

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 provided by conducting adjust work lest 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.

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Secondary compulsory education of DPRK has peculiar outside courses. Every provinces (municipalities) including Pyongyang have students and children' palace and at there, primary and sensor 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 braining 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.

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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 actions 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

holidayers, 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

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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.

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First of all, publicity to raise recognition of people on the importance of Biodiversity, will be widely launcher. 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 Naturel 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 resent years, in vestment 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 Amrok 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.*, *Microphysogonio 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

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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: