. The number of plant species of economic value for usage shows in table 5.

Table 5. Number of Species by Use of Plants in DPRK

Usage	Species
Medicinal plant	900
Wild edible greens	300
Nuts	30
Forage plant	160
Timber plant	100
Fibre plant	100
Oil plant	50
Spice plant	60
Honey source	170
Horiculture	300
Sugar source	10
Total	2,180

Among forest resources of DPRK, we can take following species as representative ones;

- *Abies nephrolepis*, *Picea jezoensis*, *Larix olgensis* var. *koreana*, *Ulmus macrocapa*, *Tilia amurensis* with high timber value;
- *Juglans regia*, *J.cordiformis*, *J.mandshurica*, *Pinus koraiensis*, *Evodia danielli* as oil plant;
- *Panax schinseng*, *Schizandra chinensis*, *Rheum coreanum*, *Codonopsis pilsula*, *Atractylodes*

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- ovata*, *Epimedium koreanum*, *Eleutherococcus Enticosus* as medicinal;
- *Vitis amurensis*, *Actinidia argenta*, *Vaccinium uliginosum*, *Castanea crenata*, *Quercus sp.* As nuts;
- *Spuriopinella calycina*, *Pteridium aquilinum*, *Osmunda japonica*, *Aralia elata*, *Platycodon grandiflorum* as wild edible greens;
- *Trcholoma matsutake*, *Pleurotus ostreatus*, *P.cornucopiaen* as mushroom resource;
- *Syringa dilatata*, *Thymus quinque costatus*, *Agastache rugosa*, *Ledum palustre* as spice plant.

Taxa	Endangered & rare species in DPRK	Species in CITES	
		Annex1	Annex2
Amphibian	9		
Reptile	13		
Aves	74	15	21
Mammal	28	4	7
Total	124	19	28

As for forest wild animals with economic value, we can take *Caprecolus caprecolus*, *Hydropotes inermis*, *Nemorhaedus goral*, *Sus scorfa*, *Lepus mandschuricus*, *Cervus nippon*, *Moschus moschiferus*, *Ursus thibetatus*, *Meles meles*, *Nyctereutes procyonoides*, *Martes zibellina*, *Lutra lutra*, *Phasianus colchicus*, *Coturnix coturnix*, *Tetrastes bonasia*, *Lyrurus tetrix*. And in winter, ten thousands flocks of *Anatidae* fly along wetland at seaside of east and west seas. There distributed 185 species of fresh, brackish water and anadromous fishes including 65 species of *Cyprinidae* in freshwater. And are there 900 species of *Disces* and rich marine grasses and invertebrates with high industrial value such as *Haliotis gigantea*, *Stichopus japonicus*, *Echinoidea*, *Erimaculus isenbeckii*, *Neptunus trituberculatus*, *Chionoecetes opilio* in seawater of DPRK.

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

1.3 Threats to DPRK Biodiversity

1.3.1. Threatened Status

1.3.1.1. Threatened status for ecosystem

Destruction of ecosystems is being accelerated by natural disasters such as deforestation, soil erosion, deterioration of water quality, decrease of economic resources and also, flood.

Forest ecosystem

In DPRK, where mountains cover 80% of whole territory, forest ecosystem diversity takes important position in diversity conservation of the whole territory. Presently, the drastic loss of

forest area in DPRK is resulted by population increase and arable land expansion, forest fires and firewood use increase.

Forest area in DPRK was 821,1300ha in 1993, and in 1996, decreased into 818,3000ha. Particularly, the non-forest area is increased as 36,1000ha in 1993 and 38,0000ha in 1996. The destruction of forest brings changes of runoff and soil erosion, and this causes perturbation of river system and negative impacts on diversity of littoral ecosystem. Since the whole territory of the country shows district basin unit, forest management and diversity conservation in basin area are directly related with the diversity conservation of whole territory.

Water ecosystem

The DPRK has high density of rivers and streams. July-August is rainy season for which it takes half of the annual precipitation. The circumstances threaten the water ecosystem on a continuous basis.

Presently, the DPRK has suffered damages from floods due to the frequency of heavy rains. This brought severe damages to the biodiversity of water ecosystem. Different from biota in marine or land, biota in freshwater is restricted its expansion for habitat area. Therefore, on the assumption that no passageways are well built in hydrological structures then, it will block the migration passageways of fish. In addition, the biota in freshwater will be suffered by eutrophication of life wastes of human when the rivers are blocked.

1.3.1.2. Threatened status for species

The DPRK has high richness of animals and plants per area. Esp. about 10% of endangered species of Asian birds have habitat in our country. At present, 52 species of higher plant and 38 species of vertebrate are estimated as endangered and vulnerable species. And among 158 species of endangered and rare plants, 50 species are endemic, while 16 species are endemic for 159 species of endangered and rare animals. (Annex 2 and 3)

Nipponia nippon, distributed in DPRK has not been discovered since the end of 1970s and *Tadorna cristata* is thought to be extincted. *Grus japonensis* and *Platalea minor*, the rare species are also threatened by decrease of habitats.

Some species with high economic value are being gradually reduced, esp., in medicinal plant and marine animal. Especially, medicinal root and marine species such as abalone and sea cucumber that have high value for export are vivid with their abatement.

1.3.1.3. Threatened status for genetic resource

We find great risks in gene resource of domestic plants and animals. If importance is being put mainly to the high productivity in crops, livestock and poultry then, it will bring result that traditional breeds and races acclimatized to a given local natural condition be laid aside. For example, reduction is found in traditional breeds and races that are of high harvest and of high standing ability in poor soil condition such as millet, sorghum, and Italian millet. Some traditional breeds and races of domestic plants and animals in the country are lost during the period of Fatherland Liberation War between 1950~1953.

Since the traditional breeds/races of crops and livestock are cultivated and breaded in small scale, to establish fine system to collect and keep genes by establishing the state level gene-bank is raised as a principle task.

1.3.2 The Factors of Threats to Biodiversity

1.3.2.1. Population increase

Population growth in DPRK is as follows:

19,060,000 in 1986
20,960,000 in 1991
21,210,000 in 1993
21,510,000 in 1994
21,820,000 in 1995
22,110,000 in 1996

The population density of DPRK is 187 prs per square kilometre which is higher than China (119 per km²). If the population is continuously increased in this speed, the population of DPRK will be 30,000,000 in 2020. Increase of population will increase the use of bio-resources as well as impacts to the biodiversity.

1.3.2.2. Habitats destruction and over exploitation

The soundness of wild plant and animal depends on the condition of habitat. The habitat loss reflects the biodiversity loss. The habitat has its loss from the development and over-exploitation of resources and flood damages. The habitats for wild animals and plants are affected by increase of fire wood use in local areas. Presently, local people solve most of fuel problems in forest resource.

The firewood use in locals comes to 7,200,000m³ per year in 1996 that is 2.4 times much compare to the 1993. Therefore, to reduce the habitat loss of forest animals due to the destruction of forest resource, it suggests to lower the dependence rate on forest for firewood. The habitat destruction in DPRK also, depends on prevention of soil erosion.

The DPRK boasts for developed topography of valleys for having many rivers and streams. And this provides animals and plants to inhabit generally in incline areas. When heavy rain comes, will bring the enormous erosion of soil followed by the disturbance of ecosystem. This requires long time for rehabilitation. The heavy rain results the amount of soil erosion which affects water ecosystem, tremendously. In addition, threatens are coming to the forest ecosystem from the expansion of forest fires in the period of spring dry season and invader insects such as *Cecidomyia brachyntera* and *Iceria spp.*

Over-use of resources becomes the leading cause for biodiversity loss. 800 species of herb are available for Koryo medicine, the traditional medical science of DPRK. However, much amount of herb resource has decreased, nowadays This bias appears more in the use of root for medicine. With the reduction of resources, the possible pick amount of medicinal herbs has been cut from 40,000t in 1984 to 24,000t in 1996.

The main cause of decrease of coastal marine resource in DPRK is laid to the over-exploitation of marine resource. Those sea urchin, sea cucumber, which were available about 7,200t per year in KES during the period of 1970~1975 have brought reduction of about 1/3 during the period of 1985~1990.

1.3.2.3 Climate variability

The recent global warming, also, affects the DPRK biodiversity with distinct. According to the result of analysis of climate changes between 1910s and 1980s, the annual average temperature from 1900 to 1940 showed (0.2-1.6°C lower than average year that was) cold period while, from 1950 to 1980 showed (0.2-0.3°C higher than average year that was) warming. Especially, entering the 1990s, the annual average temperature is going up and the abnormal high temperature recorded in 1994 was the highest of climate observation ever since 1918. And 1990, 1995 and 1996 were the years of abnormal heavy rain season, whereas, 1997 was the year of drought.

The flood damages due to the heavy rains of 1995 and 1996 which were the result of abnormal climate change brought great losses to the ecosystems of agriculture, forest and rivers. For example, the flood damaged area of farmland covers an 359,000ha in 1995 and 297,659ha in 1996 and river ecosystem had great affection due to the damages of river banks. In addition, drought in 1997 brought 450,000ha of arable land damaged.

1.3.2.4. Other causes.

We find some contributors to biodiversity loss from neighbours.

Acid rains from China move along the aerial current of Korean West Sea sky to the DPRK and may give adverse impacts to the country forest. The biodiversity of Amnok and Tuman rivers are greatly affected by the neighbours since these rivers are the international waters bounded with China and Russia. Beside, invader insects and contagious diseases also give impacts on country's biodiversity.

As mentioned above, the vital problem in biodiversity of DPRK is to take counter measures to eliminate the factors which destruct the ecosystem function of DPRK. Here, the target objective to conserve the biodiversity of the country is to prevent soil erosion resulting from heavy rain, landslide and flood damages. Therefore, the DPRK should take action to enhance the management ability for ecosystem in every aspects.

1.3.3. The Urgency of Biodiversity Conservation and Demand for its Sustainable Use

Biodiversity conservation is closely related with resources necessary for the human existence, which is principle factor for the state security.

The government of DPRK took epochal measures including the expansion of protected areas for the implementation of the CBD adopted in UNCED in 1992. And the "Law of Fishery" is newly established and adopted action to supplement the GPLM with the biodiversity conservation. Yet, the DPRK has still many blocks in conserving biodiversity.

Population growth, destructive utilization of resources and frequent damages by flood have greatly

affected biodiversity adversely throughout DPRK. Esp, the national geographical condition with high-pitched montane topography of DPRK shows that unless we pay attention to the biodiversity conservation, there will be severe adverse consequences.

Under such circumstances, it is urgent task for DPRK to establish the sustainable use system of bio-resources for the national economy. Consequently, here falls the necessity that broad mass should be enlightened with biodiversity conservation and sustainable use, so to improve the managing ability of bio-resource and open vigorous campaign.

Chapert 2. Current efforts and assessment of Biodiversity Conservation In its sustainable use in DPR Korea

2.1. *In-situ* Conservation

2.1.1 *Establishment of protected area*

2.1.1.1 *History of establishment*

Protected area in nature including nature reserve is the most effective measure to conserve biodiversity. It is because that establishment of protected area itself aimed to hand over the rich and beautiful nature areas to next generations. Therefore, the in-situ conservation that is, nature protected area requires protection of valuable natural ecosystem and habitats for wildlife that can ensure the reproduction and evolution of living organisms in ecosystems and keep the energy flow, material cycling and ecological process in the system.

The first natural protected area in DPRK is Mt. Myohyang nature reserve that the great leader Kim Il Sung personally designated in April 1954. The great leader Kim Il Sung issued an Order to conserve relics, scenic spots and natural monuments and took state measure to protect 39 natural monument and relics at the popular Provisional People's Committee of North Korea in April, 1946. The great leader Kim Il Sung adopted the standing Committee decree of Supreme People's Assembly of DPRK "On protection and proliferation of useful animals and plants" in February 1959, and designated reserves in decision of the cabinet No.29. In July 1973, the great leader Kim Il Sung issued the DPRK President Order, No.1".

On strengthening more nature conservation work" and took measures to make fatherland more beautiful by newly fixing and well managing protected area in conformity with reality and positively use it in scientific and research work and youths. In 1976, the Government of DPRK declared the decision of readjusts nature protected area of the country. In DPRK, some of the Korean revolutionary sites where the great leader Kim Il Sung waged anti-Japanese armed struggle for the independence of the country to end the Japanese colonial rule. The establishment of special reserves in DPRK was started from the time when the great leader Kim Jong Il organized marching the revolutionary battle sites including Pochonbo, Samjiyon in Mt. Paekdu area as special reserves in 1959. The special reserves play the function of nature reserves as this include the vast areas of forest ecosystem.

DPRK, under the Governmental measures on several times, has established 6 natural reserves (among which, Mt. Paekdu Natural Reserve is included to MAB, UNESCO and registered as Biosphere reserve in 1987), 14 plant reserves, 14 animal reserves and 6 sea bird breeding reserves until 1994. The Government of DPRK has acceded to the convention on Biodiversity Conservation in 1995 and has done its best to increase the numbers and areas of natural reserves.

2.1.1.2 *Categories and numbers*

There are now 2,428,600ha of protected areas counting 19.78% of the whole territory and among them, the area of nature reserves is 696,927 ha(5.68% of whole territory).

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The location and area of natural protected area by types in DPRK are as follows.

Table 6. List of Protected Areas in DPRK

No	Name	Location	Area	Year of Establishment
1	<u>Biosphere Reserve</u> Mt. Paekdu B. R	Samjiyon county, Ryanggang Prov.	132,000	1989
2	<u>Nature Park</u> Mt. Kumgang N.P.	Kosong , Kumgang county, Kangwon Prov	60,000	1995
3	Tongchon N.P.	Tongchon county, Kangwon Prov.	4,000	1995
4	Solbong N. P.	Gosan county, Kangwon Prov.	1,400	1998
5	Songdowon N.P.	Wonsan city, Kangwon Prov.	500	1995
6	Mt. Chilbo N.P.	Myongchon county, N. Hamgyong Prov.	30,000	1995
7	Bonpo N.P.	Rajin Sonbong city	5,000	1996
8	Lake Bujon N.P.	Bujon county, S. Hamgyong Prov.	4,100	1995
9	Mt. Paekun N.P.	Yonggwang county, S. Hamgyong Prov.	2,000	1995
10	Mt. Myohyang N.P.	Hyangsan county, N.Pyongan Prov.,	16,000	1995
11	Lake Yonpung N.P.	Hichon city, Jagang Prov.	5,000	1995
12	Lake Kumsong N.P.	Anju city, Gaechon city, S.Pyongan Prov. Nyongwon county, Pechon county, S. Pyongan province	14,000	1995
13	Mt. Guwol N.P.	Unryul county, Samchon county, Anak county, S. Hwanghae Prov.	20,000	1995
14	Monggumpo N.P.	Ryongyon county, S. Hwanghae Prov.	3,000	1995
15	Mt. Jangsu N.P.	Sinwon county, Jaeryong county, S. Hwanghae Prov.	3,000	1995
16	Sokdam N.P.	Byoksong county, S.Hwanghae Prov.	2,500	1995
17	Lake Sohung N.P.	Bongsan county, Rinsan county, N. Hwanghae Prov.	3,800	1995
18	Mt. Jongbang N.P.	Sariwon city, N. Hwanghae Prov.	2,000	1995
19	Mt. Daesong N.P.	Pyongyang city	2,000	1995
20	Wau Island, N. P.	Nampo city	5,000	1995
21	Lake Taesong, N.P.	Nampo city	2,000	1995
22	Pakyon N.P.	Gaesong city	3,200	1995
23	<u>Nature Reserve</u> Mt. Paekdu N.R.	Samjiyon county, Ryonggang Prov.	24,000	1959
24	Mt. Kumgang N.R.	Gosong county, Kumgang county, Gangwon Prov.	7,600	1976
25	Mt. Chilbo N.R.	Myongchon county, N. Hamgyong Prov.	5,000	1976
26	Gwanmo peak N.R.	Gyongsong county, N. Hamgyong Prov.	5,000	1993
27	Mt. Myohyang N.R.	Hyangsan county, N. Pyongan Prov. Hichon city, Jagang Prov.	7,000	1954
28	Mt. Guwol N.R.	Samchon county, Unryul county, S. Hwanghae Prov.	1,000	1976
29	Mt. Oga N.R.	Hwapyong county, Jagang Prov.	5,000	1995
30	Mt. Rangrim N.R.	Rangrim county, Jagang Prov.	6,000	1995

