

UNDP/GEF
Ministry of Finance, the People's Republic of China

Global Environment Management Capacity

Self-Assessment Project

(Biodiversity Sub-project)

China Biodiversity Conservation
National Capacity Self-Assessment Report

(Third Draft)

Sub-project Steering Agency
CBD Implementation Office, SEPA

Sub-project Executing Institution:
Foreign Cooperation Center for Environmental Protection, SEPA

March 30, 2005

Abbreviation

| | |
|------|--|
| UNDP | United Nations Development Program |
| UNEP | United Nations Environment Program |
| GEF | Global Environment Facility |
| GDP | Gross Domestic Product |
| CERN | China Ecosystem Research Network |
| IUCN | The World Conservation Union |
| WWF | World Wide Fund for Nature |
| TNC | The Nature Conservancy |
| CBIS | China Biodiversity Information System |
| CHM | Clearing-house Mechanism |
| ADB | Asian Development Bank |
| NGOs | Non-Governmental Organizations |
| CBD | The Convention on Biological Diversity |
| GMOs | Genetically modified organisms |

Contents

Chapter I Introduction

- 1.1 Mega-biodiversity in China
- 1.2 Threats to the biodiversity in China and threatening factors
- 1.3 Background of the creation and implementation of the CBD
- 1.4 Current CBD implementation capacity and its prospects

Chapter II Assessment of China's CBD implementation capacity

- 2.1 State sustainable development strategy and its impacts
- 2.2 Current CBD implementation capacities of related ministries of the central government
- 2.3 Current CBD implementation capacities of provincial governments
- 2.4 Current capacities of other stakeholders
- 2.5 International projects associated with CBD implementation

Chapter III Assessment of needs of China CBD implementation

- 3.1 State strategy, bylaw, policy, institution and system
- 3.2 Investigation and monitoring of biodiversity
- 3.3 In-situ protection
- 3.4 Ex-situ protection
- 3.5 GMO safety management
- 3.6 Management and control of alien invasive species
- 3.7 Acquisition of genetic resources and traditional knowledge and benefit sharing
- 3.8 Scientific research, human power and technology acquisition
- 3.9 Publicity, education and public participation
- 3.10 Data administration and information exchange
- 3.11 Assessment of needs of the capacities of local governments
- 3.12 Assessment of needs of the capacities of NGOs

Chapter IV Priority fields and priority actions of capacity building

- Priority field 1: Construction of related policies, laws, regulations and institutions
- Priority field 2: Identification, inventory and monitoring of biodiversity
- Priority field 3: *In situ* conservation of biodiversity
- Priority field 4: *Ex situ* conservation of biodiversity
- Priority field 5: GMOs safety management
- Priority field 6: Management and control of invasive alien species
- Priority field 7: Access to and benefit sharing of genetic resources and traditional knowledge
- Priority field 8: Scientific research, human power and technology transfer
- Priority field 9: Publicity, education and public participation
- Priority field 10: Data management and information exchange
- Priority field 11: Capacity building of local governments
- Priority field 12: Capacity building of NGOs

Appendix I: List of experts in the report preparation team

China Biodiversity Conservation Capacity Building Self-Evaluation Report

Chapter I Introduction

1.1 Mega-biodiversity in China

China is one of the countries on the globe with extraordinarily rich biodiversity. Its mountainous setting, variable climates and vast territory determine that vegetation distribution in China features longitudinal and latitudinal variations and vertical changes along with the elevation of mountains, which, together with its complex agricultural systems rich in crop variety, in turn determines that the biodiversity in China is of great global importance at all the three levels, ecosystem, species, and genetic resources.

1.1.1 Diversity in ecosystem

From north to south, China straddles a number of climatic zones, such as cool temperate, temperate, warm temperate, subtropics, and northern tropics, and consequently its biomes vary with the climatic zones from north to south respectively of cool temperate coniferous forests, temperate coniferous-broadleaf mixed forests, warm temperate deciduous broadleaf forests, subtropical evergreen broadleaf forests and tropical monsoon rainforests. With the decline in precipitation from east to west of the country, the vegetation also changes significantly. In North China, coniferous-broadleaf mixed forests is replaced sequentially from east to west by meadow steppe, typical steppe, desert steppe, steppish desert, typical desert and ultra-arid desert; and in South China, the subtropical evergreen broadleaf forests in the east (the hilly regions in the south of the lower reaches of the Yangtze River) are significantly different in nature from those in the west (the Yunnan Plateau) and composed of a number of species of the same genus but different in species. Apparently its geographic distribution of complex ecosystems decides another feature of the biodiversity of China, i.e. diversity in spatial distribution, which is incorporated into significant differences in species composition, structure, functions and process of ecosystems with similar appearance. Complex varied vegetation conditions also gestate diversity in fauna.

China's maritime space spreads over three climatic zones, temperate, subtropics and tropics in the middle and lower latitudes, along the east side of the Asian continent and has a total coast-line extending 18,000 km and more than 5,000 islands over 500m² in area. The ecosystems of the sea area are also very complex and diversified, encompassing estuary ecosystem, gulf ecosystem, coastal wetland ecosystem, coral reef ecosystem, mangrove ecosystem, seaweed bed ecosystem, upwelling ecosystem and black tide ecosystem.

1.1.2 Diversity in species

The complex and diversified ecosystem result in an extraordinarily rich species diversity. According to statistics, China has about 33,000 species of higher plant species, ranking third in the

world after Brazil and Columbia. These fall into 3984 genera and 518 families, accounting for 11.2%, 63.2% and 28.3%, respectively, of that of the earth (Table 1). China has a total of 6347 species of vertebrates, 1244 species of birds, and 3862 species of fishes, accounting for 13.97%, 13.1% and 20.3%, respectively, of the global total. The species of invertebrates including insects, lower plants, fungi, bacteria, and actinomycetes are even more diversity and numerous. As most of these species have not yet been recognized or described, it is hard to make accurate estimates. The species of marine life are also varied and diverse. Those already identified have reached over 20,000 species accounting for over 10% in the marine life diversity of the planet.

Table 1 Comparison of China with the world in statistics of family, genera and species of higher plants

| Plant group | Family | | Genus | | Species | |
|--------------|--------|-------|-------|-------|---------|--------|
| | China | World | China | World | China | World |
| Bryophyte | 117 | 195 | 560 | 1050 | 3341 | 23000 |
| Pteridophyta | 63 | 65 | 224 | 443 | 2600 | 12000 |
| Gymnosperm | 10 | 15 | 34 | 79 | 250 | 850 |
| angiosperm | 328 | 544 | 3166 | 12500 | 27018 | 260000 |
| Total | 518 | 819 | 3984 | 14072 | 33209 | 295850 |

1.1.3 Genetic diversity

The global significance of the biodiversity of China is represented in China being one of the eight major origins of agricultural crops and one of the four major cradles of cultured plants in the world. So China has long been famous as “Mother of Gardens” of the world. In China's more than 7000 year long civilization history, our ancestors introduced, cultivated, domesticated and bred a huge variety of animals and plants, turning them into domestic livestock and farming crops. Of her 56 nationalities, every one has its own distinct and specific tradition and experience, including traditional religion, culture and medicine, in exploitation and conservation of bio-resources, thus forming various nationality-specific production patterns of agriculture, forestry, animal husbandry, by-production and fishery and eventually turning China into a country with rich traditional knowledge, innovations and practices that are associated with conservation and sustainable use of genetic resources. Now China has a total of over 600 species of farming crops, of which 237 originated from China or have China as one of their origins. They include 20 species of food crops, 45 of vegetable and flavoring crops, 53 of fruits, 11 of fiber plants, 42 of medicinal plants (typical species), 19 of ornamental plants and 47 of other cash crops. China is also very rich in resources of wild relative species of cultured crops, e.g. one species of wild soybean and three species of wild rice, extensively distributed in the country, and moreover, is well-known all over the world for her gardens and Chinese herbal medicine of long history. Her diversity in species of ornamental garden plants, flower plants and medicinal plants cultured and bred is one of the major features of the genetic diversity of China.

1.2 Threats to the biodiversity in China and threatening factors

As China is right in period of rapid economic development, the conflict between

environmental protection and economic development is getting more and more acute and her biodiversity is being threatened at the three levels of ecosystem diversity, species diversity and genetic diversity. It was indicated in the “China Biodiversity Country Study” published in 1998 that 22.06% of the mammal species, 14.63% of the bird species, 4.52% of reptile species, 2.46% of the amphibian species and 2.41% of the fish species were endangered species. But in the “China Species Red List” (Vol. I), adopting the 2001 “IUCN Red List Categories and Criteria” for reevaluation of the endangered level of the 10211 species of animals and plants (5,803 animals and 4,408 plants) in China (including Hong Kong, Macau and Taiwan), the situation is more serious than former assessments, with the proportions of the threatened in various classes of species commonly ranging within 20 – 40%. In particular the number of threatened plant species is far higher than past estimates.

Most of the threats, however, come from irrational exploitation of resources. For instance, deforestation and destruction of natural vegetation, reclamation and overgrazing of grasslands, reclamation of wetlands and over-catching of marine fisheries, pollution of industrial wastes and agricultural chemicals, etc. have greatly undermined the natural ecosystems (forest, steppe, desert, wetland, sea, etc.) and farmland ecosystems. As a result of the ever shrinking and fragmented habitats, combined with artificial hunting, poaching, catching, excavating and various other human activities, especially illegal poaching and mining, a large variety of wildlife species is being threatened and some species endangered. The major threatening factors are summed up as follows:

1.2.1 Over-exploitation of resources

Owing to growth of the population, the activities of resource exploitation are intensified, posing a direct threat to biodiversity. Although the state has implemented an overall project of protecting natural forests and exerted strict control of logging in natural forests, the enforcement varies in intensity and effect from place to place. For the sake of sustenance and local economy, over-planned felling and illegal logging are a common occurrence in some places. Over-grazing is a major factor causing degradation of grasslands. In Inner Mongolia and North China, grasslands are commonly over-stocked by 50%– 100%. As a result of the over-grazing and long term overstocking, the grasslands in the arid and semi-arid regions of North China have degraded severely in quality, thus leading to impaired ecosystem functions , decline in yield of forage by a large margin, and serious desertification.

Growth in the population of fishermen and catching capacity, like tonnage and power of fishing vessels, has led to over exploitation of the fishery resources. Though the state has adopted plans controlling the use of netting gear on fishing vessels in the sea and enforced the regulations forbidding fishing in summer in the sea and in some periods in the Yangtze River for maintenance and management of fish resources, the decline in fishery resources has not yet ultimately been halted. Especially, in relation to the implementation of the UN Convention on Maritime Law, large groups of Chinese fishermen have quitted operation in their traditional fishing areas, thus aggravating the pressure on the carrying capacity of the offshore fishery resources of the country. The mangrove forests along the coasts of South China have suffered destructive damage. In the 1950s China had 50,000 ha of mangroves, but now has only less than 15,000 ha, as a direct result of artificial felling. Moreover, poverty and shortage of fuel in the rural areas also lead to

destruction of biodiversity.

1.2.2 Environmental pollution and development and construction

In recent years, results of the monitoring of the marine environment of the country indicate that most of the offshore waters are in the state of eutrophication, which is especially serious in the estuary of the Yalu River, Liaodong Gulf, Bohai Bay, estuary of the Yangtze River, Hangzhou Bay, estuary of the Pearl River. As a result of the eutrophication, the occurrence of red tide is on the rise in both time and area in the country. In 2003, China witnessed occurrence of red tide 119 times spreading over a cumulative area of 14,550km². Besides, the maladjustment of nutrient salts in the water bodies has caused changes in the composition of species. The resultant decrease in fish species high in economic value is a serious threat to the fishery resources.

The construction of highways, railways, ports, airfields, dams, reservoirs, polders, new cities, and production, living and tourist facilities are in most cases posing threats to the natural habitat of wild relative species of farming crops. For instance, in field investigations in the 1960s, common wild rice was found growing in 24 sites in Jinghong of Yunnan Province and now only one site survives due to expansion of farmlands and tourist spots. And in the nationwide surveys in 1978 – 1980, wild rice plants were found distributed in 1182 spots and surveys. The 1994 survey found most of them had disappeared.

1.2.3 Monoculture of crop varieties

A major threat to genetic crops species is loss of variety. With development and utilization of new crop varieties, cultivation of crops is concentrated on a limited number of varieties and quite a number of traditional varieties and landraces are discarded and have even disappeared despite their importance in gene resources. After the “Green revolution”, with the rapid advance in breed improvement technology and introduction of alien varieties, the replacement in variety of some staple crops, such as rice, wheat, corn, cotton, soybean and rape, etc. has been accelerated. The extension area of a few varieties has increased by a large margin. Numerous local traditional crop varieties that have been domesticated and bred during thousands of years are disappearing regionally. For instance, in the early 1950s about 10000 different varieties of wheat were grown in the country and now only 400 or so are extensively cultivated. A similar problem also exists with the aquiculture in the sea and leads to degradation of its quality. Artificial afforestation of a few varieties of trees results in loss of native tree varieties and decline in biodiversity in the forestlands.

1.2.4 Intrusion of invasive alien species

Introduction of alien invasive species could disturb the ecological balance of wildlife populations, disturb normal operation of food chain in the natural ecosystems, and cause catastrophe to the local biodiversity. According to statistics, alien forest invasive pests, like pine wood nematodes, slash pine mealybugs, pine greedy scales, American white moths, Matsumura pine scales, etc. have serious occurrences and can damage 1.5 million ha of pine forests every year, and agricultural pests, like Rice water weevils (*Lissorhoptrus oryzophilus* Kuschel), Vegetable leaf miner (*Liriomyza sativae* Blanchard), Giant African snail (*Achatina fulica*), etc., seriously infect as large an area as 1.4-1.6 million ha every year recently; Ragweed (*Ambrosia*

artemisiifolia L.) have already invaded into Northeast, North, East and Central China; Crofton Weed (*Eupatorium adenophorum* Spreng) and Fragrant Eupatorium (Siam Weed) (*Eupatorium odoratum* L.) spread massively in Southwest China; and Mile-a-minute weed (*Mikaina micrantha* H.B.K.) has become a serious hazard in Guangdong. According to estimates, the damage of over a dozen of alien invasive species to the economy reaches 57 billion yuan (RMB) every year.

1.2.5 Natural factors and climatic change

The damage of natural calamities to biodiversity is often hard to anticipate and sometimes very bad. For instance, forest fire is a major factor leading for loss of natural forests. Although many fire precaution measures have been taken in recent years, forest fire happens quite frequently. During the period from 1988 to 2001, forest fire broke out over 6,500 times every year on average, destroying 51,500 ha of forests. Decrease of precipitation in North China dried up large tracts of natural wetlands, wiping out the wetland vegetation and bird habitats there.

Climatic change causing damage to biodiversity is commonly recognized. As a result of global warming, climatic zones are moving northwards, forcing the species distribution zones move also. During the process of the moving, changes in habitat, barriers in facilities and some other factors will lead to weakened ecosystems and induce diseases among species, thus bringing direct and indirect damage to biodiversity.

1.3 Background to the creation and implementation of the CBD

1.3.1 Background to the creation of the CBD

In view of the serious threat to global biodiversity, the UN Congress passed a resolution in 1987, committing to the UNEP a task of organizing the constitution of some legal papers oriented toward conservation of biodiversity of the earth. In 1988, UNEP set up an “*ad hoc* working group for the convention drafting”, and invited governments of the countries of the world to take part in drafting and discussing the convention. In November 1988, UNEP presided over the “The First Drafting Meeting of the *Ad Hoc* Working Group” held in Geneva and called over a dozen meetings for drafting and inter-governmental negotiation in the following three years. The “Convention on Biological Diversity” was eventually passed and kept open for signature at the UN Conference on Environment and Development” held in June 1992 in Brazil. The Chinese government signed the Convention at the conference.

1.3.2 Progress of the CBD implementation

Since the “Convention on Biological Diversity” (CBD) was put into effect on Dec. 29, 1993, seven conferences of the Parties (COP) to CBD have been convened, each raising some hot issues in conservation of the global biodiversity and making corresponding resolutions, guiding countries of the world in taking actions for biodiversity conservation. At the Seventh Conference of the Parties (COP7) held in Kuala Lumpur, Malaysia, Feb. 9-27, 2004, a new target was set forth, i.e. by 2010 the drastic downward trend of the global biodiversity will have been halted. In addition, the conference carefully reviewed over 30 issues under 20 substantial items and passed over 30 corresponding decisions. The issues reviewed and discussed by the two sub-working groups at the conference include various disciplinary and trans-disciplinary topics, like access to and benefit sharing of genetic resources and traditional knowledge, protected areas, multi-year program of

work of COP, transfer of technology and technology cooperation, financial mechanism and fund budget, forest, mountains, inland waters, agriculture, marine biodiversity, etc..

1.3.3 China's active participation in negotiation on CBD

China is one of the first countries participating in drafting and negotiating the "Convention on Biological Diversity". Ever since 1988, the State Environmental Protection Administration (SEPA) has been taking the lead organizing related ministries of the State Council, such as Foreign Affairs, Finance, Science and Technology, Agriculture, Forestry, Construction, Trade, Patents, Traditional Medicine and Chinese Academy of Sciences, to attend various inter-governmental negotiations. At the COP7, the Chinese government had a delegation of 26 representatives from 11 related ministries and administrations of the State Council and the government of the Hong Kong Special Administrative Region, showing high attention to the "Convention on Biological Diversity". The Chinese government not only dispatched delegations to all the negotiation talks, but also has been playing important roles. On Jan. 5, 1993, China ratified CBD, becoming one of the first a few Contracting Parties.

1.4 CBD implementation capacity

1.4.1 State implementation coordination institution

As early as the inter-governmental CBD negotiations were still occurring, the State Council already authorized the SEPA to act as the leading ministry in charge, and assume the responsibility of coordinating CBD negotiations and related international activities. At the same time when China ratified the Convention, the State Council approved establishment of a coordination mechanism of "China CBD Implementation Coordination Group", which is responsible for coordination in ministerial level of CBD implementation and related biodiversity conservation and management inside and outside the country. This coordination mechanism, led by SEPA, is composed of 13 member organizations, at beginning stage, of Ministry of Foreign Affairs, State Development and Reforming Commission (the former State Planning Commission), Ministry of Science and Technology (the former State Science and Technology Commission), Ministry of Finance, Ministry of Agriculture, Ministry of Construction, State Forestry Administration (the former Ministry of Forestry), State Oceanography Administration, State Intellectual Property Rights Office (the former National Patent Bureau), General Administration of Customs, State Chinese Traditional Medicine Administration and Chinese Academy of Sciences. An office was set up in SEPA, responsible for routine affairs of the inter-ministerial coordination mechanism and CBD implementation. With the expansion of the field range of biodiversity involves, the members of the CBD Coordination Group increased to 20 in 1995, adding Ministry of Education (the former State Education Commission), Ministry of Public Security, Ministry of Broadcasting, Film and Television, Xinhua News Agency, People's Daily and Guangming Daily and further to 22 members in 2004 to include the Ministry of Commerce and State Quality Inspection and Quarantine Administration.

1.4.2 CBD implementation in China

In the past 10 years since CBD entered into force at the end 1993, the Chinese government has been earnestly implementing her undertakings and international obligations. Together with

other member organizations of the coordination group, SEPA has been taking an active part in follow-up international activities. And beginning from 1996, China played an active part in negotiating the “Cartagena Protocol on Biosafety” under CBD and signed the Protocol in August 2000. Currently the legal process for ratification of the Protocol is underway.

In the past dozen years, China has been deploying a series of fruitful work and project activities in the biodiversity fields covering various aspects from strategy, planning, institution building, to conservation, sustainable use and scientific research of biodiversity, which have efficiently protected biodiversity and promoted sustainable socio-economic development in the country, thus contributing enormously to conservation of the globally significant and endemic ecosystems, species and genetic resources in China.

The CBD implementation has received increasingly attention from the Chinese government. The State Council approved the SEPA to set up “CBD Implementation & Biosafety Management Office” and it is in charge of addressing affairs and issues related to implementation of CBD and Cartagena Protocol on Biosafety, and all the related ministries and administrations have also assigned specified institutions to take care of biodiversity-related affairs. The Chinese Academy of Sciences has established a biodiversity commission, coordinating scientific researches in the biodiversity field. The operation funds for addressing CBD implementation affairs have been listed into the budget of the Ministry of Finance and biodiversity-related research projects into the national science and technology program of the Ministry of Science and Technology. Local governments have also included biodiversity conservation as a priority field in environmental protection. CBD implementation project activities have been deployed extensively.

Chapter II Assessment of China’s CBD implementation capacity

2.1 National sustainable development strategy and its impacts

2.1.1 China persisting in following the road of sustainable development

In the past 20 years, China has achieved rapid economic development. Although her GDP has been rising steadily at a rate of 9%, the holistic quality of the national economy is not so good, which is displayed in unbalanced regional development and low efficiency in utilization of the resources. Overgrowth of the economy has caused enormous pressure on natural resources and the environment, thus restraining further development of the economy and society. In order to promote harmonized development of the economy, society and environment, the Chinese government will keep constantly following the road of sustainable development by specifying sustainable development targets for the ten years to come, which include building up the capacity for sustainable development, rationalizing exploitation of the land resources, improving environment quality, etc..

The Central Committee of the Chinese Communist Party and the State Council has come up with a viewpoint of human-based comprehensive, harmonized, sustainable and scientific development of the country. The 16th National Congress of the Chinese Communist Party called for, during the first 20 years in the 21st century, building up China into a well-off society capable of strengthening her capacity for sustainable development, improving her eco-environment, raising her efficiency in exploitation of the resources and promoting harmonization of humanity

with nature. The ex-President, Jiang Zemin stated at the Second GEF Conference of Member Countries that “rational exploitation of resources and protection of the environment are certainly the needs of sustainable development” and that “only by following the road of circular economy based on most efficient utilization of resources and environmental protection, can sustainable development be realized.”

In order to carry out the national strategy of sustainable development, the Chinese government has in turn promulgated the “National Program for environmental protection in the Tenth Five-Year-Plan Period”, “China Biodiversity Conservation Action Plan”, “National Program for Eco-environment Construction” and “National Eco-environmental protection Outline”. As a response, all related ministries and administrations have also constituted their respective departmental or trans-departmental action plans for conservation of biodiversity, including “China Biodiversity Conservation Action Plan in Forestry”, “China Biodiversity Action Plan in Agricultural Departments”, “China Maritime Biodiversity Conservation Action Plan”, “China Wetlands Conservation Action Plan”, etc. thus incorporating the activities in related ministries and administrations into the national action plan.

2.1.2 Implementation of the national sustainable development strategy

While developing her economy, China has also been increasing her investment in environmental protection. In the period of 1991 – 1995, this investment reached 200 billion yuan and in the period of 1996 – 2000, rose to 360 billion yuan. It is estimated that the investment would soar up to 700 billion yuan in the period of 2001 – 2005. During the five years from 1998 to 2002, the Chinese government spent 580 billion yuan in environmental protection and ecological construction, accounting for 1.29% of the GDP of the same period and equaling to 1.7 times as much as the total input in environmental protection during the period from 1949 to 1997. In her tenth “Five-Year” Plan (2001 – 2005) for development of the national economy and society, China has added in major indexes for sustainable development, intensified her capacity building of the nation’s environmental protection machine, implemented large-scale ecological engineering projects and moreover set up intensification of environmental protection as an important content in the strategic readjustment of her economic structure.

China has also adopted the project of “Grain-for-Green”, of which the basic policy is “give up unsuitable farmland for afforestation, close mountains for afforestation, provide grains as a form of relief, contracted by individuals”. The government provides farmers who lose farmlands in the grain-for-green project free of charge grains and saplings for afforestation on given-up farmlands and forest-suitable waste hills and lands. The saplings are cultured in a planned way under the administration of the forestry departments, and the sapling nurseries distribute saplings free of charge. By the end of 2002, the Chinese government had put in nearly 300 billion yuan and the country had had over 10 million ha of farmlands given up to forests and grasslands in 193 counties scattered in 17 provinces (regions).

In recent years, the state and provinces have one after another laid down policies of levying ecological compensation, covering exploitation of the resources of mines, lands, tourist spots, water, forest, wildlife, and grasslands, utilization of medicinal herbs, electric power, sea waters, etc.. The funds raised from levying charges will mainly be used in restoring eco-environment and conservation of biodiversity.

In the campaign of developing the west, the state has already started to establish investment

mechanisms of multiple subjects of investment and diversified investment patterns. In response to requirements of the central government, government at all levels and related departments are to make out long-term plans for construction of eco-environment, and list funds for construction of eco-environment into their financial budgets. Banks are to increase loans to projects of eco-environment construction and duly extend the repayment period of the loans. Priority will be given to projects of eco-environment construction in arranging long-term low interest loans and capital donations from abroad. In some related regions and between regions, a sound ecological compensation mechanism will gradually be set up. Researches will be carried out on formulation of some policies and measures to encourage non-governmental investment in the field of eco-environmental construction in the campaign of developing the west. Use of barren mountains and hills can be leased to encourage organizations and individual farmers to create green industry. Government at regional levels may consider some financial subsidies to investments in the field of eco-environment construction.

2.1.3 Targets of biodiversity conservation in China

In 2000, the Chinese government promulgated the “National Eco-environmental protection Outline”, specifying projected targets of eco-environment conservation, i.e. by 2010, the tendency of damaging eco-environment will have been put an end to, by 2030 the deteriorating trend of the eco-environment halted, and by 2050 the eco-environment of the country will be overall improved with clean urban and rural environments, natural ecosystems sound in circulation and eco-environments of green mountains and clear waters in most parts of the country.

The “China 21st Century Agenda – White Book on Population, Environment and Development of China in the 21st Century” compiled by the Chinese government specifies that the long-term objectives of conservation of biodiversity are to set up a countrywide nature reserve network designed for conservation of species and ecosystem diversity, a catalogue of biodiversity and lay down strategies for conservation and sustainable exploitation of bio-resources. Its objectives in the near future include:

- Lay down programs, regulations, criteria and policies for conservation of biodiversity;
- Build up and complete the nation's nature reserve network, and specify management systems for these reserves in line with international standards for biodiversity conservation and the needs of sustainable development;
- Set up monitoring stations to obtain environment-economy-interaction data so as to lay down a solid foundation for conservation of ecosystems and species and sustainable management;
- Catalogue rare and precious plant species of China, determine priorities of species and ecosystems for protection and complete the compilation of the red book on animals and plants of China;
- Search for approaches to harmonizing conservation of biodiversity with sustainable exploitation of bio-resources, build up demonstration projects combining conservation of bio-resources with sustainable exploitation at the levels of species, nature reserves and ecosystems, and set up operational models of sustainable development.

2.2 Current CBD implementation capacity of related ministries of the central government

2.2.1 Organizations, policies, laws, systems, plans and programs

At the level of the central government, the institutional framework for conservation and management of biodiversity has already been set up. The China CBD Implementation Coordination Group is composed of 22 ministries and administrations, which play their respective important roles in biodiversity related affairs based on their own functions and division of work. SEPA, as an administrative department in charge of environmental protection under the State Council, is generally responsible for coordinating CBD implementation activities, and organizing and coordinating, in a centralized way, conservation of national biodiversity and supervision and inspection of the conservation; the Ministry of Construction, Ministry of Agriculture, State Forestry Administration, State Oceanography Administration and State of Traditional Chinese Medicine Administration are responsible for management of the bio-resources and conservation of biodiversity in their own respective trades; the Ministry of Science and Technology, Ministry of Education, State Intellectual Property Rights Office and Chinese Academy of Sciences are responsible for scientific researches on biodiversity, cultivation of human resources and protection of intellectual property rights; the Ministry of Public Security, State Industry and Commerce Administration, General Administration of Customs and State Quality Inspection and Quarantine Administration are responsible for enforcement in communities, market and entry and exit at the border; the Ministry of Foreign Affairs is responsible for diplomatic policies in negotiation on and implementation of CBD; the Ministry of Commerce is responsible for trades related to bio-resources; the State Development and Restructuring Commission and Ministry of Finance are responsible for laying down economic policies and plans and arranging required funds; the Ministry of Radio, Film and Television, Xinhua News Agency, People's Daily and Guangming Daily are responsible for publicity and education of biodiversity conservation. In the following paragraphs a brief introduction is given to relevant policies, bylaws, systems, plans, programs and project activities of related resource management departments.

1) environmental protection department

Being the administrative department in charge of responsibility under the State Council, SEPA assumes the responsibility of controlling pollution and protecting eco-environment of the country. While going all out to implement pollution control in cities, SEPA gets fully aware of the urgency and importance of protection of natural environment and construction of ecology. Consequently, it has come up with the policy of "attention to both pollution control and ecology protection". In 2001, the State Council promulgated the "National Eco-environmental protection Outline".

