Reports of National Capacity Self-assessment for China’s Implementing International Environmental Conventions

Edited by Project Management Office of GEF/UNDP National Capacity Self-assessment for China’s Implementing International Environmental Conventions
Preface

The National Capacity Self-Assessment (NCSA) is funded by the Global Environmental Facility (GEF) and is aimed at assisting countries to assess their priority national capacity for Multilateral Environmental Agreements (MEAs). These MEAs include the United Nations Framework Convention for Climate Change (UNFCCC), United Nations Convention for Biodiversity (UNCBD), and United Nations Convention to Combat Land Degradation (UNCCD). The NCSA is unique in that it promotes synergy among the three MEAs. Through the self-assessment, countries will identify capacity gaps and then come up with their own solutions to rectify these gaps. There are more than 100 countries around the world to support the implementation of the NCSA at various different stages.

China faces with the challenge of increasing loss of renewable natural resources, land degradation, water shortage and conflict between demand and supply of energy in the process of rapid economic development. The NCSA represented the first important step in national efforts to develop capacity for implementing the MEAs.

On March 5, 2004, the Planning Workshop for Chinese UNDP/GEF National Capacity Needs Self Assessment for Global Environment Management Project (NCSA) took place in Debao Hotel, Beijing, marking an official start-up of the project. In this project, GEF granted US$ 200,000 and Chinese Government Contributed US$17,000 as co-financing.

As the GEF Operational Focal Point, NCSA project is the first GEF project directly executed by Ministry of Finance (MOF) and managed by China GEF Office which was jointly established by MOF and the State Environment Protection Administration (SEPA). China GEF Office provided all logistical support to the project and facilitates the work of the National Project Coordinator and International Expert. The Project Management Office was located in the China GEF Office. Office Director and support staff were provided by MOF and convention focal points (UNFCCC, UNCBD and UNCCD). As implementing agency, UNDP provided support and guidance to the day-to-day management of the project.

The Coordination Committee consisting of MOF, the State Development Planning Committee (SDPC), SEPA, State Forestry Administration (SFA) and the three Convention Focal Points were established, responsible for approving project work plans, approving and disseminating major project outputs and integrating this project activities with related nationally-funded activities. Major outputs shared for the Committee members’ review and comments.

The Expert Advisory Group (EAG) provided on-going scientific and technical support to the project. The three Convention Focal Points identify the members of the EAG. The EAG was consulted throughout the duration of the project, and all project outputs were shared with the EAG for its comments.
The project built linkages with national priority goals, previous and on-going activities, and decision and provisions of relevant conventions related with capacity needs assessment. The objective of the assessment in China included: 1) to identify, confirm and review priority issues for action within the thematic areas of biodiversity, climate change and desertification/land degradation, respectively, 2) to explore related capacity needs within and across the three thematic areas, 3) to catalyze targeted and coordinated action and requests for future external funding and assistance, 4) to link country action to broader environmental management and sustainable development framework. The outcomes of the assessment will contribute to the overall goal of sustainable development in China.

The NCSA project in China included four subcontracts: three subcontracts in biodiversity, climate change and desertification fields and a subcontract in the crosscutting field. The products of the four subcontracts were four national reports.

In order to ensure that the status and needs of capacity building in China were fully and accurately embodied in the reports, China government emphasized the leading role of three convention focal points in the process of assessment and importance for the assessment to use existing negotiation and implementation mechanisms of UNFCCC, UNCBD and UNCCD in China. So under the guidance of three National committee for the Implementation of conventions, the three subcontracts progressed their work and the three subcontracts reports (Biodiversity, climate change and desertification fields) were modified and refined several times according to the opinions of stake holders. Then the crosscutting report was produced based on the other three national reports on the three fields.
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Edited by Project Management Office of GEF/UNDP National Capacity Self-assessment for China’s Implementing International Environmental Conventions

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Part I

National Capacity Self-Assessment for Implementing UNCBD
Reports of National Capacity Self-assessment for China’s Implementing International Environmental Conventions
1 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 500 m² in area.
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 3,984 genera and 518 families, accounting for 11.2%, 63.2% and 28.3%, respectively, of that of the earth (Table 1.1). China has a total of 6,347 species of vertebrates, 1,244 species of birds, and 3,862 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>
<thead>
<tr>
<th>Plant group</th>
<th>Family China</th>
<th>World</th>
<th>Genus China</th>
<th>World</th>
<th>Species China</th>
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<td>Bryophyte</td>
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<td>560</td>
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<td>Pteridophyta</td>
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<td>12,500</td>
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<tr>
<td>Total</td>
<td>518</td>
<td>819</td>
<td>3,984</td>
<td>14,072</td>
<td>33,209</td>
<td>295,850</td>
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</table>