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	<u>Landscape(scenic beauty)</u> <u>Reserve</u>			
31	Lake Supung L.R.	Sakju county, Changsong county N. Pyongan Prov.	27,300	1995
32	Lake Manpung L.R.	Chonma county, N. Pyongan Prov.	3,940	1995
33	Lake Taechon L. R.	Daegwan county, Taechon county, N. Pyongan Prov.	12,500	1995
34	Ryongmun-Paekryeng L.R	Gujang county, N. Pyongan Prov.	5,000	1995
35	Lake Jangyon L. R.	Orang county, N. Hamgyong Prov.	1,880	1995
36	Onpo L.R.	Gyongsong county, N. Hamgyong Prov.	3,000	1995
37	Mt. Songjin L. R.	Rajin-Sonbong city, Undok county N. Hamgyong Prov.	4,000	1995
38	Lake Jangjin L. R.	Jangjin county, S. Hamgyong Prov.	6,000	1995
39	Riwon L. R.	Riwon county, S. Hamgyong Prov.	800	1995
40	Lake Sam L. R.	Rakwon county, S. Hamgyong Prov.	900	1995
41	Mt. Duryu L. R.	Danchon city, S. Hamgyong Prov.	8,546	1995
42	Hodo peninsula L. R.	Kumya county, S. Hamgyong Prov.	3,400	1995
43	Lake Unpa L. R.	Unpa county, Jaeryong county, N. Hwanghae Prov.	5,930	1995
44	Gangryeng peninsula L.R.	Gangryeng county, S. Hwanghae Prov.	2,000	1995
45	Lake Pungso L. R.	Pungso county, Ryanggang Prov.	4,500	1995
46	Hwangsuwon L. R.	Kim Hyong Jik county, Ryanggang Prov.	2,900	1995
47	Lake Wonbong L. R.	Paekam county, Yonsa county, Ryanggang Prov.	6,000	1995
48	Wiwon Reservoir L.R.	Wiwon county, Jagang Prov.	7,000	1995
49	Lake Unbong L. R.	Jasong county, Jagang Prov.	7,650	1995
50	Songwon Reservoir L.R.	Songwon county, Gopung county, Jagang Prov.	9,000	1995
51	Lake Rangrim L. R.	Rangrim county, Jagang Prov.	6,000	1995
52	Lake Jangjagang L.R.	Sijung county, Manpo city, Jagang Prov.	7,600	1995
53	Sambang L. R.	Sepo county, Gangwon Prov.	4,000	1995
54	West Sea Barrage L.R.	Nampo city, Unchon county S. Hwanghae Prov.	8,000	1995
	<u>Plant Reserve</u>			
55	Maengsan Black Pine Tree P. Reserve	Maengsan County, S. Pyongan Prov.	40	1959
56	Yangdok Mushroom P.R.	Yangdok county, S. Pyongan Prov.	1,653	1976
57	Sinmido Plant R.	Sonchon county, N. Pyongan Prov.	1,830	1959
58	Hwangpo Mansam P. R.	Rangrim county, Jagang Prov.	7,650	1976
59	Jangsangot P. R.	Ryongyon cunty, S. Hwanghae Prov.	2,580	1959
60	Mt. Suyang P. R.	Haeju city, S. Hwanghae Prov.	1,900	1976
61	Mt. Myolak P. R.	Rinsan county, N. Hwanghae Prov.	3,440	1959
62	Mt. Duryu P. R.	Chonnae county, Kangwon Prov.	3,500	1976
63	Mt. Chuae P. R.	Sepo county, Gosan county, Kangwon Prov.	2,900	1996
64	Chailbong P. R.	Bujon county, S. Hamgyong Prov. Pungso county, Ryanggang Prov.	2,460	1976
65	Unmandae, Sinuidae P.R	Hwadae county, N. Hamgyong Prov.		
66	Paekam Ganjang swamp P. Reserve	Paekam county, Ryanggang Prov.	17 900	1976 1993
67	Jonchon gasiogalpi P.R.	Jonchon county, Jagang Prov.		
68	Kumya Seaside P.R.	Kumya county, S. Hamgyong Prov.	340 120	1993 1993

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	<u>Animal Reserve</u>			
69	Donggye A. R.	Paekam county, Ryanggang Prov.	9,880	1959
70	Daehung A. R.	Pochon county, Ryanggang Prov.	10,360	1959
71	Kumsok A. R.	Dongsin county, Jagang Prov.	12,406	1976
72	Mt. Danga A. R.	Dongchang county, N. Pyongan Prov.	2,830	1976
73	Mt. Chonbul A. R.	Yonggwang county, Sinhung county, S. Hamgyong Prov.	6,904	1976
74	Mt. Sasu A. R.	Jongpyong county, S. Hamgyong Prov.	2,270	1976
75	Yangam A. R.	Pyonggang county, Kangwon Prov.	2,804	1976
76	Mt. Daegak A. R.	Goksan county, Sinpyong county, Suan county, N. Hwanghae Prov.	3,246	1976
77	Mt. Hakbong A. R.	Ichon county, Kangwon prov. Tosan county, N. Hwanghae Prov.	2,671	1993
78	Chonghakdae A. R.	Jonchon county, Dongsin county, Jagang Prov.	6,967	1993
79	Songwon A. R.	Songwon county, Jagang Prov.	4,800	1993
80	Mt. Obong A. R.	Yontan county, Suan county, N. Hwanghae Prov.	2,937	1993
81	Huisaekbong A. R.	Rangrim county, Jagang Prov. Huchang county, Ryanggang Prov.	16,000	1993
82	Dryocopus javensis A. R.	Rinsan county, Pyongsan county, Bongchon county, N. Hwanghae Prov.	9,960	1993
	<u>Seabird Reserve</u>			
83	Is. Unmudo Seabird R.	Jongju city, N. Pyongan Prov.	85	1976
84	Is. Daegamdo S.R.	Jongju city, N. Pyongan Prov.	25	1976
85	Is. Sonchonrabdo S.R.	Sonchon county, N. Pyongan Prov.	20	1976
86	Is. Tokdo S.R.	Onchon county, S. Pyongan Prov.	10	1976
87	Is. Sonbongal-som S.R.	Rajin-Sonbong city,	25	1959
88	Is. Tongchonol-som S.R.	Tongchon county, Kangwon Prov.	24	1959
	<u>Migratory Bird (Wetland) Reserve</u>			
89	Kumya Migratory Bird (Wetland) Reserve	Kumya county, S. Hamgyong Prov.	2,000	1995
90	Mundok M. B. W. R.	Mundok county, S. Pyongan Prov.	3,000	1995
91	Ryongyon M. B. W. R.	Ryongyon county, S. Hwanghae Prov.	2,000	1995
92	Chongdan M. B. W. R.	Chongdan county, N. Hwanghae Prov.	1,000	1995
93	Sindo M. B. W. R.	Sindo county, N. Pyongan Prov.	1,000	1995
94	Ongjin M. B. W. R.	Ongjin county, S. Hwanghae Prov.	1,000	1995
95	Unryul M. B. W. R.	Unryul county, S. Hwanghae Prov.	800	1995
96	Chonapo M. B. W. R.	Tongchon county, Kangwon Prov.	700	1995
97	Dongjong Lake M.B.W.R.	Tongchon county, Kangwon Prov.	800	1995
98	Kwangpo M. B. W. R.	Jongpyong county, S. Hamgyong Prov.	2,000	1995
99	Orangchon M. B. W. R.	Orang county, N. Hamgyong Prov.	1,500	1995
100	Sonbong M. B.W.R.	Rajin-Sonbong city.	3,200	1995
Total sum			671336	

* If areas of 5 Nature Reserves(Mt. Paekdu, Mt. Kungang, Mt. Chilbo, Mt. Myohyang, Mt. Kuwol) with Nature Park, Biosphere Reserves are excluded, it will be 626,736ha in all.

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No	Name	Location	Area	Year of Establishment
101	Rajin Bay M. R. S. R.	Rajin-songbong city (Songjin Bay-Is. Daejodo)	2,400	1996
102	Pohang Bay M. R. S.R.	Chongjin city, N. Hamgyong Prov. (Ryongje Bay-Sajin Bay)	800	1996
103	Hwangjin Bay M. R. S. R	Myongchon county, N. Hamgyong Prov. (Buksu Bay.-Mudung dong)	500	1996
104	Sinchang Bay M. R. S. R	Bukchon county, N. Hamgyong Prov. (Ryonggodan-Ryongam Bay)	700	1996
105	Riwong Bay M. R. S. R.	Riwon county, S. Hamgyong Prov. (Chongryong Bay-Usonggal Rock)	2,500	1996
106	Yanghwa Bay M. R. S. R.	Sinpo city, S. Hamgyong Prov. (Saekjakdan- Gacheung got)	1,600	1976
107	Rakwon Ear Shell, M. R. S.R.	Rakwon county, S. Hamgyong Prov.	2,400	1976
108	Sean Oyster, M. R. S. R.	(Siamdan) Chonnae county, Munchon city, Kangwon Prov.(Songjong Bay)	1,700	1996
109	Munchon Saksaki bM. R. S. R.	Muchon city, Kangwon Prov.	300	1996
110	Kosong Bay Coast. N.R.	(Yemjuchon fishing ground-Silpochon fishery)	1,200	1996
111	Ongjin(laver) R.	Kosong county, Kangwon Prov. (Kosong Bay Aquatic Area)	1,200	1996
112	Dungsagoz Coast N. R.	Ongjin county, S. Hwanghae Prov. (Sagot)	1,200	1996
113	Is. Mhabdo Coast N. R.	Kangryong county, S. Hwanghae Prov. (Dungsagoz)	1,200	1996
114	Ocha Coast N. R.	Ongjin county, S. Hwanghae Prov. (Mahabdan)	1,000	1996
115	Oruji(Sea-cucumber) N.R.	Ryongyon county, S. Hwanghae prov. (Jangsanri uoiyangsu) Jangyon county, S. Hwanghae Prov. (nearby Paetory)	750	1996
Total sum			19,450	
No	Name	Location	Area	Year of Establishment
	<u>Freshwater Marine Resource Reserve</u>			
116	Chongchon river silverfish S. R.	Gaechon city, S. Pyongan Prov.(Sambong- workers district Ryonghwari, Anju city)	400	1976
117	Jangja river freshwater S.R.	Sijung county-Jangja river reservoir bank, Jagang Prov.	520	1996
118	Donggyesu char S.R.	Doggye Workers District, Paekam county, Ryanggang Prov.	270	1976
119	Mayang Resevior Mayang trout S.R.	Musan county, N. Hamgyong Prov.	300	1976
120	Jangjin River Hucho- islikawai S. R.	Jangjin ub-Jangjin Lake-Soksa ri, S. Hamgyong Prov.	480	1976
121	Dokji River(salmon, trout) S. R.	Lower stream of Dokji River, Kumya county, S. Hamgyong Prov.	300	1976
122	Ryesong River, Turtle S.R	Daepyong ri-Chimgyo ri, Singye county, N. Hwanghae Prov.	200	1976

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123	Rimjin River <i>Gonoprokopterus mylodone</i> , S. R.	Bukpo ri, Tosan county-Jonghak ri, Jangpung county, Kaesong city.	210	1976
124	Daehung char, <i>Brachymystax</i> <i>lenok</i> S. R.	Rangrim ri, Daehung ri, Daehung county, S. Pyongan Prov.	200	1976
125	Daedong River Ponghwa turtle S. R.	Ponghwa Lockage, Gangdong county- Wonhung ri, Samsok district, Pyongyang	300	1976
126	Daedong River Mirim (carp, cornet fish) S.R.	Mirim Lockage-Rungrado, Pyongyang	115	1996
127	Dokribongsu Mayang trout S. R.	Lower reach of Wonbong Reservoir, Ryanggang Prov.	400	1996
Total sum			3,395	

If natural protected areas of DPRK are divided according to criteria of protected area (from I to V) of IUCN, they are as follows.(Table 7)

Table 7. Classification of natural protected areas of DPRK

Criteria of IUCN		Protected Areas	Numbers	Area(ha)
1.	Strict Nature Reserve !	1 N.R. except Mt. Paekdu	8	60,000
2.	Nature Park	Nature Reserve	21	167,900
3.	Natural Monuments	20 N.P. except Mt. Kumgang	291	51,191
		Nature Parks	12	19,000
		District which preserved N. M. Special Reserves		
4.	Wild Biological Reserves	Plant Reserves	14	29,330
		Animal Reserves	14	94,071
		Seabird Reserves	6	189
		Migratory bird(wetland) Reserve	12	19,000
5.	Landscape(Scenic beauty)Reserves	23 places except Lake Supung Landscape Reserve	24	147,646
Total				588927

According to the classification criteria of IUCN, I-III types of Natural protected areas of DPRK are 298,691ha, and 290,236ha of IV-V types, and 588,927ha in all counting 4.8% of the whole territory. If square measures except Nature Reserve area of Mt. Paekdu Biosphere Reserve, are added, reaches 696,927ha.

There are 12 Inland Marine Resource Reserve(3,395ha), Nature Reserve(91,475ha) of city and county which belong to VI type of criteria of IUCN and 1,406,803ha of all Reserve forest including, Reservoir Forest Reserve and Hygienic Forest grown for scenic beauty and 200,000ha of Special Forest Reserves, city park, etc., 30,000ha of protected areas, totally, 1,731,673ha of land protected areas and 15 coastal fishery Resource Reserves(19,450ha) are established as conservation area.

2.1.1.3 Geographical distribution and areas

Geographical distribution of DPRK is divided into plant, animal and soil distributions. And it is

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classified into highlands, northern lands, middle land, and middle coastland considering climate, topographical causes. Northern highlands with Kaema plateau, Paekmu plateau as its main, is the area that includes whole parts of Ryanggang province and some parts of Yensa County, Musan County, N. Hamgyong Prov., Jangjin County, Bujon County, S. Hamgyong Prov, Rangrim County, Jagang prov, Daehung County, S. Pyongan Prov.

The average height is above 1,300m, and subarctic coniferous forest including deodar forest distributed in the 2,000M regions of Mr. Paekdu North highlands are divided into 5 districts of Mt. Paekdu district and Gwanmobong (Peak) district, Huchang-Samsu district, Pungsan-Pungso district, Rangrim-Bujon district.

Northern parts includes most area of North and South Hamgyong Province, some regions of North Hwanghae Province, and most regions of Jagang Prov, North and South Pyongan Provinces. Northern regions are divided into 12 districts of Tuman River Midstream, Sonbong-Gyongsong district, Mt. Chilbo district, Hochon-Kumgol district, Riwon-Sinhung district, Munchon-Rakwon district, Mt. Duryu-Yodok district, Mt. Oga district, Kanggye-Mt.Seungjok district, irae bong(Peak)-Chonma district, Mt.Myohyang district, Yangdok-Mt.Maengsan district.

Middle area is divided into 4 districts of Is. Bidansom-Jongju district, Pyongwon-Onchon district, Sariwon-Singye district, Chugaryeng-Changdo district including plain area of North and South Pyongan provinces and Inland areas of N.Hwanghae province and Kangwon province. Middle coast area belongs to comparatively wild region in DPRK, and its animal distribution is with plenty of south type species.

Middle coast region is divided into 4 districts of Mt.Kuwol district, Ryongyon-Baechon district, S. Hwanghae prov., Hodo peninsula-Tongchon district, Mt. Kumgang district of S. Hamgyong Province and Kangwon province.

The square measures of natural protected area and its, rates according to geographical distribution are as follows.(Table 8)

Table 8. Geographical Area rates of nature protected areas in DPRK

Biogeography		Area (1,000ha)	Areas of protected Area(1,000ha)	Conservation Area Rates (%)
Region	District			
I. Northern highlands	1. Mt.Paekdu Dist	345.5	148.4	42.95
	2. Gwangmobong(peak)Dist	721.9	15.8	2.19
	3. Huchang-Samsu	346.2	0	0
	4. Pungsan-Pungso	427.2	7.4	1.73
	5. Rangrim-Bujon	977.8	48.2	4.93
II. North region	6. Tuman River Midstream Dist	386.7	0	0
	7. Sonbong-Gyongsong	755.4	15.3	2.0
	8. Mt.Chilbo	203.8	31.5	15.4
	9. Hochon-Kumgol	305.7	8.5	2.78
	10. Riwon-Sinhung	631.0	9.7	1.54
	11. Munchon-Rakwon	168.3	5.2	3.08
	12. Mt.Duryu-Yodok	310.7	3.5	1.12
	13. Mt. Oga	365.8	12.7	3.47

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	14. Kanggye- Mt.Seungjok	569.6	23.6	4.14
	15. Biraebong-Chonma (peak)	651.9	34.5	5.29
	16. Mt.Myohyang	590.5	57.7	9.77
	17. Yangdok-Maengsan	894.9	21.9	2.45
III. Middle regions	18. Is.Bidansom-Jongju Dist	325.4	2.9	0.89
	19. Pyongwon-Onchon	488.6	12.0	2.45
	20. Sariwon-Singye	752.5	17.3	2.29
	21. Chugaryong-Changdo	773.4	11.1	1.43
IV. Middle coastal Region	22. Mt.Guwol dist	224.3	33.8	13.83
	23. Ryongyon-Baechon	773.4	35.6	4.60
	24. Hodo peninsula - Tongchon	101.9	4.8	4.71
	25. Mt. Kumgang	163.3	64.7	39.62

2.1.2 Management for protected area

2.1.2.1 Policies, Legislation and enforcement

DPRK took measures to systematically extend natural protected area after designating Mt. Myohyang District as special Reserve in 1954.

The great leader comrade Kim Il Sung taught that mountains, sea and rivers in our country are the precious thing, and therefore, the mountains should be thickly wooded, and lots of various beautiful birds and animals should be lived and the crowd of fishes in rivers and the sea should be swarmed by the thousands.

Main policy for protected area in DPRK, are first of all to decide nature reserve, special reserve, animals and plant reserves, and preserve natural environment of reserves in their original state and thoroughly protect and well equip them. Next, with improvement of management for protected areas, it is to enable people to rise as one in building up fatherland more beautiful by doing scientific research work and youth education work in Nature-Reserve and animal and plant reserves.