Conservation of biodiversity is one of the major functions of SEPA. In order to implement the "Convention on Biological Diversity", the China Biodiversity Conservation Action Plan specifies seven targets in biodiversity conservation, i.e. establishment and completion of the national nature reserve network, determination of wildlife species significant to biodiversity and programs for their protection, conservation of genetic resources of crops and livestock, evaluation of *in-situ* conservation of wild species outside nature reserves, setting-up of country-wide information and monitoring systems, coordination of biodiversity conservation with sustainable development, and intensification of basic research on biodiversity of China.

The "Regulations for Nature Reserves of the People's Republic of China" promulgated and put into effect in 1994 stipulate that the administrative department in charge of environmental

protection under the State Council is in charge of the responsibility of overall management of nature reserves all over the country, mainly by formulating statutes, policies, criteria, guidelines, and development programs for management of nature reserves and reviewing establishment of state-level nature reserves. The administrative departments in charge of forestry, agriculture, geology, mines, water conservancy and seas, and the Chinese Academy of Sciences play their respective roles in their own fields of responsibility and manage related nature reserves. Local governments at county level or over are responsible for designing setup and duties of the management of nature reserves. It is up to the governments of provinces, autonomous regions and municipalities to make decisions in light of the local conditions.

Approved by the State Council, a system of Inter-ministerial Joint Meeting for conservation of bio-species resources was formed, in 2003, of 17 ministries and administrations with the SEPA in the lead to coordinate and intensify conservation of bio-species resources. The Joint Meeting office is affiliated to SEPA. Meanwhile a national bio-species resources conservation expert committee was set up for providing scientific consultation. According to arrangement of the Inter-ministerial Joint Meeting, SEPA, together with 10 ministries and administrations, formed 6 teams to inspect enforcement of conservation of bio-species resources in over 50 institutions in 12 provinces (or regions) in the late half of 2003. Such an inspection will be conducted again in 2005 and gradually the enforcement inspection will become a system.

SEPA has proposed to set up key ecological function reserves, which are oriented to perform restoration conservation of some key ecological function reserves critical to eco-safety of the country, regions or valleys. In contrast to nature reserves, the ecological function reserves will not ban or restrict human activities or exploitation of resources, but rather provide guidance to protection and reasonable exploitation of natural resources on the basis of the theory of ecosystem services and on the premise that the activities would not undermine the leading ecological functions of the reserves. Today China has 18 pilot state-leveled ecological function reserves established.

In order to ascertain strategies of sustainable development and ways of circular economy, and promote harmonized development of regional social economy and environmental protection, especially overall harmonized development of urban-rural economy, society and eco-environment, China has launched construction of ecological demonstration zones, ecological provinces, cities and counties. Today, China has 528 test sites for construction of ecological demonstration zones and has approved 8 provinces as trials for construction of ecological provinces and over 20 pilot ecological municipalities or counties.

SEPA is also the administrative department in charge of enforcement of the “Environment Assessment Law” and assumes the responsibility of conducting environmental impact assessment of construction projects and programs. These assessments also cover impacts on biodiversity. For instance, assessment of eco-environment impacts has already been conducted of some national key construction projects, such as grand development of the west, the three-gorges dam, transferring gas from west to east, diverting water from south to north, Qing-Zang railway, etc. Precaution measures have been taken for conservation of the biodiversity in these regions.

2) Forest department

The State Forestry Administration is in charge of conservation of forest resources, protection of terrestrial wildlife and wild plants in forest regions, management of nature reserves based on

forests and wildlife, and conservation and sustainable exploitation of wetland ecosystems. In the past dozen of years, the State Forestry Administration has accomplished a great deal in constituting laws and bylaws, such as the amended “Forest Law”, “Detailed rule for enforcement of the forest law”, “Regulations for protection of wild plants”, and is in the process of amending the “Law for protection of wildlife” and formulating “Regulations for conservation of wetlands”. At the same time, the State Forestry Administration has also laid down a series of national standards and industry criteria for programming, management evaluation and investigation techniques for forest-and-wildlife-based nature reserves.

In the past decade, the forestry administration has established a forest resources and wildlife resources monitoring system and an environmental impact assessment system for exploitation of forest resources and wildlife resources; set up and overall enforced rules of paid use and quota-based utilization of wild bio-resources; and exercised licensing systems on hunting, transport, import and export, and domestic raising of wildlife, and a license system for use of sport guns and bullets, which must be produced in assigned factories on quota and sold at assigned shops as is stipulated by the law.

In 1992, the State Forestry Administration compiled “China Forestry Biodiversity Conservation Action Plan”, which analyzed the *status quo* of the forest biodiversity in China and problems it was confronted with, analyzed and evaluated the existing policies for conservation of the biodiversity, and proposed targets and tasks of conservation of the forest biodiversity. In 1995, it worked out “Forestry action plan of the 21st century agenda of China”.

As regards national strategy, the State Forestry Administration has proposed and is implementing six big projects closely related to conservation of biodiversity. The project of conservation of wildlife and construction of nature reserves, in particular, is a large-scaled engineering construction project oriented directly toward conservation of biodiversity. The general program of the project is divided into three phases: its target in the near future (2001 – 2010) is to complete construction of the frameworks of the administrations in charge of conservation of wildlife at the central and provincial levels; exercise legal conservation and management to ensure efficient operation of the wildlife management in the key regions of the country in the fields of breeding, production, transportation, marketing, medicine and import/export; implement selectively 15 wildlife salvation projects; build up 15 new wild animal domestication and breeding centers and 32 wildlife monitoring centers (stations).

In order to conserve and save endangered rare and precious species, the State Forestry Administration will emphatically implement rescue and conservation projects for 15 species of wildlife, such as giant panda (*Ailuropoda melanoleuca*), crested ibis (*Nipponia nippon*), golden monkey (*Rhinopithecus roxellanae*), tiger (*Panthera tigris*), Tibetan antelope (*Pantholops hodgsoni*), Chinese alligator (*Alligator sinensis*), gibbon (*Hylobates*), snow leopard (*Panthera uncia*), *Procapra przewalskii*, musk deer (*Moschus moschiferus*), deer, cranes, pheasants, Korean pine, cycads, and orchids, build up 25 wildlife game refuges and 18 breeding centres and 6 wild plant breeding centre. At the same time, the State Forestry Administration will exert effective control of import and export of nationally endangered wildlife species.

The State Forestry Administration is endeavoring to set up effective and cooperative wetland management mechanisms; finish the survey on wetland resources; set up a wetland resources monitoring system; make programs for conservation and rational exploitation of wetlands; take advantage of the call of the Central Committee of the Chinese Communist Party on surrendering

polders to flood and lakes.

3) Agricultural department

The Ministry of Agriculture is in charge of conservation of the resources of wild plants, wild aquatic life, animals and poultry, grassland and fishery as well as biodiversity of the agriculture, animal husbandry and fishery, and taking the lead in coordinating management of invasive alien species. On the basis of the “China Biodiversity Conservation Action Plan”, the Ministry has worked out its own “China action plan for conservation of biodiversity in agricultural departments” and the tenth “five-year” plan and 2015 plan for protection of agricultural eco-environment of the country.

The Ministry has also laid down and promulgated “Approaches to conservation of wild plants in agriculture”, specifying detailed procedures for conservation and management of wild plants in agriculture all over the country. In 2001 and 2003, the Ministry set up a steering team for conservation of wild plants in agriculture, an expert board for evaluation of conservation of wild plants in agriculture, and a leading team and administrative office for control of invasive alien biomes. Corresponding organizations were also established in each province (region or municipality). To address the issue of some wild plant species being demolished, the Ministry has laid down regulations for their conservation, for instance, the “Approaches to management of gathering of liquorice and Chinese ephedra”.

On the basis of the “Law of Seeds”, the Ministry of Agriculture worked out “Approaches to management of agricultural crop germplasm resources” in 2003, specifying criteria and management measures for collecting, collating, identifying, registering, preserving, exchanging, exploiting and managing agricultural crop germplasm resources, listing conservation of the agricultural crop germplasm resources as its major contents, and calling for establishment of national germplasm banks and germplasm resources nature reserves or shelters. Hence, the Ministry of Agriculture has set up a national committee for management of agricultural crop germplasm resources and agricultural departments in provinces (regions) have also established corresponding organizations.

In light of the “Regulations for Breeders of Animals and Poultry”, the Ministry organized a national livestock and poultry genetic resources management board in 1996 and released a list of livestock and poultry species for state protection in 2000. The Ministry also assigned a group of farms or regions as state-level livestock and poultry species resources conservation units for these species. Some provinces or regions have also established corresponding organizations for management of livestock and poultry genetic resources.

In the aspect of management of fishery resources, the Ministry of Agriculture has laid down and promulgated “Regulations for management of fisheries in the Yangtze River”, “Approaches to management of aquatic offspring”, “Regulations for maintenance of bio-resources in the Bohai Bay”, etc., effectively promoting sustainable exploitation of the fishery resources.

On July 10, 1996, the Ministry of Agriculture released “Approaches to enforcing safety management of agricultural genetic engineering”, which signified the beginning of safety management of agricultural GMOs. In 2001, the State Council promulgated “Regulations for safety management of agricultural GMOs”, starting normalized management of agricultural GMOs related research, field trials, commercial production, processing, marketing, import and export activities. In light of the regulations promulgated by the State Council, the Ministry of

Agriculture released in 2002 “Approaches to safety management of import of agricultural GMOs”, “Approaches to management safety assessment of agricultural GMOs” and “Approaches to management of labeling of agricultural GMOs”.

In order to intensify law enforcement, the Ministry of Agriculture launched a countrywide campaign of inspecting law observation in agricultural scientific and technical activities in 2004, with emphasis on conservation of wild plants under state priority protection, protection and authorization of new plant varieties and intensification of management of labeling of agricultural GMOs.

In 2004, the Ministry of Agriculture laid down “Strategies and framework for national development in prevention, management and control of invasion of alien biomes” and proposed plans for development of four priority fields, capacity building of three grand systems and development of 11 priority projects at the present stage.

4) Ocean department

The State Oceanography Administration is responsible for supervising conservation of marine biodiversity and marine eco-environment and management of marine nature reserves and special protected zones. The “Marine environmental protection Law of the People's Republic of China” specifies legal regulations for coastal engineering construction, maritime petroleum exploration and exploitation, ship navigation, waste dumping, and activities damaging marine environment, like discharging of land-sourced pollutants. The “Fishery Law of the People's Republic of China” stipulates protection, multiplication, exploitation and rational utilization of fishery resources.

In order to intensify management of utilization of the sea waters, safeguard state ownership of the sea waters and legal rights and interests of holders of the right to use sea waters, and promote rational exploitation and sustainable utilization of the sea waters, China promulgated in 2002 “Approaches to management of the use of sea waters of the People's Republic of China”. The State Council also issued a series of ordinances for protection of the marine environment, e.g. “Ordinance for management of prevention of ships from polluting the sea waters”, “Ordinance for management of environmental protection in maritime petroleum exploration and exploitation”, “Ordinance for management of dumping in the sea”, “Ordinance for management of prevention of ship breaking from polluting the sea waters”, “Ordinance for management of prevention of land-sourced pollutants from polluting the marine environment”, “Ordinance for management of prevention of coastal engineering construction projects from polluting the marine environment”, etc..

The State Oceanography Administration has released a series criteria and regulations for protection of marine environment, e.g. “Approaches to management of marine nature reserves”, “Approaches to management of offshore environmental function zones”, “Criteria for sea water quality”, “Criteria for halobios quality”, “Standard for grading and classification of marine nature reserves”, “Criteria for construction and management of marine nature reserves”, “Technical regulations for monitoring marine nature reserves”, etc.. So far, a system composed of laws, regulations and standards has thus been formed for management of marine environmental protection and marine biodiversity.

The “Outline of the program for development of marine economy of the country” ratified and put into effect in May 2003 specifies that the basic policies and principles for rational exploitation

and conservation of marine resources, prevention of pollution and ecological destruction of the seas, and promotion sustainable development of marine economy are:

- Strictly control discharge of land-sourced pollutants into the sea, and keep the discharge of land-sourced pollutants up to the standard. Gradually adopt a total quantity control system for discharge of pollutants in key regions of sea waters.
- Intensify protection of typical marine ecosystems, rehabilitation of important offshore ecological function zones, and setting up and completion of marine nature reserves of which each has its own features. Carry out surveys and protect special marine ecosystems, such as coastal mangrove forests, coral reefs, seaweed beds, estuaries, coastal wetlands, etc.
- Control and reduce intensity of the catch of coastal traditional fishery resources, keep on setting up closed fishing grounds, closed fishing season and fishery fallow system, and protect key fishing grounds from being destroyed. Reinforce protection of aquatic resources breeding areas in the key fishing grounds, marine outfalls of rivers, bays, etc. and strengthen construction of nature reserves for endangered rare and precious species.
- Rationalize utilization of the coastline resources, carry out survey and evaluation of coasts, work out plans for utilization and protection of coasts, protect coast-defending plants, like mangroves, strictly control poldering of tidal flats, shallow seas, coast swamps, reedy wetlands and mangrove forests.

5) Construction department

The responsibility of the Ministry of Construction is to guide and manage the operation of gardens and parks and greening in cities, and undertake the work of the urban team in the office of the National Greening Committee. In conservation of biodiversity, the Ministry of Construction has its stress laid on 1) intensifying construction of urban eco-environment and promoting improvement of urban eco-environment; 2) reinforcing *ex situ* conservation of endangered rare and precious species in zoos and botanic gardens; 3) maintaining *in situ* conservation of the ecosystems in tourist scenic spots and endangered rare and precious species.

In 2001, the State Council issued a “Circular from the State Council about intensifying greening of cities”, requesting enhancement of biodiversity research on urban green belt systems, especially research on conservation and exploitation of regional biodiversity, development of new plant varieties and experiment on breeding of garden plants and introduction and culture of new varieties, and calling for the Ministry of Construction and provincial administrative departments for urban greening to increase intensity in management of greening of large cities and strengthen enforcement inspection and management supervision.

In response to the Circular from the State Council, the Ministry of Construction released its 2002 Document No. 249 “Circular on reinforcing biodiversity conservation in cities”, specifying policies for *in-situ* and *ex-situ* protection, i.e. exercise *in-situ* conservation of existing green belts and trees in cities and pay attention to and intensify *ex-situ* conservation of endangered rare and precious species; and setting up a reviewing system for transplantation of big trees in cities, that is to say, in case that a large number of big trees need to be transplanted or large-scale tree replacement is to be done, it is necessary to organize experts to review and sign comments of the case and submit the case to the provincial administration department in charge of gardening and greening for approval.

In November 1993, the State Council relayed a circular from the Ministry of Construction, “Circular on intensifying *ex-situ* protection of wild animals in zoos”. And in 1994 the Ministry of Construction released “Regulations for management of urban zoos”, stating specifically that “the state encourages zoos to develop scientific research and *ex-situ* protection of endangered rare and precious animals.” And Article 25 of the amended Chapter IV of the regulations stipulates that “the management of the zoos should work out plans for development of populations of wild animals in the zoos, which should cooperate and coordinate closely in the research on protection and breeding of endangered rare and precious animals. Zoos with adequate in capacity should set up breeding research centres.”

In 1985 the State Council promulgated “Provisional regulations for management of tourist scenic spots”, which stipulates that all scenes and natural environments in tourist scenic spots must be protected and no destruction or random alteration is allowed. Later on, the Ministry of Construction issued a series of specific regulations for related issues, such as “Approaches to implementation of the provisional regulations for management of tourist scenic spots” (1987), “Regulations for management of construction of tourist scenic spots” (1993), “Regulations for penalties in management of tourist scenic spots” (1994). In line with related policies and bylaws of the state, the provinces also figured out regulations for management of tourist scenic spots of their own, setting up specific regulations for conservation of the resources of scenic spots, protection of famous antique trees and conservation of wildlife, thus providing ready bylaws to follow in establishment of tourist scenic spots

2.2 Identification and monitoring of biodiversity

2.2.1 Identification capacity

Thorough investigation of bio-resources is the basis for biological study and finding out background of the biodiversity of the country has long been the key target of the biological field of China. In the past century, especially after the foundation of the new republic, investigations, surveys and cataloguing have been organized and launched by departments in charge, research institutions, colleges and universities, and local governments with striking achievements. Owing to the abundance of the biodiversity of the country and limitation of the investigations and surveys, however, there is still a long arduous way to go for resources investigation and cataloguing.

1) Background investigation of biota and construction of bio-specimen museums

The Chinese Academy of Sciences has already accomplished large volumes of systematic scientific surveys and basic research in the field of investigation and monitoring of biodiversity. Particularly in the past dozen years when large-scaled bio-resources investigations ceased, the Chinese Academy of Sciences has kept on doing supplementary investigations. Based on the findings of the countrywide investigations of biota in the past 50 years and the data accumulated in the past century, more than 10 research institutes under the Chinese Academy of Sciences, such as the Institute of Botany, botanic gardens, Institute of Zoology, Institute of Micro-organisms, Institute of Biology, etc. have been working in cooperation of dozens of colleges, universities and research institutes all over the country and eventually published large volumes of records, such as “Flora of China” (126 books in 85 volumes in total), “Fauna of China” (only 57 volumes published), “Cryptogams of China”, “Vegetation of China”, “Illustrated Handbook of Higher Plants in China”, “Higher Plants of China”, “Vegetation Map of China”, etc. amounting to nearly

400 volumes. Besides, they also published the “Red Books of Plants in China” (Volume I, in both Chinese and English), “Red Book about Endangered Animals” (5 volumes), “Red catalogue of species in China”, etc. introducing the status quo of endangered species of the country. These publications are indispensable basic data for learning the background of the biodiversity of the country as well as a scientific basis for conservation of biodiversity in China.

In order to build up capacity in the study on bio-species and biota, the Chinese Academy of Sciences has basically completed a bio-specimen museum system, consisting of 21 museums with 16.23 million specimens, accounting for over 50% of the country’s total, among which over 5 million pieces are animal specimens, about 10 million plant specimens and 0.83 million fungi and moss specimens. Quite a number of the 21 specimen museums are the oldest in China and rank first in storage and space in Asia, possessing considerable influence in the world. For instance, the plant specimen museum in the Institute of Botany, Chinese Academy of Sciences is 10,000 m² in floorage and has in storage 2.2 million plant specimens, over 80,000 seed specimens, over 70,000 specimens of plant fossil and 15,000 type specimens. It is the largest plant specimen museum in Asia. The animal specimen museum of the Institute of Zoology has expanded to 7000 m² in floorage and possesses nearly 5 million animal specimens, among which about 50,000 nomenclator specimens and about 1,500 type specimens, making it a first rate animal specimen museum in Asia. The fungi specimen museum in the Institute of Micro-organisms is 1300 m² in floorage and accommodates 400,000 fungi specimens. It is also the largest fungi specimen museum in Asia.

Colleges and universities are also important sites for storage of bio-specimens. Biological specimen museums considerable in scale are quite common in biological departments of universities and vocational colleges. The total number of specimens stored in these museums is far beyond 10 million. Therefore, colleges and universities and research institutions under various ministries and administrations are important resources in investigation and cataloguing and specimen storage of biodiversity.

2) Investigation of species and wetland resources under priority protection

In the past decades, the State Forestry Administration organized resource investigations of giant panda, wetland, wild animals under priority protection and wild plants under priority protection. According to the third investigation of giant panda from 1999 till now, the population of pandas in the wild has increased from 1110 or so in the previous investigation (1985 – 1988) to 1590 or so (excluding infant panda below 1.5 years old). Currently China has 161 giant pandas kept in zoos (including 23 in other countries). The investigations show that since the 1990s when a “project for protecting giant pandas and their habitats in China”, wild pandas are found distributed in larger areas and to have better habitat condition and their population is kept stable and rising somewhat. But in some regions, the problems of artificial fragmentation and disturbance of wild panda habitat still exist.

In 1995, the State Forestry Administration (ex-Ministry of Forestry) launched a wild animal resource survey, the largest in scale ever done since the foundation of the new republic. It lasted 5 years and cost tens of millions of yuan, with focus on 252 species that were in comparison heavily consumed or seriously endangered (including 153 species under priority protection of the state). Results show that great effect has been achieved in the conservation of wildlife in China, particularly, species under priority protection of the state, and nature reserves play an effective role in conserving the major habitats for over 300 species of wildlife under priority protection of

the state. However, some of the species, not in the list under priority protection of the state, but rather high in economic value, show a decreasing trend in stock. The survey indicates that it is an inevitable option to develop artificial breeding to solve the problem in exploitation.

The State Forestry Administration organized a countrywide survey on resources of wild plants under priority protection of the state during 1996 – 2000. On the basis of the research findings of the past in phytology and forestry, natural existence of 191 target plant species all over the country was investigated. Results show that during this survey 3 species (salt birch, etc.) were not found; 12 species of woody plants (e.g. Puto hornbeam, etc.) had only 1 – 10 wild plants each left in their native habitats; 9 species had only 11 – 100 wild plants left like Emei Parakmeria, etc.; and 85 species had only 50,000 individuals and below, totally accounting for 44.5% of the 191 species investigated. The situation is rather serious.

Along with the surveys on wildlife, the first national survey on wetland resources was also carried out. Results show that the country had a total of 38.48 million ha of wetland (excluding paddy fields), of which 36.2 million ha were natural wetlands, including 13.7 million ha of swampy wetlands, 5.94 million ha of coastal wetlands, 8.21 million ha of potamic wetlands and 8.35 million ha of lacustrine wetlands. About 16 million ha or 40% of the natural wetlands have been incorporated into 353 nature reserves and thus under better protection. Nevertheless, in some regions, blindfold poldering of wetlands, irrational exploitation of the bio-resources and water resources and serious pollution of wetlands were still found.

3) Investigation of farming crop germplasm resources

As early as the 1950s, the Ministry of Agriculture began investigation and collection of farming crop germplasm resources all over the country, building of germplasm storage facilities, and survey of domestically raised animals. In the mid- and late 1980s, it started to list the study on crop germplasm resources as “national key sci-tech project”, thus initiating overall and systematic development of collection, storage, research and exploitation of farming crop germplasm resources in the country.

During 1956 – 1957, the Ministry of Agriculture organized the first countrywide survey and collection of local crop varieties. As a result, a total of 210,000 germplasm accessions of 43 species of field crops, and over 17,000 accessions of vegetable germplasm were made. After 1978, investigations of crop germplasm resources were carried out one after another in Yunnan, Tibet, Hainan Island, the Shen-nong-jia Mountains, Da-ba-shan Mountains (including southwest Sichuan), Guixi Mountains in south Guizhou, the Three-Gorge Reservoir Region and “Jing-Jiu” Development Zone. By taking into consideration distribution characteristics of the species, sampling investigations were conducted on resources of wild rice, wild soybean, forage plants, wheat kindred plants, pasture and forest all over the country and several special surveys on cotton, hemp, mulberry and some fruits were done in some provinces (regions). So far, the Ministry of Agriculture has accomplished a total of over 30 surveys for investigation or collection of crop germplasm resources.

Beginning in 2002, the Ministry of Agriculture established special funds for development of survey, investigation, collection and *in-situ* conservation of agricultural wild plants. Surveys of the 191 species listed in the “Catalogue of wild plants under priority protection of the state” (the agriculture volume) have been carried out for their geographic distributions, eco-environments, vegetation coverage, morphological characteristics, protection values, endangeredness, etc.. Proposals for their mid- and long-term protection have been brought forwards. Moreover,

extensive investigations have been carried out of resources of wild germplasms of major farming crops, like wild rice, wild soybean, and wild wheat relatives, in 210 counties (or cities) over 16 provinces. Germplasms of these precious wild plants have been gathered and protected *ex-situ* in the national gene banks or nurseries, and a group of demonstrative agricultural wild plant reserves have been set up.

While the survey on farming crop germplasm resources was under way, surveys on resources of varieties of livestock and poultry, of fishery aquatic bio-resources, and of forest germplasms were also being carried out. Germplasms were collected, stored and catalogued.

4) Investigation on marine bio-resources

Since the 1950s, China has been carried out several large-scale countrywide surveys, e.g. national survey of seas, national investigation of coastal zones, national survey of sea islands and islets, national sea zoning for fishery, and also some regional investigations, like investigations of the Yantai-Weihai fishing ground, Zhoushan fishing ground, East China Sea continental shelf, Taiwan shallow water fishing ground, upflow, black tides, Xisha Islands, Nansha Islands, Northwest Pacific Ocean, etc.. As a result of these surveys and investigations, a clear picture of the species diversity of halobios of the country is obtained. Today a total of 20,278 species of halobios have been recorded, among which 229 species are of monera, 5028 species of protista, 188 species of fungi, 1203 species of plantage, and 13630 species of animal. In 2002, the State Oceanography Administration conducted investigations on major ecological problems in offshore estuaries, coastal wetlands, coral reefs, mangrove forests and seaweed beds, etc. and their causes in 12 key regions of the country. On this basis, the Administration has put forth some workable countermeasures for solution of these major ecological problems.

2.2.2 Monitoring capacity

Although China still lags far behind in biodiversity monitoring capacity, in the past dozen of years a certain foundation has been laid down and corresponding monitoring systems have been established to a various degree in related departments. For instance, SEPA has a powerful multi-leveled monitoring network established, consisting of over 2000 environmental monitoring posts distributed all over the country. Ecological monitoring is an integral part of the network; the forest department has its own forest resources monitoring system; the agricultural department has an agricultural environmental monitoring network and a pest hazard forecasting system; the oceanography department, its marine environmental monitoring system; and the Chinese Academy of Sciences, its China ecosystem research network, etc.

1) CERN

The establishment of the China Ecosystems Research Network (CERN) started in 1988 and designed to monitor changes in the ecosystems of China, study comprehensively major problems with the resources and eco-environments of China, and develop resources science, environmental science and ecology. At present CERN is composed of 13 farmland ecosystem experimental stations, 9 forest ecosystem experimental stations, 2 grassland ecosystem experiment stations, 6 desert ecosystem experimental stations, 1 marsh ecosystem experimental station, 2 lacustrine ecosystem experimental stations, 3 marine ecosystem experimental stations, 5 disciplinary sub-centers (water, soil, atmosphere, biomes and water area ecosystems) and 1 comprehensive research center.

CERN serves as a basic center for monitoring ecosystems and researching on eco-

environments of the country, and is also serves an important role of the network for monitoring changes in the global eco-environment. Currently CERN is oriented in research towards: 1) long-term monitoring of the major types of ecosystems of the country and laws of their successions; 2) structural functions of the major types of ecosystems of the country and their reactions to global changes; 3) mechanisms for restoration and rehabilitation of typical degraded ecosystems; 4) quality evaluation and health diagnosis of ecosystems; 5) rational exploitation of regional resources and regional sustainable development; 6) mechanism of the formation of productivity of ecosystems and effective regulation; 7) comprehensive management of eco-environments and demonstrative experiment on development of high-efficient agriculture.

2) Continuous investigation and monitoring of forest resources

The Investigation, Programming and Designing Institute of the State Forestry Administration is equipped with advanced GIS and remote-sensing technologies, thus forming a reliable hi-tech platform for the national forestry eco-environmental monitoring system. Its main business in resources monitoring is to monitor forest resources, desertification, wildlife, forest fire, wetlands, etc.. For these tasks, it has set up corresponding units, which are staffed with relatively strong sci-tech personnel. The Chinese Academy of Forestry Sciences has also laid down foundations for monitoring of forestry ecology.

The State Forestry Administration also attaches much importance to development and establishment of GIS for continuous investigation of forestry resources in Inner Mongolia, Heilongjiang, Jilin, Liaoning, Hebei, Beijing, etc.; has laid down criteria for the compilation of forest distribution maps by means of remote-sensing interpretation in continuous investigation of forestry resources; accomplished field operation quality inspection and indoor statistics, data processing and analysis and mapping of the investigations in Jilin, Heilongjiang, Liaoning, Hebei and Beijing; updated statistic data of the fifth national continuous investigation of forestry resources; specified methods used for inspection and receiving of remote-sensing interpretation of sample areas and indoor statistics and analysis in the continuous investigation of forestry resources; completed statistics of forestry resources in the six engineering regions, such as the “natural forest conservation engineering project”, etc.; and established and updated databases.

The Ministry of Agriculture and the State Forestry Administration have jointly established a agricultural and forestry pest and disease hazard forecast and prevention network, composed of crop pest and disease forecasting stations and forest pest prevention stations (posts) at various levels (province, county and township) all over the country, and announcements and monitoring are carried out through the database network.

3) Monitoring of marine environment

The State Oceanography Administration has already established a national marine environment monitoring system composed of satellites, aircraft, ships, buoys and on-shore posts. The system is useful for real-time monitoring of habitats, status and trends of basic physical and chemical elements of the sea. In order to get to know accurately what is the major threat to and status and trend of the marine environment and marine biodiversity and to meet the basic requirements of ecology-based administration of the seas, the state has adopted one after another “Plan for monitoring trends of the marine environment quality”, “Routine monitoring of red tide in the monitoring zones off the coast of the country” and “Routine monitoring of marine ecology in the marine ecology monitoring off-shore zones of the country”.

In order to alleviate the impact of red tides on marine biodiversity and marine ecosystems,

the State Oceanography Administration began to perform routine monitoring of red tide in the monitoring zones off the coast of the country in 2002 and set up 10 red tide monitoring zones in these major breeding zones off the coast of the country, monitoring with high intensity and frequency. In 2003, the number of red tide monitoring zones increased to 18, covering basically all the offshore zones with high incidence of red tides and all major marine aquaculture zones.

In 2004, the State Oceanography Administration initiated its routine monitoring of marine ecology in the marine ecology monitoring zones off the coast of the country. The major task of the 15 marine ecology monitoring zones set up in those major offshore ecosystems and ecological sensitive zones is to maintain round the clock monitoring. The ecology monitoring zones cover estuary, coastal wetland, mangrove forest, coral reef, seaweed bed and bay ecosystems, and monitor variation of their environmental, biological and ecological threat indices derived on the basis of the key ecological processes and major ecological threats of each ecosystems.

2.2.3 *In-situ* conservation and sustainable use of biodiversity

1) Construction and management of nature reserves

By the end of 2003, the country had built up a total of 1999 nature reserves of all types and at all levels, covering a total area of 143.98 million ha (137.95 million ha of land and 6.03 million ha of sea waters) or 14.37% of the country's total. Among the figure, 226 were state-level nature reserves, totaling 88.713 million ha in area. And the state had marked out 2553 game refuges, totaling 38.285 million ha in area. Moreover, the country has twenty tracts of wetlands of international significance, totaling 3.03 million ha in area.

As regards administration, environmental protection departments are the administrative departments in charge of comprehensive management of the nature reserves. There are over 300 nature reserves under their direct administration. The forestry departments, however, are the major undertaker of the establishment and management of nature reserves. By the end of 2003, the forestry departments had built up 1538 nature reserves of different types and at all levels, covering 117.798 million ha in area or 12.27% of the country's land. Among them, 164 are state-level nature reserves, covering a total land area of 71.376 million ha. Besides, the forestry departments all over the country have established over 50,000 local reserves of all types, protecting about 1.5 million ha of various forest ecology, wetlands, wildlife and their habitats, ancient and famous trees, cultural relics and natural landscapes, etc. Also involved in construction and management of nature reserves are the Ministry of Agriculture, State Oceanography Administration, Ministry of Land Resources, Ministry of Construction, State Traditional Chinese Medicine Administration, Chinese Academy of Sciences, etc..

Sorted by type, the nature reserves of China are mainly of the three categories, reserves of natural ecosystems, reserves of species and reserves of natural relics. The first category can be further divided into types, such as forest, grassland, wetland, desert, sea and coast. For instance, among the more than 80 marine and coastal nature reserves, 24 are state-level marine nature reserves, protecting various endangered rare and precious species and typical marine ecosystems, including lancelets, manatees, sea calves, Indo-pacific hump backed dolphin, (*Sousa chinensis*), sea turtles, Germain's swiftlets, mangrove forests, coral reefs, estuaries, wetlands, bays, islands and lagoons, etc.

In addition, the country has established 677 scenic spots of tourist attraction, of which 177 are of the state level and 452 of the province level, accounting for over 1% of the country's total

land area. Since 1996, in cooperation with other related ministries and administrations, the Ministry of Construction has applied 8 times to the UNESCO for enrollment of natural sites into the list of world's heritage sites. By the end of 2003, a total of 16 scenic spots had been accepted into the "World List of Natural Heritage", such as the Taishan Mountains, Huangshan, Leshan - Emei Mountains, Wuyi Mountains, Lushan Mountains, Huanglong, Dujiang Dam - Qingcheng Mountains, the confluence of three parallel rivers, etc..

2) Natural forest conservation engineering project

Among terrestrial ecosystems, natural forests are the natural resources that are the most complex in composition, the largest in biomass, and the soundest in function and play a decisive role in combating droughts and floods, inhibiting land desertification, conserving species, and maintaining ecological balance. The initiation of the natural forest conservation engineering project is a pioneering undertaking in the ecological construction history of China and in that of the world as well. The project will no doubt contribute significantly to conservation of biodiversity, improvement of the eco-environment of the country and also the globe.

Pilot sites of the project began to be set up in 1998. On Oct. 24, 2000, the State Council officially approved the all round start-up of the "Program for implementation of the natural forest conservation engineering project in the upper reaches of the Yangtze River and the mid- and lower reaches of the Yellow River", and the "Program for implementation of the natural forest conservation engineering project in the major state-owned forest regions in Northeast China and Inner Mongolia". The project will last from 2000 to 2010, calling for a total investment of 96.8 billion yuan.

The project has three major targets: 1) truly realize conservation of the existing forest resources by putting a complete end to commercial logging of natural forests in the upper reaches of the Yangtze River and the mid- and lower reaches of the Yellow River, and cutting the timber output by 19.905 million m³/yr and exerting strict protection of 94.2 million ha of forests in the major state-owned forest regions in Northeast China and Inner Mongolia; 2) accelerate culturing of forest resources by expanding the area of forests and grasslands by 14.67 million ha in the upper reaches of the Yangtze River and the mid- and lower reaches of the Yellow River, of which 8.67 million ha will be forest lands, thus increasing the forest coverage by 3.72%; 3) properly settle the 741,000 redundant forestry workers into new trades by realizing strategic shift of forestry industries and enterprises and rationally readjusting the industrial structure of forestry.

3) *In-situ* protection of relatives of agricultural crops

Based on the "Ordinance for Protection of Wild Plant", the Ministry of Agriculture laid down in 2002 "Approaches to protect agricultural wild plants", with specific regulations for protection and management of agricultural wild plants all over the country. In regions where wild plant species under the priority protection of the state are distributed in concentration, the Ministry of Agriculture and the provincial administrative department in charge of agriculture are responsible to demarcate and set up nature reserves of state or province level for protection of these wild plant species; and the agricultural environment monitoring organizations subordinate to the administrative departments in charge of agriculture at the county level or above are responsible to monitor impacts of changes in environmental quality in their respective regions on the growth of the wild plants under priority protection of the state or the region, and report their findings duly to

the administrative department in charge of agriculture. So far a total of 47 demonstration sites for protection of native habitats of agricultural wild plants have been built up or are under construction. Each site has a core zone, buffer zone and experimental zone. Now these demonstration sites provide protection to a number of wild plant species, such as wild soybean, wild rice, Huashan new straw, thickspike wildrye, wild buckwheat, wild apple, wild lotus, etc. The build-up of these demonstration sites has laid down a solid foundation for construction of native habitat reserves and protection sites for the plant genetic resources of the country.

4) Conservation and sustainable use of grassland resources

China has already set up dozens of nature reserves for protection of a system of typical grassland ecosystems. Nevertheless, owing to over-grazing and the nibbling habit of goats, grasslands are commonly subject to degradation and even to desertification. Therefore, besides establishment of nature reserves, maintenance and sustainable exploitation are the most important means to conserve grassland resources. In the past decades, the state and local regions have been paying high attention to conservation of grassland resources, adopting various means like artificial grass planting, air sowing, fencing for grass cultivation, combining cultivation of grassland and pasture with ecological construction, implementing “Grain for Green” projects and limiting overgrazing of pastures, etc.. The acreage of reserved grassland has reached over 15 million ha, of fenced grassland over 10 million ha, and of grassland under “Grain for Green” projects, 1.633 million ha.

5) Maintenance and sustainable exploitation of fishery resources

China takes seriously the issue of conservation of marine fishery stocks and has adopted a series of measures to maintain the fishery resources so as to ensure implementation of the strategy of sustainable development of marine fishery. By adopting control over fishery catching intensity, reducing number of fishing vessels, applying fishing-off-season systems, setting up fishery resources nature reserves, implementing plans for zero-increment in marine catching, etc. China is striving to have her fishery shift from the model of expanding production scale and increasing output in the past to a sustainable development model with emphasis on conserving resources, optimizing fishery structure and improving quality and benefits.

As early as in 1979, China already began to adopt a catching license system to restrict blind increase in catching intensity and in 1987 to enforce a policy of setting up indices for controlling fishing vessel power. Since 1995 China has defined summer as fishing off season. From July to August every year, fishing is completely closed in sea waters north to 27° Lat. Special closed fishing zones and seasons are also specified to conserve the resources of some special species. The system of closed fishing zones and seasons has been playing a significant role in controlling catching intensity, conserving fishery stocks, and maintaining sustainable exploitation of the marine biodiversity resources. In the past few years, the closed fishing season has extended from 2 months to 3 months. And in 2003 the State Council approved adoption of a system of closing fishing for 3 months every year in the Yangtze River valley.

6) Effect of scenic spots of tourist attraction on conservation of biodiversity

Scenic spots of tourist attraction often encompass cultural and historical attractions and sites, beautiful natural landscapes, and rich biodiversity as well. Normally the following practices are

adopted in these spots for conservation of biodiversity: 1) demarcate a special reserve to provide special protection of native and rare plant species and dominant plant communities within the zones of natural heritage; 2) protect ancient and famous trees by surveying, classifying and documenting ancient and famous trees, and bonsai stumps and laying down regulations for their conservation and protection; 3) conserve wildlife habitat environments and terminate criminal activities like hunting, poaching and trafficking wildlife inside the scenic spots; 4) take precautions to prevent forest fire by signing “forest fire prevention responsibility deeds” with operators of the scenic spots and enforcing fire prevention responsibility system by levels.

2.2.4 Construction of *ex-situ* protection facilities

1) Construction of botanic gardens

Botanic gardens are important sites for *ex-situ* protection of plants and have been playing a key role in conservation of plant diversity. Currently, China has over 140 botanic gardens, where a huge number of Chinese native plants are cultivated, accounting for 65% of the components of the Chinese flora. For instance, the Beijing Botanic Garden has over 5,000 species in its northern garden (including cultivated varieties), of which 95 species are under the national priority protection of the state, and about 6,000 species in its southern garden. The Kunming Botanic Garden has collected 5000 species; the South China Botanic Garden, about 8,000 species; the Xishuangbanna Botanic Garden, about 10,000 species; the Wuhan Botanic Garden, about 4,000 species; the Nanjing Zhongshan Botanic Garden, about 3,000 species; and the Shenzhen Botanic Garden, about 4,000 species. The botanic gardens make full use of their respective advantage in setting up a total of 135 sub-gardens specific to their own respective features, providing *ex-situ* protection to over 300 endangered rare and precious species of plants.

The Chinese Academy of Sciences is planning to invest 300 million yuan and work in cooperation with over 140 botanic gardens in the country to conserve the resources of over 30,000 species of higher plants native to China. It is planned that within 15 years the number of plant species under the protection of the 12 botanic gardens under the the Chinese Academy of Sciences will be increased from 13,000 to 21,000. The total land coverage of the under-planned Qinling Botanic Garden under the charge of the Xi'an Branch of Chinese Academy of Sciences will reach 458 km², 4 times larger than the largest botanic garden so far in the world.

2) Construction of zoos

Today, China has nearly 200 city zoos and safari parks, among which the Beijing Zoo is the largest city zoo of the country. The zoos maintain 6546 animals of 446 species and built up over 30 breeding stocks of domestic or foreign endangered rare and precious species of animals, such as giant panda, crested ibis (*Nipponia nippon*), golden monkey (*Rhinopithecus roxellanae*), antelope, black-necked crane, giraffe, zebra, etc., and the sizes of these stocks are expanding. For instance, the population of crested ibis, has reached 38 and the species of crane 12. Moreover, the country has built up more than 20 aquaria. The Beijing Oceanic Museum has the largest aquarium in any inland city of Asia.

Chengdu, Wuzhou, Shenyang, Wuhan, Chongqing and Shanghai have respectively set up giant panda, black leaf monkey (*Trachypithecus francoisi*), crane, golden monkey, South China tiger, takin breeding bases, and Chengdu has also established an “Open Lab for Research on Breeding and Genetics of Endangered Wild Animals”, devoted to research on artificial breeding of

endangered rare and precious animals. To make for raising, mating, and breeding of South China tigers for conservation of the breeding stocks, a group of ecological South China tiger exhibition zones have been built within zoos. They have become important bases for *ex-situ* protection of wild animals.

3) Breeding bases of rare and precious species of animals

Besides zoos, over 230 wild animal artificial breeding bases have been built up all over the country and so have over 20 endangered wild animal first-aid and breeding centers, for Northeast China tigers, elks, wild horses (*Equus przewalskyi*), Saiga antelope (*Saiga tatarica*), crested ibis, Chinese alligator, white flag dolphin (*Lipotes vexillifer*), Chinese sturgeons, giant salamanders, mullets, sea turtles, etc.. The figure is also increasing. For instance, the State Forestry Administration is investing 27.6 million yuan in capital construction of a base of the China Giant Panda Protection and Research Center in Bifeng Gorge of Ya'an; the state will invest more than 29 million yuan in setting up a Tibetan antelope (*Pantholops hodgsoni*) artificial breeding research center and a breeding base in Dangxiong County of Lhasa and Gacuo Township of the Shuanghe Special Administrative Region, Naqu Prefecture, Tibet. Moreover, the country has also established a group of endangered rare and precious plant species introducing and breeding centers, for instance, the SEPA had some endangered rare and endangered plant species introduction and conservation centers set up in Kunmin of Yunnan, Jiujiang of Jiangxi, etc. as early as in the 1990s.

4) Agricultural crop and domestic animal germplasm preservation

Through decades of painstaking efforts in collecting, gathering and introducing from abroad crop germplasm, China has accumulated nearly 380,000 pieces of crop germplasms and over 50 domestic animal species, varieties and breeds, and built up modernized long-term, medium-term and copy banks and germplasm nurseries with match safety facilities for conservation of crop genetic resources. The years of 1987 and 2003 witnessed the establishment of two modernized state crop germplasm banks in Beijing. With a total floorage of 8,600m², a storage capacity of 1 million accessions, being one of the most modern crop germplasm banks in the globe. During the eighth "Five-Year" plan period, a national crop germplasm duplicate bank was erected in Xining, Qinghai Province. As follow-up, a total of 30 germplast nurseries and 2 tube-cultured seedling banks (17 for fruit, 4 for cereal crops, 8 for cash crops and 1 for forage grass) were established one after another. At the same time, the Chinese Academy of Agricultural Sciences built up 10 medium-term crop genetic resource banks in its various crop research institutes, and various provincial academies of agricultural (forestry) sciences set up 17 medium-term crop germplasm resource banks. Besides, China has also established domestic animal (cattle and sheep) semen banks and embryo banks.

By the end of 2000, through propagation and culture, a total of 332,000 accessions of genetic resources of over 160 kinds of crops, belonging to 740 species (or subspecies), 192 genera, 35 families had checked into the state long-term bank for storage; and 45,000 genetic resources of over 50 kinds of crops, including 1193 species (or sub-species) in the national crop germplasm nurseries.

5) *In vitro* storage of wild germplasm resources

In 1996, the Chinese Academy of Sciences set up 11 plant, animal and microorganism germplasm banks for conservation of wild germplasm resources, which are termed as a whole the Typical Culture Preservation Commission, Chinese Academy of Sciences, i.e. China General Microorganism Preservation Management Center; China Virus Preservation Center, Cell Bank, Kunmin Cell Bank, Gene Bank, In-vitro Plant Germplasm Bank, Endangered Rare and Special Plant Germplasm Bank, Marine Germplasm Bank, Freshwater Alga Spore Bank, Chinese Nationality Eternal Life Cell Bank, and an information network center. Currently the commission has 6316 kinds (or strains) of various culture gathered and stored in its subordinate banks, totaling 21644 pieces, including 15929 strains of bacteria, 350 strains of protozoans, 2274 genes and gene elements, 504 cell cultures of wild animal, 880 strains of virus, 300 pieces of in-vitro plant germplasms, 250 strains of freshwater algae, 381 strains of marine algae, 775 pieces of endangered rare and precious plant germplasms and 21 strains of human cells of genetic resources.

Presently China's first national wildlife germplasm resources bank is under construction in Kunmin Botany Institute, Chinese Academy of Sciences, with a total investment reaching 148 million yuan. The resources bank will be charged with preserving germplasm resources collected from Yunnan Province and its neighboring regions and the Qing-Zang Plateau, with focus on plants and concurrently animal and microorganism germplasms. When it is completed, it will be composed of a seed bank, an *in-vitro* plant germplasm bank, a DNA bank, a microorganism seed bank, an animal germplasm bank, an information center and a plant germplasm resources nursery, with a capacity of collecting and preserving totally 190,000 accessions belonging to 19,000 species.

2.2.5 GMOs biosafety management

On Dec. 29, 1993, the former-State Science and Technology Commission released "Approaches to Genetic Engineering Safety Management" and the Ministry of Agriculture followed by issuing "Approaches to Implementation and Management of Safety of Agricultural Genetic Engineering" on July 10, 1996, thus beginning its work on risk assessment and safety management of agricultural GMOs.

From the end of 1997 to 1999, with the support of UNEP/GEF, the SEPA led and worked in cooperation with other ministries and administrations, such as Ministry of Agriculture, Ministry of Science and Technology, Ministry of Education, Ministry of Commerce, State Forestry Administration, State Chinese Traditional Medicine Administration and Chinese Academy of Sciences, drafting "China National Biosafety Framework", which has laid down a solid basis for biosafety management of the country by depicting in detail frameworks of the policy system and legal system for national biosafety management in China, framework of the technical criteria for risk assessment and risk management of GMOs and products thereof, and needs in national capacity building for biosafety management.

On Aug. 8, 2000 China signed the "Cartagena Protocol on Biosafety", formally initiating her legal processes for joining the protocol. In 2001, the State Council approved establishment of a "Biosafety Management Office" in the SEPA, taking care of affairs and business related to the "Convention on Biological Diversity" and the "Cartagena Protocol on Biosafety" and running management of GMOs environment safety in the country. Recently, a CBD implementation related national biosafety information clearing-house has been put into operation.

In 2001, the State Council promulgated "Regulation for biosafety management of agricultural

GMOs”, aiming to standardize management of research, experiment, production, processing, marketing, import and export of agricultural GMOs. According to the gist of the ordinance and in light of new problems and development trends in the field of agricultural GMOs, the Ministry of Agriculture released “Approaches to biosafety management of import of agricultural GMOs”, “Approaches to management of safety assessment of agricultural GMOs” and “Approaches to labeling management of agricultural GMOs”, thus greatly intensifying management of agricultural GMOs.

In order to strengthen import inspection of GMOs and products thereof, the State Quality Inspection and Quarantine Administration released and implemented “Approaches to management of inspection and quarantine of GMO products in import and export” in 2004. In order to further research on risk assessment and risk management of GMOs, the Ministry of Science and Technology has listed research projects on biosafety of GMOs into “863” and 973 programs. Besides, a number of biosafety research projects have also been launched in SEPA. Ministry of Agriculture, State Forestry Administration, Ministry of Public Health, Ministry of Education, etc.

To guarantee implementation of the “Ordinance” and three “Approaches”, the Ministry of Agriculture has formed a steering team for biosafety management of agricultural GMOs and set up an office for biosafety management of agricultural GMOs, and established an inter-ministerial joint conference system for biosafety management of agricultural GMOs. The conference will be attended by responsible persons of the Ministry of Agriculture, Ministry of Commerce, Ministry of Public Health, State Quality Inspection and Quarantine Administration and SEPA, and held responsible for coordinating major issues in biosafety management of agricultural GMOs. Besides, the Ministry of Agriculture has also set up a national agricultural GMO biosafety committee, in charge of biosafety assessment of agricultural GMOs.

Since 1997, China has granted enlarged field testing to transgenic rice, rape, corn, wheat, potato and soybean, one after another, and biosafety certificates to transgenic pest-resistant cotton, tomato, sweet pepper, and petunia. And after the promulgation of the “Ordinance for biosafety management of agricultural GMOs”, i.e. from March 2002 to June 2004, the Ministry of Agriculture approved 250 GMOs cases for restricted field trails, 133 cases for environmental release (enlarged field trial) and 115 cases for productive testing, totally granted 44 Safety Certificates.

2.2.6 Management and control of invasive alien species

Management and control of invasive alien species involves a number of departments. Currently, China has organized a national coordination team composed of the Ministry of Agriculture, SEPA, State Quality Inspection and Quarantine Administration, State Forestry Administration, State Oceanography Administration, Ministry of Science and Technology, Ministry of Trade, General Administration of Customs, etc. with the Ministry of Agriculture in the lead, thus forming an effective coordination mechanism and cooperation based on division of tasks. Presently they are engaged in constituting regulations for management of and control programs for invasive alien species.

According to incomplete statistics, China has over 400 invasive alien species, among which over 100 are quite harmful. In the IUCN Global List of the 100 most threatening alien species, China has over 50. In early 2003, SEPA and Chinese Academy of Sciences jointly announced the first list of 16 important invasive alien species in China. In recent years, the

invasion of alien species has been showing an uprising trend in number of species, frequency of invasion, range of infection, seriousness in damage and economic loss. The economic loss caused to agriculture, forestry, animal husbandry and fisheries by only 11 major invasive alien species, such as sweet potato whitefly, crofton weed, pine wood nematodes, etc. reaches to 57.4 billion yuan, every year.

Since the early 1990s, China has been carrying out systematic researches on quarantine inspection and techniques for control of pests, on distribution, dynamics in communities, bio-ecological properties, level of harm, and techniques for control of invasive alien species already in China, such as vegetable leaf miner, sweet potato whitefly, red turpentine back beetle, pine wood nematodes, pine greedy scales, loblolly pine mealybug, American white moths, codling moth, rice water weevils, sweet potato mycosphaerella blight, etc., and on technology for bio-control and comprehensive management of invasive harmful weeds, like ragweed, alligator weed, water hyacinth, mile-a-minute weed, crofton weed, etc.

In 2003, the Ministry of Agriculture released “Circular on launching test actions to wipe out invasive alien species” and “2003 action plan to wipe out invasive alien species”, launching pilot action of wiping out invasive alien species with ragweed and crofton weed in focus in one province and five counties (Liaoning, Kaiyuan City and Tengchong County of Yunnan, Xichang City, Ningnan County and Renhe District of Panzhihua City in Sichuan). The campaign mobilized nearly 8 million people from all circles of the society, destroying a total of 19.2 billion ragweed plants over an area of 860,000 ha with the wiping out rate reaching over 80%, and uprooting crofton weeds over 4000 ha. In 2004, the scale of the campaign was expanded to one hundred counties in 10 provinces.

China now has in place an examination and approval system for introduction of aquatic and terrestrial wild animals; and signed with the USA a “Sino-USA Agreement on Agricultural Cooperation”, stipulating implementation of quarantine of imported wheat and other cereals. Hence, China has set up quarantine units at over 200 customs ports, forming a supervision network.

Control of invasive alien species and protection marine ecological safety have become major tasks of the ocean administration departments. Being one of the six demonstration countries of the “Global ballast water management project” established jointly by the GEF, UNDP and IMO (International Maritime Organization), China has set up a demonstration base in Dalian and accomplished a number of projects, such as “Biodiversity background investigation of the Dalian Port”, “Ballast water management in the Dalian Port”, “Red tide information network for ships – a China-specific project in global ballast water management”, etc., thus laying down a solid basis for effective management and control of invasion of pest and pathogens in ballast water and its deposit and successful constitution and implementation of ballast water related laws in the future.

2.2.7 Basic research on conservation and sustainable exploitation of biodiversity

1) Basic research on biodiversity

Since the late 1980s, China has carried out a large volume of research work on conservation and sustainable exploitation of biodiversity, providing the government with strong sci-tech support in decision-making on conservation and sustainable exploitation of biodiversity and bio-resources. The Ministry of Science and Technology has listed conservation of biodiversity into the state key

sci-tech program since the early 1990s; the State Natural Science Foundation has also opened up a number of research projects in the field of biodiversity; other related departments, like the SEPA, State Forestry Administration, Ministry of Agriculture, Ministry of Construction, State Oceanography Administration, State Chinese Traditional Medicine Administration, etc. have also been carrying out research projects on conservation and management of biodiversity. The Chinese Academy of Sciences, in particular, has organized several key basic research projects in the field of biodiversity since the early 1990s, with a total investment of 200 million yuan.

In the eighth “Five-Year Plan” period (1991 – 1995), the Chinese Academy of Sciences masterminded three key research projects in the field of biodiversity, i.e. “Basic research on ecology of conservation of biodiversity in China” financially supported by the Ministry of Science and Technology; “Research on biology of conservation of major endangered plants in China” by the State Natural Science Foundation; and “Biological basis for conservation and sustainable exploitation of biodiversity” by the Chinese Academy of Sciences. Through these research projects, a primary knowledge has been obtained as to status and causes of the damages the key forest, grassland, fresh water and coral reef ecosystems have suffered; and by adopting nursery biological approaches, like community survivability analysis, DNA sequence analysis, etc., endangeredness of key endangered species and its mechanism are evaluated, thus providing a scientific basis for culturing biodiversity and especially for culturing of important species and ecosystems. To support the above-said three key research projects, the Chinese Academy of Sciences began to implement the biodiversity research and information management project (BRIM) since 1993, a 4.5 million \$US World Bank loan project.

In the ninth “Five-Year Plan” period (1996 – 2000) and the years that follow, the Chinese Academy of Sciences launched a number of key biodiversity projects in October 2000, including “biodiversity culturing in key regions of China” financially supported by the State Natural Science Foundation; “Mechanism of human activities affecting biodiversity in the Lantsang River Valley” and “Variation, sustainable exploitation and ecological safety of biodiversity of the Yangtze River Valley” by the Chinese Academy of Sciences. And beginning from 2004, the Chinese Academy of Sciences undertook a pilot project of formulation and sharing of standards and criteria for describing biological specimens”, which is a part of the construction of a platform for sharing of sci-tech knowledge in national natural resources.

2) Research and development of sustainable exploitation of biodiversity

If the Chinese Academy of Sciences and colleges and universities are said to be somewhat leaning toward basic theoretic researches, the projects established by various biodiversity related administrative departments in charge are inclined towards applied research, particularly on technology for and management of conservation and sustainable exploitation. For instance, the environmental protection departments have their research focused on policies for conservation of biodiversity; the agricultural scientific research departments on conservation and exploitation of germplasm resources; the forestry departments on monitoring of forest and wildlife resources, and

the gardening and city construction departments on artificial breeding technology for endangered rare and precious species, etc.. For instance:

Agricultural research institutions have screened out and innovatively exploited a large variety of quality germplasm out of the large volumes of crop germplasm resources also preserved in banks for utilization in production; made observation and documentation of agronomical properties of all the 380,000 accessions of crop genetic resources in the banks (nurseries) of the country; and compiled more than 90 volumes of catalogues of germplasm resources of 67 species (or kinds) of crops, covering more than 380,000 accessions of genetic resources. Meanwhile they have also appraised pest-resistance of 62%, major characteristics of 57%, stress-resistances (cold, drought, salt and waterlogging) of 43%, and other properties of 3% of the germplasm resources in the banks and nurseries. Through the appraisal, they have screened out 26,000 accessions of quality germplasm and evaluated and created 1475 quality germplasm types. According to incomplete statistics, 168 of these quality germplasm types screened out have been extended directly as quality varieties, and 247 bred indirectly into new varieties. Their cumulative cultivation area has reached 260 million ha, creating significant socio-economic benefits.

Researches are also being carried out on technology for artificial breeding of endangered rare and precious animals in zoos and wild animal breeding bases all over the country. The Beijing Zoo has made outstanding achievements in raising, breeding and rearing of giant pandas and accomplished the research on pedigree of pandas; carried out research on *ex-situ* conservation and natural rearing of Crested Ibis; and taken the lead globally in successfully adopting the technology of artificial insemination in breeding black-necked cranes. The Chengdu Giant Panda Breeding Research Center has already four generations of pandas raised in captivity and built up the largest artificial panda community in the world. The zoos in Beijing, Chengdu, Chongqing, Shanghai and Fuzhou and the Wolong Giant Panda Research Center have carried out a total of 97 research projects in the past 5 years.