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 cultivated plants in the world. So China has long been famous as “Mother of Gardens” of the world. In China’s more than 7,000 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 spe-
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 10,211 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 over-stocking, 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 1,182 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 10,000 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 artemisifolia 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 to 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 to 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 Kula 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 Oceanog-
raphy 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 “Office of Biodiversity Conservation & 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.
2 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 “Frain-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, contracteed 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 the 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 charged 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 centres. 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


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 pollut-
ing 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.

2.2.2 Identification and monitoring of biodiversity

(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.

- 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 7,000 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 1,300 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.

- 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 1,110 or so in the previous investigation (1985—1988) to 1,590 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.

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.

● 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, 5,028 species of protista, 188 species of fungi, 1,203 species of plantage, and 13,630 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) 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 2,000 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.
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.

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.

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 2,553 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 1,538 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 m$^3$/a 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, thickskep 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 exploi-
tation 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 Kunmin Botanic Garden has collected 5,000 species; the South China Botanic Garden, about 8,000 species; the Xi-shuang-ban-na 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 6,546 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, girafe, 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 1,193 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 6,316 kinds (or strains) of various culture gathered and stored in its subordinate banks, totaling 21,644 pieces, including 15,929 strains of bacteria, 350 strains of protozoans, 2,274 genes and gene elements, 504 cell cultures of wild anima, 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


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”. 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. On April 27, 2005, the state Comril ratified Cartagena Protocol on Biosafety, and became the 120th Party to the Protocol since sep.6, 2005.

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 upsurging 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 4,000 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 1,475 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 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 system. The system encompasses 180 kinds of crops and 380,000 accessions of genetic resources, including 1,600 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 culti-
vation 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 polices, 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 at-
tention 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 by laws 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, indepently-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..

   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 6,500 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 8,000 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). 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 US$. And in recent years, its input seems to be rising. In 2004 its budget for China projects reached 5 million US$. 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 5,000 $US. 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 2,000, 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 1,500 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 entelope; 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.

- **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 agropastoralists in Northwest Yunnan; Eco-cultural tourism in Jisha Village, Diqin Prefecture; Support of indigenous knowledge for the use and conservation of biodiversity; community education; etc.

- **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 1,424 farmer households have benefited from the foundation.

- **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 $US/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.

- **“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.

- **“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.

- **“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 Safegurds”. 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


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 ef-
fects 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

- China Biodiversity Conservation Action 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 690,000 $US. 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.

- 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 400,000 $US, 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.

- Biodiversity Data Management and Information Networking Capacity Building
  This was a pilot project of the UNEP/GEF with 280,000$US 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.

● 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 360,000 $US 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.

● 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 $US. 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.

● 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 $US. 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.
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

● 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 condominium and set up the Changqing Giant Panda Nature Reserve.

● 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 $US, 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 allover the country to improve their own management.

- 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 $US, 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 Ruoergai 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 $US; 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 $US; 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 $US.

GEF also approved the project of “Lop Nur Nature Sanctuary Biodiversity Conservation” in October 1998 with a grant of 725,000 $US, 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 $US; 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.
3 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:

- 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.

- 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.

- **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.

- **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:

- **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.

- **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.

- **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.

- **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.

- 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.

- 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.

- 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...
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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 1,999, covering 14.4% of the country’s total in land area. When the 677 tourist scenic spots and over 1,000 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 1,538 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, 2,992 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 condominia, 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 institutes “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 3,000~5,000 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 precautious 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 “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 of Transgenic Organisms”.

(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 bio-technical 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 standardised, 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 sys-
tems 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 field 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
● 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.
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.

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”.

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

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.

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
   • 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.
   • 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
   • 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.
   • 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, botanical 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, botanical 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 of 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 4,300 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 condominia 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.

(5) 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:

● 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.

● With abundant capital: TNC raises as much as 1 billion SUS annually and its budget for China projects in 2004 reached 3 million SUS; WWF per se is a foundation organization and its budget for China projects in 2004 reached 5 million SUS; 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.

● 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

- 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.

- 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

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

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

- 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

- Late initiation, but fast development: China now has about 2,000 grassroots NGOs of all types on environmental protection, but their development in membership is somewhat restricted;

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

- Lack of stable financial sources: They depend mainly on donations from foundations abroad

- 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

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

(3) Needs

- 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.
- 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.
- 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.
- They should set up platforms to intensify communication and network contacts with international and other domestic NGOs.
4 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 sports, 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;
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;

Carry out system research on genetic mechanisms, biological properties, and ecological properties of invasive alien species and comprehensive exploitation of their biomass;

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;

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;

③ Assist related administrations in maintaining nationwide inspection of law enforce-
ment of protection of species and genetic resources;

④ 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 Bio-
logical 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 rebuild-
ing 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 technolo-
gies 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.
Part II

National Capacity Needs Self-assessment for Implementing UNFCCC
1 Introduction

1.1 Background

The capacity building for developing countries is a key component of the United Nations Framework Convention on Climate Change (the Convention) and the Kyoto Protocol (the Protocol). Both Article 9 of the Convention and the 10(e) of the Protocol address the issue of capacity building. Since the independent review of capacity building for developing countries in the 11th SB meeting of the Convention and the COP5, the capacity building for developing countries has been an outstanding issue of COPs and most of the SB meetings for special review and negotiation. In the 11/CP.5 of COP5, a comprehensive approach for solving the capacity building for developing countries has been proposed and the COP5 also stipulates that it is necessary to conduct a review on the capacity building of developing countries for implementing conventions, the demands and focus of capacity building and the coordination between Capacity Development Initiatives (CDI) of GEF and other related activities. It was under such circumstances that the National Capacity Self-assessment project was initiated by GEF and implemented by UNDP.

The ideas of COP5 were further detailized and optimized to be incorporated into the Decision 2/CP.7 of Marrakesh Accord. This Decision identifies the main areas of capacity building for developing countries and requests a comprehensive review on the implementation of this Decision. This report basically focuses on the above-mentioned areas of capacity building to conduct reviews and identification based on the review of the activities, and the demands and focus of such activities. This approach can help to conform the review of the demand of capacity building to related Decisions of COP.

1.2 Project significance and objectives

The implementation of this NCSA project has the following significance:

- The carrying out of the actions decided by Decisions of COP is contributive to the
effective implementation of the Convention;

- To provide a plan and information basis for more systematic, organized and focused
capacity building activities for developing countries, which is also a very important part for
the implementation of the Convention;

- To identify the demand and focus of the capacity building in China, which can be used
to guide such activities in China in the area of climate change funded by GEF acting as the
funding entity of the Convention, other multi-lateral and bilateral development agencies, and
also public and private entities.

The project objectives are as follows:

- To undertake reviews on the main capacity building activities in China, acquiring
lessons learnt and providing a benchmark for future similar activities;

- To identify the focus of capacity building to provide a guidance for the such activities
supported by related stakeholders;

- To propose basic strategy, guidance and action plan for the capacity building activities
in China in the near future.

1.3 Project organization

This project was initiated and funded by GEF, and UNDP was the international
implementing agency. The governmental coordination agency of China is the International
Department of Ministry of Finance, and the coordination agency for climate change project
is the Office of National Climate Change Coordination Committee of National Develop-
ment and Reform Commission (NDRC). A project team composed of representatives from
National Development and Reform Commission (NDRC), Ministry of Finance (MOF),
Ministry of Foreign Affairs (MFA), Ministry of Science & Technology (MOST), China
Meteorological Administration (CMA), State Environmental Protection Administration
(SEPA) and related experts was formed to be responsible for the project coordination and
management.