Management for protected areas in DPRK, the legal base is provided by several time's decree and decision of Administration council including "Standing Committee decree of Supreme People's Assembly "On protection and proliferation of useful animals and plants "In February 1959. Particularly, the article of the Law on Environment of DPRK" indicates that natural environment reserve and Special Reserves should be preserved in their original state and management of protected area should be improved and strengthened by investigating and monitoring the changes of the weather, hydrology, animals and plants, and topography in protected areas.

Administrative Council of DPRK took countermeasures to control the actual state of ecosystem and its changes and conduct suitable management in addition to it, by comprehensively conducting monitoring the previously established protected areas in 1995 and newly established protected areas in every 10 years in future as the work of expanding protected areas and improving its management places an important position in biodiversity of the country. In this connection, share responsibility of the central agencies and municipalities which are responsible for managing protected area till now, were enabled to be clarified.

2.1.2.2 Institutional and Personnel status

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Protected areas of DPRK are managed by Ministry of Land and Environment Protection, Ministry of Forestry, Ministry of Culture, and Academy of Sciences. Natural protected area managed by Ministry of Land and Environment Protection are 80 and some 4,800 manage members are engaged in this. The numbers of management members by protected areas are as follows. (Table 9)

Table 9. Management numbers by major natural protected areas

No	Name	Numbers of members(person)
1	Mt. Myohyang Nature Park	632
2	Mt. Kuwol N. P.	855
3	Mt. Chilbo N. P.	120
4	Mt. Kumgang N. P.	200
5	Mt. Sohung N. P.	93
6	Mt. Yenpung N. P.	30
7	Mt. Jongbang N. P.	220
8	Mt. Oga Nature Reserve	330
9	Lake Taesong N. P.	95
10	Tongchon(Lake Sijung) N. P.	179
11	Etc	4,616
Total		7,280

2.1.2.3 Researches and monitoring

Researches on actual state flora and fauna in protected area and ecosystem are conducted by Academy of Sciences. Particularly, as Academy of Sciences conducted comprehensive researches on districts of Mt. Paekdu. "A series of Mt. Paekdu" is published. Comprehensive researches on major protected areas like Mt. Chilbo, Mt. Oga, Mt. Myohyang, Mt. Kumgang, Mt. Kuwol were conducted till now, and recent investigations on major wetland like Mundok, Kumya, Ryongyon are being systematically organized and conducted.

On the basis of it, the comprehensive re-evaluation for protected areas were conducted during 1991~1994. However, systematic researches on the whole protected areas of the country are in the lack state. Monitoring on natural protected areas are not smoothly organized except some regions. In this connection, being based on researches on animals and plants, ecosystems for protected areas, the establishment of state monitoring system is proposed as an important task.

2.1.3 Assessment for establishment and management of protected areas

2.1.3.1 Main achievements

The Government of DPRK has reevaluated the nature reserves of the country for the implementation of Agenda 21 and Convention on Biodiversity Conservation, adopted at UNCED in 1992. Revaluation was done considering the distribution of vegetation, species of animals and plants,

especially, the endemic species of the country and those of global significant already surveyed in research institutes to define whether the nature reserves are distributed for the well-protection of the biodiversity of the whole country.

Through the re-evaluation, main habitats of migratory birds in Mt.Rangrim area, Mundok and Kumya have been supplemented, and the areas of reserves that are been supplemented, and the areas of reserves that are believed not to be enough for the function of ecosystem and unsuitable for the protection of animal and plant species have been expanded. In addition to this, some of the nature reserves have been renamed as nature parks for the development of eco-tourism of the country. However, the continuance of habits for animals and plants in protected areas are considered in this work.

2.1.3.2 Main gaps

First, under the condition that many areas are newly established as nature reserves and their areas are expanded, there are still gap in taking comprehensive countermeasures for appropriate management and identifying the objectives of other relevant organizations and increasing their awareness. Especially, preparations are not well arranged to give benefits to its local people and make them actively participate to the management of protected areas.

The main problems are :

Poor regulations for nature reserves.

The main law on the management of nature reserves in DPRK is the Law on Environment Protection, issued in 1986. In order to fully implement the Law on Environment Protection, the regulation of the management of reserves must be included to its implementation regulations and each regulations must be fully completed according to its characteristics.

At present, most of the newly established nature reserves do not its management regulations. As a result, the protection and management of nature reserves are not effectively done. Furthermore, there is no authority system to coordinate the work of departments in the existing regulations for reserve management. Therefore, it is very difficult to have consensus on ideas between the relevant departments and solve issues arising over the reserves.

Poor management capacity of nature reserves.

Most of the newly established nature reserves do not have institutes for its management, as a result, budgets are not provided and hence, management is poorly done. At present, reserves are managed by professional managers and ranger, But, most of the managers do not possess professional education on management of reserves so their quality is very low. Due to the lack of fund, field research stations and facilities for monitoring eco-environmental changes have not been established and because of this, the problem of scientification of reserve management and high management level are to be solved. Furthermore, there are no facilities for educating local people to understand the value of reserves and encouraging them to participate to the management of reserves.

Deficiency of connection and controlling between Central Agency and local administrative organs in managing development and protected areas.

According to the demands of actual development that protected areas rapidly increased, the

problems to enlarge the department which is responsible for protected areas, in Ministry of Land Environment Protection, and enhance its functions, are proposed. As there is no such counter measures, the control for development which is going to conduct in and around the protected areas, have not been done yet. Under the condition that the nature reserves are expanded, it is an urgent task to make various options including the development of eco-tourism through which the local people benefit considerably without any inconvenience to their life.

Lack of international connection

In case that protected area is regionally of internationally significant, cooperation for it should be organized, and we should try to necessary cooperation through international organizations.

2.2 Ex-Situ Conservation

Ex-Situ conservation of wild plant and animal is also important as well as in-situ conservation. Botanical gardens and zoos should play an important role in conserving extinct individual species of animal and plant in nature and species with economic value including medicinal plants. It should also play a special role in educating people, especially the youth, to love the nature and protect animal and plant, and with the methodology of sustainable use of biological resources.

2.2.1 Ex-situ conservation of wild plants

Botanical garden and arboretum play an important role in conserving plant diversity. DPRK has built Botanical Garden of 20 ha at the foot of Mt. Taesong in Pyongyang in 1959, It has built small sized botanical gardens in every cities of provinces, and also in Samjiyon county, Ryanggang Province around Mt. Paekdu area for the protection of alpine plant species.

There are botanical gardens in significant district in view of biodiversity (Mt. Oga, Ongjin, Yangdok etc). Thus, in present 1998, DPRK have national 14 province botanical garden, 3 arboretums, and 21 city, county level flower garden. It is estimated that about 8,500 plant species are cultivated in the Central Botanical Garden at present, of which 2,500 species are native ones. The Central Botanical Garden, preserves 4,000 species of valuable plants, presented to the Great leader Kim Il Sung and the Great leader Kim Jong Il from the Presidents and individuals of foreign countries and over-sea compatriots.

Among them, Kimilsunglia from Jakaruta Botanical Garden, Indonesia and Kimjongillia by Japanese Gardener are preserved and widely cultivated. At present, an arboretum of 100 ha, is built near the Central Botanical Garden. Arboretum, with the aim to preserve 2,500 species in near future, proceeds with its work to collect and preserve saplings. The Central Botanical Garden also has science hall for public education and plant specimen hall with the capacity of preserving 200,000-plant specimen (present proserving species number: about 150,000)

2.2.2 Ex-situ Conservation of wild Animals

DPRK has established Central 200 of 100ha at the foot of Mt. Taesong, Pyongyang in 1959 and local zoos in every cities of provinces. The largest zoo in local area is Wonsan Zoo in Songdowon city, Kangwon Province.

At present, the total number of animal species in Central zoo is 650, among which 180 species are mammal, 260 species are bird, 50 species are reptile and amphibian, and 160 species are fish. Animals, presented by Presidents of foreign countries including African countries, individuals and managers of foreign countries are now breeding captive in the Central zoo. The species number is 180. The Central zoo has succeeded in breeding rare animals not only in our country but also the other countries (breeding of Indian elephant, tiger, wolf, Red-crowned crane). In the near future, the Central zoo will be improved and expanded newly expecting 65 ha of natural zoo.

2.2.3 Seed Bank

It is an important task of biodiversity conservation to establish the preservation system for plant species and animal cell. At present, seed Bank is partly organized in post-graduate course of Agricultural science under the Academy of Science, the Cell Bank is being tried to newly organize. And the standard of preservation is not yet high. In such a condition, it will be necessary to build state Seed Bank, and provide close relation with Seed banks organized before, and by strengthening capacity of this establish the preservation system at the even of seed and cell of rare species in the country.

2.2.4 Assessment of ex-situ conservation

Central zoo, arboretum and Botanical Garden are of adequate size for *ex-situ* conservation of wild animals and plants. Therefore it is important to strengthen capacity of its management and species preservation.

For this, information management of preserved species must be improved and it will be the first phase for strengthening the capacity of management and species preservation. The information on species must be data-based by computer and should be available for effective-use needed for increasing the capacity of species protection system network. In addition to it, great attention should be paid to the study on breeding of endangered and rare species in DPRK.

Central Botanical Garden should reproduce the world rare family plants such as *Pentactina rupciola*, *Kumgang asiatica* and economic species with high medical values. Central zoo should promote the breeding program of endangered and rare species such as Red-crowned crane, Black-faced Spoonbill, *Egretta cuolophotates*, and re-pasturage increased populations to nature.

To strengthen the ex-situ conservation, programs should be promoted to provide reproduction centres by establishing botanical gardens and zoos within the main nature protection areas. Above-mentioned programs should proceed in close relation with the Central Botanical Garden and zoo. Works should be done linked with International Species Registering System (ISIS) which is preparing International Species Book to prevent breeding of same specie from the family.

It is necessary to expand aquarium for enhancing the role of zoo, DPRK has rich species with economic value in marine and many rare species in freshwater. The biology in fresh water is greatly influenced when its distribution is narrowed and the quality of habitat is poor.

Therefore, the aquarium shall be the centre in promoting breeding program of endangered species in freshwater. In order to fully carry out such works, the budget should be provided for modernizing the equipment of breeding and species preservation in Central Botanical Garden,

arboretum and zoo, besides, budget should also be provided to equip breeding centres in natural habitat. It is difficult to strengthen enabling activity with only entrance fee and incomes from it.

2.3. Sustainable use

2.3.1 Agriculture

2.3.1.1 Actual statute

Agricultural land of DPRK is 2,103,000ha, which accounts for 77.1% of land area. Among them, dry field is 998,000ha(47.4% of agricultural area), 587,000ha of paddy field (27.7% of agricultural land area), 160,000ha of fruit field (7.5% of agricultural land area) and mulberry tree and industrial crops have been cultivated in the areas.

The per *jongbo* yield of grain was 7.6 ton of rice, 6.5 ton of maize in the highest crop year, however, the flood damage of 1995, 1996 and drought of 1997 have brought rapid decreased, therefore only 2.5ton of rice in 1996, and 1.4 ton of maize were harvested. The total grain output of 1997 as 2,865,000ton and it as the insufficient state in general. In such a condition, the problem of ensuring high and stable harvest is proposed as an important task in agriculture field.

In this connection, the most important problems of raising fertility of agricultural land, developing and introducing seeds in consonance with climate and soil condition and prevent soil erosion of sloping field are proposed. Particularly, from topographical and climatic speciality of DPRK of which 80% of land are mountains, the problem of preventing soil loss is proposed as an urgent task.

2.3.1.2 Conducted work

Ministry of Agriculture in DPRK mapped out strategy and action plan for sustainable agricultural development and agro-eco environment conservation in 1998, as agro-eco environment is proposed as an important problem the work to get high and stable harvest in agriculture.

Strategy and action plan includes locality of agricultural land, there dimensional use of agricultural land by double-cropping, inter cropping cultivation, plant breeding distribution and improvement of cultivation techniques, introducing organic farming method for raising soil fertility, safe water supply, establishment and intensification of eco-agricultural models.

Ministry of Agriculture, have conducted the work of intensify production of complex microbe fertility to raise crop harvest, and took a series of measures to preserve genetic resources of crops and livestock ("Crop seed test regulation" (1992) "Seed livestock management regulation (1992) and its detailed regulations). Particularly, ministry of Agriculture arable land destructed by flood from 1995~1996 to be restored mainly.

2.3.1.3 Assessment

In DPRK, recent natural disaster, decrease of food production and insufficient agricultural materials including fertility, farming machines have brought decrease of food production. As an urgent measure for this, we received various co-operation including foods from

international organization and other countries. Square measures titled land of grain(rice, maize) is only 0.056ha. Rice-field is mainly at flat area, and paddy field is most distributed at sloped land and among them, sloping field above 16° reaches 200,000ha. As forest is near by sloping field in general, destruction of forest ecosystem affects agricultural ecosystem.

In such a condition, to raise productivity and stability of agriculture it is important to prevent soil erosion of mountains by putting great effort to afforestation and water conservancy work with work of raising soil fertility systematically by developing stock breeding and to intensify three dimensional use of agricultural land introduction of agro-forestry complex system, agricultural land.

In this connection, it is important to conduct comprehensive assessment on agro-ecosystem biodiversity of country and to establish and generalize eco-agriculture, models of resources cyclic type agro-culture. And it is important to strengthen preservation, exploration and introducing measure coinciding with climatic and soil condition of DPRK. In this connection, the work of providing close relation between sustainable agriculture development strategy and biodiversity strategy and action plan in DPRK, are promoted.

2.3.2. Forest

2.3.2.1 Actual state

Forest land in DPRK is 8,906,000ha, which accounts for about 73% of land area, among them, 8,183,000ha of tree forest land, 380,000ha of no tree forest land and the rest is no forest land and other area. No tree forest land was 361,000ha in 1993 and estimated to be more increased because of floods during 1995, and other causes.

DPRK is planning reafforestation 200,000ha of forest till 2005, and 3,310,000ha of forest till 2020 to protect forest resources and provide comprehensive and sustainable use, 110,000,000m³ forest accumulation will be were increased till 2020 and accordingly 287m³ of accumulate 2000 per ha will be raised. And producing timber in the principle of cyclic felling, and the work to enable felling one tree and planting 10 trees are being promoted.

Presently, 800,000ha of firewood afforestation and 250,000ha of oil-bearing tree forest including 50,000ha of *Evodia Daniellii Benn* afforestation are being conducted in forest sector aiming at the year of 2002, to and afforestation work in flood damaged regions including Amrok river and Chongchon river are being promoted.

2.3.2.2. Conducted work

Government of DPRK sent order to wage vigorously afforestation of firewood in 1992(order number 54, November 1992) and took measure to smoothly solve firewood problem of village regions within a few years. In 1993, government took nation-wide measure to accelerate afforestation work of forest of oil-bearing trees and industrial trees and decision decisively increased the sapling production, to the level of 800,000,000 trees a year for the present and raise to above 1,120,000,000 trees by the year 1998.

Forest department have planted about 100,000ha(total 399,000ha) of trees every year and some 3,000ha of firewood were more afforested. And, according to national tree planting and afforestation policy, the works of increasing kinds of trees and diversify nation-wide forest are being positively promoted. And the work for protecting and proliferating useful animals are being simultaneously promoted and the work of survey and research the distribution by regions, resources quantity, method of proliferation on wild animals and birds living in DPRK and the work to provide living environment and breeding conditions of useful animals are being vigorously waged on a mass-scale.

Recent years, forest department achieved some successes in the work of restoring destructed forests by floods.

2.3.2.3 Assessment

The area of forest land in DPRK reaches 73% of land area, however, the accumulation per ha is not high. Therefore, the demands for timber needed in various sectors of national economy are not being fully provided. And production capacity of sapling is not high and there are not many kinds of trees to be produced. In such a condition, to accelerate the national afforestation, tree planting work, to raise the producing capacity of sampling to above 1,100,000,000 trees and to diversity kinds of trees simultaneously.

At the same time, the work of improving wild mountains and naked mountains near population region and forest wit low productivity to the forests with diversified kinds of trees, economic useful and high productivity, will have to be accelerated. Particularly, decisive measure is needed to improve basin management in view of actual state of flood damage in recent years and the work of preventing soil erosion of forest is proposed as and important task in afforestation. And the work of protection and proliferation work of useful animals will be accelerated with diversification of forest.

2.3.3. Fishery

2.3.3.1. Actual state

Positive protection and proliferation of fish resources is proposed as an important task in developing national economy and raising people's living by increasing production of marine products. However, the production of marine products of DPRK have not been raised in recent years.

It is because that myongtae resources, the major production fish species, have not been increased for changes of ocean and it decrease of it. Meanwhile, the coast of DPRK has about 20,000ha of right soil for natural sea culture and 100,000 ha of suitable land for artificial breeding, however, only 10,000ha scale of nursery have been built because of insufficient sea culture materials for recent year's economic difficulties. Also inland productivity of marine products is no high thoroughly protecting aquatic environment and preceding.

In such a condition, the protection and proliferation work of fish resources the work of increasing production of marine products is proposed as an important task.