3) Integration of research forces and resources in various fields in various departments

To integrate and coordinate research forces and resources in various fields in various departments of the country, the Ministry of Science and Technology and Ministry of Finance have recently mobilized scientific and technological forces all over the country into building a “national platform for sci-tech basic conditions” in response to the general arrangement of the “Synopsis for construction of national platform for sci-tech basic conditions”, which will provide an effective sci-tech platform for speeding up the advance of science and technology, development of the economy and build-up of the overall national strength. The platform will focus on integration, sharing and construction of sci-tech resources, such as research and experiment bases, large-scale scientific instruments and equipment, natural sci-tech resources, scientific data and literature, sci-tech findings transformation and public service platform, and network sci-tech environment, etc.. Among them, the natural sci-tech resources (sharing) platform will first include 8 types of resources, such as plant germplasm resources, animal program resources, microbial strain resources, human genetic resources, biological specimens, rock mineral and fossil specimens, experiment materials and standard substances, into the first phase of construction. The purpose is to intensify integration of the existing resources, lay down uniform criteria for description, technical standards and regulations through scientific classification, expand volumes of natural sci-tech resources for sharing, standardize construction of various-typed material object banks for

natural sci-tech resources, and improve the level of digitization and efficiency and quality of the sharing.

2.2.8 Publicity, education and training of personnel

1) Publicity and education

Activities of publicity and education for conservation of biodiversity have been undertaken in various related departments. To specify targets and tasks of the national environment publicity and education campaign, SEPA, Propaganda Department of the CPC Central Committee and Ministry of Education have jointly worked out “Outline of the national environment publicity and education campaign (1996 – 2010)”. SEPA and regional environmental protection departments take advantage of celebration days like “June 5th, the World Environment Day”, “April 22nd, Earth Day”, “May 22nd, the International Biodiversity Day”, to give extensive publicity to bylaws for nature conservation and biodiversity knowledge. In 2003, to observe “the International Biodiversity Day”, SEPA organized a national biodiversity quiz contest, which attracted more than 30,000 participants in over 20 provinces. The CBD Implementation Office also publishes regularly “CBD Implementation Newsletter”, duly reporting CBD implementation progresses and activities inside and outside the country.

The forestry, agriculture, construction and maritime departments also make use of “Bird-loving week”, “Bird-loving month”, “Bird festival”, “World wetland day”, “Wildlife protection propaganda month”, “Arbor day”, and various forms of activities, such as seminars, exhibitions and solicitation of essays, to give publicity to the “Law for Protection of Wildlife”, “Forestry Law”, etc.. In the recent seven years, they have also organized annually national and regional wildlife quiz contests, essay contests and wildlife summer camps for students of middle and primary schools.

Public sites like parks and gardens in cities are ideal places for publicity and education of biodiversity. In 1993, the Shanghai Zoo invested in and built up a popular knowledge education hall, accessible to youth; the Beijing Zoo has its popular knowledge hall open to visitor free of charge from Aug. 1st, 2003. Botanic gardens provide universal education in botanic knowledge to middle and primary school students through hanging name plates in front of plants, organizing plant or ecological summer camps, popular knowledge guided tours, and on-spot consultation, publishing propaganda pamphlets, and holding youth quiz contests and lectures.

In order to enforce the “Law of popularization of common scientific knowledge”, in December 2002, the Ministry of Science and Technology, Propaganda Department of the CPC Central Committee, Ministry of Education, and Science and Technology Association of China decided to assign 100 institutions as “National Youth Sci-tech Education Base”, of which 25 are devoted to the fields of animals and plants, including biodiversity museums, animal exhibits, botanic gardens, ecological experiment centers, national nature reserves, arbor gardens, insect museums, etc. .

2) Training of personnel

Training of human resources has long been a concern of related administrations in charge. Various forms of training are offered to grassroots managerial personnel who are often low in professional level and law enforcement, including various training courses, lecture courses by experts, investigations and training abroad, etc.. Thus quite a number of grassroots managerial

personnel have received training to various degrees. Training is also provided to technicians, to farmers in awareness of biodiversity conservation and biodiversity knowledge, and to students in environmental protection.

The SEPA, State Forestry Administration, Ministry of Agriculture, Ministry of Construction, and State Oceanography Administration organize training of managers of nature reserves in professional technology and management. Through training, the business quality and actual work capacity of the grassroots managerial and technical personnel have been significantly improved. In order to build up stable and permanent training bases, on Dec. 27, 2004, the first nature reserve college of the country was established in the Beijing Forestry University. The college is oriented to train and cultivate senior scientific researchers, engineering technologists and operation managers.

In 2003, the Ministry of Agriculture listed pilot action to exterminate invasive organisms as one of the eleven good things to be done for the farmers. Through training of various forms, agricultural managerial persons, technicians and farmers will learn how to identify invasive alien species and master control measures and extermination techniques.

Since 1998, the UNESCO-supported international cooperative project – environment, population and sustainable development education project (abbreviated as EPD) has already run six national lecture courses and had over 10,000 teachers from over 1,000 schools in 9 provinces (metropolis or regions) take part in experiment and research activities of the EPD education project and nearly 500,000 students in universities and middle and primary schools attended the education activities.

2.2.9 Data management and information sharing

In construction of data management and information system, various departments have accomplished large volumes of work and laid down a certain foundation. For instance, SEPA has initiated “Biodiversity CHM” under the CBD implementation system, and established information links with related departments; the State Forestry Administration has set up a forest resource inventory database and a nature reserve management information system; the Ministry of Agriculture has built up large-scale databases and information systems for collection and management of agricultural germplasm resources; the Chinese Academy of Sciences has established biodiversity basic database and information system; and ocean, construction and higher education systems have set up related databases and information systems in their respective fields. However, currently China is still at a quite low level in data management and information sharing. Information sharing is only feasible within single institutions, departments or systems, or even sometimes not possible within a department or system.

1) Construction of CBIS

CBIS is a large-scaled biodiversity basic data administration and information sharing platform developed by the Chinese Academy of Sciences. The general objective is through collection, collation and dissemination of information related to study, protection and sustainable utilization of biodiversity at home and abroad, to expand the exchange range of biodiversity information and contents of the information, to stimulate cooperation between organizations and individuals from various walks of life inside and outside the country, to popularize biodiversity knowledge throughout society, to provide scientific data for the state, regional and local decision-

making departments, and eventually to promote development of the conservation and sustainable exploitation of biodiversity.

In content, CBIS is composed of basic database, model bank and expert system bank. The data in the basic database include data of species catalogues, endangered and protected species, typical ecosystems, biological specimens, *ex-situ* conservation, *in-situ* conservation, seeds and germplasm resources, environmental factors and vegetation, relevant social and economic development, literature information, biodiversity information cataloguing, etc.; the model bank has in storage: ecosystem models, community dynamic models of critical species of ecosystems, temporal and spatial dynamic community survivability analysis models, biodiversity status evaluation models, and environment and tools of modeling. And the expert system bank encompasses endangered species protection expert system, nature reserve planning expert system, biodiversity resources sustainable exploitation expert system, and environment and tools for development of expert systems.

CBIS is a distribution system covering the entire country to collect, collate, preserve and disseminate Chinese biodiversity data and information, and is composed of one central system, five disciplinary sections and dozens of data source points. The central system, located at the Institute of Botany, Chinese Academy of Sciences, is to establish and maintain the comprehensive biodiversity database that covers the entire country, the major environment factor and vegetation database, the ecosystems level model bank and expert system, model and expert system environment and development tools, etc.; the disciplinary sections are responsible to build up their own respective nationwide database, model bank and expert system, with emphasis on data and information administration at the species level; and the data source points should set up related database system in light of the characteristics of their own respective geographic regions and professional data, and display biodiversity information and data in the form of tables and graphics modes, using the GIS technology.

2) Agricultural crop germplasm resource information system

The Chinese Academy of Agricultural Sciences has already built up a national crop (including domesticated animals) genetic resource information system and realized modern management of the genetic resource information. The system encompasses 180 kinds of crops and 380,000 accessions of genetic resources, including 1600 MB numerical value and image information. The system also includes database subsystems like management of the national germplasm bank, management of the Xining germplasm duplicate bank, management of the national germplasm nursery, identification of crop properties, comprehensive evaluation of special quality germplasms, management of the national mid-term exchange bank, and foreign seed introduction and exchange, etc. the Chinese Academy of Agricultural Sciences has also established a crop genetic resources electronic geographic information system and a genetic resources image database. All over the country, a total of 42 germplasm information service posts have been set up, realizing centralized management of the country's crop cultivation information and information sharing and utilization. Meanwhile the national crop genetic resource information system also has established GPS and GIS databases of distributions of kindred plants of wild rice, wild soybean, and wild wheat.

3) China biodiversity CHM

“China national biodiversity information clearing-house mechanism” (CHM) sits inside the SEPA and is under the management of the office of the China CBD Implementation Coordination Group. It started test operations in 1998 and in recent years has received financial support from the UNEP/GEF project of China Biodiversity CHM Capacity Building”. The clearing-house mechanism is responsible for collating and releasing domestic biodiversity information and handling foreign relations in a uniform way, also organizing and directing construction of departmental and regional state biodiversity information networks all over the country. The clearing-house mechanism can provide information covering: general information of the Convention, profile of the biodiversity in China, work of the China CBD Implementation Coordination Team, Chinese policies, laws and rules, and state reports related to conservation and sustainable exploitation of biodiversity, progress and major activities in China’s CBD implementation, Chinese nature reserves, biosafety, invasive alien species, access to and benefit sharing of genetic resources and traditional knowledge, etc..

2.3 CBD Implementation Capacity Building of Provincial and Local Governments

2.3.1 Local policies, bylaws and coordination organizations

In contrast to western countries with decentralised systems, the environmental protection laws and policies in China are embodied at the state level, local government agencies are mainly to implement or enforce the national policies, and laws. Of course the provincial people’s congresses and governments can also constitute their local bylaws or specific regulations or approaches to implement the national laws and bylaws in line with the spirit of national policies and laws, and are also allowed to adopt more flexible measures that are more site-specific. Even if they enforce the same national policy or law, they differ in intensity from region to region. Generally speaking, in matters of constitution of policies and bylaws, inter-departmental coordination and human resources, the provincial governments and their administrative departments in charge have much lower capacity than the central government. The provinces are of course quite different in capacity due to their respective conditions.

For instance, Yunnan Province is typical of provinces that have relative strong biodiversity management capacity. As Yunnan is the province that has the richest biodiversity in China, its environmental protection has been focused on conservation of biodiversity with special attention from the government. In 1994 Yunnan was the first to set up a “Provincial Biodiversity Conservation Committee” in China, which, composed of responsible persons from more than a dozen of departments, commissions and bureaus of the province, functions as a coordinating and decision-making organization in conservation of biodiversity. So far the Biodiversity Committee of Yunnan Province has been working for 10 years and accomplished a great deal of fruitful work and still runs efficiently. Some other provinces, like Heilongjiang, Inner Mongolia, Hebei, etc., have also formed provincial biodiversity conservation committees or boards headed by vice-governor of the province.

Yunnan Province pays special attention to legislation of conservation of biodiversity and has promulgated as many as 46 items of biodiversity-related bylaws to supplement national laws. In this aspect, Yunnan has taken the lead. Among the provincial or prefectural bylaws and policies, some important ones are: Ordinance for protection of precious tree species in Yunnan; Ordinance

for registration and protection of new horticultural plant species in Yunnan; Ordinance for protection of the Dianchi Lake; Ordinance for protection of terrestrial wildlife in Yunnan; Ordinance for management of nature reserves in Yunnan; Ordinance for management of nature reserves issued by Xi-shuang-ban-na Dai Nationality Autonomous Prefecture of Yunnan; Ordinance for protection of forest resources issued by Xi-shuang-ban-na Dai Nationality Autonomous Prefecture of Yunnan; Outline for protection of endangered rare and endangered plant species in Yunnan; Provisional regulations for management and protection of endangered rare and precious plant species in Yunnan; Approaches to management of agricultural crop seeds in Yunnan; Circular about intensifying management and protection of the yew resources released by the Yunnan Province People's Government; Circular about further intensifying management and protection of the wildlife resources released by the Yunnan Provincial Government, etc..

2.3.2 Investigation and monitoring of biodiversity

As the investigations on flora and fauna are rather professional, general regional organizations are unable to undertake the task. So, biodiversity investigation depends mainly on colleges, universities and research institutes. In provinces that have more colleges, universities and research institutes that are strong in biological knowledge, the work of investigation and monitoring of biodiversity is often well done. Currently quite a number of provinces have already compiled and published their respective "Vegetation", "Flora", and "Fauna". For instance, Yunnan is not only rich in biodiversity, but also rather strong in sci-tech force in the study on biodiversity. The Chinese Academy of Sciences has a botany institute and a zoology institute in Kunming and a botanical garden in Xi-shuang-ban-na, which form an advantaged condition of Yunnan. Besides, Yunnan has also a number of colleges and universities, e.g. the Yunnan University, Yunnan Agricultural University, Southwest China Forestry College, etc..

The Yunnan Province Government has also attached much importance to compilation of biodiversity records, investing 3.3 million yuan in compiling the "Flora of Yunnan", which is committed to the Kunming Botany Institute, Chinese Academy of Sciences. For that project, the Chinese Academy of Sciences also invested 1.1 million yuan. So far 22 volumes of the "Flora of Yunnan" have been compiled, containing detailed catalogues of 17,600 species of tracheophytae. The Kunming Botany Institute also invested 3.3 million yuan in establishing a national germplasm resources database, which is dominated by the plant germplasm resources in Yunnan.

2.3.3 Capacity for *in-situ* protection of biodiversity

Among the existing 1999 nature reserves all over the country, 226 are state-level nature reserves covering a total area of 88,713,000 ha, 654 province-level ones covering 39,956,200 ha; 340 city-level ones covering 4,292,000 ha and 779 county-level ones covering 11,021,100 ha. It is quite obvious that nature reserves under the province level form the majority. For instance, Yunnan has 186 nature reserves, covering a total area of 3.4 million ha, accounting for 8.64% of the province's total land area. Besides the financial input from the SEPA and State Forestry Administration, Yunnan province also invests annually 50 – 60 million yuan in construction and management of the nature reserves, far exceeding the sum of the inputs from the departments of the central government. This is not a small burden for a poverty-stricken province in West China like Yunnan. This scale of the input is even rare in coastal regions in East China and is convincing evidence of the importance of biodiversity conservation in Yunnan and the role of the provincial

government in conservation of biodiversity.

In order to create a sound environment for investment and sustainable development of local economy, a lot of local governments have made great input in environmental protection and ecological construction, showing their attention to protection of natural eco-environments and restoration of typical habitat and ecosystems in regions that have suffered serious ecological damage. For instance, the restoration of mangrove forest ecosystems is aimed at strengthening the coast anti-erosion capacity. In 1999, the Zhuhai City Government launched a project of introducing and planting mangroves in Qi'ao of Zhuhai and allocates several million yuan as a special fund for restoration of mangrove forests along the coasts of Qi'ao Island. As a result, the mangrove habitat and ecosystem there have been restored. The Guangdong Province Government has assigned Zhanjiang, Maomin, Yangjiang, Jiangmen, Zhuhai, Guangzhou and Shantou as pilot sites for restoring mangrove wetlands. They adopt site-specific scientific measures and have made great headway in restoring mangrove forests. So far the province has accomplished afforestation of mangroves in a total of 600 ha.

2.3.4 Capacity building for *ex-situ* protection

As local governments are often limited in financial capacity, they fail to have adequate input in *ex-situ* conservation of biodiversity. Not many new *ex-situ* conservation facilities have been built up and the existing ones are equipped with simple and outdated equipment. With the rapid development in economy in recent years, some provinces are increasing input in *ex-situ* conservation of biodiversity and propose construction of a number of modern *ex-situ* conservation facilities. The following engineering construction projects are examples indicating local governments' efforts in *ex-situ* protection of biodiversity. These projects have been established and started construction in recent years. Most of them are built with the investment raised locally and some from both the central and local governments.

1) South China Botanic Garden

In December 2003, Guangdong Province, Guangzhou City and Chinese Academy of Sciences signed an agreement on jointly building up "South China Botanic Garden, Chinese Academy of Sciences". The three parties invested a total of 300 million yuan at a ratio of 1:1:1. The first phase of the project is to build and rebuild infrastructures, redesign 11 special topic gardens, like the South China Endangered Rare and Precious Plant Breeding Center, Scientific Knowledge Popularization Center, Magnolia Garden, etc., renovate the garden site, and construct a specimen museum, etc..

2) Beijing City Wildlife Rescue and Breeding Center

The project of Beijing City Wildlife Rescue and Breeding Center, established by the Beijing Planning Committee and supervised by the Beijing Forestry Bureau, has started construction in Shuangqing Forest Farm, Shunyi District, Beijing. The project has received an input of 60 million yuan for its first phase of construction. After the project is completed, it will be adequate to provide first aid and accommodation to wildlife in Beijing region, domesticate and breed endangered wildlife, and meet the needs of protection of urban wildlife.

3) *Ex-situ* protection and nursing base for rare and precious plants unique to Central China

In March 2003, Wuhan City of Hubei Province invested in building an *ex-situ* protection and nursing base for rare and endangered plants unique to Central China inside the Sushanshi Forest Park. The project is planned to have a total investment of 50 million yuan and cover a total land

area of 70.2 ha. After the base is built up, some plant species unique to Central China and large groups of endangered plants in the Three-Gorges region will be transplanted here.

4) Xiamen City Endangered Aquatic Species Protection Center

The Xiamen City Endangered Aquatic Species Protection Center will be located on the Huoshao Island. The construction of the center already started in early 2003. The center is budgeted to have 8.76 million yuan in total investment and will consist of laboratories, observation and monitoring rooms, dissecting rooms, treatment rooms, research and specimen rooms, a scientific knowledge popularization hall, a library, a computer administration center and other matching facilities, like trestles for observation of dolphins, deep water mesh cages, rescue and treatment equipment, etc..

5) Zhejiang Shengzhou River Deer Breeding Base

In August 2003 the only one state-level river deer breeding base in China was built up in Shengzhou, Zhejiang. Over 300 river deers have begun their life in the base. Currently, the base with a total investment of 16 million yuan, is composed of a breeding farm, semi-wild grazing ground, fields for free grazing, research and experiment building. The objective of the base is to free domestically raised river deers in to the wild.

6) Shennongjia Golden Monkey Domesticating and Breeding Base

The Shennongjia State Nature Reserve will build up a research base for domesticating and breeding golden monkeys, which are under the priority protection of the state. The project started construction in 2004 and will take 2 – 3 years to complete and need 30 million yuan for investment. The base sits in Dalongtan, Shennongjia, covering an area of 166 ha where golden monkeys naturally live. After the base is complete, it will keep 10 – 15 golden monkey.

7) Local crop germplasm mid-term banks

With the state intensifying its strength in collecting and preserving agricultural crop germplasm resources, motivation is stimulated at the regional level. In 1980 – 1995, 16 provinces (municipalities or regions) built up crop germplasm resources mid-term banks, which have preserved 200,000 accessions of various crop germplasm.

2.4 Capacities of stakeholders

Although the number of stakeholders of biodiversity is not small, responsible governmental departments, research institutions, enterprises, NGOs, the general public, media, and other parties really concerned with and supporting conservation of biodiversity are rather limited in number. In the following section, a brief introduction is given on NGOs and their work and capacities.

2.4.1 Semi-official academic NGOs and social groups

Out of the needs for development of science and academic exchange, China has quite a large number of semi-official academic NGOs and social groups, like academic societies and associations. Strictly speaking they are not NGOs, but institutions under government administration. Some societies and associations, however, do have some NGO nature or features, like association licensing system, independently-raised funds, etc.. These kinds of societies and associations are hundreds of thousands in number in the whole country. The number of first-class societies and associations under the China Science and Technology Association alone is almost 200. Including second-class societies and associations and local branches will take the figure up to thousands, of which at least about 20% are associated with environmental protection and

biodiversity. Here are a few examples:

1) Chinese Wildlife Protection Association

The Chinese Wildlife Protection Association was formally established in December 1983 as a nationwide social group under the China Science and Technology Association. Now it has 31 provincial branches and 537 prefectural or county branches and its total number of members reaches 40,000, who are professionals involved in management, research and education of wildlife protection, domestication and breeding of wildlife, nature reserves and nature lover groups. The major task of the association is to promote activities, such as publicity and education, scientific research and academic exchange related to rescue and protection of rare and endangered species, provision of technical consultation, fund raising and participation in related international cooperation and exchange.

2) Chinese Wild Plant Protection Association

The Chinese Wild Plant Protection Association, set up in October 2003, is a semi-official NGO, professionally under the administration of the State Forestry Administration and Ministry of Agriculture. Its objective is under the direction of the state policy to conserve of wild plants to unite forces in all walks of life in society, give publicity to related state policies and decrees, popularize and disseminate knowledge about wild plants, improve the nation's awareness of protection of wild plants and contribute to effective conservation and rational exploitation of wild plant resources and promotion of the development of the cause of wild plant conservation in China.

3) Chinese Society of Environmental Science

The almost 20 years old Chinese Society of Environmental Science is a nationwide academic group, interested in environmental protection under the administration of the China Science and Technology Association and SEPA. It has 10 branches, among which the branch of nature conservation aims to promote conservation of biodiversity, establishment and management of nature reserves, biosafety management of GMOs, ecological farming, organic foods, etc.

4) Chinese Society of Ecology

Established in 1979, the Chinese Society of Ecology is a nationwide non-profitable multi-disciplinary all-round academic group, legally formed voluntarily by researchers of ecological science and technology. Now it has a total of 6500 members, 13 professional committees and 4 working committees. Local societies of ecology have been set up in 29 provinces (regions or municipalities).

5) Chinese Zoo Association

The China Zoo Association is oriented chiefly towards organizing and carrying out academic and technical exchanges on animal conservation, with focus on conservation of South China tigers, breeding of giant panda, conservation of cranes, etc.. The association has accomplished revision and updating of international pedigrees for four rare and precious species of animals, their integration into the international species information systems, and revision of five domestic pedigrees to varying degrees.

6) Chinese Society of Oceanography

Founded in 1979, the Chinese Society of Oceanography is affiliated to the State Oceanography Administration. With 8000 members and over 180 group members, the society has 12 branches and 9 professional committees. Its major task is to carry on sci-tech exchange on oceanography, popularize oceanographic scientific and technical knowledge, and disseminate

scientific interest, ideas and approaches.

2.4.2 International NGOs

With the deepening reform and open-door policy in China and realization of the global importance of China in environmental protection, international NGOs have been continuously establishing themselves in the country in recent years. Presently, at least 200 international NGOs are operating in the country, and at least 30 of them are associated with conservation of biodiversity. IUCN (The World Conservation Union) and WWF (World Wide Fund for Nature) are two of them that have launched projects quite early in China, and most have entered the country in the recent 5 years, e.g. TNC (The Nature Conservancy), CI (Conservation International), GP (Greenpeace), IFAW (International Fund for Animal Welfare), Oxfam, AAI (Action Aid International), WI (Wetland International), FFI (Fauna and Flora International), ICF (International Crane Foundation), Wild Aid, WCS (Wildlife Conservation Society), etc.. These international NGOs have carried out various types of operations in China, contributing significantly to the conservation of biodiversity. Here are two examples to illustrate their work and contribution.

1) World Wide Fund for Nature (WWF)

WWF is an international organization, founded about 50 years ago. It entered into the country in 1980 and has been operating for 25 years. During this period it has accomplished several projects with a total investment of 20 million USD. And in recent years, its input seems to be rising. In 2004 its budget for China projects reached 5 million USD. About 70 – 80% of the WWF funds are directly signed to the partners of cooperation. Its major tenet is to assist in capacity building in related fields, and improve the senses of citizen society and public participation. For years WWF has devoted its main effort to conservation of wildlife (e.g. giant panda), environmental education (setting up environmental education centers in 16 normal universities in cooperation with the Ministry of Education), drafting of national action plan for conservation of wetlands (in cooperation of the State Forestry Administration), demonstration of ecological tourism, demonstration of joint management with local communities, land-for-lake projects, poverty alleviation (providing small loans to farmers), etc.. In 2001 WWF established “Small-scaled fund project for conservation of rare and endangered species in China”. Since then it earmarks 100,000 \$US annually to support small projects of such as nature, each no more than 5000 USD. These projects are oriented to support conservation of rare and endangered species in China that have received much attention in the past.

WWF started its operation in Yunnan as early as in 1998, and Yunnan is the home site of one of its six local offices in China. Its first phase project was to promote condominium establishment in the Baima Snow Mountain Reserve with communities and public participation; and its second phase project is focused on the topic of “poverty and environment”, aiming to promote development of management of reserves from a closed pattern to that of public participation from the angle of policy, to guarantee the right of communities and include biodiversity conservation and eco-environmental protection into the poverty alleviation program.

2) The Nature Conservancy (TNC)

Established in 1950 in the USA, TNC is now an organization of over 1 million members and 400 million \$US in fixed assets. Every year, it spends 80 – 100 million \$US on projects, of which about 3 – 4 million \$US in China (e.g. in 2004). TNC started its first China project in 1998 in northwest Yunnan. It has registered in Yunnan as a non-profitable organization. The provincial

environmental protection bureau is its close partner. The tenet of TNC in its operation is to cooperate as much as possible with the government and established close relationship with the government, so its operation in Yunnan goes on smoothly and has been recognized in the locality.

TNC has a number of major projects in Yunnan, e.g. Northwest Yunnan Conservation Action Plan Framework (2001 – 2020, approved by the provincial government); ecological zoning of Northwest Yunnan; conservation of five hot spot regions in Northwest Yunnan; Conservation of snub-nosed monkeys in Yunnan; research on high mountain complex; and extension of alternate energy. These projects are being carried out in the five typical biodiversity hot spot regions in Northwest Yunnan, i.e. Lashi Lake valley of Lijiang City, Meili Snow Mountain of Deqin County, the Laojunshan Mountains striding over four prefectures in Northwest Yunnan, Shangrila Grand Canyon of Shangrila County, and the Gaoligongshan Mountain Nature Reserve in Gongshan County. Northwest Yunnan is one of the regions richest in biodiversity in Yunnan. It is of great significance to both the country and the world to conserve the biodiversity in the region well.

3) CNC-DIVERSITAS

The CNC-DIVERSITAS (the Chinese National Commission of the International Biodiversity Plan) was established in 2004 and is affiliated to the Chinese Academy of Sciences. Its major duty is to take part in activities related to the global DIVERSITAS programme on behalf of the country, advance international cooperation and exchange; stimulate related institutions in the country to develop researches and academic exchanges on biodiversity; deploy state-level biodiversity researches and provide scientific consultation services for management of bio-resources and environment and sustainable development strategy; participate in planning of national key projects entrusted by related ministries and administrations and international cooperative projects; intensify publicity to common scientific knowledge; and improve the public's sense of biodiversity conservation. The CNC-DIVERSITAS is striving hard to push forward development of biodiversity research and academic exchange activities in the country, coordinate biodiversity researches and sharing of research results between departments, and promote exchange and cooperation between Chinese and foreign scientists, research institutions and organizations in the field, contributing development of the cause of biodiversity conservation and sustainable exploitation in China.

4) Other international NGOs

Besides the international NGOs mentioned above, there are many other international NGOs working in China. They all have contributed significantly. For instance, the Conservation International has an office in Beijing and carried out some projects in Yunnan. The IFAW is an organization devoted to conservation of wildlife worldwide. In the past few years, the foundation cooperated with the SEPA to carry out public education and propaganda activities related to biodiversity conservation, and supported nationwide biodiversity quiz competitions with funds. The Greenpeace has launched projects protecting eco-farming and traditional knowledge and bravely exposed the behavior of the APP-China (SINAR MAS GROUP) of felling natural forests, which triggered a great response in the society. The IUCN also has an office in Beijing and is in the process of promotion for red lists of organisms in China

2.4.3 Domestic NGOs

Before 1994, China did not have any NGOs in the true sense. But 10 years later, the number of non-governmental environmental protection organizations (or civil environmental protection

leagues or groups) has reached over 2000, and they have hundreds of thousands of members, altogether. The figure is still rising rapidly. In the past few years, NGOs have got increasingly involved in environmental protection of the country and have some effect on decision-making of the state. For instance, NGOs criticized the project to construct the Nujiang Dam for hydraulic power because of its environmental impacts, causing the central government to be careful in reviewing and approving the project. Nevertheless, the voices of the non-governmental environmental protection organizations are still rather weak, like an infant in comparison with those in the western world. There is still a long way to go for them to get really involved in decision-making of the government.