After a competitive tendering and bidding process, the Department of Environmental
Economy and Management of School of Environment & Natural Resources of Renmin Uni-
versity of China was selected as the project management entity. Meanwhile, experts from the
Energy Research Institute of National Development and Reform Commission (NDRC), Chi-
nese Academy of Sciences (CAS), Chinese Academy of Social Sciences (CASS), National
Climate Center, State Environmental Protection Administration (SEPA), Chinese Academy
of Agricultural Sciences (CAAS), and Tsinghua University were invited to participate in the
survey and writing of the report.
1.4 Structure of the report

This report consists of 4 chapters, among which the 1\textsuperscript{st} chapter is the project background, 2\textsuperscript{nd} chapter is an introduction to methodology, the 3\textsuperscript{rd} chapter is a comprehensive and systematic review of current capacity building activities, obstacles, current status, demand for capacity building and focal areas, and the 4\textsuperscript{th} chapter draws a conclusion of the report.
2 Methodologies

The methodology, employed in this project, is based on the consideration that representatives of different kinds of stakeholders should have adequate opportunities to express their needs and recommendations on capacity building activities in China. Communication was conducted with a broad range of stakeholder representatives. The investigation covers directly 61 institutions/organizations and 79 individuals. Officials at both national and provincial levels, in charge of economic planning, spatial economic development, management in energy, the environment, forest, water resources, and meteorology etc., were invited to participate in meetings and interviews. Managers and engineers from enterprises, as well as researchers from academic institutions were also interviewed. Representatives from associations of such industrial sectors as metallurgy, petrochemical industry, textiles and dyeing, chemical fibre, power, coal, etc., were also visited to listen to their comments. The communication was conducted in Beijing, Inner Mongolia Autonomous Region, Hunan Province, and Chongqing Municipality. In addition to meetings and interviews, questionnaires are also distributed and about 80 questionnaires were collected and analyzed. Based on the above samples and investigations, expert contributors in different areas were invited to analyze the collected information and compile the assessment report.

These expert authors cover such capacity building areas as (1) institutional and policy analysis, (2) enabling environment, (3) national communication and emission inventory, (4) national strategies/programs on climate change, (5) vulnerability and adaptation, (6) mitigation, (7) research and systematic observation, (8) development and transfer of technology, (9) Clean Development Mechanism, (10) education, training, and public awareness, and (11) database and information network. The assessment was also deployed within the above eleven areas.

With the GEF guidance, capacity is categorized at three levels: systemic, institutional, and individual. Although there is a difficulty in developing a set of indicators to reflect the current status of capacity and to assess effectiveness of capacity building activities, some indicators with available data, such as financial resources, scale and numbers of projects, relevant beneficiaries, covered areas, are also observed. A strategy to combine quantitative and qualitative analysis is introduced. The assessment of needs for capacity building in China to mitigate and adapt to climate change is mainly based on existing experiences and knowl-
Part II

National Capacity Needs Self-assessment for Implementing UNFCCC

The needs assessment process for climate change overviewed almost the relevant capacity building activities in China since the entry into force of the UNFCCC. Such capacity building activities could be classified into three categories based on the source of funding. They are the capacity building activities supported by multilateral organizations represented by GEF and UNDP, bilateral donors represented by some governments of developed countries, and the domestic funding from Chinese governmental departments. The previous capacity building activities, although not so sufficient, covered some areas in climate change such as edge from experts, as well as recommendations and opinions from the above mentioned investigated sample groups.

Figure 2.1 The Execution Flowchart of this project
institutional capacity, national communication, national strategy, evaluation on vulnerability and adaptation, development of Clean Development Mechanism (CDM) projects, and education/training and public awareness. However capacity building activities targeting at development and transfer of technologies, specific mitigation measures, research and systematic research, adaptation, human resources development, coordination and cooperation are relatively scarce and weak and need to be strengthened.

All in all, as a developing country, the capacity to deal with climate change in China is still very weak. The activities carrying-out are very initial, and huge gaps remain when compared to the capacities and capabilities requested by the implementation of the UNFCCC and the Kyoto Protocol.
3 Assessment of the Needs for Capacity Building

Since the Convention came into effect in 1994, and in particular the Marrakech Accord was agreed upon in 2001, a series of capacity building activities have been undertaken in China in response to climate change, covering a variety of climate change issues. Some of these activities have been completed while others are still in progress. Overall, capacity building has played a positive role in raising awareness and understanding issues related to climate change issues.