2.3.3.2. Conducted work

In 1995 DPRK have promulgated DPRK the general "fishery law" which have regulated the protection and utilization of fish resources and have promoted the work which comprehensively readjusts the fish resources reserve in 1996. At the same time, in 1996, the government took measures to put great efforts to composition and proliferation of coastal sedentary fish resources in nation-wide improve the discipline of fishing industry and fishery management in compliance with demands of "fishery law" and preceding resources composition work before producing.

To fully provide this work, fishery association committee(non-standing) is organized. The proliferation plan of fishery resources in all units using fishery resources will be practised by state on the basis of this organized work and strict system is established the rights of fishery utilization should be if these plans are not conducted with this, the work for inland fish resources of is strengthened protection and proliferation and its utilization are strengthened. In 1997, the state ordered to develop nation wide nursery(Order No 44, in August, 1997) and enabled to wage the work of building new nursery farm and simultaneously took measures to raise productivity of lake, reservoir, aquatic area of rivers and streams.

2.3.3.3. Assessment

DPRK has favourable aquatic condition for fishery development and have profound nursery experiences. Particularly, previously provided Coastal culture ground raised the production quantity 100~150ton of sea wed, 50ton~60ton of sea tangle(laminariales), 100~150ton of oyster, and have lots of prepared technical forces. In such a condition, it is important to increase the investment on fishery department and increase of present coastal culture ground into 5 times scale.

Now, as artificial proliferation and nursery techniques of marine animals and plants are being researched and developed deeply in present fishery department, if enlargement of comprehensive adjustment and developing work if coastal fishing ground, esp., the improvement of management work of fishery resources reserve, and the biodiversity conservation of inland ecosystem and enhancement of biological productivity are positively pushed ahead and whole fish industry are diverted into resources management type fish industry considering biodiversity conservation, the aquatic environment of DPRK will be smoothly provided and production of marine products will be systematically raised.

2.3.4. Koryo medicine (Traditional medicine)

2.3.4.1. Actual state

Koryo medicine, traditional medicine of DPRK has long tradition.

Presently, the task to combine Koryo medicine with medicine is proposed for health administration of people. Koryo Medicine Production Management bureau, Ministry of Health is in charge of production of Koryo medicine in DPRK.

There are Koryo medicine resources prospecting corps, Koryo medicine resources designing office, and Korean Koryo medicine technical Centre under the Koryo medicine management bureau. And 12 numbers of medicinal plant farm which specialize medicinal plantation and 210

municipal, county medicinal plant management office for protection and proliferation are built up under Koryo medicine production management bureau, Ministry of Health and else, there are 15 medicinal plant test place and 16 cultivation enterprise, 10 protection and proliferation enterprises of animals for medicinal use, 45 deer ranch and musk deer (*Moschus moschiferus*).

2.3.4.2. Work Conducted

Ministry of Health systematically conducted the survey by regions and kinds on Koryo medicine resources of country and conducted the work to properly regulate the utilization of medicinal plant in nature.

At the same time, the work of intensifying medicinal plant cultivation base and breeding sites of medicinal animals were conducted to provide sustainable use of Koryo medicine resources. And the scientific and technical dissemination work for protection and proliferation of medicinal plant and righteous utilization of Koryo medicine, were conducted broadly through 12 units of Koryo medicine newspaper press, broadcast, TV, etc.

Koryo medicine producing sector made plan to compose 10,000ha of medicinal plant resources in the future and above 1,000ha of area Koryo medicine resources have been enlarged every year. And about 10,000ha of cultivation medicinal plant base cultivate and produce Koryo medicine of which resources are insufficient.

2.3.4.3. Assessment

Recently, the problem to fully provide the increasing demands of Koryo medicine is proposed in Koryo medicine department. In this connection, it is important to intensify resources research work on all of the medicinal plant resources and precede its work of providing condition necessary. And, it is necessary to increase production quantity by expanding, modernizing facilities for artificial proliferation of medicinal plant cultivation and medicinal animals. Particularly, in Koryo medicine department, the work of strengthening preservation of genetic resources of medicinal plant and establishing right system for sustainable use of Koryo medicine resources, are proposed as important task.

2.3.5. Sanatoria and Ecotourism

2.3.5.1. Actual State

Sanatoria and ecotourism are form of biodiversity utilization which enables people to understand deeply on biodiversity and enjoy values which biodiversity provides. DPRK takes several measures for sanatoria and ecotourism which is capable of sustainable use to satisfy health promotion cultural demands of people.

2.3.5.2. Work Conducted

Major nature park and spot in DPRK have facilities including sanatorium, rest place, Children's Union members' camp, and tourism hotel. And there are camps in revolutionary and site.

By utilizing such facilities effectively, the plan to love nature and build well is mapped out and it

is being realized.

2.3.5.3. Assessment

It is important to explain the importance of biodiversity to all members who use facilities of sanatoria and tourism which were previously provided in DPRK and to map out and adjust action plan, that organize and conduct all sorts of activities in various forms in consonance with regional peculiarity.

And the sanatoria and ecotourism which is compatible with biodiversity should be provided by conducting adjusted work. Least sanatoria and tourism facility should not affect the natural environment including wild animals and plants.

2.4. Capability strengthening conditions

2.4.1. Major state policies

Major state policy of biodiversity of DPRK is clearly clarified in president order No.1 "On strengthening Nature conservation work"(July, 1973). President Order No.1 clarifies that economizing and taking care of natural resources of the country as well as protecting it as owners are one of the most honourable and noble task, which faces to our people, and only when we protect well natural resources of the country we can develop national economy, increase the peoples living standard and make more beautiful landscape. If major environment policy of several departments related to biodiversity conservation are summarised, they are as follows.

- To firmly build up timber producing base forest department and increase many oil-bearing forests, fibre and pulp-wood forests and to improve use less forest into useful one, and strengthen afforestation and conservancy work and utilize mountains collectively and effectively.
- To systematically enhance the soil fertility in agricultural field, utilize agricultural land in three dimensions, and ensure rich, stable harvest by placing farm work on a scientific and technological basis on the principle of the right crop in the right time, and the right crop on the right soil and preserve agricultural eco-environment as well as development of stock-raising by increasing grass field area.
- To prevent environment pollution of inland and marine aquatic area in fishery department and establish the utilization order of coast, marine aquatic area and precede protection and proliferation of fish resources and develop fish industry into natural resources management type industry by enlarging the marine cultivation.
- Health public should develop Koryo medicine, the traditional medicine, and fully provide the plantation of Koryo medicine and its sustainable use including intensification of area of planting medicinal plant.
- Scientific educational department should develop scientific, research work for biodiversity and its sustainable use and foster able personnel who can fully provide biodiversity conservation general and natural resources management by enforcing environment conservation education biodiversity and enhance the social awareness on biodiversity conservation.

2.4.2. Legal basis

2.4.2.1. Enactment and enforcement of Law.

In April 1986, DPRK have proclaimed "Environment Protection Law of DPRK " which comprehensively regulated the work and method to protect and manage nature environment including atmospheres, water, soil and biology.

Biodiversity related laws of DPRK are as follows;

- "Land law of DPRK" 1997
- " Forest Law of DPRK" 1992
- " Construction Law of DPRK" 1992
- " Fisher Law of DPRK" 1995
- " Law on Cultural Relics Preservation of DPRK" 1995
- " Water resources Law of DPRK" 1997
- " Law on preventing marine pollution of DPRK" 1997

In September 1998, DPRK have amended constitution, the main law of the country. Newly amended constitution on DPRK indicates problem to constantly strengthen environment protection work in article.

2.4.2.2. Success and Enforcement

DPRK proclaimed several laws and regulations for recent 10 years Among them, many laws and regulations are related with diversity conservation. Biodiversity-related laws are transmitted and penetrated to broad mass according to fine state system and all the related regulations are conveyed to central and local agencies. As result, conservation related laws, regulations are being fully implemented by peoples' voluntary activity, and there is not little success in these factors.

The government of DPRK is taking measure to award a title of model law-abiding county(municipal) to units which have successes in implementing law and regulations and generalize its models to whole country.

Presently, the monitoring and control work on biodiversity conservation is being conducted by several bureaus from Ministry of Land and Environment Protection in close cooperation with Ministry of Public Security and judicial and procuratorial organs.

Main laws for natural environment protection are already established in DPRK. However, the comprehensive laws on biodiversity conservation have not been adopted and laws on plant and wild animals conservation wanted. Now, Central People's Committee proceeding work of is enacting such a these wanted laws, Biodiversity conservation related several laws and regulations have been enacted, however, were is a series of issue points in keeping it thoroughly.

Illegal deforestation, illegal hunting and fishing happened by some agencies and contaminating environment phenomena prouted persons, and they become impediment in biodiversity conservation in the districts concerned. In this connection, state is taking measures to strengthen administrative, legal responsibility according to its gravity.

2.4.3. Administrative and organization Framework system machinery

2.4.3.1. Central Agency

Now, the government of DPRK has non-standing environment protection committee and national environment control committee under the Cabinet. The government of DPRK newly reformed the organization of Central guide agency in Sep. 1998. Central agencies related to biodiversity conservation are Ministry of Land and Environment Protection and State Planning Commission, Academy of Sciences, Ministry of Agriculture, Ministry of forestry, Ministry of fishery, Ministry of Public Health, Ministry of Education, Ministry of foreign Trade, Ministry of Construction, Ministry of Finance, and Ministry of Public Security the responsibility of every central agencies are as follows.

- Ministry Land and Environment Protection, they are responsible for general organization and lead management on land and environment, national environment protection work and make, national land development programme and make management regulations on land, resources and prevention of pollution, and conduct comprehensive control, work.
- State Planning Commission
In mapping out national economy plan, include biodiversity conservation and sustainable utilization plan and cooperate its implementation by conceding plans from several sectors of national economy according to principles of unified and detailed planning.
- Academy of Science.
Map out the national scientific research development plan on biodiversity conservation and sustainable use and help implementing scientific research work in research agencies and introduce advanced techniques and bear the responsibility for these national overall scientific technical development.
- Ministry of Agriculture
For high and stable agricultural production, accelerate agricultural development and map out and implement agricultural biodiversity conservation including preservation and management of agro-gene-resources and bear the for responsibility for preserving agro-ecosystem environment.
- Ministry of Forestry
Beas the responsibility for mapping out and implementing sustainable forestry developing plan by combining forestry production and biodiversity conservation of forestry ecosystem providing demands for timber.
- Ministry of Fishery
Strengthes fishery resource and protection management of marine and freshwater ecosystems, develops resource management type fishery to increase fishery resources and utilize sustainably and before responsibility for its implementation.
- Ministry of Public Health
Makes management regulations by mapping plan for protection and sustainable use of Koryo medicine resource and heas the responsibility for providing demands on increasing Koryo medicine.
- Ministry of Education
Makes education programme on biodiversity conservation and sustainable use and implements it and trains able personnel of this sector by raising social awareness on

- biodiversity conservation.
- Ministry of Foreign Trade
Regulates excessive exports of biotic resources including fish products and forest resources examines exports, imports which will affect biodiversity conservation and bears the responsibility for control it.
- Ministry of Construction Inspection
Organizes and implements work to assess impacts beforehand of which construction will affect biodiversity and bears the responsibility for control work which all the construction plan should not affect biodiversity.

2.4.3.2. Local Government Agencies

Local administrative district system of DPRK involves province(Municipality directly under central authority) (district) county, ri(town, dong, workers district). DPRK has 9 provinces, 3 city under the direct jurisdiction, some 200 municipality and county and about 4000ris.

People's Committee of provinces, cities and counties are responsible for environment protection work in its district of jurisdiction. They take measure on environment protection work of their districts and develop work by legalizing thorough consideration of people's government agencies. And they inform the problems aroused in the environment protection sector, and expand activity under the guidance of central agency.

In DPRK, there are foresters, fishery resource guards, keepers for environment protection who are in charge of biodiversity, conservation under the direct control of Ministry of land and Environment protection. They cooperate officials of local agency in protection and utilization of nature resources and biodiversity protection problems.

People's government agencies of province, municipality and counties adopt the decisions of environment protection work including biodiversity conservation and are responsible for approving and providing necessary budget. However, local administrative agencies lack of knowledge on environment problem and ecosystem and present utilization of biotic resources and management work of protected areas have not been fully conducted.

Therefore, strengthening capability of officials of local government agency are proposed as an important task in biodiversity conservation. And, for the unique natural geographical condition of DPRK, it is important to organize and conduct the cooperation of local government agencies and cooperation between and adjacent local administrative economic agency outside the protected area. And issues of mapping out area unit on protection and sustainable use of nature resource and push ahead with responsibility, are proposed.

The problem of establishing effective organization system which enables central agencies to fully provide these works and push ahead with common efforts by leading and coordinating it in uniform, it is proposed as an important task.

2.4.3.3. Non government organization

In DPRK, there are Korea Naturel Conservation union, Korea General Federation of Scientific

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Technology, and academic organizations including biological academy, zoological academy, botanical academy, environment protection union.

Korea Naturel Conservation union is non-government al organization which accomplish responsible role in biodiversity conservation Korean Natural Conservation Union has organizations province (municipality), city (district) and county under federation.

2.4.4. Scientific and technical capability

In DPRK, the research institutes of biology, forest and fishery belong to the Academy of Sciences except from Research institute of university and institutes under some ministries. Institutions outside Academy of Science, have to receive academic guidance of Academy of Science.

Biological Branch under the Academy of Sciences include Botanic Institute Botanic Institute Zoological Institute, Experiment and Biological Institute, and Forest science include Research Institute of economic forest, forest administration research Institute Research Institute for plant protection, and Fishery scientific Branch include East sea fishery Research Institute, East coastal culture Research Institute, west sea fishery Research Institute, and west coastal cultivation Institute Research Institutes of agricultural sector are all included in the post-graduate course in Academy of Agricultural Science and Research Institutes of medical Science are in post-graduate in Academy of Agricultural Science.

Environment and Development Centre belongs to the Ministry of Land and Environment Protection. The scientific forces of biology, fishery, forest sectors of Academy of Science and universities in DPRK are as follows.(Table 10)

Table 10. The numbers of scientific research members of Biology, fishery and forest sectors.

Department	Academy of Science
Botany	269
Zoology	121
Physiotegey	98
Genetics	112
Biochemistry	87
Fishery	261
Forest	474
Total	1402

2.4.4.2. Conducted work

Academy of Sciences systematically organized and conducted the survey on biotic resources of the country for biodiversity conservation and sustainable use. As result, "Korean flora", "Korean Spore-bearing Plants", "Korean Birds"(1-3), "Korean Mammalia", "Korean Amphibian Reptiles", "Korean West sea fishes", "Korean East Sea fishes", volumes are published in all. In relation to

biodiversity conservation, the Academy of Science conducted survey work on natural protected area of the country in 1995 and made proposal to comprehensively readjust it on the basis of it.

Academy of Science achieved a series of success in protection and proliferation of *Rheum coreanum*, *Sansam*, Black-faced spoonbill, cranes by mobilizing research on animal and plant species, vulnerable and rare species with are valuable in economy. In Bioengineering techniques of DPRK, the research work is being conducted in Cell and Gene Branch, the post-graduate course of Agricultural Science, and post-graduate courses of medical science under the Academy of Science and new high-yielding varieties and high bioactive organization are being developed.

Universities under the Ministry of Education achieved series of success in research works for fundamental research biodiversity conservation, and protection and proliferation of biological resources.

2.4.4.3. Assessment

It takes a long time to investigate diverse animal and plant resources of DPRK exactly with present parataxonomy forces. In field of botany, higher plant taxonomy investigated, is mainly however the investigation on lower plant taxonomy were not intensified. In field of zoology, the condition is same and research forces are in the much feu state.

Endangered and rare animal and plant have insufficient investigation except birds and recent information on individuals birds some important species and its changes are in the poor state.

Despite eco-investigation of flora and fauna and major species on important nature protected areas was conducted, the regular research on its changes was not conducted well. The facilities for biodiversity study are backward and they are not enough. To hurriedly organize and conduct work of inventory of biotic resources for biodiversity conservation is an primary task for raising biodiversity of DPRK to higher step. It is necessary to provide close cooperation between export institutions and universities, and on the sot officials for this work.

2.4.5 Education and Publicity

2.4.5.1 School education

DPRK is enforcing compulsory 11 year free education at state expense. There are 2 year's kindergarten as pre-school education organ, and 4 year's primary school as elementary education organ, and 6 year's senior meddle school as secondary education.

Education related to environment protection begins from kindergarten. The numbers of pupils in DPRK reach about 420,000. Training biological teachers is conducted in Universities of Education, in Central and every provinces(municipality) and teaching plan includes environment protection and ecological subjects.

Every universities are obliged to learn environment protection subject since 1993. Faculty of Geography in Kim Il Sung University trains experts of national land development programme and environment protection, and biological faculty trains parataxonomist and ecological exports. Technical colleges by fields like agriculture, fishery, timber industry.

Secondary compulsory education of DPRK has peculiar outside courses. Every provinces (municipalities) including Pyongyang have students and children's palace and at there, primary and senior middle school pupils are to receive extracurricular lessons related to biodiversity conservation after school hours.

Primary and senior middle schools of the country organize the "Safeguard for love native place", "Safeguard for love native place" plant and cultivates trees on mountains and field and conduct work to love native place and build it well like building a hygienic and cultured way of street and village.

Students and pupils of whole country actively participate in monthly work related to biodiversity conservation such as "Month of land environment protection", and "Month of useful bird protection" of April, and "Month of plant tree" of April and November.

DPRK has training system to re-educate Central local government officials on the job. The special central training organ is University of National Economy in Pyongyang. However, teaching schedule will have to be enlarged so that students should be given full knowledge on biodiversity in accordance with fine education system and talented technicians, specialists should be fostered in a short period of time. And take measure to train prepared senior middle school teachers by raising quality of biodiversity education in teacher education. And various methods and work system which (short course, etc) can give full education of biodiversity fields to officials on the job should be developed.

2.4.5.2. Publicity

Several kinds of magazines including "Nature Protection", "Land Management" are published as professional propaganda magazine related to biodiversity conservation. And newspapers, magazines, radio, one-hour special televisions are actively participating in massive propaganda work on environment protection.

Recently, television of DPRK has new established education culture radio tunnel. However, the massive propaganda units of DPRK do not put great efforts in the work for biodiversity conservation. It is because that exact materials (interior and abroad) are not fully provided. And, lots of magazines and reference books are not distributed in local schools and organizations. In future, it is important to properly map out biodiversity mass propaganda plan which includes mass medias and realize it. Particularly, the educational cultural radio tunnel will play an important role in mass propaganda of biodiversity conservation.

2.4.6. International cooperation

2.4.6.1. Multilateral cooperation and international conventions

DPRK put importance to international cooperation of biodiversity conservation and wages positive activity. This activity is greatly different with previous action in its scope of work. In 1979, DPRK participated in plan "Man and Biosphere"(MAB) of UNESCO and registered Mt. Paekdu Nature Reserve as Mt. Paekdu international Biosphere Reserve in 1989.

DPRK have become a party to the "Convention on World Culture and Natural Heritage Protection" in Oct. 1998. However, they don't enter the "Convention on International Trade of Endangered Species" (CITES), and "International Wetland Protection Convention". Presently, DPRK is reconsidering entry of convention related to such biodiversity.

2.4.6.2. Bilateral Cooperation

DPRK have entered the "Convention on Migratory Birds Protection" with previous Russia in 1987.

Chapter 3. Biodiversity Strategy for DPRK

3.1 Overall Vision and Goal

Biodiversity is major element for sustainable utilization of biological resources by soundly maintaining global ecosystem, the survival foundation of mankind. Biodiversity conservation of DPRK is just about converting our country into a golden tapestry flourishing with birds and animals, and also comprehensively utilizing mountains, rivers and sea, therefore enabling people to get substantial benefit by sustainable use of biological resources.

Thus, the long-term objectives of Biodiversity conservation strategy in DPRK are:

- To conserve various ecosystem, animals and plants species by representative biogeography, and establish sustainable utilization system of all biological resources.
- To appropriately manage relatively large area, and make protective region to be organically linked with each other.

The present objectives are:

- To prevent the degradation of animals and plants species which inhabit in DPRK.
- To set up right conservation measure on the significant regions in biodiversity conservation.
- To establish sustainable utilization system of major biotic resources.

3.2 Strategic objectives and direction

3.2.1 Conservation

Objective 1. Identify the status of biological diversity components.

For biodiversity conservation, the diversity and its changes of ecosystem, species, gene resources in DPRK should be investigated regularly. On the basis of this, strengthening steps of law, policy for biodiversity conservation and establishment of measures for management, and make conservation and sustainable use to be organically linked with each other, are proposed as an important task.

To confirm status of biodiversity components, investigation on biodiversity inventories and regular evaluation, research and monitoring changes of species and ecosystem and actiones including assessment of economic value of biodiversity are needed.

Objective 2. Monitor and assess the adverse impacts on biodiversity.

The current losses of biodiversity involves various kinds of construction including building industrial, population area except natural influences, forest fire by artificial causes, disturbance of ecosystems by induction or introduced species, degradation of resources by over-exploitation and capture, and environment pollution by industry living things to cast away, etc., these unnatural causes affect greatly.

Under the circumstances that land area is not large in DPRK, not only establishing thorough afforestation and water conservancy including afforestation to fully decrease adverse impacts by natural disaster but also taking measures to remove artificial adverse impacts on biodiversity, are

necessary. In this context, the economic losses by biodiversity damage are to be evaluated and planned monitoring system to remove and decrease the bad influences of biodiversity should be established.

Objective 3. Strengthen in-sit conservation of biodiversity

Establishing integral system of natural protected area and improving management methods are of great significance in strengthening in-sit biodiversity conservation.

Natural protected area is the one that was legally assured with the aid to conserve nature.

The present protected area of DPRK reach about 6% of total land area.

The problem of clearly deciding target of biodiversity conservation in every protected areas, is important.

In this connection, after reevaluating protected areas in DPRK, the priority issues to achieve conservation target should be clarified and action plan should be established. Particularly, the problem of dividing the present created natural protected areas according to type of protected area of IUCN, the monitoring system on natural protected areas will be established, and safety measures on major species will be established. And, the laws and regulations including protective management laws on natural protected areas will have to be strengthened and protection management work of natural protected areas that are of global significance, should have close international relation.

Objective 4. Strengthen national *ex-situ* protection capabilities

In conservation measure of wild animal and plant species, the key is to provide safe survival of individuals in *in-situ*. However, the maintenance, recovery of individuals in nature will have difficult case in case of extinct species. In this case, to combine conservation in *ex-situ* with the conservation in *in-situ* is important.

In *ex-situ* conservation, after planning the work of breeding species in captive and individuals were bred, the wild individuals should be restored by reintroducing breeding individual to nature.

In the context of this work, the enforcement of capability of zoos, botanic gardens.

To prevent genetic simplicity by inbreeding under the condition that the facilities to heighten conservation capacity of extinct species in zoos, botanic garden, are enlarged and bred, the line record system will be established. At the same time, the measures to comprehensively promote the line preservation techniques and breeding, and free to nature, etc., will have to be taken.

Objective 5. Initiate conservation of economically valuable genetic resources.

The work of preservation of genetic resources for development of agriculture, forestry, fishery and microbe, is not only urgent problem from the actual state of biological gene resources in the word viewpoint but also are of peculiar significance in economic development of DPRK.

To conserve gene resources, many problems are proposed including monitoring on gene loss in nature, preservation in *in-situ* with storage, revival, record, data system, of collection gene resources and assessment improvement and mutual exchange of sex cell. In DPRK, it is important to strengthen work of adjustment and mutual exchange of facility for preserving national gene resources, and the work of global data exchange by presently building up data base after equipping necessary facilities for gene resources preservation in the sectors of agriculture, forestry and microbes.

Objective 6. Protect biodiversity conservation outside the protected areas.

To successfully promote the conservation of biodiversity, fully providing the biodiversity conservation outside the protected areas as well as enforcement of protected area management work, is important.

In view of not large land area in DPRK, biodiversity conservation outside the protected area is peculiarly important in case of having inadequate square measures in the aspects of ecosystem. Important thing in this is that population within the given area should not only have exact recognition on the significance and value of creating protected area, but also enabling them to obtain various forms of benefit in biodiversity conservation outside the protected area.

In this context, the establishment of sustainable utilization measures including forestry, fishery resources at regions neighbouring protected areas, and measures for making buffer zone around the protected areas, the establishment and maintenance of ecological corridors, which can provide perfect migration for plants and animals, the recovery of aggravated habitats, and prevention of contaminated substances from arable land to wetland etc., are to be promoted.

3.2.2. Sustainable utilization

Objective 7. Provide ecological activities on sustainable forestry, agriculture and fishery. As biological resources have reproductivity, to increase and sustainable use bioresources, is closely connected with environment conservation problem to provide people with clear air and water as well as the problem of providing present and long-term economic demands. Therefore, the diversity preservation of biology demands to provide ecological activity in forestry, fishery, and agriculture seeding possible resources management to sustain.

To do this, afforestation should be conducted at destructed forest and regions with low-productivity and monoculture plantation forests should be avoided. To utilize forest comprehensively, the activity to improve the utilization values of forest should be waged by promoting forest biodiversity and forestry should completely provide the cyclic felling.

Fishery should extensively study all the activities doing damage to inside the surface water coast, and marine ecosystem biodiversity and control strictly. Particularly, emission of pollutant to the coast aquatic area and rivers should be completely prevented.

At the same time, all the fishery will have to be converted into resources management style fishery be giving emphasis to protection and propagation of marine resources.

In this connection, coastal cultivation, culture fishing will have to be enlarged and developed. Diminishing fertility should be prevented by preserving arable land ecosystem biodiversity in Agriculture, and the activity to increase agricultural production with organic farming method, environment conservation type agriculture as its main content according to regional features. Particularly, biological method are to be encouraged in prevention of soil erosion, preservation of agro-gene resources diversity and prevention of harmful insects.

And the economic assessment on biodiversity loss should be conducted in forestry, fishery fields and we will positively active to eliminate unnecessary waste of biological resources.

Objective 8. Encourage traditional medicine.

Stimulation of traditional medicine, so to speak, is closely connected with problem of managing medicinal animals and plants in a possible method to be used sustainable. It is important to enlarge the protection and propagation work in *in-situ* of medicinal animals and plants resources which are widely used in Koryo medicine treatment, and to establish the preservation system in *in-situ* and *ex-situ* of medicinal plant gene resources. And cultivation work enabling sustainable use will be enlarged by widely disseminating effective growing techniques of experiences in the botanic garden, arboretum and medicinal cultivation districts.

Medicinal animal resources enables idealisation in nature to be strictly controlled by establishing scientific and technical measures for artificial propagation. And development of traditional medical supplies are to be positively encouraged.

Objective 9. Restore habitats which are of ecological significance

Unity with protected area will be maintained by establishing buffer zone in protected area and neighbouring regions with establishment of nature protected area and enforcement of conservation management work. Accordingly, the ecologically important habitat are to be restored taking into account making ecological corridors plants and animals can migrate or disperse as seasons or climate change, by making dispersed protected area and buffer zone be connected each other.

In this connection, various ecological recovery techniques are to be actively introduced after giving priority to natural ecosystem recovery in the areas in which habitats were dispersed and disturbed.

Particularly, ecosystem of wild animals and plants and fishery activity destructed by flood damage should be restored, and biodiversity conservation will be closely combined with plans of afforestation and water conservancy, basin.

Objective 10. Encourage social economic incentives to stimulate sustainable use

In fully providing sustainable use of biological resources, the most important thing is to enable local population to receive the profits by establishment of protected area, protection propagation of biological resources as the living profits. For this purpose, resources collection likely to utilize sustainable have to be proceeded by encouraging the activity to raise ecological and social values in protected area and surrounding regions.

In this context, the integrated regional plans of conservation and utilization to satisfactorily provide comprehensive utilization of mountains, rivers and sea. Particularly, as 80% of territory are highlands in DPRK, it becomes an important task to bring forest resources including wild fruits, raw materials for oil, wild vegetables and mushrooms obtained from mountains, to be satisfactorily provided as peoples' foodlife and raw materials of local industry.

Objective 11. Develop sanatorium and ecotourism which are sustainable in ecology. Sanatorium and ecotourism hold an important place in satisfying cultural demands of people. Through sanatorium and ecotourism, understanding on nature should be raised and consciousness of love nature should be fostered. Development of rest and ecotourism contributes not only in raising rallies of ecosystem in given regions but also in promoting economic profits of given regions.

In this connection the problem of strengthening environment education on local population

holidaymakers, tourists and enabling people of given region to participate in management of potential sustainable use, and regional growth of profits through goods' development of special local products, etc., are all to be developed.

Objective 12. Control negative influences of exotic species.

From natural geographical conditions in DPRK, extensive investigation that exotic species affects ecosystem, is necessary. Particularly, the exotic species of fresh water area will bring a great change to its original biome(biofacies) and ecosystem. Therefore, introduction and induction of animals and plants species from other countries exerting a bad influences upon crops, livestock, fish resources will have to be appropriately restricted so that there should be no hinderance in development of agriculture, forestry and fishery in DPRK.

Objective 13. Establish procedures for evaluation of environment impacts related to biodiversity Including previous assessment procedures of environment impacts (to assess effects of development on environment) in all developing targets, becomes an urgent task in biodiversity conservation.

This work is particularly important in view of not large territory and varied regional environment like DPRK. In this context, the organization and human capability to fully conduct environment assessment are to be strengthened with the work of providing legal foundations on environment evaluation procedures.

Presently, the environment impacts work related to development of Rajin-Sonbong region, the free economic trade zone, will be immediately developed. And, the impacts on biodiversity are to be monitored if it is necessary even if the construction is finished.

Researches for biodiversity assessment including investigation of actual state of biodiversity and for evaluation of biodiversity including readjustment of data materials, and development of biodiversity recovery techniques should be proceeded to satisfactorily promote the assessment work of environment effect for biodiversity conservation.

Objective 14. Foster capacity for biosafety.

Examples of development, utilization of gene biology exerting bad influences upon environment protection, are not proposed until now. However, the maintenance of biotic safety to prevent emission of gave biology as well as development of biological engineering techniques are proposed as important problems.

In this context, the safety guarantee guides in the research stage of DNA (deoxyribonucleic acid), and in the industrial utilization stage of gene formulating biology should be mapped out and proceeded. And measures to provide facilities which can guarantee biotic safety will have to be established.

3.2.3. Profit sharing

Objective 15. Provide fair and equitable profit distribution on local communities.

Biotic resources have regional character. Presently, the profits that local population obtained from utilization of biological resources are very large However, the profits have not been exactly

assessed in quantity and the awareness on the present and prospective profits are not high. Therefore, biological resources lively to revival will have to be promoted the research evaluation on the present, and prospective profits and the measures that enables profits by biotic resources to be distributed fairly, and equitably in local population and administrative organs, will be established. And by encouraging exploration research of local speciality exploiting biological resources, and accordingly, enable it to behold in suitable price and to be hold an important proportion.

Objective 16. Develop traditional knowledge, initiatives and practical activity

After preserving traditional crops, livestock, animals and plants species diversity in a given region, the traditional knowledge, initiatives and practical activity to use it effectively should be actively encouraged.

Under the circumstances that it is lengthy to the north and south and there are lots of highlands in DPRK, many genetic resources handed down traditionally by regions will have to be found out with establishment of its preservation system and the activity will be extensively waged to develop and introduce the high productive local speciality. Necessary facilities related to this should be equipped in region and the training work of technicians, experts will be strengthened.

Objective 17. Establish information network and clearing-house mechanism.

To satisfactorily conduct biodiversity conservation work, information on biodiversity should be collected, preserved and disseminated fully in quality and quantity. Presently as biodiversity data are dispersed in several units in DPRK, the national information centre will be set up in a short period, and the information will be briefly, and appropriately provided to officials, agencies that need data.

In this context, national biodiversity information centre will be built up in a brief period. National information centre will be in charge of data base for all sorts of information on biodiversity, ESP., information of several sectors will be integrated in time by applying geography information system.

Data base from national biodiversity information centre will be connected with electronic computer data base network established within country presently. And, the exchange of information materials will be activated by setting up International data exchange mechanism related to biodiversity conservation.

3.2.4. Common measure related to conservation and sustainable use

Objective 18. Include biodiversity conservation in national economic plan.

To fully provide biodiversity conservation work, the enforcement of scientific and technical activity, personnel training, enhancement of mechanism capacity, invest increase, and environment effect assessment work emerged from biodiversity conservation research and technical development of sustainable use, should be included.

This work should be proceeded through broad mass discussion. Particularly, plan maker should decide clear goal of biodiversity and exact priority order. Priority order should be exactly decided in the national economic branch plan and local economic development plan and there should be

enough consideration on its implementation. With this, the plan should be included with measure of monitoring actual state of its promotion.

Objective 19. Remove duplication of investment providing linkage between sectors by including biodiversity conservation in national land development programme. National land development plan is an united and comprehensive prospective plan to rationally develop, utilize, consolidate and beautify territory in accordance with promotion of well-being of the people and to build up general economic life of the country in a prospective and planned manner.

Therefore, biodiversity conservation accounts for important proportion in mapping on national, important regions and local land development programme. By mapping out national land development programme well, and on the basis of it, if we build up land in a planned manner and conserve, develop and use biodiversity sustainably, national economy in mapping out plan steps, will be satisfactorily provided and the waste of materials and funds will be eliminated. Particularly, the loss of biodiversity in land construction will be removed by paying special attention to biodiversity conservation.

Objective 20. Strengthen the scientific research work on biodiversity conservation and, its sustainable use.

It is necessary to enforce investigation and development research on biodiversity to smoothly provide biodiversity conservation and its sustainable utilization.

First of all, clarification including classification, distribution, state, all sorts of ecosystem structures, functions and study including biodiversity maintenance agency, and biodiversity evaluation, mutual relation between biodiversity component elements, and monitoring lessons, should be strengthened.

Completion degree of biodiversity inventory including microbe resources should be enhanced.

On this basis investigation, development of bio-engineering techniques in sectors of environment agriculture, forest, fishery public health, food industry, and comprehensive utilization of environment resources, development of preservation techniques and technical transfer etc., should be strengthened and the co-operative study and joint development between institutions, universities within the country should be promoted. And south-south Concord as its main contentment, joint research on biodiversity between world countries and neighbouring countries should be encouraged.