The non-governmental environmental protection organizations have a rather profound environmental protection creed, and conservation of biodiversity is also one of the themes that NGOs are interested in. Based on nature, scale and means, NGOs can be sorted into the following types. Some examples are cited here for illustration.

1) Non-governmental groups and organizations

Friends of Nature, Beijing Village of the Earth, Green Courtyard, etc. can be said to be among the NGOs that have a relative long history and considerable influence. On March 31st, 1994, the first environmental protection NGO of China – Friends of Nature, registered as a Green Culture Branch of the China Culture Academy” at the Ministry of Civil Affairs with approval for establishment and later on it was shortened as “Friends of Nature”. Around 1996, the “Beijing Village of the Earth” and “Green Courtyard” followed and joined with the Friends of Nature, becoming leaders of the environment NGOs in China. Now the three NGOs are regular organizations operating normally.

The Friends of Nature has a total of 1500 individual members and about 500 group members. Each member pays 50 yuan/annum as membership fee for publication of a newsletter. In recent years its annual budget reached more than 1 million yuan, most of which comes from donations abroad and only 10% is obtained from domestic sources through application for projects. The organization has only 10 full-time employees and dozens of volunteers. Its membership is composed of media, students, cadres, retirees, etc.. Organizationally, it has a botanic group, a zoologist group and a singing club, and often organizes its members to attend lectures, watch environmental protection films, plant trees, have promotional parties, etc.. It has carried out a series of biodiversity conservation activities, such as conservation of Tibetan antelope, lobbying UK Prime Minister (1998) for conservation of Tibetan antelope; Conservation of golden monkey (1995 – 1996); exhibition of grassland ecology and nomadic culture (2004); protected land projects (since 2003), etc..

The “Green Courtyard” is a large-sized environmental protection organization, attracting 30,000 volunteers and still affiliated to a foundation. Although it has not formally registered for its establishment, this has not affected their active campaigns. The “Journalist Salon for Environment” organized by Green Courtyard has certain influence in the media. Significantly, Green Courtyard has made its show in the debate on “Nujiang Dam”.

2) Research-type non-profitable groups and organizations

Out of their passion and belief in the cause, some researchers leave their affiliation where they find it hard to realize their ideal targets and effects, and form some non-profitable

organizations so as to materialize their targets. And some retired researchers want to give full play to their unused energy and wits through reopening a battle field to make their dreams come true and display their true value. These NGOs often register as a non-profitable research institution and keep in operation through applying for project funds, most of which depend on sources abroad. In the following paragraphs, a few examples are cited for illustration.

i) Center for Biodiversity and Indigenous Knowledge (CBIK)

CBIK, set up in 1995 in Yunnan Province, had more than 100 members who are mostly scientists. Operated with 24 full-time employees, the CBIK depends fully on financial support from abroad. It has now the following projects in operation: amelioration of Yunnan swidden-fallow management; resource policy support initiative for watershed governance in Yunnan; upland community livelihoods in Yunnan; Enhancing the livelihoods of agro-pastoralists in Northwest Yunnan; Eco-cultural tourism in Jisha Village, Diqing Prefecture; Support of indigenous knowledge for the use and conservation of biodiversity; community education; etc..

ii) Social Development Research Center, Yunnan Academy of Social Sciences

The center has registered at the Industry and Commerce Administration as a non-profit enterprise and operates based on the “UNDP/GEF Maintain Ecosystems Biodiversity Conservation Demonstration Project in Yunnan of China”. They have developed a model of community condominium based on local villagers and local township government. At the township level, a condominium board has set up and at the village level a condominium team consists of villager representatives elected through democratic voting. These condominium teams have registered at the county bureau of civil affairs. Besides, a community development foundation is established to support farmers to develop substitute energy in the form of high-interest loan. So far a total of 1424 farmer households have benefited from the foundation.

iii) Tianheng Sustainable Development Research Institute. This is a private NGO registered as a mass-run non-business institution, whose head is a retired government official with some scientific background. The institute is staffed with 10 full-time employees with a budget of about 200,000 USD/annum for research and development. Devoted to environmental protection, it extends applicable techniques (biogas, vegetable plastic sheds) to develop eco-farming, and some advanced techniques (e.g. wind electric power generation, battery powered cars, use of renewable energy, etc.) and provide legal intermediation and investigation of legal basis of nature reserves, etc..

3) Grassroots environmental protection groups and organizations

In recent years grassroots environmental protection groups and organizations have sprung up in large numbers like bamboo shoots after spring rain and, are mostly formed of college or university students or common people in the society. These groups or organizations do not have many members and these are often limited within a certain university, trade, special sector or place. Some groups are even formed of friends with shared interests and ideals. Many of them have not registered under any administration and do not have adequate financial sources. But they are rather active in thinking and often developing activities under very hard conditions. The following three examples are typical of them.

i) “Green Field Association”: It is an environmental protection group formed voluntarily of students of the Xiamen University without any legal registration under any governmental administration, but only at the university and operates under the guidance of the university. It has

600 – 700 members, all of whom are students studying in the university. Its activities are devoted to protection of mangrove forests, birds and wildlife and provision of environmental education. Its budget depends on donations and meagre membership fees. An international organization called “Global Green Funds” supports the association with 1,000 \$US a year. Its expenditure is controlled around 20,000 yuan a year.

ii) **“Green Uplands”**: This is a small-sized registered private NGO, formed only of a couple. They have developed activities in Northwest Yunnan, e.g. photo exhibitions of wildlife (snub-nosed monkeys) protection, environmental protection propaganda and education to local communities and energy experiments. More often than not they work in the field under extremely rough conditions. Their funds are all from abroad. Some of their photos and TV films based on wildlife in Yunnan have won international awards.

iii) **“Voluntary Actions of China Fishermen Blue Protectors Team”**: On Aug. 27, 2000, 21 fishermen in Shipu Town, Xiangshan County of Zhejiang Province spontaneously organized a team famed as “Voluntary Actions of China Fishermen Blue Protectors Team”, the first voluntary team devoted to protection of the sea in China. And on Sept. 15, 2002, a steering committee of the voluntary organization was formally established in Shipu Port, a famous fishing port in China. This civil group is formed of representatives of fishermen, representatives of other voluntary organizations and officials from relevant governmental departments. Its main objective is to give publicity to the ideology of protection of the sea among fishermen.

2.4.4 Participation of enterprises

With the rise in the sense of biodiversity conservation of the public, some enterprises have begun to provide financial support generously to the cause of conservation of biodiversity. For instance, the HSBC Group (Hong Kong and Shanghai Bank Corporation) is a private enterprise, which has played an important role in biodiversity conservation by taking part in the project of “Investment in Nature”, which is a five-year ecological partner cooperative project of the HSBC Group, the “Botanic Garden Conservation International”, the “World Wide Fund for Nature” and “Earth Safeguards”. The project was already initiated in February 2002. HSBC Group contributed 50 million \$US to the project, of which 11.6 million \$US will be used as investment in or assistance to plant conservation activities through the global botanic garden cooperation network of the Botanic Garden Conservation International. A portion of the funds contributed by the HSBC Group to the project has been used to support the Convention on the fifth International Symposium on Conservation of Plant Biodiversity in China.

In recent years, a group of one hundred entrepreneurs in China have launched a campaign of sand controlling in Allashan region, Inner Mongolia, promising to contribute 100,000 yuan per person per year in an attempt to build up eco-environment in the region. This campaign is of great significance, showing that enterprises have spontaneously begun to undertake their social responsibility to protect the environment, and will no doubt win support from more enterprises.

2.5 CBD Implementation Related International Cooperation

With the deepening of the reform and open-door policy and the increase in international cooperation in the field of environmental protection, China has participated in a series of environmental protection protocols and conventions. Some are closely related to biodiversity, such as “Convention on Biological Diversity”, “The Convention on International Trade in Endangered

Species of Wild Fauna and Flora” (CITES), “The Convention on Wetlands of International Importance Especially as Waterfowl Habitat” (RAMSAR Convention), “The Convention Concerning the Protection of the World Cultural and Natural Heritage Sites” (the World Heritage Convention), “The International Convention for the Regulation of Whaling”, “ UN Convention to Combat Desertification”, “UN Framework Convention on Climatic Changes”, “International Union for the Protection of New Varieties of Plants”, etc.

2.5.1 Basis for international cooperation

China has been closely cooperating with the UN organizations, for instance, multilateral cooperative projects with the UNDP, UNEP, FAO, UNESCO, World Bank, GEF, etc., and with a number of international NGOs, for instance, long-term cooperative projects with IUCN, WWF, etc.. Moreover, China also has entered cooperation with dozens of countries in America, Europe, Asia, Africa, and Oceania on conservation of biodiversity. The world society has offered China large volumes of financial and technical assistance to China’s effort in environmental protection and biodiversity conservation and contributed enormously to the building of China’s capacity of protecting biodiversity and managing the country.

China is not only a trustworthy partner in cooperation, but also a country deserving international investment. First of all, the biodiversity in China is extremely rich, so conservation of the biodiversity in China is of great significance to the conservation of global biodiversity. Secondly, China is presently in the process of fast economic growth and needs urgently to keep conservation and sustainable development in harmony, and her experience in sustainable development can serve as a demonstration for developing countries around the world. And thirdly, China is a big responsible country and is actively implementing her international commitments. China has made full arrangements guaranteeing financial, human and material supply. Most of the multilateral and bilateral cooperative projects that are being implemented have already shown significant environmental, economic and social benefits.

International cooperation with China is mainly in the form of cooperation in international consultation and projects. Project cooperation is being carried out mainly with the funds from GEF. In the past 10 years, GEF has invested a total of 61.65 million \$US in biodiversity related projects.

2.5.2 International cooperation in consultation

In order to extensively solicit suggestions and opinions from the world society on harmonization of environmental protection and economic development in China, the Chinese government authorized establishment of the China Council for International Cooperation on Environment and Development (CCICED). The Council is a senior international consultation group, chaired by a Vice-Premier in charge of environmental protection and staffed with ministers or deputy ministers of related ministries and commissions, well-known specialists and professors in the field of environment and development at home and abroad, ministers from other countries and leaders of international organizations. Its main duty is to provide policy proposals for solution of important, urgent and crucial problems in the field of environment and development in China and show policy demonstration and project demonstrations.

The Council convenes a plenary conference or meeting once a year. Each annual meeting has a topic. Accordingly, celebrities at home and abroad are invited to address the topic at the

conference and then general debate follows. Besides, representatives from related departments, provinces, autonomous regions, metropolises of China would also be invited to introduce sustainable development strategies implemented in China, and representatives from donor countries, embassies that express interest in the activities and international organizations are present as observers.

The Council has also set up a biodiversity task force, which is busily engaged in implementing projects like “China Species Information System”, nature reserve network and Chinese red list of species, etc. The project of nature reserve network will not only analyze problems and gaps in representativeness of species and ecosystems, but also study area effects on habitat of trans-boundary bio-resources and nature reserve clusters, and utilization and needs of nature reserves in social, cultural, research and ecological tourisms so as to enable efficient management of nature reserves representative of China, which will create optimal ecological benefit and human welfare.

2.5.3 Cooperation with GEF and its executive organization

1) CBD implementation related GEF basic projects of capacity building to be implemented by SEPA

i) China Biodiversity Conservation Acton Plan

As early as in 1991 the “Convention on Biological Diversity” was still under negotiation, the UNDP and the World Bank began to have China as their pilot project for compiling “China Biodiversity Conservation Action Plan” with a fund of \$US690,000. The project was accomplished in 1993 and the “Action Plan” was promulgated by the Chinese Government in 1994. Under the leadership of the SEPA, over 100 experts and officials from 10 ministries and commissions took part in the drafting of the “Action Plan”, which set out 7 specific targets and 26 specific actions. Based on the targets and actions, 18 projects of priority were brought forward. Being the national blue print and program for conservation of biodiversity, the “Action Plan” has been deemed as a reference and guideline for years for investment in international and national projects.

ii) China Biodiversity Country Study

As a major follow-up after the “Convention on Biological Diversity” was put into effect, the UNEP/GEF sponsored project “Biodiversity Country Study” was formally launched in early 1995 with a fund of \$US400,000, basically completed at the end of 1996 and approved and promulgated by the State Council in 1997. The project involved officials from over 10 ministries and administrations and several hundreds of experts from dozens of universities and research institutes. It elaborated the biodiversity background of the country, evaluated benefits of the conservation of biodiversity from the economic angle, analyzed the cost of the national CBD implementation actions, and highlighted the needs for national capacity building.

iii) Biodiversity Data Management and Information Networking Capacity Building

This was a pilot project of the UNEP/GEF with \$US280 000 and designed to assist countries, especially developing countries to intensify capacity building for administration of biodiversity data and build up data and information clearing-house mechanisms under the “Convention on Biological Diversity”. Being one of the 10 pilot countries, China initiated the project in 1996 and mobilized several hundreds of experts from 9 related ministries and administrations into the project. Large-scaled institutional surveys were carried out on the status of the administration of

biodiversity data. Based on the findings, a national biodiversity data administration plan was compiled, and a technical guideline for data administration constituted, and at the same time GIS searching systems were developed and coordinated between some databases and nature reserves.

iv) China National Biosafety Framework

The China National Biosafety Framework Project, carried out in 1997 – 1999, is a pilot project of the UNEP/GEF on the globe with \$US360,000 for China. The project was oriented toward building up the country's capacity in management of GMOs and preparing capacity basis in the field of policy and technology for implementation of the "Cartagena Protocol on Biosafety". Dozens of experts from 8 ministries and administrations got involved in and accomplished the project in 1999. And the China National Biosafety Framework was released in the same year. The "Framework" raised principles, policy framework, legal system framework, framework system of technical guidelines for risk assessment and risk management, institutional framework for national biosafety management and needs of capacity building for GMOs biosafety management in China. The impact of the "Framework" has been obvious on the current legislation and policies for biosafety management of agricultural GMOs.

v) Implementation Demonstration of China National Biosafety Framework

The GEF Council approved the demonstration projects for national biosafety framework implementation in 8 countries. The project in China was funded with 997,000 USD. Initiated in September 2002, the project will last for 38 months. The targets and major tasks of the project are: 1) establish and consolidate the policy and legislation system of the country for biosafety management; 2) draft up technical guidelines for risk assessment and risk management of GMOs in China; 3) develop techniques and methods for monitoring of environmental impact of GMOs; 4) build up a national biosafety information clearing-house and database system; 5) carry out biosafety publicity and education and training of human resources at home and abroad.

vi) Capacity Building for China Biodiversity CHM

According to the "Convention on Biological Diversity", all Contracting Parties should build up national biodiversity CHM, which has 3 targets: 1) promote and assist development of science and technology inside the signatory country and sci-tech cooperation between signatories; 2) facilitate information communication by building up a global information CHM; 3) develop network, e.g. tie points of the information clearing-house and partners in cooperation. The project was formally started in 2002 and has a budget of 390,000 USD. Now, the CHM is operating. Under the website of the SEPA, a biodiversity website has been set up and connected with a large number of related websites at home and abroad.

vii) National report on CBD implementation

In 1997 – 1998 the project of "National Report on China CBD Implementation" was carried out, in 2000-2001, a second national report was accomplished, and in 2005 a third one will soon be submitted.

2) Projects invested wholly by GEF and implemented by the State Forestry Administration

i) Nature Reserves Management Project

The GEF China Nature Reserves Management Project was carried out by the World Bank and the State Forestry Administration, with a grant of 17.9 million \$US from the World Bank and an appropriation of 5.7 million \$US from the Chinese government as matching funds. Major activities of the project were; 1) Strengthen management of the nature reserves covered by the

project by intensifying protection, planning, institutional framework and community participation; 2) restructuring forestry enterprises: turn the Changqing Forestry Bureau into a state-level nature reserve in Shaanxi; 3) institutional capacity building: constitute a program for construction of a national nature reserves system and run training of nature reserve employees; 4) set up an advanced biodiversity management information database, and a surveying and monitoring system, and provide corresponding equipment; 5) support researches in nature reserves and provide special techniques and equipment for research activities.

Through implementation of the project, the participants studied and learnt world-advanced experience in management of nature reserves, successfully introduced scientific management programming systems, compiled standardised scientific plans for management of nature reserves, introduced and established field patrolling and monitoring systems for nature reserves, ushered in advanced methods for community participation and community condominiums and set up the Changqing Giant Panda Nature Reserve.

ii) Sustainable Forest Development Project, Protected Areas Management Component

In 1998, the Chinese government and World Bank both agreed to include the “Forestry Sustainable Development Project” into a three-year rolling program, and specified that the project encompass three major items in content, management of natural forest, management of nature reserves, and afforestation. The contents of the “Management of nature reserves” are: assist in selection of nature reserves of global significance from natural forests to take part in participatory conservation and management. The project was carried out in 13 nature reserves in 7 provinces, covering a total land area of 1.16 million ha. The budget of the project was 22.5 million USD, of which 16 million came from GEF and 6.5 million from the Chinese government.

Through introduction of participatory and shared responsibility working approaches, the project has realized harmonization of protection and development of the nature reserves combined with sustainable exploitation of natural resources; by providing training in light of job arrangements in the nature reserves, the project has improved capabilities of the employees of the nature reserves and guaranteed sustainability of the training capability; and the project has accomplished policy research, which can be cited as models and a basis for nature reserves all over the country to improve their own management.

iii) Wetland Biodiversity Conservation and Sustainable Use in China

China has a total of over 60 million ha of wetlands, of which 25 million ha are natural, and 38 million ha paddy fields. According to the standard of the “The Wetlands Convention”, about 40% of her wetlands of global significance are under medium or high threat. Therefore, the project was initiated. The project was given a budget of over 30 million USD, of which 11.689 million \$US came from the GEF (through UNDP) and 20.297 million \$US from the Chinese government. The project chose four typical, but different wetlands of global significance in wetland biodiversity, e.g. the Sanjiang Plain of Heilongjiang, the Ruergai Marshes in Sichuan and Gansu provinces, the coastal swamps in Yancheng of Jiangsu Province and Dongting Lake of Hunan Province.

The project was formally started in July 2000 and has made great headway in training and compiling electronic biodiversity maps. In October 2002, the project began its mid-term appraisal. As the appraisal came up with new ideas as regards the overall designing in the first phase, the project has begun a lengthy redesign and readjustment phase ever since the completion of the appraisal.

3) Other GEF projects

The State Oceanography Administration has also organized and implemented a series of GEF/UNDP sponsored projects, e.g. “Protection of the Grand Marine Ecosystem of the Yellow Sea”, “Management of the Coastal Biodiversity in South China”, “East Asia Marine environmental protection Project – Establishment of Partnership in Bohai Marine environmental protection”, etc..

Local governments in Yunnan and some other provinces have also implemented some GEF biodiversity projects, e.g. GEF project of Multi-agency and Local Participatory Cooperation in Biodiversity Conservation, Yunnan’s Upland Ecosystem, launched jointly by the UNDP and Yunnan province in 2000 with a total budget of 750,000 USD; the “IBRD/GEF Lake Dianchi Freshwater Biodiversity Restoration Project” launched in 2003 and to be implemented by the Kunming Zoology Institute, Chinese Academy of Sciences with a total budget of 975,000 USD; and the ADB/GEF Sanjiang Plain Wetlands Protection Project” launched in 2004 and to be implemented by the ADB and the Heilongjiang government with a total project budget of 12.14 million USD.

GEF also approved the project of “Lop Nur Nature Sanctuary Biodiversity Conservation” in October 1998 with a grant of 725,000 USD, aiming to conserve the desert ecosystems and the unique landscape of Yardang wind-erosion and rare and endangered species therein, especially wild two-humped camels, an extremely endangered species unique to China/Mongolia.

Besides, there are a lot more GEF regional and global biodiversity projects implemented or to be carried out by international organizations and China as project site or pilot site had or has a part in these projects.

4) China/GEF/UNDP Biodiversity Conservation and Sustainable Use Partnership Project

This is a new project launched jointly by the SEPA, GEF and UNDP and been included as a GEF project underway. The overall objective of the project is: to ensure real intensification of the biodiversity conservation capacity, more effective conservation of the biodiversity, and efficient harmonized exploitation of various resources. The project has four major items in its contents: 1) intensification of national basic capacity building for biodiversity conservation and sustainable use; 2) inclusion of biodiversity conservation into the nation’s five-year plan for development of social economy and decision-making for local investment; 3) intensification of biodiversity conservation within nature reserves; 4) intensification of biodiversity conservation and sustainable use outside nature reserves and development of “ecological function reserves”. This project will provide solutions to problems of harmonization of multi-lateral, bilateral, inter-departmental and central-regional relationships, cooperation and information exchange. It is, therefore regarded as a blue print for future biodiversity projects in China.

In addition, the SEPA is also applying to implement the GEF projects of “Nature Conservation and Flood Control of the Yangtze River Valley” and “Biodiversity Conservation in South China Sea”, etc..

2.5.4 Other international cooperative projects

1) EU-China Biodiversity Plan

This project is a bilateral cooperation between the EU and Chinese government, which calls

for the EU to put in 30 million Euro in the next 10 years for conservation of biodiversity and promotion of sustainable use of biodiversity in China. The target of the project is to: set up extendable biodiversity management systems in China; review the policies, bylaws and detailed rules for implementation of these policies, bylaws in use or to be constituted for impacting biodiversity; to ensure that decision-makers in various ministries and administrations integrate biodiversity into their respective plans for development of social economy; and set up demonstrations of conservation and sustainable use of biodiversity in provinces in South and West China. The project is right now in the process of initiation. With implementation of the project going on, it will create significant impact on China's policy and management systems for biodiversity conservation.

2) Sino-Canada Biodiversity Conservation and Community Development Project

In May 2001, the Sino-Canada Project of Biodiversity Conservation and Community Development in Inner Mongolia Autonomous Region was officially launched. The Canadian Government is to invest 6 million Canadian dollars into the five-year cooperative project, covering conservation and management of biodiversity, environmental education, and improvement of the living standard of the communities. The departments in charge of the project on the Chinese side are the SEPA and the environmental protection Bureau of the Inner Mongolia Autonomous Region. The project will be carried out in 7 state-level nature reserves and communities in their neighborhood and is expected to play an important role in promoting the management of nature reserves in the Inner Mongolia Autonomous Region. The project will be concluded at the end of 2005.

3) Forest conservation and community development projects

In the field of forest conservation, China has a number of cooperative projects with Germany and other European countries. China and the Netherlands started a project on "Forest conservation and community development" in Yunnan in May 1998, aiming mainly to protect the tropical and subtropical forest resources and its biodiversity in Yunnan Province, especially in Simao, Baoshan, Nujiang and Dehong prefectures. The project has set up 21 demonstration villages, worked out "communities' environment action plans" for them, and run environmental education seminars. Functions of the protected forests in these prefectures, counties and townships involved in the project have been strengthened steadily, and the overall management of the nature reserves and the 350,000 ha of forests in their neighborhood improved significantly.

4) Multi-lateral cooperation on natural conservation of the sea

China pays high attention to conservation and management of the high seas and the resources therein and has started negotiations with Russia, the USA and Japan on issues of exploitation and conservation of the fishery resources in the Bering Sea and signed and sanctioned the "Convention on Maintenance and Management of the Codfish Resources in the Central Bering Sea". In order to protect the fishery resources in the high seas, China takes part in international activities for protection of tunny, whales and other endangered species and has joined in the "International Convention on Conservation of Tunny in the Atlantic Ocean". Besides, China has also signed agreements with her neighboring countries, e.g. "Sino-Japan Fishery Agreement", "Sino-Korea Fishery Agreement", "Sino-Vietnam Fishery Cooperation Agreement in the Beibu (Tonkin) Gulf",

etc..

5) International cooperation between botanic gardens and zoos

Botanic gardens within the Chinese Academy of Sciences system have long been involved in extensive cooperation and communication with botanic gardens in other countries on conservation of biodiversity. Botanic gardens in other countries have also intensified their international cooperation and exchange in recent years. For instance, the Beijing Botanic Garden has established relations with botanic gardens in over 30 countries for exchange of seeds; compiled “Flora of China” (25 volumes in total) in cooperation with the Missouri Botanical Garden of the USA, which took 15 years and 10 million USD; and kept relations with the Chicago Botanical Garden of the USA, Kew Gardens and Edinburgh Botanical Garden of the UK, for personnel exchange. The Chinese Zoo Association presented a pair of giant pandas in the Chengdu Zoo to visit the Atlanta Zoo of the USA in 1999, initiating the 10-year cooperation on breeding of pandas between the two sides.

Chapter III Evaluation of Needs of China CBD Implementation Capacity

3.1 National strategies, legislation, policies, regimes, institutional systems

3.1.1 Assessment

1) Policy and legislation systems that are not so complete and coordination

In the past dozens of years, China has laid down a lot of laws, bylaws, and management systems in the field of biodiversity conservation and promulgated a series of bylaws and regulations whether at the ecosystem level, species level or genetic resource level. China pays high attention to environmental protection, deems it as one of the basic national policies and has defined her guidelines of harmonized development of environment, economy and society and her strategy of implementation of sustainable development. Generally speaking, the legislation and law enforcement in China are turning toward a direction that will benefit biodiversity conservation. It is, however, essential to see clearly shortages existing in the processes of constitution and enforcement of these laws and bylaws, and a long way to go especially in finalising the legislation for biodiversity conservation. They are mainly displayed in the following aspects:

i) Inadequate connection between and integration of individual resource laws: The existing policy and law systems are dependent from each other. Related departments in charge of administration of resources often work out regulations for conservation and sustainable exploitation of certain bio-resources out of their own benefits, regardless of whether these regulations would do any good to conservation of other resources, let alone giving consideration to the conservation of the entire biodiversity. For instance, a policy for afforestation would not concern any grass planting or conservation of the local water resources. So it is very hard for various bylaws and regulations to get connected or harmonized.

ii) Stress on exploitation of bio-resources and neglect of conservation of biodiversity: The existing policies and bylaws are constituted and enforced under the supervision of the departments in charge of administration of respective resources. The laws and regulations are mostly oriented towards standardizing development of the industry, marketing activities and resources management and never put conservation of bio-resources as their focal points, let alone setting biodiversity conservation as their targets. Even when they do have some contents related to the conservation, these are rather limited.

iii) Incomplete policies and bylaws for ecological compensation in conservation and exploitation of resources: The shortage of restraining mechanisms for unplanned exploitation of resources leads to a vicious circle of exhaustion of the resources and pollution of the environment. Although the Chinese government has long been engaged in constituting policies and regulations for ecological compensation, the work is hard and progresses slowly and its coverage is also limited. To promote regional sustainable exploitation of natural resources and sustainable development of the social economy, it is necessary to work out different ecological compensation policies, bylaws and systems in light of the characteristics of each respective ecological function region.

iv) Incomplete enforcement of policies and bylaws and lack of systems and supervision mechanism: It is generally held that China has in place relatively sound legislation and policy systems in conservation of resources and ecology, but when it comes to enforcement, it is usually bad implementation. The cause is mainly lack of good workable systems. And even if there are, they do not have any mechanism to oversee their enforcement or implementation. As a result, quite a number of good policies and bylaws are not well-enforced or implemented, thus leading to the fact that there are laws but little observation of them or that the laws are enforced but not thoroughly. Besides, there is no mechanism that can be used to evaluate and supervise the processes and effect of law enforcement by the law enforcement departments.

2) No reasonable institutional system for sustainable management of biodiversity yet established

Out of historical and practical causes, the legislation of China in the field of biodiversity conservation lags far behind pollution control. The management of biodiversity adopts the model of management by departments assigned respectively based on elements of resources, and the setup of the management framework and its division of responsibilities can be found scattered in various related laws, bylaws and regulations, that is to say, the functions of management are scattered in a number of departments, thus leading to the lack of a forceful unified biodiversity supervision and management mechanism. The shortcomings of the lack lie in:

i) Too many policy-makers. Out of their own departmental interest, resources administration departments are actively pushing forward law-making for the resources under their respective control and enhancing their authorization and power through doing so, thus creating conflict between laws or bylaws. Doing things independently in planning and policy-making, disconnecting from each other, and unclear and unreasonable division of work, often lead to frequent occurrence of multiple management, unbalanced, overlapping and duplicating construction.

ii) Unclear division of management responsibility between the central and local governments: According to the existing laws and regulations, it seems that the central

government is held responsible for biodiversity conservation holistically, but in fact, the central government shares the responsibility among local governments through administrative orders. The local governments undertake most of the conservation tasks with limited funds.

iii) Little thought to the interest of stakeholders: Most of the laws and bylaws were laid down under the planned economy system and hence the philosophy in constituting legal provisions and laws is centered around government administration, giving little thought to the rights and obligations of stakeholders and particularly little to participation of the entire society; more to administrative management and less to scientific management.

3) Failure to implement action plans holistically

National strategies, plans and programs are often very large in scale, but short of overall financial guarantee, and poor in participation and partnership. They are mainly governmental behaviors, giving little thought to involving social forces. And moreover, with replacement of leaders, governmental strategies, plans and programs are often subject to great readjustment. Quite a number of programs and plans have never been implemented and were just put aside after they were worked out, because there is no mechanism for mandatory regular inspection of implementation of these programs and plans. So biodiversity conservation programs are often not implemented. When it comes to action plans, low level of communication with the local governments and communities makes them hard to realize.

“China Biodiversity Conservation Action Plan” (shortened as Action Plan hereinafter) has been released for 10 years, but has never truly been fully implemented. More often than not, the international society and foreign partners pay more attention to contents of the “Action Plan” whereas the Chinese partners often neglect implementation of the “Action Plan”. One of the reasons is that the government has too many programs, plans and documents, for instance, environmental protection plans as well as biodiversity action plans, nature reserve development programs as well as construction programs for ecological functional zones, five-year plans as well as mid-term and long-term programs. The administrative departments find it difficult to follow, thus resulting in such a phenomenon that planning and programming exceed implementation.

Lack of high attention to the “Action Plan” has another cause that the document is somewhat out of date, because China has changed so fast. A 10 years old plan needs to be amended to catch up in many aspects. In addition, the “Action Plan” *per se* reveals some innate shortcomings, which are displayed in the following aspects.

i) The original “Action Plan” was not so closely associated with the CBD that it failed to reflect the core contents of the “Convention of Biological Diversity”. The “Action Plan” was compiled well before the CBD was signed and put into effect. It was formally initiated in 1991 and began implementation in 1992. In early 1992 the structure and contents of the “Action Plan” were already defined, while the document of “Convention of Biological Diversity” was finalized on May 22, 1992. The “Action Plan” put forward 7 specific targets, but neglected biosafety management of GMOs and also left out prevention and control of invasive alien species, protection of traditional knowledge and benefit sharing, and technology transfer, etc.. Although it talked about conservation of genetic resources, it missed benefit sharing. The above-mentioned topics missed in the “Action Plan” were rightly foci of negotiations of the CBD.

ii) The “Action Plan” lacked contents about national strategies. As China initiated the “Action Plan” quite early, it lacked experience in designing its structure and contents. Its contents

were limited to priority actions and priority plans without sharing any space for national biodiversity strategies. Later on, when UNDP/GEF approved similar projects of other countries, they all combined the two items, national strategy and action plan, i.e. “national strategies and action plans for biodiversity conservation”. Compared with the action plans of other countries, the “Action Plan” of China appeared incomplete because it missed the important component of national strategy, which made the designing of the action plan and priority projects short of psyche.

iii) The “Action Plan” was not so closely related with functional departments and their scope of duties. The “Action Plan” failed to have all its actions and projects related to functional departments in light of their scope of duties. As a result, these departments did not know what their duties were in the “Action Plan”, and no priority actions or priority projects were actually implemented. The “Action Plan” was only a decoration.

iv) With the passing of time, the “Action Plan” should be duly updated in data and information. Although the “Action Plan” was formally released in July 1994, compilation of its text was completed at the end of 1992 and the data cited in the text mostly were those obtained before 1991 and are already more than 10 years old. With China changing with each passing day and with booming economy, the pressure of exploitation on and inputs into conservation of the natural resources have greatly increased. The outdated data and information in the “Action Plan” could easily mislead the decision-makers and need to be updated or replaced.

3.1.2 Bottlenecks

1) Incomplete legislation, neglect of laws, undemanding law enforcement, and inadequate law enforcing capacity. China lacks a holistic plan for biodiversity legislation or comprehensive analysis and research of rule of law, and does not have any legislation for acquisition of genetic resources and benefit sharing, acquisition of traditional knowledge and benefit sharing, and prevention of invasive alien species. What is worse, common phenomena in China are that there are laws but little observation and the laws are enforced based on personal feelings. The bottleneck of law enforcement is the inadequacy of the law-enforcing capacity. The departments in charge of administration of resources do not have enough law-enforcing forces, and the grassroots workers of GMOs have no idea or understanding of the laws and their sense of law observing is very weak.

2) Local governments are keen on economic development, but lack initiative in conserving biodiversity: Local governments pay too much attention to fulfilling their respective GDP targets and are eager for quick success and instant benefits. They are hot on development of local economy, but neglect environmental protection. Frequent replacement of local government leaders also affects realization of environmental protection targets. Moreover, those grassroots leaders often do not have much knowledge about biodiversity and lack understanding of the strategic position of biodiversity.

In the course of biodiversity conservation, it is always the central government setting the keynote in policies, programs and plans, whereas the regional or local governments only respond passively. In this case, in regions or fields where financial input from the central government is available, the conservation activities look vivid and dramatic and the local governments are also high in enthusiasm, and *vice versa*. The passiveness of the local governments hinders earnest conservation of biodiversity.

3) Lack of mechanism for supervising implementation of laws and policies: After promulgating a law or releasing a decision, the central government seldom follows up with supervision of the implementation or evaluation of the effect. As a result, it does not know anything about how it is implemented, but depends only on reports from the governments at lower levels. As a matter of fact, China does not lack good environmental protection policies and bylaws, which are sometimes better than those in the western countries. But when they are going to be enforcement or executed, they are often done at a discount or not well executed. The major cause is that there is no mechanism for the public to perform supervision of the implementation, and even the government *per se* does not have any mechanism for internal evaluation.

4) Lack of cooperative spirit between departments: The phenomenon of disputing over trifles between departments has never disappeared. Every department always wants to expand its own scope of functions or domain of authority, instead of offering mutual support. Though they are all national plans or programs, the department attaches importance only to those constituted under its own leadership or does not care too much about plans or programs worked out by others. This is often the case, restraining the already limited human, material and financial resources from being brought into full play.

3.1.3 Needs

1) Consolidating the legislation: To consolidate biodiversity legislation at the three levels of biodiversity conservation, it is essential to learn from the experiences of other countries and re-investigate the relations between laws so as to establish the legislation system, accelerate amendment of the “Nature Protected Law” and “Wild Animal Conservation Law”, intensify construction of the legal institution for conservation of genetic resources and benefit sharing, complete national legislation in other fields, such as biosafety, prevention of invasive alien species, protection of traditional knowledge, etc., and eventually bring the biodiversity legislation onto the world track.

2) Trigger off initiative of local governments: Research should be carried out to create mechanism that will trigger off initiative and consciousness of the governments at the provincial and lower levels in biodiversity conservation. It is necessary to have local governments share certain responsibilities and to have biodiversity conservation included into local social economy development programs and environmental protection working plans through a responsibility system. The local government will not only undertake a great deal of specific tasks, but also share responsibility together with the departments in charge in the central government, thus keeping tasks in line with their responsibilities.

3) Set up supervision mechanism and evaluation mechanism: Besides establishing the mechanisms for internal evaluation inside the government, it is also necessary to establish mechanisms for social supervision, enabling the whole society to supervise courses of the implementation or execution of governmental bylaws, policies, institutions, plans and projects and evaluate their effects. The mainstay of social supervision is the grassroots masses, news media, scientists and stakeholders of biodiversity.

4) Study and amend the “China Biodiversity Strategy and Action Plan”: In response to the requirements of the “Convention on Biological Diversity” and the challenges China is confronted with in the new era, China should act as soon as possible to revise the original “China Biodiversity Conservation Action Plan” and put forth new targets, actions, priority projects and implementation

schedules.

3.2 Investigation and monitoring of biodiversity

3.2.1 Assessment

1) Vague knowledge about background of the resources: China started systematic investigation of biodiversity in the 1950s and by the end of the 1980s the large-scale bio-resources surveys had basically come to an end. Although they have drawn a basic profile of the biodiversity in China, when it comes to various sorts of life forms, many blanks are left unfilled as to species and population numbers, and some regions and classes or categories are still unexplored and waiting for investigation with no information available as to inventory and distribution of species. Even for some already investigated regions and classes or categories, supplementary and further investigations are needed, for their background information is not complete or detailed. Facts show that even in regions already investigated several times, new species keep on being discovered. On the other hand, most of the investigations or surveys were done in the 1950s - 1970s. Dozens of years have passed and witnessed rapid economic development and extensive exploitation of the land resources, which has caused great changes in the ecosystems and biotas. Some changes are so great that their original faces have completely been lost. It is quite natural that new discovery will be made in any new investigation.

The investigation and inventory of genetic resources is far from complete. Sampling investigations show that China originally had 1.08 million accessions of forest germplasm resources in reserves, but now has only 0.12 million pieces preserved; in estimation 0.6 – 0.8 million accessions of crop germplasm resources, but has only 0.38 million accessions collected for preservation. The agricultural wild plant records, in particular, have only 20,000 accessions collected and preserved, accounting for 10% - 20% of the actual resources. The investigation of background of the microbes also has more blanks to fill.

2) Lack of continuity and institutionalization for resource survey. Though the “Wild Animal Protection Law” stipulates that investigation of stock size be carried out once every 10 years, the countrywide investigation of terrestrial wildlife resources organized by the State Forestry Administration is the first one ever done, and the Ministry of Agriculture also began its first investigation of wild aquatics only in recent years. In light of execution of the investigations, shortages could be found in a number of fields, especially the availability of zoological taxonomists. For instance, professionals in the discipline of amphibians and reptiles are very rare and quite a number of research institutes and colleges have found no successors. This is because it is very hard for scientists engaged in biodiversity investigation, biota analysis and research on traditional taxonomy to find funds, which no doubt hinders progress of monitoring of biodiversity countrywide. As a result of lack of attention to resources investigation, limited input in related fields, and shortage of skilled professionals and basic equipment in design of investigation programs, processing and analysis of investigation data, inadequate investigation capacity and absence of uniform national standard and databases for the bio-resources investigation are factors seriously affecting the investigations.

3) Unfledged monitoring system: So far, the biodiversity monitoring system has not yet become fledged, there is still much space uncovered by monitoring. Though CERN has dozens of stationary monitoring posts set up all over the country, they are designed for monitoring of ecosystems. The State Forestry Administration has its monitoring systems in shape for continuous

investigation of forest resources, but they lack efficient means and facilities to monitor wildlife and wetland resources. The monitoring of marine resources and halobios is still at its initial stage, and inadequately equipped with large-sized monitoring equipment. The agricultural departments are just in the process of building up their monitoring systems for agricultural crop and livestock, fishery, wild aquatics, agricultural wild plant resources and invasive alien species, etc..

3.2.2 Bottlenecks

1) Inadequate capital input: As resources investigation does not receive much input and often runs short of funds, its activities are also very limited, especially in the investigation of medicinal organisms, aquatic organisms, agricultural wild relative plants and microbe resources, which are really urgent.

2) Unstable force: The investigation lacks young blood, particularly in taxonomy of plants, animals and micro-organisms, and the number of young scientists capable of conducting field investigation is even less. So the investigation is not of high quality. In the field of investigation of agricultural wild plants, professionals are in shortage, and most members of the investigation teams are low in professional skill, in field work experience, and in capacity of data processing, in short, not competent for the job.

3) Inadequate monitoring equipment and facilities: It is quite common that there are not enough basic facilities for field monitoring, methodologies for monitoring of various resources, sophisticated analytic instruments and equipment, data processing facilities, inter-departmental information exchange and sharing platforms, prediction, forecasting and early warning mechanisms and emergency handling capacities and facilities, etc.

3.2.3 Demands

1) Establishment of continuous resources investigation projects: Increase fund allocation to bio-resources investigation; list resources investigation and monitoring as continuous and regular projects and set them up as a system; include their budgets into the national financial plan, and try as much as possible to apply for funds from international financial mechanisms.

2) Identification of weak areas and weak fields: Constitute an overall program and implementation plan for countrywide resources investigation; identify key areas, key fields, special community groups and special regions; and work out a reasonable mid- and long-term time schedule.

3) Build-up of a professional task force for resources investigation: Set up training mechanism that will enable cultivation of quite a number of professionals of biological taxonomy and data and information processing to meet the demand of resources investigation; and select and send first-class young scientists and technologists abroad for training so as to harmonize methods and facilitate information exchange with foreign colleagues.

4) Investment in and equipment with monitoring facilities: Purchase data processing and information exchange equipment for resources investigation; invest in and complete the monitoring systems and infrastructure of investigation of various bio-resources, with stress on construction of long-term monitoring stations and nodes.

5) Reinforcement of capacities of the nature reserves for investigating and monitoring bio-resources: Investigate and monitor bio-resources of the nature reserves, where bio-resources are concentrated and biodiversity especially rich; and set it as a priority project to develop monitoring

capacity of the nature reserves.

3.3 *In-situ* conservation

3.3.1 Assessment

China has made striking achievements in the construction of nature reserves. By the end of 2003, the number of nature reserves has reached 1999, covering 14.4% of the country's total in land area. When the 677 tourist scenic spots and over 1000 forest parks are counted in, the land coverage reaches 16%, well above the world's average of 12%. Nevertheless, their management quality lags far behind their construction, which is displayed in the following aspects:

1) Unbalanced development, authorized but not built up, or built up but not managed: In the past few years, nature reserves have accelerated in development. Comparison between 2002 and 2003 shows that nature reserves increased by 242 or 13.77% in total number and by 11.031 million ha or 8.30% in area. However, problems with the management of these nature reserves are deeply rooted with the old left unsolved and the new coming one by one. So the current situation is that the nature reserves are large in number and area as well, but low in management level and unbalanced in development between regions.

2) Deficiency of human resources: Some nature reserves, though having institutional frameworks set up, are not fully staffed. Out of the 1538 nature reserves in the forestry system, only 700 are staffed with full-time managerial personnel, accounting for 45.51% of the total, whereas the remaining 54.49% of the nature reserves are not. Among the managerial personnel of the nature reserves, 2992 are professional technicians, accounting for 9.63% of the total and equaling to only 4.28 persons per nature reserve.

3) Problems with *in-situ* conservation of agricultural wild plants: The work of *in-situ* protection of agricultural wild plants began quite late. So far a total of 47 native habitat conservation demonstration sites have been or are being built up, mainly devoted to protection of wild crop relatives, like wild rice, wild soybean and white wheat. The sites, however, are often small in size. In practice, it is very hard to manage these conservation sites. As they are small in size, it is not feasible to have them set up as special reserves or establish special management for them. But if they do not have special conservation facilities or are not under the care of assigned personnel, they are vulnerable to destruction.

4) Untimely bylaws: "The Regulation for Nature Reserves" promulgated for enforcement in 1994 was drafted in the early 1990s. Some of its articles have already become outdated and are not suitable to the demands for development of the nature reserves in the new era. Meanwhile, few standards, regulations, and guidelines related to nature reserves are available, thus restraining development and management of the nature reserves in depth.

5) Shortage of funds: The input of funds for construction of nature reserves is far from adequate, restraining their development. Especially nature reserves at the local levels can not get support from the central government, and their investment intensity is far less than that of national nature reserves. Moreover, nature reserves are often located in remote poverty-stricken regions, where the working conditions are very poor. As a result of long-term shortage of funds, they still use old outdated basic facilities, and primitive means for resources maintenance. They do not have much sources that can be devoted to scientific research and monitoring. So it is hard for them to perform effective management of the resources. Investigations of 217 nature reserves revealed that 71 or 32.72% had not yet received any investment, 106 or 48.45% got less than 2 million yuan

totally since their establishment and only 40 or 18.43% got more than 2 million yuan.

6) Poverty-stricken communities: The conflict of nature reserves with local economic development and resources exploitation is outstanding. The set up of nature reserves restricts the livelihoods of local communities, resulting in poverty of inhabitants in the neighborhood of some of the nature reserves and greater contradictions between communities and nature reserves, and eventually undermining the effect of conservation. In addition, negligence of the interest of stakeholders of nature reserves also hurt their enthusiasm in participation.

7) Sharpening conflict between conservation and development: Many nature reserves try to take advantage of their potential resources to develop tourism and other economic activities and even to attract investment and business in order to solve their financial problems. However, improper exploitation and development would hinder realization of their original task of protecting their targets.

3.3.2 Bottlenecks

1) Lack of policies and bylaws: The original “Regulation” is no longer fit to the new situation. Some of its articles are already alienated from reality and hard to operate or execute, there are a lot of loopholes, which objectively restrict development of the nature reserves. Besides, lack of proper policies, standards, regulations and guidelines for management of nature reserves is also a bottleneck restricting improvement of the management of nature reserves.

2) Inadequate funds and unbalanced development: On the whole, national nature reserves are fairly better off with funds, whereas nature reserves at local levels are in a hole. Especially those in poverty-stricken regions in Central and West China are in very hard and tough conditions, restricting improvement of their management. Nature reserves differ sharply in both development and financial situation.

3) Pauperization of communities: Poverty of communities is a bottleneck to development of nature reserves. A majority of nature reserves fail to solve the problem. People living in the neighborhood live in hardship. With the sharpening conflict in interest, pauperization of the communities will further restrict operation of the nature reserves and pose a potential threat to the conservation and management of the resources in the nature reserves.

3.3.3 Demands

1) Constitute and promulgate new “Law for Nature Reserves” as soon as possible: In constituting a new law, it is essential to develop a series of operable rules and regulations and some matching policies, technical criteria, standards, guidelines, programs, etc.. It is also necessary to strictly normalize and properly control exploitation of the resources and development of tourist projects in the nature reserves.

2) Intensify investment in construction and management of nature reserves: National nature reserves should be taken care of financially by the central government so as to release financial pressure on the regions. It is also necessary to increase investment in nature reserves at the provincial level or below and in poverty-stricken regions in Central and West China so as to improve their management and living conditions. Aid from international society and the GEF financial mechanism are also important sources of funds.

3) Strengthen skill training of employees of nature reserves: Nature reserves should pay special attention to cultivate high level professional and managerial talent; enroll and attracting

professionals with high educational background to work for them; dispatch outstanding professional and managerial members to get training abroad; introduce foreign experiences in management and cultivate senior experts and skilled technicians.

4) Introduce participatory management models: It is essential to encourage local communities and inhabitants to participate in management of the nature reserves; strengthen and harmonize the relations of the nature reserves with local communities; help local people to eradicate poverty by introducing poverty-alleviation development projects or setting up compensation funds to compensate local people economically for the losses they suffer.

5) Keep research on demonstration of efficient management of nature reserves: Extensive research should be carried out on management quality of nature reserves, management institutions, management plans, institutional frameworks, community condominiums, maintenance and proper exploitation of resources, etc. by referring to successful experience of foreign countries in managing national parks and reserves, so as to accumulate experience in management of the nature reserves.

3.4 *Ex-situ* conservation

3.4.1 Assessment

1) Inadequate infrastructure construction: China has over 600 cities in her organization system, whereas, the total number of botanic gardens and forest gardens, of whatever size, total to only over 140, which are mostly distributed in large cities, universities, and research institutions, and rarely in province-level and county-level cities. The situation with zoos and aquariums is even worse, because they are costly to maintain and operate. Nevertheless, botanic gardens and zoos are public places for popularization of common scientific knowledge and especially helpful to teenagers. Limitation in such facilities restricts opportunities for the public to get education in general knowledge of biodiversity.

2) Insufficiency in research capacity: Botanic gardens and zoos are advantaged sites for biological research. However, they fail to bring their role of scientific research base into full play. Most of them do not have scientific research listed as their major tasks, except for some botanic gardens and zoos in some metropolises, where researches on artificial breeding of some endangered rare and precious species have been or are being carried out. Even the botanic garden under the Kunming Botany Institute, Chinese Academy of Sciences, is not included as one of the institute's "innovation bases". Nevertheless, in western countries, botanic gardens and zoos *per se* are high-level research institutions.

3) Scattered collection and preservation of germplasm resources: Botanic gardens in China are quite scattered in distribution. The number of germplasm resources introduced and preserved in large-scale botanic gardens varies in the range of 3000 – 5000 species each. The botanic gardens are low in utilization efficiency of their facilities and have limited influence in the world. But in western countries, like the USA and UK, some extra-large botanic gardens, though not many, contains 20,000 – 30,000 species each and display great influence all over the world.

4) Low strength of the investment in public facilities: Botanic gardens and zoos are facilities of public welfare, representing the image of a city. So they should be included into the program for urban construction and built up with local government investment. The Beijing Botanic Garden has spent 100 million yuan building up a large-size greenhouse, which would not have been done without government investment or maintained just by selling entrance tickets. Many a

city stresses construction of traffic roads and development of real estate, but neglects that of public facilities, like botanic gardens, zoos, etc..

5) Failure to recognize their role in public education: Local governments often neglect the role of botanic gardens and zoos in popularization of common scientific knowledge and publicity to and education of the public. With limited governmental support, botanic gardens and zoos often assume sole responsibility for their profits or losses, thus leading to rapid rise in payment for entry into zoos, botanic gardens and aquaria. Too costly entrance tickets scare off visitors, thus resulting in a vicious circle, and eventually in low effect of these places in popularization and education of common scientific knowledge of biodiversity.

3.4.2 Bottlenecks

1) Lack of overall national program for *ex-situ* conservation: China does not have an overall program for construction of botanic gardens, zoos, aquaria, arbor gardens, safari parks, endangered and rare and precious species breeding centers all over the country. Their development often differ sharply from region to region and sometimes is carried out blindly.

2) Too little capital input: Construction of public facilities, like botanic gardens and zoos never gets enough attention in urban construction program. They are not only limited in number, but also not high in construction quality. Moreover they are not adequately equipped with proper publicity and education facilities. The high price of their entrance tickets resulting from limited government investment deprives the public of opportunities of receiving biodiversity knowledge.

3) Inadequate *ex-situ* conservation facilities: Although China has laid down some basis for *ex-situ* protection of agricultural crop germplasm resources, nothing significant has been done for the collection and preservation of forest germplasm resources and particularly medicinal plant germplasm resources. Modern facilities essential for *in-vitro* preservation of animal, poultry, fish and wildlife germplasm resources are far from sufficient, thus restricting to a certain extent protection and conservation of these resources.

3.4.3 Needs

1) Compile a national program for biodiversity *ex-situ* conservation: It is necessary to rationalize programs for arrangement and construction of *ex-situ* conservation facilities, like botanic gardens and zoos all over the country; invest in construction of a small number of large-scaled modernized botanic gardens, zoos and aquaria for concentrated preservation of bio-species. It is also advisable to set up small-sized *ex-situ* facilities for *ex-situ* protection of rare and endangered species in areas of their respective native habitats according to the needs, for concentrated preservation of local species under protection. For wildlife of particular importance special re-introduction and breeding centres should be built up.

2) Consolidate agricultural germplasm resources banks and intensify research on development and exploitation: Based on consolidation and maintenance of agricultural crop germplasm resources banks, a complete national preservation system is to be further built up by setting up additionally 5 – 8 national crop germplasm nurseries (cassava, tropical fruits, tropical pasturage, palm plants, spices and beverage plants, kiwi fruit, plum, waxberry, etc.) and a number of germplasm *in-vitro* preservation tanks for livestock, poultry and fishes. Research should be enhanced on identify properties of germplasm resources and at molecular level, to develop new and useful varieties by making use of eximious genes.

3) Strengthen construction of biodiversity knowledge popularization and education facilities: Halls or auditoria for popularization of common scientific knowledge need to be built in botanic gardens, zoos and aquaria and equipped with proper facilities. Botanic gardens, zoos and aquaria should also make use of their exhibition zones to provide visitors and teenage students more opportunities for biodiversity education.

4) Increase financial input for maintenance of botanic gardens, zoos and aquaria: Increased input may reduce the burden of the public and teenager students in paying for entry, hence expanding the potential of reception of visitors, and providing the public and teenager students more opportunities for biodiversity education (c.f. Free entry to Hong Kong Botanic Gardens).

5) Expand collection of species resources: Potentialities of expanding collection of species and variety resources do exist. It is possible to enrich collections in the botanic gardens, zoos and aquaria in quantity and quality through exchange, mutual donation, requisition, and purchase, and introduction of useful species and gene resources.

6) Implement projects of releasing cultivated and domesticated species into fields: Some endangered rare and precious species increase in population after they have been cultivated and bred artificially in botanic gardens, zoos and introduction and breeding bases. Then it is high time to release them into fields and nature to realize the true objective of biodiversity conservation rather than keep for exhibition or sale.

7) Intensify capacity building of managerial personnel and improve management of experience facilities: To build botanic gardens, zoos and germplasm banks into scientific research bases, it is necessary to introduce senior professionals, making it possible to make use the unique advantaged conditions of the *ex-situ* conservation facilities to raise the level of research on conservation of rare and endangered species.

3.5 GMOs biosafety management

3.5.1 Assessment

1) Though China has laid down a basis in legislation, it is not complete in legal system: China has laid down a fairly sound legal system in biosafety management of GMOs, including biosafety assessment system for enlarged field trials and commercialized production of GMOs, labeling system for GMOs and products thereof, procedures for management of imported GMOs, inspection system for GMO products entering the country, etc.. Besides, the Ministry of Agriculture has also promulgated or is constituting a series of standards and criteria. However, as a whole, the law and regulation system on biosafety is not complete, and there are some gaps in enforcements of laws and regulations.

2) Lack of public participation: Biosafety of GMOs and products thereof is closely related to health of the consumers, who are entitled to know what they are eating and to make choice. However, at present, the public does not know much about GMOs or have much sense of biosafety, and it is shortage for public participation in the process of decision-making for GMOs environmental release and commercialization.

3) Inadequate capacity for biosafety research and inspection of GMOs: In the past 20 years, China has invested huge sums in research and development of GMO technology, amounting to dozens of billion yuan or more, but not enough in this is on biosafety of GMOs and its research force is not strong enough either. Moreover, GMOs detecting capacity is also rather weak in

China. Some universities and research institutes in big cities do have some sophisticated testing instruments, but most grassroots units do not have such capacity.

3.5.2 Bottlenecks

1) Lack of supervision mechanism: Legislation is no doubt important, but law enforcement is all the more so. For law enforcement, it is essential to have a good supervision mechanism, composed of that from the inside as well as that from the outside, from other departments, research institutes, enterprises, scientists and social public. Lack of such supervision mechanism would make it difficult to realize the target of biosafety management of GMOs.

2) Inadequate input in research on biosafety and weak basic facilities for detecting and monitoring GMOs: GMO risk assessment depends on scientific research. The “precautionary principle” calls for adoption of precautionary measures to avoid risks before full scientific evidence is obtained so as to reduce possible harm of enlarged field trials of GMOs to biodiversity and human health. Inadequate research capacity already restricts progress of GMO risk assessment in depth, but also affects quality and effect of its risk assessment and risk management. Lack of a complete monitoring system and sound detecting means also limit the risk assessment of GMOs approved for enlarged environmental release to the environment and health.

3) Poor communication and harmonization between the international laws and domestic laws: National laws and regulations should keep consistent with international ones. China has already joined in the “Convention on Biological Diversity” and started its legal processes for ratifying the “Cartagena Protocol on Biosafety”. But the departments in charge of international laws and in charge of national laws do not have much communication, thus affecting harmonization of implementation of international obligations through execution of national laws.

3.5.3 Needs

1) Make sound the legislation: The Regulation promulgated by the State Council is limited to biosafety management of agricultural GMOs and has nothing concerning management of transgenic trees, transgenic medicinal organisms and processed GMO food. It is, therefore, essential to perfect related regulations, standards and criteria while drafting a comprehensive “Law for Biosafety”.

2) Put law enforcement under inspection: Departments in charge should carry out inspections of law enforcement regularly or irregularly, inspect and supervise enforcement of the “Regulation for biosafety management of agricultural GMOs”, and check law observation in environmental release and commercialized production and labeling of GMO products. Illegal activities and offences against the laws should be sternly punished to enhance the seriousness of the legislation. Meanwhile it is also necessary to intensify education and enhance research institutes and researchers in sense of biosafety and sense of constitutionality.

3) Reinforce research on biosafety: Biosafety management of GMOs needs accelerated construction of its technical supporting system. 1) intensify research on risks of GMOs to provide risk assessment with scientific basis, which calls for financial supports from both abroad and at home. The GEF, being the financial mechanism for “Biosafety Protocol”, is held responsible for providing financial support to developing countries; and 2) carry out research for constitution of technical standards and criteria essential for biosafety management of GMOs.

4) Set up GMO risk monitoring systems: Currently, it is urgent to set up a transgenic cotton

environment monitoring system, composed of transgenic cotton environment monitoring networks to be built up in the cotton production areas in the Yangtze River Valley, Yellow River Valley and Xinjiang region, and work out monitoring plans for long-term risk monitoring. At the same time a transgenic poplar risk monitoring system, and monitoring plans for transgenic rice and transgenic soybean should also be set up. A national GMO biosafety environment and verification center should also be established to be an authoritative and impartial technical platform.