Based on Decision 2/CP7 in the Marrakech Accord, this report follows the classifications with respect to the areas for implementation of the Convention and its Protocol:

- Establishment of institutions and organizations;
- Creation of appropriate environment;
- Preparation of national communications and Greenhouse gas inventories;
- Making of national climate change strategy;
- Assessment of vulnerabilities and adatability;
- Assessment of options for implementing mitigation measures;
- Undertaking research and system observations;
- Promotion of technological development and transfer;
- Development and implementation of CDM projects;
- Education and awareness raising of the general public;
- Construction and development of networking information systems;

Considering the various areas and the results from interviews and investigations, this chapter first briefly introduces and summarizes capacity building activities undertaken in specific area. Then an assessment is made of the capabilities in these areas for identification of barriers to capacity building. Finally, major needs and key areas are given for further capacity building activities.

3.1 Institutional and organizational capacity building

3.1.1 Relevant capacity building activities

Basic capacity building has been undertaken in the area of institutions and organization
related to climate change in China. Participation in trainings sponsored by bilateral and multilateral organizations, such as UNFCCC Secretariat, World Bank and Asian Development Bank, has helped to build up and strengthen the capabilities of government officials, negotiators and researchers that are involved in climate change at central level. However, these activities do not touch upon climate change institutions. The scale and coverage of trainees are also rather limited. Therefore, there is only limited impact of these capacity building activities in China.

In the meantime, China has gradually established and improved its climate change administrative and management institutions respond to climate change with self made efforts. A national climate change coordinating organization has been setup. In 1990, the Chinese government established the National Climate Change Coordination Group (NCCCG), with Song Jian, the former State Councilor leading the Group. In 1998, NCCCG was renominated as the National Coordination Committee on Climate Change (NCCCC), with then State Development and Planning Commission as the leading organization. In 2003, NCCC was restructured, with the National Development and Reform Commission as the Committee leader and Ministry of Foreign Affairs, Ministry of Science and Technology, State Environment Protection Administration and China Meteorological Administration as deputy leader organizations. Since its establishment, NCCC has carried out a considerable amount of work on supervising China's involvement in international negotiations on climate change, and on making and coordinating policies and measures in response to climate change. With the making of the Rules for Responding and Addressing Climate Change and the opening of inter-ministerial communications, an initial coordinating mechanism has been established with participation by multiple ministries. In May 2004, China published its Interim Measures for Clean Development Mechanism Projects. The principle of “Learning by Doing” is well reflected in all these activities.

Of course, these institutions and organizations are rather weak in comparison with their counterparts in other countries, with respect to authority, manpower, routine budget that are required to take on the challenges and workload.

3.1.2 Capacity assessment

Institutional and organizational capacities are associated with the establishment and level of legislation, manpower and budget. Legislation refers to the making of laws, regulations and policies and their implementation. Manpower and budgetary issues include not only functional department and staff in the government but also institutions in the public service sector, such as research, education, and mass media. In addition, institutional factors are also related to social norms, such as culture, traditions, religion and ethics. As these issues are covered in other areas such as education and training, they are not included in this part of the assessment.
From a legal perspective, the commitments to UNFCCC and Kyoto Protocol are legally binding as China is a party to these international agreements. Although many laws and regulations in the areas of energy, forest, environment protection, water and other natural resources are indirectly linked to climate change issues, there have been no systematic laws, regulations and policy initiatives addressing climate change.

With respect to organizational structure, an office to serve as the secretariat of the National Committee on Coordination of Climate Change has been established within National Development and Reform Commission, with fixed staff and regular budget. In other relevant ministries, there are designated staff members responsible for climate change affairs, but they are in most cases not working full time on climate change. Climate change has not yet been the priority of many ministries' agenda.

Climate change research institutions have built up an elementary base. They are located within research organizations under line ministries, national research academies, and universities. Regarding both administrative and research institutions, two outstanding features are worthwhile to note: ① they are normally at national level with relatively rich resources and capacities; ② they are largely concentrated in Beijing. Considering China's population, sovereignty and scale of the economy, it can be stated that institutional and organizational capabilities are in general at a relatively weak level in climate change areas. Overall assessment is given in table 3.1.

3.1.3 Key needs for capacity building

With respect to institutional capacity building, major needs are as follows:

● Systematic translation, analysis, publication of international climate policies, in particular UNFCCC, Kyoto Protocol and related agreements. With all these efforts, Chinese decision makers will be able to read, understand and apply with relevant international laws.

● Analysis, comparison and assessment of climate change related contents which can be either consistent or in conflict with climate policies, in existing laws, regulations and policies. In this way, relevant legislation and policies can be implemented accordingly.