Objective 21. Encourage all forms of education and publicity related to biodiversity conservation. Only when broad masses participate as masters, biodiversity conservation and its sustainable use can achieve success. There fore, education and publicity on biodiversity conservation are of great significance.

To enhance the recognition on biodiversity conservation in school education, it is important to organize in service training work of teachers of this field. Through prepared teachers, exact knowledge on management methods which are capable of biodiversity conservation and sustainable utilization of nature.

Particularly in the stage of primary and secondary schools, students will learnt rich knowledge on biodiversity through an out-of-class assignment. And social education on biodiversity will be strengthened.

First of all, publicity to raise recognition of people on the importance of Biodiversity, will be widely launched. In this connection, newspaper, TV, and all sorts of publications should widely disseminate knowledge of biodiversity conservation and sustainable use. The function and role of Korea Nature Conservation Union will be more raised.

Objective 22. Strengthen the support to financial mechanisms related to biodiversity conservation and sustainable use.

As sound ecosystem is maintained and foundation for sustainable development in several sectors of national economy including forest, agriculture, fishery is consolidated through protection of natural environment and animals and plant species, the problem of increasing financial investment on biodiversity conservation and its sustainable use, is very important in both viewpoint of immediate and long-term economic profits.

However, for the successive natural disaster and several economic difficulties in recent years, investment of this sector has not been increased. In such a condition, measures to confirm target for fund distribution on priority object to provide biodiversity conservation and its sustainable use, and to assign it for state or local budget, will have to be taken.

In this context, experts for biodiversity conservation and specialists in plan sectors should positively assist Ministry of finance and local administration work, and several additional financial measures required in strengthening biodiversity conservation and its sustainable use in existing budget plan.

Objective 23. Cooperate in execution of biodiversity convention on local and global scale. Biodiversity convention intend to preserve safe global ecosystem, the survival foundation, however, habitat, species and species, the component element, are under the control, of every countries. DPRK occupies particular position from geographical situation and formation history of recent species composition.

In such a condition, joint research and cooperation on ecosystem management of Mt. Paekdu Biosphere Reserve and Amnok river aquatic area between DPRK and China, and joint research and cooperation between Russia and DPRK on conservation of Tuman river, and cooperation work on migratory birds with Japan and southeast Asian countries will be positively proceeded, the performance of biodiversity will be cooperated in local and global scale.

Objective 24. Ratify global and regional relevant conventions, agreements and documents.

Global convention related to "Convention on Biological Diversity" includes "Convention on Wetland of International Importance Especially as Waterfowl Habitat." (Ramsar convention in 1971), "Convention on International Trade in Endangered Species(CITES) (Washington Convention in 1973), and "Convention Concerning the Protection of the World Cultural and Natural Heritage"(World Heritage Convention in 1972).

As DPRK consists of peninsular in Northeast Asia, wetland of local and international significance in migration of migratory birds of these area, are enlarged, to enter the "Ramsar Convention" is closely connected with performance of "Biodiversity Convention". Thus, we will speed up joining procedure of this convention.

Next, after entrance of "Washington Convention" and "World Heritage Convention" is checked up, necessary measures should be taken. Particularly, even in present condition that we are not treaty powers of "Washington Convention" the regulation on imports, exports of animals and plants species noted in annex 1-3 of this convention, will be strengthened. And, including "Agreement of conservation of Migratory birds"(1987) with Russia which is deeply concerned with "Biodiversity Conservation", bilateral agreements between both countries will be smoothly promoted. Particularly, to satisfactorily proceed environment management regional plan of Tuman river triangle area, joint research between neighbouring countries for biodiversity conservation of Rajin-Sonbong area, will be encouraged and common environment influences evaluation system will be established.

Through performance of these international and local conventions and agreements and promotion of joint research plans, positive contribution will be done to global environment conservation.

Chapter 4. Action plan

4.1. Summary

Administration council of DPRK and took series of measures to improve and strengthen natural conservation work for the application of "Environment Law" in 1986, sending detailed regulations. After the ratification of "Biodiversity Convention", the Academy of Sciences was enabled to implement long-term plan related to sustainable use of biological resources. On the basis of this, under to cooperation of Global Environment Fund in 1998, the "Biodiversity Strategy and Action Plan of DPRK" is mapped out.

4.2. Identified Priorities

4.2.1. Standard of deciding priority target

Priority target for biodiversity conservation and sustainable use are to be settled:

- according to if it is national object, or global object in biodiversity,
- according to degree of danger of ecosystem, species, gene and its habitat,
- it is grounded upon by general assessment of ecological and economic values of given species and regions,
- it is founded on the long-term profits in sustainable use of biological resources,
- it is based on the keeping conservation ahead of development, and integration of conservation and development ,
- generalizing it by creating models in biodiversity conservation and sustainable use, according to provision of funds, labour and materials
- according to evaluation if it can display maximum effectiveness.

4.2.2. Priorities for conservation

4.2.2.1. Priority for ecosystems

- 1) 31 protected areas of forest ecosystem, among which are 11 areas to protect with priority (Mt. Paekdu area with typical subarctic conifer forest, 1,166 species of plants and 286 species of vertebrate, Mt Kumgang area with 85 species of endemic plants and south grown plants, Mt Myohyang area with clear distinction of horizontal zone and Mt. Oga area which preserves primitive forest with 1,100 year-old trees, Mt. Chilbo, Kwanmo peak Mt. Kuwol, Mt. Rangrim, Pakyon, Mt. Turu and 10 other areas).
- 2) 34 protected areas of wetland ecosystem, among which are 12 areas to protect with priority (Lower parts of Chongchon River which provides resting place to migratory birds of North - East Asia like *grus*, lower part of Kumya River in East Sea ; a wintering place for winter spending birds, Taedong Bay area in Ryongyon County, South Hwanghae Prov.; transit and wintering place, Chongdan County area in South Hwanghae Prov.; main habitat and resting place for black faced spoonbill , Sindo, Ongjin, Chonapo lagoon, Orang, Sonbong and 12 other places).
- 3) 15 protected areas of marine ecosystem, among which are 7 areas to protect preferentially (Hwangjin Bay in Myungchon County , Sinchang Bay in Pungchang County, North

Hamgyong Prov. in Korea East Sea, Kangryong, Ongjin, Kwail of South Hwanghae Prov. in Korea West Sea, Cholsan, North Pyongan Prov.)

4.2.2.2. *Priority for species*

- 1) 28 species of mammals, among which there are 10 with international significance (tiger, leopard, wolf, deer, musk deer, antelope etc) and 18 with domestic significance (otter, bear, brown bear, mink, flying squirrel, pika).
- 2) 76 species of birds, among which there are 27 with international significance (woodpecker, black faced spoonbill, stork, *Grus*, *Cygnus olor* etc) and 49 with domestic significance (Mandarin duck, Fairy Pitta, Ussurian black grouse, etc).
- 3) 11 reptiles, among which there are 5 under first class protection (*Eumeces coreensis*, big snake, tortoise, small thin snake, yellow spotted serpent) and 6 under second-class protection (turtle etc).
- 4) 9 amphibians, among which 4 under first-class protection (*Rana coreana*, *Salamandrella keyserlingii* etc) and 5 under second-class protection (*Callula tornieri*, *Hynobius leechii* etc).
- 5) 33 fishes, among which there are 7 under first-class protection (*Sarcocheilichthys acustris*, *Coregonus spp.*, *Lota lota*, *Thymallus jaluensis* etc) and 26 under second-class protection (*Hucho ishikawai*, *Phoxinus sp.*, *Microphysogonion koreensis* etc).
- 6) 11 insects including *Colias heos heos*, *Parnassius bremeri*, *Parnassius eversmanni* etc).
- 7) 158 plants, among which there are 20 under first-class protection and 138 under second-class protection.

4.2.2.3. *Priorities for genetic resources*

- 1) 8 kinds of crops to be protected.
- 2) 5 kinds of domestic stocks to be protected.

*Priorities for biodiversity conservation in DPRK should be paid to the completion of inventory on bio-resources and comprehensive evaluation on biodiversity. Priority should be given also to the improvement of protection and management of ecosystem of Mt. Paekdu, Mt. Kumgang, Mt. Myohyang, lower parts of Chongchon River and Kumya River which are of international significance, to the establishment of management system of protection area throughout the country for the protection of ecosystem, gene resources and species diversity, to the promotion of species protection in in-situ and ex-situ and to the establishment of national gene bank.

4.2.3. *Priorities for sustainable use*

- 1) Restoration of destroyed forest ecosystem due to recent natural disaster and low productivity, and enlargement of growing of young plants of trees.
- 2) Close combination of sustainable agricultural development with agro-ecosystem biodiversity in order to solve food shortage and have high yield.
- 3) Establishment of demonstration site which promotes resource cycling fishery by protecting biodiversity of sea and fresh water and increasing sea plants and animals.
- 4) Protection of Koryo medicine resources and its sustainable use.
- 5) Establishment of basin management for its improvement.

4.2.4. Priorities for benefit sharing

- 1). Creation of Centre for national biodiversity data.
- 2). Generalization of superior models for biodiversity conservation and sustainable use.

4.2.5. Priorities for general measures

- 1) Promote joint study and joint development between institutions and universities by promoting basic and applied studies on biodiversity.
- 2) Train experts, technicians and management officials capable of providing biodiversity conservation and sustainable use.
- 3) Map out biodiversity conservation plan by provinces.
- 4) Increase public awareness on biodiversity.

4.3. Action and priority projects

4.3.1. Action

4.3.1.1. Activity related to conservation

4.3.1.1.1. Conduct comprehensive investigation assessment on biodiversity of DPRK

- 1) Conduct national biodiversity inventory and assessment work Inventory work becomes basis reflecting actual state of biodiversity. Completion degree of biodiversity inventory will be enhanced by promoting new biological inventory work centering research study on classified county and region which were little surveyed.
- 2) Establish well-organized system to combine investigation on regional biological resources with evaluation on the eco-environment changes by region and conduct regularly. As regular survey evaluation on distribution, quantity and its changes of biological resources by region, becomes essential demands to utilize mountains, sea and river comprehensively and sustainably, accordingly, national system to conduct this work periodically.
- 3) Assess economic values of biodiversity comprehensively.
To explicitly evaluate direct, or indirect potential values of biodiversity, becomes necessary work in raising recognition of biodiversity and mapping out right national economic plan.
Particularly, it is important to exactly figure out economic loss on biodiversity destruction.

4.3.1.1.2 Confirm protection management goals by protected areas by revision and recruitment of new established national natural protected area system

- 1) Examine, revise and recruit new established national nature protected area system.
In 1995, DPRK increased natural protected area to 696,900ha, which reaches 5.6% of land area. Nation-work natural protected areas including new established natural protected areas are noted in table. In future, it was planned to raise to level of 8% till 2010.
New established natural protected areas have differences in their role and function.

Mt. Paekdu and Mt.Kumgang, where were established as natural protected area before, is protected areas with national and international significance and new established scene reserves

are proposed with task to provide harmonious combination of protected area with human activity by maintaining quality of sight and biodiversity.

From this, effectiveness of new established system of natural protected area should be examined and its deficiency should be revised and complemented and protection management target by protected area should be confirmed. And enable new established protected areas to engage in national land development program.

- 2) Confirm protection management goals of in land water area marine aquatic area, fishery resources reserve and enforce conservation management work. It is important to decide protection management goals in 11 new established inland fishery reserves and 15 units of fishery reserves in marine aquatic area. In view of distribution of fishery resources. Under the circumstances that fishery reserves are distributed in marine aquatic area, frame conservation management proposal in close relation with marine ecosystem management plan.
- 3) Determine the management goal of wetland conservation within system of natural protected area and strengthen conservation management work. From natural geographical condition of DPRK consisting of peninsula, wetland of west east coast is high area not only in migration of northeast migratory birds but-also in biological productivity.

As little concern for wetland conservation are shown and important wetland biodiversity has been lost in last days, confirm protection management goals and protected area design on major wetland in the areas of the mouth of Chongchon river, the mouth of Kumya river, Daedong bay, mouth of Amrok river, mouth of Tuman river and clear up responsibility and improve protection management work.

4.3.1.1.3 Equip conservation management facilities in natural protected area and improve conservation management work

- 1) Map out management plan and practice in every natural protected area.
 - Management planning work on every natural protected areas should be implemented by experts. On the basis of this functions of natural protected area should be classified as nuclear zone, buffer zone, and multi-purpose use area and appropriate management measures should be established by confirming line of distinction.
 - Protection management organization of natural protected area should be established with equipment of managing facilities, mapping out management regulations, and clarification of responsibilities, capacity of conservation management members should be fostered, and protection management work should be implemented with sense of responsibility. For this purpose, management facilities should be equipped or enforced according to its peculiarity and scale of natural protected areas.
- 2) Take measures to make local populations participate positively in management of natural protected area and conservation work of animals and plants.

Conservation management work on natural protected area and surrounding area is very difficult without positive participation of populations in given areas.

For this purpose:

- (1) Organize constant discussion between central organ, local administrative agency, and local communities that are responsible for natural protected area management and map out joint plan of protected area management.
 - (2) Select and train prepared members who are able to wage positive activity in conservation work of protected area, animals and plants among local populations.
 - (3) Make a model of business activities closely related to conservation, and generalize it, so that natural protected area should give benefits to local populations.
 - (4) Conduct education, publicity activity to local residents significance of natural protected area, and combine their necessary knowledge dissemination facilities with conservation management facilities.
- 3) Enforce scientific research work and monitoring work of protected area in natural protected area. Although not little scientific research works on natural protected area were conducted till now, regular investigation research work is insufficient. Thus, build spot research facility in natural protected areas and organize and conduct constant investigation study on animals and plants species, eco-environment and closely combine investigation research results with monitoring on protected area.

4.3.1.1.4 Map out preservation plan on the species of significance in biodiversity and improve conservation management work

- 1) According to criterion of danger degree of species state, decide the priority precedence and compile "Red data book"

Now, there is Centre for Nature Conservation in Academy of Science as professional institution for investigation and conservation of endangered or rare species in DPRK. As Centre for Nature Conservation collected and adjusted materials of endangered or rare species in DPRK, it is necessary to complete national "Red data book" and publish it. At the same time, several forms of materials (poster, booklet) should be disseminated to raise more social recognition on importance of conserving vulnerable or rare species.

- 2) Map out species preservation plan in *in-situ* and practice it. DPRK has global final district of habitation for white-bellied black woodpecker, and only breeding sites of 550 black-faced spoonbills in the work and wintering sites or transit areas of Red-crowned crane (*Grus japonensis*), white-naped crane (*Grus vipio*), hooded cranes (*Grus monacha*).

Global decreasing animals such as tiger (*Panthera tigris*), leopard (*Panthera leopard*), musk deer (*Moschus moschifer*) and otter are distributed and plants species including *Pentactina rupicola*, *Keumkangsania asiatica* which belongs to family in worldwide, are distributed. In this connection, it is important to improve habitat environment and strengthen conservation management work by mapping out conservation plan of species in *in-situ* which are of significance in biodiversity.

- 3) Manage species preservation facilities in *ex-situ*, and develop artificial breeding techniques of major species and enlarge conservation, proliferation work. As the population density is high and it is difficult to increase area of natural protected area, it is necessary to enforce work to remove and breed species bred in captive to nature by establishing species preservation measures in *ex-situ* for successful preservation of wild animals and plants species. To push ahead this work

successfully, artificial breeding facilities for endemic species, economic valuable species with vulnerable and rare species as its main content should be enlarged in zoos and botanic garden.

Now, Central botanic garden and Central zoos is small. In this condition, artificial breeding facility of vulnerable or rare species should be increased preferentially in Central botanic garden and Central zoos and artificial breeding facility should be gradually furnished in local zoos and botanic garden near by habitat.

At the same time, effective tissue culture, artificial breeding technology should be developed and line record system to prevent genetic homogeneity should be established. And issue points aroused in setting free species bred in captive should be investigated extensively and scientific research work to raise hit rate of natural restoration should be strengthened. And culture facility for breeding vulnerable or rare species in captive should be equipped in natural protected areas and enable it to contribute to preservation and rehabilitation work of species.

4.3.1.1.5 Establish preservation network system of national crops, livestock, germ and genetic resources.

- 1) Set up national gene bank and organize centre for utilization of genetic resources preservation. Presently, the crop genetic resources by kinds including grain vegetables, in given institutes under the Academy of Agricultural science, Tree gene resources in Forestry Branch, livestock gene resources in breeding farms under zoo technic Institute and Agricultural Ministry, and microbe gene resources are dispersed and preserved in several institutes.

As result, some difficulties are aroused in every units in effective preservation and utilization of genetic resources. In such a condition, setting up the national gene bank and smoothly conducting the preservation of genetic resources and building up comprehensive genetic resources data base.

- 2) Establish the preservation network system of crops, tree, livestock, microbe gene resources. As national establishment of gene bank could not solve the preservation work of gene resources, utilization committee for preserving genetic resources to fully provide the preservation and utilization of gene resources should be nationally established and strategy and action plan in utilization sectors of genetic resources preservation, should be mapped out. And raise the utility ate by establishing effective network system between preservation units of genetic resources and fully provide biological safety. At the same time, genetic resources.

4.3.1.1.6 Restore destructed ecosystem outside of natural protected area and establish the buffer zone and ecological corridor.