5) Strengthen public publicity and education: Biosafety education of the public needs input of more energy. First of all, it is necessary to begin with intensification of publicity of biotechnical knowledge, and then carry out education in risk prevention to let the public have a better understanding of biotechnology and risks of GMOs, while giving the public the right of being informed and the right to make choices of the food offered for eating. At the same time, the public should be invited to participate to a certain extent in decision-making on approving commercialization of GMOs.

3.6 Management and control of invasive alien species

3.6.1 Assessment

1) Lack of special laws and regulations: So far China has not yet released any special laws or regulations for prevention, introduction, and control of invasive alien species or any action plans or comprehensive precautionary measures for prevention and control of invasive alien species, providing little legal basis for management of invasive alien species. Currently, only in some related laws and regulations, e.g. “Law of quarantine for entry and exit of animals and plants”, “Wild Animal Protection Law”, “National Eco-environmental protection Outline”, “Regulation for quarantine of plants”, etc., management of invasive alien species are mentioned in the text. In the current laws and regulations, quarantine is biased towards organisms that may bring harm to agriculture, forestry, animal husbandry and fishery, but not much attention is given to those invasive alien species that may pose potential threats to ecosystems and biodiversity.

2) Poor management: Without the restriction of laws and regulations, some regions and departments show areas of blindness and more eagerness for quick success and instant benefit in introducing foreign species. Their eagerness greatly increases the risk of invasion of foreign species. And there is in effect no risk assessment system for intentionally introduced foreign species in management after they are brought in. Although the “Law of quarantine for entry and exit of animals and plants” stipulates that introduced species be subjected to quarantine treatment and experimental planting or raising, parties concerned would often not declare or send it for inspection out of their unwillingness to bother and bear the cost, thus providing invasive alien species with a potential chance for causing a hazard. Some institutes or organizations pay attention only to introduction, but neglect management, resulting in escape of foreign species from the cultivation plots or pens into natural environment becoming invasive species and posing potential threats to the environment.

3) Inadequate research: The research on invasive alien species in China is still at its initial stages and needs to be developed towards multi-disciplinary experimental and theoretic research at various levels (gene, individual, population, community and ecosystem, molecular biology, molecular ecology and eco-genetics). Weak points of the current research lie mainly in: 1) research on technology for quick detection of pathogenic microbes and systems technology for interception of invasive alien species; 2) research on models and systems for quantitative risk

assessment, early warning systems, and technical systems for quick response and emergency treatment; 3) research on mechanisms of proliferation and diffusion of potential hazardous invasive alien species; 4) research on invasive biology, invasive ecology and mechanisms of outbreak; 5) research at the microscopic level (molecular biology) and macroscopic level (community and ecosystem); and 6) research on genetic variation of invasive alien species, impacts on community structure, ecological regulation and remediation.

3.6.2 Bottlenecks

1) Lack of risk assessment mechanism for introductions from abroad: China gives too much liberty for introduction of species from abroad by anyone, be it an institution, company, or individual, without being subjected to risk assessment beforehand, and does not have a normalized regulations for declaration and management of introduction or any early warning system.

2) Inadequate quarantine and detecting capacity: Apparently, the customs house and the import and export commodity inspection and quarantine departments lack adequate capacity for controlling entrance of alien species, do not have a sound inspection and quarantine system to follow, and lag far behind in detection means, so they are unable to efficiently prevent invasive alien species from entering China.

3) Far from having developed a sound technical means for scientific research and monitoring: Currently the country's research capacity is far from adequate to study mechanisms of the invasion of foreign species and laws of the incidence, development and breakout of hazards; research on technical systems for risk assessment and risk management of invasive alien species. Technical platforms for environment monitoring, predicting and forecasting, information networks and database systems are still at an infant stage, and incapable of providing adequate scientific bases for decision-makers and administrators.

3.6.3 Needs

1) Set up invasive alien species early warning and monitoring systems: The key to preventing and controlling invasive alien species is to study ways to keep invasive alien species beyond the gates of the country or to nip them in the bud stage through a sound monitoring and early response system. For intentionally introduced foreign species, it is essential to perform normalized risk assessment and put into effect risk management measures.

2) Increase input and launch a countrywide survey on distribution and damage of invasive alien species: A countrywide survey on invasive alien species, including hazards of weeds, pests, diseases and plagues of animals, plants, and microbes, should be carried out as soon as possible to find out the types, quantity, distribution and hazards and trends of various invasive alien species. For that it is also necessary to set up index systems for assessment of the risk of foreign species threatening biodiversity, human health and agricultural production, also relational databases and technical platforms for sharing information. The proposed countrywide surveys and prevention measures need large sums of funding. In addition to the investments from the state and regional governments, financial supports from GEF and GISP (The Global Invasive Species Project) are also called for.

3) Have the regional governments play their roles and adopt effective control measures: To control invasive alien species is a mass campaign that needs the regional governments to mobilize their own motivation and the broad masses of farmers to take part in control of invasive alien

species. Effective measures to be taken may include physical, chemical and biological means for controlling further spread of invasive alien species and reducing their damage to agriculture and biodiversity.

4) Intensify research on control of invasive alien species and their comprehensive utilization: The research on biological invasion is a long-term multidisciplinary topic. Solution of many of its problems may need long-term accumulation of research findings. Invasive alien species are often strong in adaptability, rapid in growth, and enormous in biomass. If ways can be found out to make use of the biomass and to change wastes into valuable uses, it is a matter of “killing two birds with one stone”.

3.7 Access and benefit sharing of genetic resources and traditional knowledge

3.7.1 Assessment

1) Existing legislation and regulations include no provisions concerning acquisition of genetic resources and benefit sharing: Although the existing laws and regulations for conservation and management of genetic resources have been playing an important role in collecting, preserving, exchanging and exploiting resources, they are incomplete. The laws and regulations available for management of genetic resources are limited to management of the agricultural crop (including trees) germplasm resources, e.g. “Law for Seeds” (2000), “Regulation for protection of new varieties of plants” (1998), “Provisional approaches to management of imported or exported agricultural crop seeds (seedlings)” (1997), etc.. These laws and regulations say little about management of import and export of genetic resources, let alone specific stipulations about access of genetic resources in international multilateral or bilateral systems, benefit sharing or strict management systems.

2) Lack of harmonized inter-departmental management systems: 1) the management of access of biological genetic resources is not standardized, involving a number of departments, but they never have a uniform management system or an authoritative administration in handling foreign affairs; 2) There is no centralized channel for export. Everyone, an institution or an individual, can send genetic resources to institutions or individuals abroad, thus leading to loss of large volumes of biological genetic resources from the country; and 3) China does not have state mechanism for benefit sharing between the supplier and the user of the genetic resources. Even if limited gains are obtained under unequal conditions, they are often divided by research institutes or individuals, leaving nothing to show for the interests of the state.

3) Serious loss of genetic resources from China: Because the state does not have sound legislation and management systems and the public, even the professionals, commonly lack the sense of protecting genetic resources, China has suffered serious loss of genetic resources. Some institutions put genetic resources that the state specifies as unavailable to outsider for the time being into the list for exchange and boldly allow collected samples to be taken abroad without authorization in their international cooperation; some bring privately or carry seeds out of the country as requested by the other side, just to realize their own aims of gaining financial support for going abroad; and some foreign companies or researchers acquire important genetic resources by illegal means during their trips of investigation, tour and family visiting.

4) Low rate of acquired foreign genetic resources: The USA has introduced a huge volume of

plant genetic resources from abroad, accounting for 81% of its national genetic resources collection and Brazil and Russia reaches 76% and 60%, respectively. The statistics of 1998 shows that China had in total 67,000 accessions of foreign crop germplasm resources in preservation, accounting for only 18% of the total volume (350,000 accessions that time) of crop genetic resources in preservation. They were mainly introduced from a only few developed countries, like the USA, Japan, Australia, etc., and mostly of cultivated crops, instead of wild species, wild relative species or traditional native farming species. Therefore, in terms of geographical relations and genetic diversity, the limitations are apparent.

5) Lack of system investigation and cataloguing of traditional knowledge: China is a country with a very long agricultural history and a huge variety of nationality. During the 7,000 years of agricultural cultivation, farmers of various nationalities have created a rich and colorful repository of traditional knowledge, innovations and practices, including traditional Chinese medicine, traditional agricultural production patterns, breeding and cultivation techniques and living styles that are still useful in conservation and sustainable exploitation of biodiversity and traditional national cultures. For instance, many Taoist and Buddhist holy sites, maintained forests are regarded as “holy mountains” and “holy trees”, thus providing long-term protection to biodiversity. In Xi-shuang-ban-na alone, there are 400 well-protected holy maintains; in Xichang of Sichuan, the Yi nationality deems bitter mustard (*Brassica integrifolia*) as article of tribute, thus conserving the genetic diversity of bitter mustard in the locality. Nevertheless, no efforts have been done to investigate, collate and catalogue this knowledge, innovations, practices and cultures.

3.7.2 Bottlenecks

1) Incomplete legislation and regulations in the country: Article 15 of the “Convention on Biological Diversity” stipulates that the state possesses the sovereignty of genetic resources and it depends on the law of the supplier country whether its genetic resources can be acquirable. Therefore, in international affairs of access to and benefit sharing of genetic resources and traditional knowledge, the soundness of the country’s law is the key factor, which directly affects realization of the country’s benefits. In China, however, systematic laws and regulations are rare in this field and no laws to restrain effectively the behaviors of scientific researchers bringing in and out germplasm resources without declaring or sending them for quarantine. As a result, resources management in China is in a mess.

2) No clear idea of her own background: Although China has devoted decades of efforts to investigating and collecting biological genetic resources, a clear picture is still not available or only of certain taxa. China has no clear idea as to how many genetic resources have been exported and how they are being exploited in other countries, or how the background of the traditional knowledge is and how they are being applied in other countries. This is also a bottleneck restraining China from implementing the “Convention on Biological Diversity” and “Bonn Guidelines”.

3.7.3 Needs

1) Legislation: It is urgent to draft a national law and bylaws that are capable of addressing the issue of acquisition of genetic resources and traditional knowledge and benefit sharing, and that specification of related management systems, national liaison offices, CHM, mode of acquisition and mode and form of benefit sharing, etc. while taking into account the issue of connecting the

international track of the “Bonn Guidelines for Acquisition of Genetic Resources and Equal Sharing of Benefit from their Exploitation” and other international systems under negotiation. Moreover, it is also necessary to discuss legislation and regulations for patent protection of traditional knowledge.

2) Investigation and cataloguing of genetic resources and traditional knowledge: It is essential to devote consecutive years of efforts to surveys on a selective basis and supplementary investigations of genetic resources of these taxa that do not have a clear picture of their background situation. And it is especially important to carry out a nationwide survey on traditional knowledge, establish a system of evaluation criteria, specify the scope of traditional knowledge and have the findings catalogued systematically. It is also necessary to set up a uniform cataloguing system for introduced species, have all the introduced germplasms numbered in a centralized way, and hand a portion of the germplasm to the national germplasm banks for preservation. It is advisable to encourage declaration and registration with some economic incentive measures.

3) Collect focussed genetic resources from all over the country: In collecting genetic resources, focus should be placed on wild relatives of crop species and weed species. Based on the initial achievement in collecting wild soybean and wild rice species, the scope of collection should be expanded to cover wild kindred plants of wheat, barley, millet, sorghum, rape, etc.. Attention should also be paid to collection of endemic varieties, types and strains of animals, poultry and crops, and to collection, introduction and development of new varieties of crops, animals and poultry, and exploitation of their values in nutrition, medicine and energy. The collection should cover remote areas and minority regions.

4) Introduction of germplasm resources from abroad: To expand the scope of exchange of genetic resources, it is wise to make use of various patterns to acquire more valuable genetic resources from foreign and international agricultural research centers, including agricultural crops, animals and poultry, aquatics, flowers, medicinal species, microorganisms, etc.. It is also advisable to take advantage of implementation of the “948 Program” to introduce in germplasm resources and technologies for exploitation of the resources. Attention should be given to gathering germplasm from the major crop germplasm centers of origin and provenances of animals and poultry.

5) Build up bases for introduction: It is important to set up and consolidate introduction and foreign exchange information systems so as to put an end to the state of disarray in introduction and foreign exchange of germplasm and related information; build up regional introduction and quarantine experiment bases to standardize germplasm introduction, and to set up introduction experimental stations in various ecological zones all over the country so as to isolate agricultural crop species introduced from various ecological regions all over the world for experimental cultivation.

6) Develop international cooperative researches: It is wise to develop cooperative research with other countries to make use of foreign technological advantages. In developing cooperative research projects on biological genetic resources, it is necessary to pay attention to the cooperation ability of the Chinese side and necessary capacity building to enhance that ability. It is also important to sign, with the partner under the “Mutual Termed Agreements” (MTA), a fair cooperative project that may materialize in benefit sharing,.

3.8 Scientific research, human resources and technique transfer

3.8.1. Assessment

1) Research: China has already laid down a fairly sound basis for research in the field of biodiversity, and the research covers a wide range. And research institutions involved in biodiversity are also quite great in number and diversified in character.

One group of research institutes is under the Chinese Academy of Sciences and universities (faculties of life science and environmental science in comprehensive university). For instance, the Chinese Academy of Sciences has over 10 research institutes and botanical gardens that are related to biodiversity, and dozens of comprehensive universities have colleges of life sciences in the country. These institutions, however, lean towards basic theoretic research, e.g. investigation of biotas and analysis of properties of the biotas, community structure, biological geography, ecological theory, conservation biology, etc.. But their researches are not closed related to applied research projects in these trade departments and findings of their theoretic researches are not duly, directly or fully applied in biodiversity management by administrative departments of the government. On the other hand, research often lacks investment in traditional disciplines. The state invests a great deal financially in new rising disciplines, but much less in traditional disciplines, such as investigation and cataloguing of biological resources, resources management, etc..

Another group is of research institutions, universities and colleges under various sectors. For instance, the environmental protection system has its own environmental science research institutes and environment monitoring network systems; the agricultural system has a huge academy, i.e. the Chinese Academy of Agricultural Sciences, and under its administration, there are over 30 research institutes; the forestry system also has a Chinese Academy of Forestry Sciences and a Forestry Programming and Designing Institute, and under their administration, there are over 20 research institutes and research centers; the marine system also has research institutes and monitoring systems under its direct control. Besides research institutes in various sectors, there are numerous colleges and universities of trade, for instance, over 40 agricultural (including aquatic) colleges and universities, and over a dozen forestry ones all over the country. They have established close relationship with the administrations in charge of their trade. The research institutes, colleges and universities of trade focus their research activities on applied researches, e.g. research on techniques for artificial breeding of endangered rare and precious species, investigation of resources in nature reserves, construction and management of nature reserves, application of GIS, research on policy, bylaws, standards, programs and guidelines related to biodiversity, etc..

The third group is of research and monitoring institutions owned by local governments. The environmental protection, agricultural, forestry and marine departments at the province, city and county levels, all have their own technical support systems, which are often rather weak in research capacity. So these governmental departments often rely on and make use of research institutes and universities of the first and second groups located in their respective regions to strengthen their own capacity in research on technical extension. The research work in local level is mainly focused on popularization of new technology.

2) Human resources: A serious problem with human resources is the lack of professionals in the field of biological taxonomy. Taxonomy is a basic but an old discipline. Although biological taxonomy has already developed to the molecular level for species identification, traditional

classification methods still prevail in field investigation, and collection, identification and classification of samples. Nevertheless, traditional taxonomy is no longer attractive and earns only little income, but still calls for hard labor. Moreover, the imperfect evaluation system for scientists and researchers scares off young talent from research on traditional taxonomy. With the rise of molecular biology, outflow of young scientists and researchers from the field has become very serious, and taxonomists of the old generation are aged and many of them have already retired, thus resulting in a shortage of successors in the field of traditional taxonomy, and extreme shrinkage of the young researcher team devoted to the field of biodiversity.

3) Technique transfer: Article 16 of the “Convention on Biological Diversity” stresses acquisition of techniques, that is, when developing countries offer genetic resources to developed countries, the latter should transfer technologies preferentially to developing countries, including biotechnology. But in the dozen of years after the “Convention on Biological Diversity” was put into effect, no breakthrough has been observed in technology acquisition. The reason is that the developed countries set up obstacles of so-called patents for technology acquisition, and on the other hand, the developing countries are not well-prepared or have not yet fully studied or defined what technologies or techniques they need to acquire from developed countries or even have no idea when and where the genetic resources they offer can be used, what the research results will be, or what kind of biological techniques should be used.

3.8.2 Bottlenecks

1) Separation of departments and results not available for sharing: As the Chinese Academy of Sciences and universities of comprehensive nature lean towards theoretic researches, their research findings are hardly applicable directly to the governmental administrations in charge in management of biodiversity. Separation of departments in research results in lack of centralized programming of research projects, or their findings are seldom exchanged between departments or made available for sharing. Thus the limited research funds are not brought into full play.

2) Serious shortage of talents in the field of traditional biological taxonomy: Lack of a strong expert team in field investigation of biotas leads to shortage of or gap in successors in the field of resources investigation and cataloguing. Besides, approaches to research on taxonomy all need innovating.

3) Shortage of financial input: The state has not invested enough funds into research on conservation and sustainable use of biodiversity, which restrains the research from going deeper. Inadequate research management capacity hinders limited research funds and limited projects from obtaining merited results, and limited results from extension and application.

4) Too much protection of patents on the side of developed countries: Developing countries, including China, have not made any researches on or preparation for technologies to be transferred and acquired. As a result, no progress has been made in technology transfer and acquisition.

3.8.3 Needs

1) Intensify construction of research platforms: The research on biodiversity involves a variety of fields. It is essential to set up field research platforms and dynamic monitoring bases devoted to research on biodiversity in the field of ecosystems diversity, and a number of experimental centers oriented to evaluation of and research on genetic resources and endangered rare and precious species.

2) Intensify application of the results of basic theoretic research in management decision-making: Research institutes in the Chinese Academy of Sciences system and universities of a comprehensive nature should build up close relations with related governmental administrations, and need to transform their research findings into forms that are applicable to management. At the same time, research should be carried out on applied sciences in light management needs so as to provide scientific support to raise their level in decision-making.

3) Intensify exchange and sharing of research findings between departments: Communications with biodiversity-related governmental administrations should be intensified, exchanging views on setting-up of research projects, learning from others' strong points to offset one's weakness, sharing research findings, and reducing waste of funds.

4) Foster talent: In training of human resources, the educational departments and research institutes should pay attention to development of traditional basic disciplines, and increase the intensity in training talented individuals in the field of biological taxonomy. And in arranging research projects, the sci-tech departments should think much of development of traditional disciplines. It is vital to build up a basic research team in the field of biological taxonomy.

5) Get prepared for technique transfer: Preparatory research should be carried out for technique acquisition to welcome inter-governmental negotiations to be held on technology transfer under the "Convention on Biological Diversity".

6) Intensify institutional capacity building: Research capacity of institutes, colleges and universities of various systems in the filed of biodiversity should be set up and intensified. For instance, establish a number of key biodiversity labs or research centers so as to get adapted to the needs of the country for research and application of biodiversity. Although China has a quite number of research institutions in operation, they are fixed in orientation. It is essential to integrate human resources, so as to establish small-sized, highly-efficient research centers or teams that are capable of addressing new biodiversity problems.

3.9 Publicity, education and public participation

3.9.1 Assessment

1) Publicity and education

i) The concept of "biodiversity" is not well known among the masses: In the past dozens of years, China has devoted much effort in publicity of conservation of biodiversity, in an attempt to popularize the concept of "biodiversity". However, the term of "biodiversity" is mainly understood in big cities. According to a survey carried out by this project on cognition of "biodiversity" in Zhong-guan-cun and Wang-fu-jing, in Beijing, 93 or 56.36% out of the 165 subjects were able to choose correct answers in a test on concepts of biodiversity, indicating that the propaganda has achieved quite a bit. But the ratio is much lower in medium or small cities and it is estimated that there are very few people who even know the term "biodiversity" in rural areas, especially in remote regions.

ii) Decision-makers at high levels are not familiar with the concept of biodiversity: It is a great regret of the movement of biodiversity publicity and education that the concept of biodiversity has not been normally included in the central government work reports and 10-year national economic development plans of several terms of governments or seldom heard from the national leaders, indicating that the publicity of biodiversity has not been done to its fullest, and has not yet resulted in any deep impression on the decision-makers at the senior level.

iii) It is hard for national biodiversity conservation policies to reach the grassroots. Whether the conservation of biodiversity will succeed or fail, it depends on whether or not the broad masses of farmers and herdsmen adopt conservation and sustainable exploitation of bio-resources, especially residents living in remote and distant regions and islands, who inherit the traditional production and life styles of hunting, fishing and tree felling. But with the exploding population, this traditional style of production and life often brings much damage to biodiversity. As a result of inconvenient communications and unavailability of information, national policies and regulations could not be passed down and duly implemented. The people have no hint of the concept of “biodiversity” and the “Convention on Biological Diversity”.

iv) The intensity of publicity by media is far from enough: China has a huge number of TV stations, each of which has a multiple channels, and numerous newspapers and journals, and environmental protection has long been a hot issue the media are concerned with, but the government administrations in charge fail to make use of these media. Though the National CBD Implementation Work Coordination Group has four of its members in the media (the Ministry of Radio, Film and Television, the Xinhua News Agency, the People’s Daily, and the Guangming Daily), they have never devoted enough efforts to publicity of biodiversity.

2) Public participation

i) Inadequate participation of local communities in the nature reserves: The purpose of public publicity and education is to create public participation. Without voluntary participation of the masses of farmers and herdsmen at the grassroots level, biodiversity conservation will not succeed. Just imagine, if the inhabitants in the neighborhood of the nature reserves do not support construction of the reserves, it is absolutely impossible to realize the objectives of the nature reserves. However, the weakest link of the current education, training and public participation lies at the grassroots of rural areas and the neighborhood of the nature reserves, where the people most need education and training and are the most important groups of stakeholders. Therefore, the conservation of biodiversity needs their participation, but in fact their participation is far from enough.

ii) Inadequate participation of the public in decision-making: Another important link of public participation is the extensive participation of the public in decision-making processes of the government. So far such mechanism has never been formed, and the governmental departments are accustomed to the mode of self-determination. Although a huge number of policies are directly associated with the vital interests of the people, opportunities and channels of speaking out are never accessible to them. Nevertheless, China has now seen a rising trend of public participation. In 2003 the “Law for Environment Impact Assessment” was promulgated, stipulating that environmental impact assessment of construction projects and development programs be subjected to public hearings. Some foreign invested cooperative projects also invite participation of NGOs on environmental protection. In the survey on cognition of biodiversity carried in Zhong-guan-cun and Wang-fu-jing of Beijing, 40.61% of the subjects held it essential to strengthen the public participation mechanisms and incentive mechanisms.

3.9.2、 Bottlenecks

1) Publicity and education

i) The publicity towards and education of the broad masses at the grassroots level is far from enough, so common citizens do not have much knowledge about biodiversity, particularly those in the vast rural areas and remote regions, where the communication is inconvenient and information not available, and the people have no chance to take part in the education on biodiversity conservation, but their sense of conservation is the most crucial.

ii) The publicity toward and education of decision-making layers in the government at all levels is far from enough. Proper publicity toward and education of the decision-making layers at various levels may influence constitution of national strategies and policies, for these layers are a vital link, but unfortunately their senses of biodiversity conservation are not very high.

2) Public participation

i) The government lacks the mechanism of public participation in decision-making and does not have such a system as public participation in its mechanism and processes of decision-making. In many of the biodiversity-related coordination committees, no chairs are preserved for NGOs or experts in their individual capacities, let alone for the general public.

ii) Government decision-making is not transparent and public participation limited. Not only are processes of the constitution of most related bylaws, policies, strategies, plans and programs released by the government not transparent, but also the processes of their implementation and execution are not made known to the public. There are no communication channels between the government and the public. The general public can only follow passively, but not take an active part in the activities.

3.9.3 Needs

1) Set up professional teams to carry out publicity and education at the grassroots level: Nature reservation institutions at the grassroots level should have special publicity departments staffed with professionals. In grassroots units, like nature reserves, tourist scenic spots, forest parks, zoos, botanic gardens, museums, etc.. full-time publicity and education departments should be set up. The environmental protection work at the town and township level should intensify publicity towards and education of farmers in conservation of biodiversity.

2) Train young students into voluntary propaganda teams: It is advisable to mobilize student groups in colleges and universities to take part in publicity and education of biodiversity for they have the zeal and enthusiasm and the necessary knowledge to work, are able to go deep into the rural areas. Compile and publish biodiversity-related books, journals, magazines, various throwaways, and reading material disseminating biodiversity knowledge for middle and primary school students.

3) Invest in and supply necessary facilities and instruments for publicity and education of biodiversity: Currently construction of the following facilities needs to be intensified: Local publicity and education centers need to be equipped with necessary image processing instruments; in nature reserves, zoos, botanic gardens, and museums, animal and plant exhibition halls and specimen exhibitions be set up; in county sites, townships and towns, a group of sci-tech halls, libraries and cultural centers providing publicity to conservation of wildlife should be built up; in public places of cities, and market places of towns and villages billboards, placards and window stands should be erected, giving publicity to biodiversity; and special attracting columns and programs be organized on radio and TV broadcasts to publicize biodiversity.

4) Intensify education of teenagers: In the textbooks for middle and elementary school

students the knowledge about biodiversity conservation should share more space, introducing systematically biodiversity knowledge to teenagers, not only related to protection of wild animals, but also about protection of wild plants, microbes, ecosystems and genetic resources.

5) Lay down biodiversity publicity and education programs and plans: The CBD Implementation Coordination Group should activate the function of its media members and the SEPA work in cooperation with these member institutions should draft out mid- and long-term programs and annual plans for propaganda of biodiversity, organize large-sized video programs with biodiversity as their theme; make full use of the annual “World Biodiversity Day” to launch large-scaled publicity and education activities; and open up special biodiversity columns in the newspapers.

6) Explore and establish mechanism of public participation: It is essential to establish and gradually perfect effective mechanism for mobilizing, guiding, and supporting public participation in conservation of biodiversity, and build up public participation systems, like mass information and complaints systems, letter-writing and interview systems, hearings, systems for public participation in biodiversity impact assessment, news and public opinion supervising system. The government should publish information about the status of biodiversity, expand the public’s right to know the truth about the environment and provide necessary conditions for the public to care about biodiversity, take part in supervision of and consultation on biodiversity in decision-making of important projects.

3.10 Data administration and information exchange

3. 10.1 Assessment

1) Absence of an information sharing platform: According to the survey carried out for the implementation of the project of the “China UNEP/GEF Biodiversity Data Management and Information Networking Capacity Building” in 1996 – 1997, over 100 research institutions and resources management organizations all over the country have tens of hundreds of biodiversity-related databases of all sizes and types. Although a small number of public databases are already accessible on the Internet, a larger number of special databases are not. As build-up and maintenance of a database calls for a large sum of investment and involves ownership of the material and intellectual property rights, generally the owner of the database is not willing to put its own special databases on the Internet for sharing.

2) Many gaps exist in the construction of databases: Though a quite solid base has been laid down in construction of databases, this needs strengthening. On one hand, apparently databases are not available in quite a number of fields and large sums of funds are needed to develop new databases, and on the other hand, the databases already in operation are confined within their respective departments and institutions. As they are seldom connected with each other, it is hard to determine whether gaps exist.

3) Lack of a uniform format for data: As a result of the lack of integrated programming, formats of data and technical norms vary from department to department, from institute to institute and even from research team to research team, this poses obstacles for data sharing and information exchange.

4) Inexpedite information exchange: First of all, out of confidentiality of research findings and ownership of information, information exchange is blocked between institutions; secondly, out of competition for scope of function and authority between ministries or between departments,

communication and exchange of information is quite rare; thirdly, the research institutes under the Chinese Academy of Sciences and in universities lack channels for information communication with mainline governmental administrations, so their research findings are not available for the administrations to use in management; and finally, the channels for communication and exchange between domestic institutions and international organizations are not expedited, including the Internet, and other channels for professional and academic exchange.

3.10.2 Bottlenecks

1) Lack of mechanism for coordination of data management between departments: Lack of a clear picture of the status of all the existing databases and lack of macro-coordination of the databases lead to numerous duplication of databases. Currently there is no integrated national program or plan for building biodiversity databases and information systems and no mechanism for coordination between departments.

2) Inadequate data management capacity: The construction of databases still has quite a number of gaps; data processing varies in format and norm; and gaps are great in software development, facility arrangement and professional skills.

3) Lack of information sharing platforms: Channels for information and communication are not expedited between institutions and between departments; and neither is the exchange of information between countries.

3.10.3 Needs

1) Strengthen integrated coordination: On the platform of national Biodiversity CHM, necessary integration and coordination should be carried out of all the existing biodiversity databases, such as cataloguing, networking, etc., so as to make this information fully available for utilization and sharing. Based on the assessment of the existing databases, it is necessary to identify gaps and study and establish new databases and information systems.

2) Lay down a national plan for management of biodiversity data: It is essential to intensify coordination and cooperation based on division of work between departments, between research institutes and between governmental departments and research institutions. Through signing cooperation agreements, a uniform format and a national network system should be worked out for biodiversity information sharing.

3) Set up a national biodiversity basic information management system: By means computer technology, database technology and GIS plus RS (remote sensing) technology, the grid data of images of bio-species and specimens, vector data of the digital maps, bio-informatic data, biodiversity data, and biota data should be integrated eventually into a multi-scaled, multi-sourced national comprehensive biodiversity information administration system, which will be built as an important component of the global information system.

4) Make full use of the available biodiversity information systems: The CBIS set up by the Chinese Academy of Sciences has laid down a sound basis. Participants of the CBIS set up and maintain their databases in line with the uniform principle for data administration, and realize data sharing based on the “CBIS Data Sharing Agreement”. The CBIS has also signed agreements separately with outside institutions or individuals for data exchange and parts of its data and information are also kept accessible to users in society through the Internet.

3.11 Assessment of needs of local governments for capacity building

3.11.1 Status

The key as to whether China will succeed or not in biodiversity conservation lies in the biodiversity conservation capacities of her local governments. As is compared with the central government, the local governments are far too much lower in capacity. Many places do not even have basic facilities. Weak local capacity has in effect become the major bottleneck of China in implementing the “Convention on Biological Diversity”.

1) Weak local capacity in constituting rules, policies and systems: The currently available laws, bylaws, strategies, policies, systems, projects, plans and programs have all been worked out with the central government and various administrations dominant and the local governments as dependents. Though local governments are entitled to legislate, most provinces have not had any system of site-specific laws, but rather follow the central government or at most work out same practical local approaches to implementation of the central policies and regulations.

2) Lack of initiativeness of the local governments in biodiversity conservation: The local governments have to concentrate their minds on development of the economy and pursuance of their respective GDP targets. environmental protection often has to follow the needs of economic development without any initiative. Although the environmental protection, agriculture, forestry and oceanography departments of the central government have the functions to guide their respective subordinate departments at the province level in professional business, these departments at the province level are only responsible to their respective local governments, rather than the central respective administrations in charge. Thus the local governments often observe or execute policies and bylaws of the central government with some discount, while the administrations in charge of the central government can often do nothing about it.

3) Local governments often with limited finance and financing capacity: In comparison with the central government, local governments are short of funds for environmental protection and hardly capable of launching large-scaled biodiversity conservation projects. For instance, the Yunnan Provincial EPB (environmental protection bureau) has only 30 million yuan earmarked annually as special funds for environmental protection, and only about 10% of the earmarked funds are allocated for biodiversity conservation and will have to cover the salaries of the employees and operational expenses in the several nature reserves charged by EPB. The forestry department of Yunnan Province has under its administration 141 nature reserves (2.95 million ha), staffed with 4300 employees for their management. Each person shares on average less than 20,000 yuan in funds, which includes their salaries. The total sci-tech input of the province is only 250 million yuan annually, a large proportion of which is used in developing new and higher technology and only about 10% in doing basic research and applied research on biodiversity. And most of the research projects are very small and have funds in the range of 100,000 yuan. For basic research, the province has only 16 million yuan annually, but the funds the province can obtain from the National Natural Foundations alone can reach over 20 million yuan, which indicates that the local governments are way below the central government in terms of funding.

4) Limited human resources in the local and grassroots institutions: In recent years, the nation has rapidly developed its higher education and turns out plenty of college and university graduates annually, transferring new blood to the local grassroots biodiversity conservation institutions, like nature reserves, and basically solving the problem of shortage of manpower confronting grassroots institutions for years. But generally speaking, in effect, the problem of human resources remains unsolved. First of all, the staff in the local grassroots institutions are

quite low in level. The institutions at and above the provincial level have enrolled a large number of masters and doctors, whereas those at the grassroots level can only have bachelors or graduates from junior colleges; secondly, the former are higher in the ratio of experienced and skilled experts or technologists, whereas the latter are low and young graduates who are commonly lacking experience. So the grassroots institutions are still universally confronted with the problem of shortage of human resources.

5) Heavier biodiversity conservation burden for local governments: The rising number of nature reserves means a rise in financial burden for local governments. The administrations in charge in the central government are only responsible for investing in the capital construction of national level nature reserves, while the local governments have to bear the costs for management and maintenance of the national nature reserves plus all the costs for building and keeping up provincial (or below) nature reserves. For instance, Yunnan Province has to invest 50 – 60 million yuan in construction and management of nature reserves annually, while the central government appropriates only about 20 million yuan. Besides, the government will have to prepare a large sum of funds for poverty eradication and compensation for damage by wild animals to the communities in the vicinity of those nature reserves. Recently in Yunnan, wild animals, like elephants, wild boars, black bears, etc. have increased in populations and sphere of activities, which has led to 14 fatalities and over 60 injuries in the past 5 years. They also damage crops, causing economic losses, totaling 70 million yuan annually. This is a heavy burden to the local communities and local government. As a result, some communities and local residents show increasing discontent with the set up of nature reserves.

3.11.2 Bottlenecks

1) Limited power but too much responsibility for the local governments: Quite a number of good policies from the central government cannot be fully executed, leading to half-hearted biodiversity conservation in some local regions. There are a lot of problems with the coordination between local governments and the central government. For instance, in policy constitution, revenue distribution, management capacity, financial input, etc., the former share a much heavier burden than the latter, especially regions rich in biodiversity, who have to shoulder more responsibility in biodiversity conservation for the nation and even for the world, despite their limited management capacity.

2) Financial difficulties with the local governments: Biodiversity-rich provinces of the country are mostly located in its southwestern part. As the coastal regions in East China are already highly developed, nature reserves are scattered mostly in the central and western parts of the country. However, the provinces in the central and western parts are mostly not so developed and have to concentrate on economic development, which will inevitably lead to inadequate attention paid to biodiversity conservation, difficulty in funds for biodiversity conservation, and low capacity of organizing large-scaled nature reserve projects.

3) Shortage of human resources at the grassroots level: Graduates with higher educational backgrounds and senior professionals and experts are relatively concentrated in large cities and coastal regions in East China which are economically relatively well developed. The central and western parts of the country are much lower in economic condition and salaries, which are not attractive to senior talents. In regions with hard living conditions, the shortage of professionals and managerial experts is especially prominent.

4) Incomplete institutional framework at the grassroots level: The environmental protection departments at the county level or below concentrate mainly on pollution control and do little on conservation of the ecology. So they usually do not have such special organizations. Nature reserves at the municipal or county level often lack special administration agents and some even have no full-time employees. Departments in charge below the provincial level often lack forceful supporters and their capacity of carrying out research, monitoring and information handling is low.

3.11.3 Needs

1) Local governments should set up a coordinating organization for biodiversity conservation: Currently, at the central level, coordination mechanisms have been set up between departments, e.g. inter-ministerial joint conference system, CBD implementation coordination group, etc. But it is quite rare at the provincial level. Only in a few provinces, like Yunnan, biodiversity committees have been formed of related departments and bureaus with the provincial environmental protection bureau in the lead, and in most provinces no such mechanism could be found. In some provinces with such mechanism, however, activities are seldom organized. Whatsoever, biodiversity coordination organizations at the provincial level should contribute positively to constitution of strategies and action plans for biodiversity conservation at the provincial level.

2) Local governments need to build up their capacity in constituting local policies, regulations and systems: Local governments can not fully rely on the central government for policy and should bring their own initiative and enthusiasm into full play. Under the principle guidance of the policies of the central government, and in light of the local situation, the local governments should work out truly practical policies, regulations and measures, e.g. ecological compensation system, subsidies to forest ecological benefit, etc.. They may also adopt site-specific participatory condominiums for nature reserves and formulate policies combining poverty-alleviation with construction of nature reserves.

3) The central government should support local governments financially: As local governments are not capable of developing large-scaled biodiversity projects, the administrations in charge of the central government, such as the SEPA and State Forestry Administration, should help the local agencies with their capacity building by implementing some large-scaled projects in the regions. In addition, they should also share some financial burdens for the local economy, e.g. to cover all input in national nature reserves, provide some financial support to the provincial nature reserves, bear the economic compensation resulting from damage by wild animals, etc.

4) Local governments should constitute economic incentive policies to encourage high-level experts to work at grassroots. It is advisable to create preferential conditions to encourage graduates of higher educational background and senior professionals to work in Central and West China and at grassroots. Meanwhile the local governments should also pay attention to training and fostering professionals at grassroots institutions, and sending outstanding employees to universities or colleges or abroad for pursuance of higher educational degrees.

6) Local governments should build up their own technical support capacity: environmental protection, agriculture, and forestry departments of the government at the provincial level or below should build up their own technical support systems. Besides establishing their own research and monitoring teams, they should set up long-term cooperative relationship with related colleges and universities and research institutes, seeking technical support.

3.12 Assessment of needs of NGOs for capacity building

3.12.1 International NGOs

1) Status and characteristics of their capacities:

The capacities of the international NGOs working in China are characterized as:

i) With international background: These organizations are all well organized institutionally, generally long in history, rich in experience accumulated in other countries, and quite influential in the world. For instance, TNC is the largest NGO devoted to nature conservation in the USA and has a long history of 54 years; WWF has offices in many countries in the world and a history of 50 years as well; and the Green Peace has offices in over 30 countries and a history of 32 years. .

ii) With abundant capital: TNC raises as much as 1 billion \$US annually and its budget for China projects in 2004 reached 3 million \$US; WWF *per se* is a foundation organization and its budget for China projects in 2004 reached 5 million \$US; and even Green Peace that raises funds by individual donations never has financial problems and its budget for projects in the mainland and Hong Kong of China also reaches 20 million Hong Kong dollars a year.

iii) With rich human resources: As international NGOs pay well, they can easily enroll persons with high quality. These organizations have more than half of their posts staffed with young Chinese who have returned from study overseas. They have some working experience in western countries, good language ability, active thinking, ideals, devotion and dedication to public welfare undertaking.

2) Bottlenecks

i) Politically they do not have communication channels with the government: The government does not pay much attention to NGOs, which have no normal channels and mechanism available for participation in decision-making of the government; they understand that the Chinese government is not so transparent, find it difficult to acquire information and often bump on the wall of confidentiality. In their cooperation with departments, they would find it hard to balance their relationship with these departments and that the local governments are rather weak in cooperation capacity.

ii) Their development in organization is restricted: As it is hard for them to find an administration in charge to affiliate to in operation, they can not register for smooth operation, thus affecting normal operation of the organization. According to the laws of China, they can not directly raise funds in China. So even if some foreign invested enterprises are ready to donate, they can not find any proper channels to make the donation and will have to address the donation to the head office of the organization in another country. Then the head office allocates it to the office in China. The NGOs can not develop their membership and even if there are Chinese who are willing to join, they are not allowed to accept.

3) Needs in capacity building

i) It is expected the state will promulgate related laws to normalize registration, fund raising, activities and management of international NGOs;

ii) International NGOs should intensify communication between themselves to make full use of limited fund resources. They should also improve their affinity with domestic NGOs;

iii) International NGOs are not familiar with the situation of the country. Though they have their

staff localized, it takes time for the large number of new employees to learn local procedures.

3.12.2 Domestic NGOs

1) Status and characteristics of their capacities

i) **Late initiation, but fast development:** China now has about 2000 grassroots NGOs of all types on environmental protection, but their development in membership is somewhat restricted;

ii) **Unstandardized management:** Most of the domestic NGOs have not yet formally registered, and many have no affiliation. Their activities are not regularized or standardized;

iii) **Lack of stable financial sources:** They depend mainly on donations from foundations abroad

iv) **Limited activities:** Their activities or projects are rather limited and often inconsistent with the orientation of the government policies. So they do not have much influence on government decision-making.

2) Bottleneck

i) They have difficulties in raising funds and the channels for doing that are not expedited. Without the support of foreign foundations, they would not have kept on operating;

ii) They do not have any normal mechanism to hold dialogue with the government and their activities and suggestions can little arouse attention of the government;

iii) Before problems like registration with their institutional construction are really solved, their development is restricted.

3) Needs

i) The government should release as soon as possible laws and bylaws for management of NGOs to solve problems like their registration and normalize their management;

ii) The government should provide them with policies, enabling them to raise funds and break away from reliance on foreign donations, so as to ensure normal operation of the NGOs;

iii) The government should provide channels for NGOs to improve communication with related governmental administrations. And the NGOs should also intensify their contact with mainstream scientists to seek for more scientific support;

iv) They should set up platforms to intensify communication and network contacts with international and other domestic NGOs.

Chapter IV Priority fields and priority actions in capacity building

Priority field 1: Construction of biodiversity conservation related policies, laws, regulations and institutions

Priority actions:

1. Study connotations of the human-based philosophy of comprehensive, harmonious, sustainable

- scientific development and their relationship with biodiversity conservation;
2. Fully review the current biodiversity-related policies and legal system and establish new legal and policy systems;
 3. Study and establish national policies and laws that will run on the same track as the CBD;
 4. Revise “China National Strategy and Action Plan for Biodiversity Conservation”;
 5. Study ecological compensation systems and incentive policies for biodiversity conservation and have them popularized;
 6. Study how to include biodiversity conservation into national and local national economic and social development plans;
 7. Study and compile national programs of conservation and use of bio-species resources;
 8. Evaluate current mechanisms and consolidate mechanisms for coordination between CBD implementation departments at the state and local levels;
 9. Assessment of needs and intensify capacity building of the institutions involved in conservation, research, monitoring and management of biodiversity;
 10. Study and compile biodiversity-conservation-related technical norm systems and technical criteria and guidelines.

Priority field 2: Biodiversity identification, inventory and monitoring

Priority Actions:

1. Investigate and catalogue bio-resources in key regions, such as the limestone regions in Southwest China, the Qing-Zang Plateau, and arid and semi-arid regions;
2. Investigate and catalogue aquatic-resources countrywide, especially the fresh water aquatic resources in the west areas of China;
3. Investigate and collect for preservation germplasm resources of agricultural crops, domesticated animals, and aquatic fishes;
4. Investigate and catalogue the distribution sites and stock sizes for wild agricultural plant resources;
5. Investigate status of the protection of wild animals and plants under priority protection of the state;
6. Investigate and catalogue microbial resources countrywide and status of their preservation;
7. Investigate and collect for preservation medicinal bio-resources countrywide;
8. Construction and maintenance of the monitoring systems of the forest, grassland, wetland, desert and marine ecosystems;
9. Construction and maintenance of the biodiversity monitoring network systems of the nature reserves nationwide;
10. Construction and maintenance of the monitoring systems of key bio-species resources nationwide, especially those of the fresh water aquatic resources and their ecosystems.

Priority field 3: *In-situ* conservation of biodiversity

Priority actions:

1. Compile and consolidate national planning for nature reserves, coordinate various types of nature reserve development planning and consolidate biodiversity *in-situ* protection network systems;
2. Fully review functions and effects of the existing nature reserves and readjust, reorganize and

- plan the types, levels and disposition of nature reserves;
3. Compile biodiversity conservation planning for *in-situ* conservation in the facilities of tourist scenic spots, forest parks, etc.;
 4. Make over planning for and establish *in-situ* conservation zones and sites for agricultural wild plants nationwide;
 5. Draft and promulgate “Law for Nature Reserves”, constitute various regulations and specified rules as supplement to the Law, and study and compile standards, technical criteria and guidelines for management of nature reserves;
 6. Set up training systems for managerial personnel of the nature reserves and permanent training facilities; establish nature reserve management colleges in related universities, offer special courses on nature reserves in the related universities and colleges, and set up regional nature reserve management training centers;
 7. Compile plans for construction and management of nature reserves in key provinces, and carry out community development demonstration projects in the neighborhood of key nature reserves;
 8. Work out conservation planning for biodiversity outside the nature reserves, including setting up ecological function zones and ecological demonstration zones in ecologically fragile zones, and carry out ecological restoration projects;
 9. Carry out wetland conservation engineering projects, and work out and implement restoration plans for typical habitats and ecosystems, like lakes, estuaries, bays, coastal wetlands, mangrove forests, coral reefs, seaweed beds, etc.;
 10. Strengthen biodiversity conservation in the Qing-Zang Plateau, and intensify capacity building for management of national nature reserves like Qiangtang, Keke Xili, Shanjiangyuan, Arjin maintains, etc..
 11. Enhance the biodiversity protection in Southwest China, especially in Yunnan Province.

Priority field 4: *Ex-situ* conservation of biodiversity

Priority actions:

1. Overall evaluate construction of various *ex situ* conservation facilities countrywide and their functions and improve quality of the management of the *ex-situ* conservation facilities;
2. Investigate and catalogue species and stock sizes of the plants and animals protected in introduction and breeding facilities like botanic gardens and zoos;
3. Compile national plans for development of biodiversity *ex situ* conservation facilities and consolidate the national biodiversity *ex-situ* conservation network system;
4. Build up 3 – 5 regional wild plant, wild animal and microbe germplasm resources banks countrywide, build up and consolidate *in-vitro* preservation facilities for animal, poultry and aquatic germplasm resources, and build up 3 – 4 extra-large botanic gardens in the country;
5. Intensify capacity building of *ex situ* conservation facilities, like botanic gardens and zoos countrywide, including public education facilities, and public common scientific knowledge popularization facilities, like urban botanic gardens and zoos in medium- and small-sized cities;
6. Reinforce the research capacity of *ex situ* conservation facilities, intensify research on artificial breeding of rare and endangered species, and build up research teams;
7. consolidate and maintain agricultural crop germplasm resources banks, form a national

- complete set of preservation system, build up 5 – 8 new national crop germplasm resources nurseries and 8 – 10 new regional agricultural crop germplasm resources banks for mid-term preservation, intensify research on protection of core germplasms and exploitation of eximious genes, and consolidate and maintain agricultural crop germplasm resources databases and information systems;
8. Carry out experiments and research on wild reintroduction of artificially bred rare and endangered species;
 9. Set up a group of breeding and rescue centers for rare and endangered aquatics in offshore regions, rivers and lakes, and carry out proliferation and release of bred rare and endangered aquatics and key economic fishes;
 10. Keep on developing cooperation on exchange of and research on species with foreign botanic gardens and zoos, and organize investigations abroad on germplasm resources and introduction of eximious germplasm resources from abroad.

Priority field 5: GMOs biosafety management

Priority actions:

1. Study and draft “Law for Biosafety of GMOs” and related regulations, standards, criteria and guidelines;
2. consolidate the labeling system for GMOs and products thereof and establish coordination mechanism between related departments;
3. Constantly carry out inspection of enforcement of the regulations for biosafety management, and establish mechanisms for supervision of law enforcement;
4. Set up a group of national key laboratories for biosafety assessment and detection of GMOs;
5. Build up GMO (transgenic cotton, rice, poplar, etc.) outdoor risk monitoring systems and facilities;
6. Keep on studying risks of various GMOs and approaches to their risk management, and build up research teams;
7. Carry out public publicity and education of biosafety and build up mechanism for public participation in decision-making for GMO environmental releases;
8. Set up biosafety national liaison offices and biosafety information clearing-house, and equip them with necessary instruments and facilities.

Priority field 6: Management and control of invasive alien species

Priority actions:

1. Study and constitute special laws and related technical standards and guidelines for control of invasive alien species;
2. Establish a complete import and export commodity inspection and quarantine system, and study and work out laws and management systems for control of invasive alien species;
3. Establish risk pre-assessment mechanism for introduction of invasive alien species, and set up monitoring systems and early-warning mechanism for hazards of invasive alien species;
4. Comprehensively review distribution, number of incidence and hazards of major invasive alien species countrywide, build up invasive alien species databases, and track and monitor their generation and development;
5. Carry out research on genesis, proliferation, hazards and control mechanism of invasive alien

- species like crofton weed, mile-a-minute weed, ragweed and Canada goldenrod (*Solidago canadensis* L.), and carry out research on their chemical, biological and physical control techniques;
- 6 Carry out system research on genetic mechanisms, biological properties, and ecological properties of invasive alien species and comprehensive exploitation of their biomass;
 7. Carry out publicity and education of common scientific knowledge about genesis, hazards and control of invasive alien species, mobilize the masses to take positive measures to prevent and get rid of invasive alien species and carry out demonstrations of comprehensive control in provinces, cities, or counties where hazard of invasive alien species is serious;
 8. Formulate plans for safe management of ballast water, and carry out effective management and control of intrusion of hazardous pests and pathogens along with ballast water and sediments.

Priority field 7: Access to and benefit sharing of genetic resources and traditional knowledge

Priority actions:

1. Study and draft “Regulation for protection of biological genetic resources” that should have specific stipulations for access to and benefit sharing of genetic resources;
2. Set up related systems for access to and benefit sharing of genetic resources and traditional knowledge and establish customs inspection systems;
3. Investigate and catalogue baseline of genetic resources of all types, especially outflow of species and genetic resources and their utilization and benefits abroad;
4. Investigate, collate and catalogue traditional knowledge of all types countrywide, especially traditional medicines and knowledge, e.g. Tibetan and Mongolian medicines, and investigate systematically traditional knowledge, innovations and practices related to conservation and sustainable use of biodiversity in the minority regions;
5. Study and constitute patent policies and systems for protection of traditional knowledge rights;
6. Study principles of the “Bonn Guidelines” and set up demonstrations for implementation of the Guidelines;
7. Study and build up mechanism for handling businesses related to access of genetic resources and benefit sharing, including establishment of national liaison offices and information clearing-houses;
8. Extensively carry out publicity and education activities on protection of bio-species and genetic resources, and improve the awareness of protection of bio-species and genetic resources among the scientific and technical workers and grassroots masses;
9. Assist related administrations in maintaining nationwide inspection of law enforcement of protection of species and genetic resources;
10. Actively take part in negotiations on establishment of international systems of access of genetic resources and traditional knowledge as is specified in the “Convention on Biological Diversity”.

Priority field 8: Scientific research, human power and technology transfer

Priority actions:

1. Carry on basic research on biodiversity, increase intensity of support mainly to investigation and cataloguing of biodiversity resources; investigation of rare and endangered species, basic research on conservation biology, and research on effect of climatic change on biodiversity;
2. Intensify research on development and application of techniques for protection and sustainable use of biodiversity, especially research on technology on restoration and rebuilding of ecosystems, research on techniques for artificial breeding of rare and endangered species, research on techniques for preservation of agricultural germplasm resources, research on identification and exploitation of gene resources, research on techniques for proliferation and artificial release of fishery resources, etc.;
3. Intensively to carry out research on policies, e.g. ecological compensation policies, nature reserve management policies, community development policies, grain for green policies, bio-resources sustainable exploitation policies, biodiversity conservation related economic incentive policies, etc.;
4. Have related administrations work out plans for cultivating post-graduate students in some traditional disciplines, like biological taxonomy, bio-geography, ecology, and turn out large numbers of talented personnel so as to meet the urgent need for talent and professionals in these fields;
5. Cultivate senior managers for management of bio-resources;
6. Carry out investigations on status of technical transferring, and advanced and practical techniques for protection and sustainable use of biodiversity, and prioritise lists of technologies that need to be transferred from developed countries, so as to get prepared for inter-governmental negotiations on Article 16 of the CBD;
7. Intensify construction of research institutes, including construction of infrastructure and capacity building for scientific research, building up of centers and key laboratories of all types for research on protection of biodiversity, and establishment of institutions for research on policies for biodiversity conservation, so as to provide technical support to the decision-makers.

Priority field 9: Publicity, education and public participation

Priority actions:

1. Compile and implement biodiversity publicity and education plans, including education plans for teenager students;
2. Cooperate with the media and propaganda departments in working out propaganda plans for environmental protection and biodiversity conservation, open up new channels, columns and other means for production of video products with biodiversity as theme;
3. Set up facilities for publicity of biodiversity in nature reserves, botanic gardens, zoos, museums and exhibitions;
4. Organize teams of volunteer environmental protectionists to carry out publicity and education on biodiversity for the broad masses in the rural areas;
5. Work out training plans to intensify professional training and popularization of common scientific knowledge, especially people at the decision-making level;
6. Study and establish a system for the government to have public consultation and public hearings in making decisions related to biodiversity;
7. Study public participation policies and mechanism and set up demonstrations of public

- participation in biodiversity conservation at the grassroots level;
8. Study mechanisms encouraging enterprises to participate in biodiversity conservation.

Priority field 10: Data management and information exchange

Priority actions:

1. Build up and consolidate a national biodiversity information network system and reinforce construction of departmental sub-centers and grassroots information nodes, so as to form a national authoritative super information network system;
2. Intensify biodiversity data administration and build up and consolidate databases of all types;
3. Build up national biodiversity information network platform so as to promote information exchange and sharing;
4. Establish national biodiversity CHM and sharing mechanism, compile national planning for biodiversity data management, plans and agreements for information sharing, develop uniform formats, and coordinate the use of databases existing in various departments and institutions;
5. Strengthen and maintain the “National biodiversity CHM”, build up branch information clearing-houses, like genetic resources access and benefit sharing information clearing-house, technology transfer information clearing-house, GMO biosafety information clearing-house, invasive alien species information clearing-house, etc.;
6. Set up stable conditions for expediting channels of information exchange with international information clearing-house of the CBD Secretariat so as to implement corresponding international obligations.

Priority field 11: Capacity building for Local governments

Priority actions:

1. Establish a responsibility system for the administrations in charge of the central government and local governments, including coordination and division of responsibility in the field biodiversity conservation;
2. Help local governments to formulate site-specific bylaws, policies and regulations for biodiversity conservation;
3. Establish coordination mechanisms for biodiversity conservation at the provincial level and work out provincial level strategies and action plans for biodiversity conservation;
4. Study and formulate provincial plans for biodiversity conservation and development of provincial nature reserves;
5. Work out plans for introduction and training of senior professionals and experts in biodiversity;
6. Carry out demonstration projects combining development of communities of nature reserves with poverty alleviation projects;
7. Support local governments to build up their own technical supporting capacity (including research, monitoring and information, etc.);
8. Perfect institutional construction of grassroots biodiversity conservation organizations and reinforce their capacity building.

Priority field 12: Capacity building of NGOs

Priority actions: :

1. Study and constitute policies and laws for management of environmental NGOs and guide and normalize NGOs projects and activities;
2. Establish mechanism for normal communication between the government and NGOs and study mechanisms for NGOs participation in government policy-making;
3. Investigate numbers, institutional frameworks, effects and results of their projects, trends, roles and potential influence of NGOs in China
4. Study potential capacity of NGOs in the field biodiversity conservation and approaches to addressing the needs of NGOs such as registration, fund raising, etc.;
5. Set up corresponding administrations in related departments for NGOs affairs and intensify capacity building of these administrations.

Appendix 1

China Biodiversity Conservation National Capacity Self-Assessment Report

Sub-project Steering Agency:
CBD Implementation Office, SEPA

Sub-project Executing Institution:
Foreign Cooperation Center for Environmental Protection, SEPA

List of Experts of the Drafting Team

Team leader: XUE Dayuan

Team members:

YANG Qingwen, Crop Science Institutes, Chinese Academy of Agricultural Sciences (nominated by the Ministry of Agriculture)
LI Diqiang, Chinese Academy of Forestry Sciences (nominated by the State Forestry Administration)
CUI Guofa, Beijing Forestry University (nominated by the State Forestry Administration)
ZHAO Shiwei, Beijing Botanic Garden ((nominated by the Ministry of Construction)
MA Minghui, State Marine Environment Monitoring Center (nominated by the State Oceanography Administration)
ZHANG Zhixiang, Beijing Forestry University (nominated by the Ministry of Education)
MA Keping, Botany Institutes, Chinese Academy of Sciences (nominated by the Chinese Academy of Sciences)
Qin Haining, Botany Institutes, Chinese Academy of Sciences (nominated by the Chinese Academy of Sciences)
WANG Jie, CBD Implementation Office, SEPA (nominated by SEPA)
XUE Dayuan, Nanjing Institutes of Environmental Sciences, SEPA (nominated by SEPA)

Chief drafter of the report: XUE Dayuan