- 1) Restore destructed ecosystem outside of natural protected area and establish buffer zone. Recent natural disaster caused not little destruction of some natural protected area and ecosystems outside of natural protected area. In such a condition, enlargement of afforestation work on destructed forest is proposed as an urgent task. And it is important to raise more living profit of the district population by establishing buffer zone prospectively and applying effective complex management method of agriculture and forestry, agriculture forest tree in these areas.

- 2) Promote the creation of ecological corridors between national protected areas in afforestation plan by planning it. To fully decrease the influences by habitat destruction up wild animals and plants including influences by global warming, the ecological corridor between natural protected areas should be set up. Include this work in afforestation plan and national land development programmes.

4.3.1.1.7 Practice biodiversity monitoring plan by mapping out it

To Monitor and control if various regulations related to biodiversity conservation have been fully conducted or not, and evaluate the economic loss by biodiversity loss, remove and decrease the negative influences affecting biodiversity, systematic biodiversity monitoring plan should be set up and practised.

Biodiversity monitoring plan includes monitoring on forest, monitor on land use. monitoring on index species and habitat monitoring on aquatic utilization, monitoring on pollution, monitoring of management.

4.3.1.2 Action related to sustainable use

4.3.1.2.1 Develop forestry considering biodiversity

Restore forest destructed by forest fire, flood damage, drought and over exploited use in a short period, and provide sustainable use of forest resources by setting up comprehensive measures to raise biological productivity of forest.

In this context, conduct following action:

Restore the forest land with no tree including naked mountain, and forest with low productivity, in a short span of time proceed plan to increase forest biological productivity with timber production as its main content by mapping out it.

- Raise the soil fertility of dry, infertile forest land and take comprehensive measures to prevent forest soil erosion.
- Accelerate the afforestation work and satisfy the demands for firewood.
- Comprehensive plans to increase biological resources of forest including law materials for paper, oil, and wild fruits, medicinal plant, mushrooms, should be mapped out and promoted in accordance with peculiarity of regions.
- Map out and practice cyclic felling promoted in log production.
- Decrease amount of consumption of timber increasing utilization in log production and timber processing to the maximum.

4.3.1.2.2 Protect agricultural biodiversity and accelerate development of nature cyclic type agriculture

- Most of agricultural land of DPRK are situated in river basins and neighboured with forest. In such as condition, biodiversity preservation of agriculture ecosystem is in close relation with other neighbouring ecosystem. And, agricultural biodiversity conservation is closely connected with preservation of crop seeds breeds which has been homed down historically.

- For sustainable development of agriculture, it should developed in environment preservation type agriculture, nature cyclic type agriculture.

In this connection, important activities are as follows:

- To establish strict monitoring system on the utilization of agricultural land resources.
- To prevention soil loss and measure to raise soil fertility.
- To establish eco-agriculture, nature cyclic type model farms.
- To introduce organic farming method and techniques of biological fertilizer.
- To introduce of method of complex management of agricultural forest, agricultural wood forest.
- To traditional genetic resources.
- To afforest fuelwood in flat area and its sustainable use.

4.3.1.2.3 Develop fish industry in the form of nature managements by intensifying aquaculture work of aquatic fauna and flora

To maintain biological productivity in marine aquatic area, biodiversity of marine ecosystem should be protected.

The major reason that present total fish productivity is being decreased, is that conservation of aquatic environment and over exploited use were not controlled properly.

Necessary activities related to this are as follows:

- To enlarge and develop aquaculture of aquatic animals and plants.
- To improve of management on aquatic area with high productivity.
- To restore the fish ground of which environment was deteriorated, and thoroughly prevent aquatic pollution.
- To assess inland and aquatic resources exactly and establish national system for development of resources management type fish industry.

Particularly, map out the comprehensive development plan of marine aquatic area and closely connect this developing plan with biodiversity and, accordingly, establish new aquatic area anagement system.

4.3.1.2.4 Accelerate the protection and proliferation work of medicinal plant and provide sustainable use of Koryo medicine resources.

To fully provide development of Koryo medicine, the traditional medicine, and increasing demands on medicinal plant

- Exactly decide the quantity of collecting medicinal, plant on the basis of evaluation of medicinal plant resources.
- Enforcement of legal legislation in utilization of medicinal plant.
- Enlargement of artificial cultivation of medicinal plant resources with high demands.
- Establishing preservation system of medicinal plant genetic resources in In-situ and ex-situ, etc., will be major activity.

4.3.1.2.5 Intensify rest work and develop ecotourism.

Conduct following activity to fully provide rest work and eco-tourism.

- Completion of spot facility for rest and ecotourism, particularly, consolidation of facility which do not give damage to biodiversity.
- Training and intensification personnel in the of rest and ecotourism.
- Acceleration of mapping out spot activity plan on rest and ecotourism.
- Establishment of publicity and facility operation system that rest and ecotourism should not give negative effects to biodiversity.

4.3.1.2.6 Establish comprehensive measures to prevent influences by exotic species

Conduct following activity to prevent negative influences of exotic species affecting biodiversity

- Investigation research and assessment of influences affecting distribution of exotic species, actual state of habitat, and ecosystem
- Comprehensive research on introduction work of exotic species including agriculture and forest, etc.
- Remove harmful exotic species.
- Strict control of exotic species introduction to area for nature conservation.

4.3.1.2.7 Map out and promote effective environment assessment on activities which will affect biodiversity

Following action will have to be done to establish environment impact evaluation procedures on all activities which will affect biodiversity.

- Map out and promote environment impact evaluation plan
- Training specialists who can smoothly conduct environment impact assessment work.
- Send guide book for environment impact evaluation to all developing departments and thoroughly establish system that propose environment effect evaluation report before development.
- Make regulation land detailed regulation on environment effect evaluation work.
- Raise awareness of population environment impact assessment work and strengthen dissemination work of all sorts of knowledge necessary to it.

4.3.1.2.8. Take measures to prevent environment pollution which threatens biodiversity

It is important to thoroughly prevent environment pollution threatening biodiversity including forest destruction by acid rain and water pollution by life waste.

Activities to prevent environment pollution threatening biodiversity are as follows:

- Exact establish standard of preventing pollution on atmosphere, water and soil. Particularly, establish strict standard to prevent pollution separately on protected areas and keep it thoroughly.
- Establish comprehensive record system on polluting materials and thoroughly equip facility to prevent pollution and make polluting materials not to emit to nature.
- Go on study measures to prevent pollution and disseminate good experiences of preventing pollution.

4.3.1.2.9 Take measures on biotic safety

Following activity should be conducted to fully provide bio-safety.

- Map out and promote experiment guideline to ensure safety in experiment stage. When gene formulation is going to be used in nature condition, conduct environment impact evaluation work by objects.
- Make and implement guideline on the utilization of gene formulation technology in medicaments food: stuff, agriculture, forestry, fishery and mining industry.

4.3.1.2.10 Restore destructed ecosystem and improve basin management by mapping out comprehensive, national basin plan

Recent year, not little district ecosystem in DPRK received flood damage 80% of territory is mountainous topography, and water speed river and stream uprising is fast and density river network, and border of basin with explicit topography, and hydrological condition, the rehabilitation of destructed ecosystem and afforestation and water conservancy work should be promoted in combination with improvement work of basin management.

Major activities related to this are as follows:

- Reconfirm sphere of region which will be damaged by flood in future.
- Put priority to restoration of damaged area by flood and complete rehabilitation in a short period. Take measures to restore forest ecosystem destructed by artificial interference including damaged region by forest fire and no agree forest.
- Widely apply measures of soil erosion including composition of grass plates which cost low expense.
- Train able specialists for mapping out basin management plan.
- Complete afforestation techniques of basin in accordance with biodiversity conservation and promote complete afforestation proposal so that techniques for keeping much water in basin forest should be raised.
- Build model of biodiversity-related comprehensive basin management in Chongchon river basin and generalize it.
- Promote above proposals and plans in close combination with work which will be conducted during the month for protection of land environment in spring and autumn.

4.3.1.3 Action on benefit - sharing

4.3.1.3.1 Determine quantity of economic values of biodiversity in given regions in mapping out national land use plan and enable much amount by be profit of given regions.

Fixing quantity of economic values of biodiversity, becomes important possessing materials in preventing potential, and in land and aquatic area survival biotic resources giving away immediate profit from the profit by significant development And as local population receives much profits of biological resources, this profit should be sustainable form.

Following activities are necessary related to this.

- Conduct fixing quantity of economic value of biodiversity in given regions in the of mapping

out national land programme.

- Enforce local authority on utilization of biological resources in a given region.
- Encourage development research and circulation of local special products using biological resources.
- Activate the action to bring local population to see immediate and perspective on profits conservation and sustainable utilization of biological resources.

4.3.1.3.2 Appraise highly the super models in biodiversity conservation and sustainable use and generalize it.

It is important to widely introduce and publicize fine officials and generalize its models by finding out good models in protection and proliferation of useful animals and plants, afforestation, planting oil-bearing forests, cultivation of medicinal plant, and propagation work of fishery resources, etc., and conducting political and substantial evaluation on it.

In this work, it is important to positively encourage traditional knowledge, initiatives, practical activity in conformity with peculiarity of given regions.

Particularly, training many local technicians, and experts who know actual state well on a given regions, as biodiversity experts should be put efforts.

4.3.1.3.3 Establish national database and information network for biodiversity conservation and set up information exchange mechanism.

In making policy for biodiversity conservation, exact and sufficient biodiversity information should be provided and should use it effectively.

Thus, national data base should be built up by collecting dispersed materials from biodiversity sectors, an international information exchange facility should be provided.

Action related to this are as follows.

- Accelerate the accumulation of information by promoting survey research for biodiversity conservation.
- Make unique national data regulation premising introduction of geographical data system.
- Enlarge information network to be involved to data base and set up national information network system.
- Build up special information exchange facility for material exchange with other country on biodiversity.
- To fully provide collection, evaluation, and providing on biodiversity, build national biodiversity information centre.

4.3.1.4 Common measure related to conservation and sustainable use

4.3.1.4.1 Include biodiversity conservation to the planning, unification work of national economy and proceed it.

Developing economy under the unified guide of state in a planned manner, is natural demand of socialist economy in DPRK. Thus, all plans of biodiversity sectors including forest utilization plan

in forestry, fishery, health public etc, composing woodland plan, coastal culture plan, fishing plan, utilization and cultivation plan of medicinal plants, conservation of nature reserve protection and proliferation of useful animals and plant, and scientific research activity and training personnel plan should be included in national economic plan.

In this context, it is important to include biodiversity in planning, unification work of national economy. Precedence order of biodiversity conservation shall be fixed by combining national immediate profit with perspective profit of state properly, and enable it to fit together with national economic departmental plan and developing plans of local economy.

4.3.1.4.2 Include biodiversity conservation in national land development programme and make and generalize models of conservation and development.

It is important to integrate biodiversity conservation in national land development programme, the unified, comprehensive and long-term plan of land construction.

Following actions related to this will be promoted.

- Include biodiversity conservation in mapping out national plan, plan of major districts, regional plan in national land development programme.
- Relevant connection will be provided by priority integrate biodiversity conservation in national land development programme, and remove duplication of investment in utilization of land and aquatic area.
- Build models of biodiversity conservation by mapping out national land development programme integrated with conservation and sustainable development on Chongchon river basin and Daedong river basin.
- Re-examine national land development program of Rajin-Sonbong district and raise the rate of biodiversity conservation.
- Strengthen training personnel on biodiversity conservation in sectors of mapping out national land development programme.

4.3.1.4.3 Strengthen scientific research work on biodiversity

To strengthen scientific research works on biological diversity conservation and sustainable use of national economy, properly fix and promote research assignment and steadily improve training personnel and scientific research means.

Department of fundamental research work on biodiversity will promote following parts in focally point.

- Systematic research work on biodiversity and constant renovation of biodiversity inventory.
- Monitor biodiversity changes and clarify affection to it and study for establishment of rational preservation measure.
- Raise the rates of biodiversity conservation in teaching schedule of environment protection at universities.
- Set up training school specializing in training personnel of biodiversity sector, in Kim Il Sung University and Kim Hyong Jik University for education.
- Establish school of in service training for biodiversity conservation for present officials in and

management college.

- Enhance the capability of economic management officials by including teaching schedule for biodiversity conservation to university of national economy.
- Organize lecture and training course for biodiversity conservation in peoples Grand Study House.
- Raise the rates of training biodiversity experts in training procedures of doctoral institute of educational ministry and Academy of sciences.

Accelerate following activities to strengthen the mass publicity and educational activity for biodiversity conservation.

- Establish mass publicity plan for biodiversity conservation in Natural Conservation Union.
- Rise the awareness of economic management officials on biodiversity by establishing system or disseminating information data and news related to biodiversity conservation.
- Widely disseminate the knowledge on biodiversity through newspaper, magazine, radio, and television.
- With title "Biodiversity Conservation" organize writing, painting and taking story, etc., for children.
- Equip scientific knowledge dissemination room of biodiversity conservation in students and children's Palace of Pyongyang and every provinces, and operate it.
- Build national Nature Museum.
- On the occasion of memorial day related to international environment protection including "The day of biodiversity", organize all sorts of discussion, workshops and conduct dissemination activity of publicity articles.

4.3.1.4.4. Take proper measures to increase investment of biodiversity conservation.

In view of strained financial circumstances as a result of recent successive natural disaster and economic difficulties, take measures in consonance with actual condition.

Accelerate following activities related to this.

- Decide present and prospective state budget needed for biodiversity conservation and its sustainable use.
- Decide local budget on biodiversity conservation
- Concentrate investment on priority object of biodiversity conservation
- Improve quality of export goods by organizing comprehensive analysing evaluation work on all exports of form land products and prevent loss of resources in trade by coordinating exports on the basis of usable quantity of resources and additionally put its profit to biodiversity conservation.
- Regulate export items which can give negative influences to biodiversity conservation in exports of biological resources.
- Eliminate investment waste by having obligation to propose environment impact assessment paper before all development. Strengthen substantial incentives on fine units of biodiversity conservation and sustainable use.

4.3.1.4.5. Strengthen local and international cooperation for biodiversity conservation

As global environment protection work including biodiversity conservation have lots of problem that one country cannot solve, strengthen local and international co-operation in this sector.

In this connection, accelerate following activity.

- Examine all international conventions related to "Convention on Biological Diversity" and promote entry, ratify of "Convention on Wetland of International Importance Especially as Waterfowl Habitat"(Ramsar convention), which is proposed as an urgent problem from natural geographical situation of our country.
- With this, regulate exports for animals and plant species noted in annex of "Convention on International Trade in Endangered Species of Wild Fauna and Flora" (Washington convention).
- Provide performance of the "Convention on Migratory Bird Protection" (in 1987) with Russia previously ratified, and proceed ratification of migratory protection convention with China.
- Strengthen more south operation in biodiversity conservation and its sustainable use sector.
- To strengthen local co-operation of biodiversity protection sectors related to development of Tuman river delta area, encourage joint research with DPRK, China, and Russia.
- To prevent forest destruction by acid rain, positively promote local cooperative plan of this sector by participating in this.
- Strengthen more bilateral co-operation with neighbouring country in biodiversity conservation sector.

4.3.2. Priority projects

Priority projects are determined in accordance to biodiversity conservation, sustainable use, benefit sharing and general measures of the country through the preparation of 27 action plans and its options for biodiversity conservation.

Priority projects are reviewed from the present and prospective point of view in order to provide biodiversity conservation and sustainable use.

Priority projects are classified into 3 categories to make easier in comparing the size of the projects. The budget for 1st class is over 5 million \$, 1-5 million \$ for 2nd class and 1 million \$ for 3rd class.

4.3.2.1. Priority projects on biodiversity conservation

Project 1:

Title: Country Study: Biodiversity Inventory and Assessment

Objectives: To promote the completion of the list of biological resources.
To take general assessment of bio-resources

Justification: Under the circumstances that national strategy and Action Plan on Biodiversity is prepared without country study, there is a need to assess comprehensively, on the biodiversity of the country.

Activities:

- To survey on numbers, distribution and status of species of fauna and flora and

microorganisms by regions where research is less done.

- To prepare regional plant community classification table.
- To organize systematic survey on structure and function of main ecosystems.
- To survey and assess the threatened status of biodiversity.
- To assess economic value of biodiversity.
- To prepare and publish nearly completed bio-resource inventory and evaluation report on biodiversity.

Implementing Agency: Academy of Sciences

Stakeholder: Ministry of Education

Timing: 4 years

Budget: Category 3

Project 2

Title: Capacity Building for Biodiversity Monitoring.

Objective: To strengthen the capacity of biodiversity monitoring and damage control.

Justification: Major difficulties arising in the monitoring and control of adverse impacts to biodiversity are lack of biodiversity monitoring system and of capacity, equipment and experiments.

Activities:

- To establish monitoring system on forest fire.
- To complete monitoring network system on pollution and blights.
- To establish strict monitoring system on over use of natural resources, destruction and damage to biodiversity.
- To supplement and complete laws and regulations to strengthen biodiversity conservation.

Implementing Agency: Ministry of Land and Environment Protection.

Stakeholders: Ministry of Public Security, People's Committees of every Cities (counties), and Provinces

Timing: 2 years

Budget: Category 2

Project 3

Title: Establishment of National Nature Reserves

Objective: To establish full protection and management system on former protected areas and newly expanded nature reserves.

Justification: There are lack of necessary trained staffs and facilities to manage the protected areas that are newly established. And existing nature reserves and protected areas are not at full protection and management.

Activities:

- To redefine the boundaries of newly expanded nature protected areas.
- To identify the goal of protection and management of each nature reserves.
- To equip with new management facilities to protect and manage major nature reserves and allocate necessary managing staffs.

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- To establish specialized organs for management of nature reserve under Ministry of Land and Environment Protection.

Implementing Agency: Ministry of Land and Environment Protection
Stakeholders: Ministry of Public Security, People's Committees of each Cities (counties), Provinces, Academy of Sciences, Ministry of Forestry.
Timing: 2 year
Budget: Category 3

Project 4

Title: Management of Mt. Paekdu Biosphere Reserve
Objective: To work out and implement protection and management programme to protect typical ecosystems in Mt. Paekdu Biosphere Reserve which is registered as an international biosphere reserve.
Justification: Since Mt. Paekdu Biosphere Reserve is registered as an international biosphere reserve in 1989, the State Academy of Sciences had proceeded a comprehensive study on it and is under systematic survey of forest ecosystem. However, protection and management plan acceptable to biosphere reserve is not prepared yet, and several issues are raised in its protection and management.

Activities:

- To strengthen systematic survey and research on ecosystem of Mt. Paekdu Biosphere Reserve.
- To integrate infrastructure on protected areas for the management of Mt. Paekdu Biosphere Reserve.
- To develop new management plan of nuclear zone, buffer zone and multi-use zone.
- To increase ability and capability of expertise for administrative officials and local managers.
- To strengthen joint study with between the scientists of DPRK and China.

Implementing Agencies: Ministry of Forest, Academy of Sciences.
Stakeholders: People's Committee of Ryanggang Province, General Bureau of Revolutionary Site
Timing: 5 years
Budget: Category 2

Project 5

Title: Biodiversity Conservation of Mt. Myohyang
Objective: To protect peculiar biodiversity of Mt. Myohyang Nature Park, and improve its management capacity.
Justification: Mt. Myohyang is internationally significant area. Especially, Mt. Myohyang is abundant with many wild animal and plant species.
As eco-tourism is expanded in the area, it is necessary to establish a sound system for biodiversity.

Activities:

- To re-examine the management plan on parks including eco-tourism development plan and buffer zone development plan.

- To survey and monitor biodiversity regularly.
- To establish publicity facility to increase awareness on biodiversity and prepare curriculum for public propagation and education.

Implementing Agencies: Ministry of Land and Environment Protection.
Stakeholders: Academy of Sciences, N. Pyongan Province and Jagang Province.
Timing: 3 years
Budget: category 2

Project 6

Title: Wetland Conservation of Estuaries of Chongchon River, Kumya River, Tuman River and Taedong Bay.

Objectives: To take measures to protect and manage wetland of internationally important areas for migratory bird protection in estuaries of Chongchon river, Kumya river, Tuman river and Taedong bay.

Justification: Chongchon river estuary (S. Pyongan Province) and Taedong Bay (Taetan and Ongjin county, S. Hwanghae Province) of the Korean West Sea, Tuman river estuary (Rajin, onbong city) and Kumya river estuary (Kumya county, S.Hamgyong Province) take great significance as a transit site and wintering site for migratory birds of north and east of Asia.

The government has designated wetland of these areas as national migratory bird (wetland) reserves in 1995, however, its protection and management are not well done and its infrastructure is in absence.

Activities:

- To examine a plan of developing 4 wetland reserves and equip with on-site facilities to protect and manage 4 migratory bird (wetland) reserves and survey it regularly.
- To evaluate elements of threat to waterfowl's living and take measures to mitigate it.
- To expand sound habitat for waterfowls, restore destroyed ecosystem and establish demonstration site for wise use of wetland.
- To make research on wetland conservation and train personnel to manage wetland.
- To increase awareness of local people on wetland conservation.

Implementing Agency: Academy of Sciences, Ministry of Land and Environment Protection
Stakeholder: People's Committee of city, county, and provinces
Timing: 4 years
Budget: Category 2

Project 7

Title: Promotion of Management of Fishery Resource Reserve

Objectives: To protect fish resources and improve its management capacity.

Justification: Though 11 fish reserves in territorial waters and 15 in marine are designated, there is still no infrastructure of it and its protection and management is not well done.

Activities:

- To establish infrastructure on main fish reserves.
- To make up management regulations for fish reserves and strictly keep it.
- To monitor and observe, regularly, the biodiversity and its changes of fish reserves.
- To increase awareness of local people on fish reserves that take great significance.
- Increase ability and capability of personnel who manage fish reserves.

Implementing Agencies: Ministry of Land and Environment Protection, Ministry of Fishery.
Stakeholders: Academy of Sciences, Ministry of Public Security.
Timing: 4 years.
Budget: category 2.

Project 8

Title: Publication of "Red Data Book" and Protection of Endangered and Rare Species.
Objectives: To strengthen protection of endangered, rare and endemic species including Sansam (*Panx schinsing*), *Keumkangsanias asiatica*, *Rheum coreana*, black- faced spoonbill (*Platalea minor*), crane and *Nemorphedus goral* (*Amur goral*).
Justification: For plants there are 10 endangered species, 42 vulnerable species and 75 rare species, and 157 endangered and rare species of animals distributed in our country. It is, therefore necessary to survey regularly the populations and changes in nature and take measures to protect the species and their habitat. However, Red Data Book is still not yet published.

Activities:

- To publish Red Data Book which notes present status of endangered and rare species.
- To prepare protection plan for to- be- protected species in emergency.
- To establish field facilities for protection in order to protect and increase species to be protected in emergency in its habitats.
- To survey, regularly, the changes of quantity of endangered and rare species.
- To increase public awareness on the importance of endangered and rare species protection.

Implementing Agencies: Academy of Sciences, Korean Natural Conservation Union.
Stakeholders: Ministry of Land and Environment Protection, Ministry of Education.
Timing: 3 years
Budget: Category 3

Project 9

Title: Capacity Building of *Ex-situ* Conservation especially in Botanical Gardens and Zoos
Objectives: To strengthen the capability of preserving endangered, rare and endemic species in botanical gardens and zoos.
Justification: Though artificial breeding of endangered, rare and endemic species is carried out in Central Botanical Garden and Central Zoo at present, the captive facilities are not good enough and have some technical problems.

Activities:

- To prepare strategy of species preservation in botanical gardens and zoos.
- To re-equip with artificial facilities in botanical gardens and zoos and expand its size.
- To introduce advanced technologies to protect endangered and rare species.
- To set up database of collected species.
- To strengthen cooperation with botanical gardens and zoos of other countries.

Implementing Agencies: Central Botanical Garden, Central Zoo.

Stakeholders: Academy of Sciences, Ministry of Land and Environment Protection.

Timing: 4 years.

Budget: category 2.

Project 10

Title: Establishment of Gene Bank

Objectives: To establish a national gene bank to preserve genetic resources and develop a database for crop germ-plasm.

Justification: At present, gene resources are preserved and used in several institutes under. Academy of Sciences, however, preserving facilities are not properly provided.

Activities:

- To establish a national gene bank and develop a data base for gene resources.
- To establish expert panel to organise and study the gene resources and provide linkage between sectors in gene resource utilization.
- To strengthen capability of preservation and utilization of gene resources.

Implementing Agency: Academy of Sciences.

Stakeholder: Ministry of Agriculture.

Timing: 5 years.

Budget: Category 1.

Project 11

Title: Protection of Black-faced Spoonbill and *Chinese Egret*.

Objectives: To protect fully, the globally threatened Black-faced spoonbill and *Chinese Egret*.

Justification: At present, it is estimated that the number of Black-faced spoonbill in the world is about 550 and 2,500 of *Chinese Egret*. The habitats of these two threatened species are identified to be inhabitant islands in the Korean West Sea. Therefore, it is a great responsibility for DPRK to protect these species.

Activities:

- To survey, regularly the habitats and breeding population of Black-faced spoonbill and *Chinese Egret* and proceed ecological study on it.
- To develop artificial breeding of black-faced spoonbill and *Chinese Egret* and proceed ecological study on it.
- To prepare and implement the artificial breeding plan of Black-faced spoonbill and *Chinese Egret* outside their habitats.

- To increase public awareness to protect Black-faced spoonbill and *Chinese Egret*.

Implementing Agencies: Academy of Sciences, Central Zoo.

Stakeholders: Ministry of Land and Environment Protection.

Timing: 3 years.

Budget: Category 3.

4.3.2.2. Priority projects on sustainable use

Project 12

Title: Restoration of Degraded Forest Ecosystem by Tree Planting.

Objectives: To restore destroyed and damaged forest due to natural disaster in recent years, as soon as possible, and increase diverse tree seedlings to 1-1.5 billion.

Justification: 80% of land is mountainous in DPRK and it rains heavily in summer due to low atmospheric pressure occurring from down river of Janggang in China which brings some damages to adjacent agro-ecosystem and forest ecosystem. It is, therefore, necessary to produce tree seedlings for afforestation in short time.

Activities:

- To prepare and promote restoration options for damaged forest ecosystem.
- To modernize 10-tree seedling nursery farms for afforestation of 2 million ha.
- To enhance research work in tree breeding and seedling nursery.
- To increase the capabilities of local forest managers in these regions.
- To establish ecological corridors in destroyed ecosystem to link protected areas.

Implementing Agencies: Ministry of Land and Environment Protection, Ministry of Forestry.

Stakeholders: People's Committee of local government, Academy of Sciences.

Timing: 3 years.

Budget: Category 2.

Project 13

Title: Demonstrations for eco-farming and Recycling Use for Agricultural Resources.

Objectives: To provide agro-ecosystem diversity and ensure a sustainable use for agricultural resources by establishing demonstrations for eco-farming and recycling agriculture that are suitable to local geography and ecological features.

Justification: Soil appropriate for agriculture in DPRK is limited and its fertility is not high due to lack of organic resources. Besides, there is a great danger of threat of soil erosion due to seasonal and regional partiality of precipitation distribution. Therefore, it is necessary to establishing eco-farming demonstrations, in order to mitigate above mentioned threat.

Activities:

- To prepare strategy and action plan for eco-farming and recycling agriculture.
- To maintain biodiversity in agricultural ecosystem and take measures to increase the fertility of cultivated land.
- To introduce organic agricultural method and effective bio-chemicals.

- To introduce management system of agro-forestry and combined agro-forest- livestock.
- To develop grassland in accordance with geographical features.
- To establish biological exterminating method of blight.
- To popularise the theory and technology of eco-agriculture.

Implementing Agency: Ministry of Agriculture.
Stakeholders: Academy of Sciences, Ministry of Land and Environment Protection.
Timing: 5 years.
Budget: Category 1.

Project 14

Title: Protection and Increase of Fishery Resources and Biodiversity of Freshwater and Marine
Objective: To make sustainable use by protecting and increasing fishery resource with high productivity and economic value, which takes great part in solving people's food problem, and meanwhile to protect water environment.
Justification: Increase of biological productivity of territorial waters and sea is prerequisite for improving the people's diet. However, fish resources are decreased due to changes in marine condition and lack of managing capability for resources. Therefore, it is necessary to strengthen the protection and increase of marine resources and eco-environment of waters.

Activities:

- To survey the status of fish resources in freshwater and near seas, regularly.
- To establish hatchery for anadromous fish including salmon and trout, and increase of releasing rate.
- To modernize summer seed planting place of seaweed.
- To take comprehensive survey for eco-environment of waters where productivity has declined.
- To develop capacity building of technicians on mariculture.

Implementing Agency: Ministry of Fishery.
Stakeholders: Academy of Sciences, Ministry of Land and Environment Protection, Ministry of Public Security.
Timing: 6 years.
Budget: Category 2.

Project 15

Title: Protection and Increase of Koryo Medicines Resources.
Objectives: To use sustainably the main medicinal plants used in Koryo medicines.
Justification: Despite the demand for Koryo medicine is being increased, the eco- environment for herb resource is being destroyed. There are other factors that bring herb resource reduce, so that the medicine does not meet its demand in market.

Activities:

- To prepare protection strategy of Koryo medicine resources.
- To improve management level for herb protected area.

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- To investigate appropriate place for artificial cultivation for herb resources.
- To create 6 projects for herbal production construction.
- To enhance public awareness on herbal protection and its sustainable use.

Implementing Agency: Ministry of Public Health.

Stakeholders: Ministry of Land and Environment Protection, Academy of Sciences.

Timing: 4 years

Budget: Category 2.

Project 16

Title: Afforestation of City Environment.

Objective: To increase quality of biodiversity of city environment by harmonizing parks, recreation ground and forest within cities with forests outside cities.

Justification: It is impossible to provide people with appropriate environment suitable to people's health without promoting afforestation in high dense cities.

Activities:

- To prepare the national strategy of city afforestation.
- To develop a design for rational distribution of city greenery and diversify composition.
- To improve the capacity of breeding farm and seed farm to afforest city.
- To create tree sapling farms.
- To improve the management of city greenery.

Implementing Agency: Ministry of Land and Environment Protection, Ministry of City Management.

Stakeholders: Academy of Sciences, People's Committee of Local Government.

Timing: 5 years

Budget: Category 2

Project 17

Title: Demonstration for the Sustainable Development and Biodiversity Conservation in Chongchon River Basin by Setting up Buffer Zones.

Objective: To generalize methodology by establishing a model for biodiversity conservation and sustainable development including the designation of buffer zone in Chongchon River basin, one of the heavy rain areas.

Justification: Mt. Myohyang natural park is located in the Chongchon River basin and Mundok migratory bird (wetland) reserve is situated at the lower part of the river.

Chongchon River area is the main habitat for silver fish. The basin is surrounded with industrial areas with high precipitation, hence, there is a great danger of damage due to flood. Therefore, it is of national significance to combine eco-environmental protection and sustainable development.

Activities:

- To take a comprehensive survey on biodiversity in Chongchon River basin.
- To prepare comprehensive development plan for Chongchon River basin which integrates biodiversity conservation.

- To establishment Mt Myohyang Nature Park and manage buffer zones.
- To protect fishery resources in Chongchon River.
- To afforest Chongchon River basin.

Implementing Agency: Ministry of Land and Environment Protection, Academy of Sciences.
Stakeholders: Ministry of Forestry, Ministry of Education, Ministry of Agriculture
Timing: 4 years
Budget: Category 2.

4.3.2.3. Priority projects on benefit - sharing

Project 18:

Title: Establishment of National Biodiversity Information Centre.
Objectives: To establish national biodiversity information centre and biodiversity databases and to collect and exchange scientific data on ecosystem, gene and species resources and habitats.
Justification: At present, biodiversity relevant data are dispersed and it is not scientifically analyzed, hence unable to use it effectively. To establish biodiversity database and operate information networking, it is needed to establish a national biodiversity information centre.

Activities:

- To establish a new national biodiversity information centre.
- To collect all the scattered biodiversity relevant data and file it up properly to use it by GIS.
- To train experts to establish databases and operate the information system.
- To promote use of biodiversity databases in policy-making.

Implementing Agency: Ministry of Land and Environment Protection
Stakeholders: Academy of Sciences, Ministry of Agriculture, Ministry of Forestry, Ministry of Fishery, Ministry of Public Health.
Timing: 4 years.
Budget: Category 2.

4.3.2.4. Priority projects on general measures

Project 19

Title: Development of Local Biodiversity Conservation Plan
Objective: To develop specific local plan on biodiversity conservation and sustainable use and incorporate biodiversity into local economy and to develop socio development plan and land management plan.
Justification: Since biodiversity has regional characteristics, it is important to develop some special local biodiversity plan which accord with local conditions and reflect the National Economic Development Plan.
Activities:

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- To prepare some provincial level plans on biodiversity conservation and sustainable use.
- To identify local significant area for biodiversity conservation in provincial plans and develop provincial plan on nature reserve construction.
- To collect data and information on status of bio-resource use in provinces.
- To take measures to conserve bio-resources and its proliferation in local/provincial level.

Implementing Agency: People's Committee of Provinces.
Stakeholder: Ministry of Land and Environment Protection.
Timing: 1 year
Budget: Category 3

Project 20

Title: Development of National Biodiversity Training Programme.

Objectives: To train scientists, technicians, administrative officials, and local officials and reserve managers, in order to ensure biodiversity conservation and sustainable use and to strengthen enabling activities.

Justification: The scope of biodiversity conservation and its sustainable use is too large, hence, it is very important to be aware of national status and international trend. At present, the management level in the existing reserves is very low and it is significant to the staffs. And it is also needed to train local people how to conserve biodiversity.

Activities:

- To establish 3 biodiversity-training centres in selected universities and institutes under the Academy of Sciences.
- To equip with facilities in training centres
- To develop series of training materials.
- To organize regular training courses.
- To allocate qualified teachers, technicians, and managers.
- To send young people to study abroad.
- To invite foreign experts to give lectures.

Implementing Agencies: Ministry of Education, Academy of Sciences.

Stakeholders: Ministry of Land and Environment Protection, Korean Nature Conservation Union.

Timing: 5 years.

Budget: Category 3.