● In-depth analysis and investigation of climate policy and legislation to mitigate and adapt climate change.

● Improvement of CDM implementing policy framework.

Regarding organizational capacity building, the following are assessed as the major capacity needs:

● Upgrading the status and function of NCCCC; establishment of National CDM Administrative Office; Creation of national scientific advisory committee on climate change.

● Meeting the needs of officials in governments at provincial level and below; and management professionals in large companies and relevant organizations, for climate change
Table 3.1  Assessment of Institutional and organizational capabilities

<table>
<thead>
<tr>
<th>Level</th>
<th>Institutional Capability</th>
<th>Organizations and manpower</th>
<th>Coordination mechanism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central government</td>
<td>No climate change legislation; relevant laws on energy, environment, and natural resources, but with no stipulation on climate change; enforcement of relative laws is weak on climate change issues.</td>
<td>Interministerial coordination organization in existence, secretariat established, but with very limited staff numbers; few climate change divisions in relevant ministries, in most cases, no full time staff; implementation capacity weak.</td>
<td>Coordinating power relatively limited, some inactive.</td>
</tr>
<tr>
<td>Local government level</td>
<td>As above</td>
<td>No coordinating organization; no specific offices and staff members</td>
<td>none</td>
</tr>
<tr>
<td>Research, teaching</td>
<td>Most in national academies, research institutions under line ministries, key universities and NGOs; most located in Beijing only;</td>
<td>In existence, with limited number of organizations and staff; almost none outside Beijing.</td>
<td>Cooperation and exchange within Beijing, with no fixed mechanism, weak coordinating power.</td>
</tr>
<tr>
<td>and NGO</td>
<td>Companies for renewable energy development, energy efficiency; certification of energy saving, planning, no climate change measures.</td>
<td>No climate change professionals, no climate change division in company management</td>
<td>No civil societies for climate change established</td>
</tr>
<tr>
<td>Private sector</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

information and management capabilities.

- Systematic training at a large scale so as to build up decision making capacity of relevant people. Sufficient training needs to be extended to relevant government officials and professionals in companies, teaching and research institutions in all provinces.

There is also a need to strengthen the capacity for technical support systems. A number of institutions are required to be established as major technical supporting units for personnel training, basic research in natural and social science, technological development and policy research. These technical support institutions will be distributed to different regions and sectors over the country as appropriate.

3.2 Creation and enhancement of enabling environment

3.2.1 Relevant capacity building activities

With regard to global climate protection, China has established a series of relevant
policies and measures, of which some significant effects have been achieved. Some measures, aiming to ensure the society mitigate and/or adapt to climate change, have also been formulating. However, the system of both policies and ensuring measures is obvious to be further completed and strengthened, especially in terms of the implementing capacity. So far, few ad hoc capacity building activities on creating and strengthening the enabling environment have taken place in China.

3.2.2 Capacity assessment

The Chinese government gives high priority to the implementation of sustainable development strategy and acts actively on global climate change issues. From this point, it can be stated that there is a positive macro environment to carry out capacity building for creation and enhancement of enabling environment in China. However, results of the survey and interviews indicate obvious insufficiencies in the enabling environment in China, which are mainly reflected in the following aspects:

- There is no systematic planning on capacity building for climate change in China;
- There is a shortage of finance for R&D of capacity building, as well as for implementation of capacity building activities;
- There is no incentive in the policy system to promote capacity building;
- The expert ability for capacity building needs be improved very much, the initiative of public participation and enterprise involvement in capacity building need to be increased to a large extent.

That is, given the current status, improvement in various aspects in China is urgently required to formulate the enabling environment for climate change issues.

3.2.3 Key needs for capacity building

In accordance with reality, the creation and enhancement of enabling environment in China should focus on the following areas:

- Institutional demand: to establish a coordinating institution for planning, implementation, and management of climate change capacity building;
- Policy demand: to issue incentive policy to promote capacity building, strengthen the administrative motivation, market motivation and public awareness motivation for climate change capacity building;
- Technology demand: to design sound contents and effective activities for capacity building;
- Financial demand: to increase financial inputs into the design, planning, and implementation of capacity building activities;
- Human resource demand: to establish and strengthen the expert and administrative
team for climate change capacity building.

The major measures and approaches to meet the demands mentioned above are identified as following:

- to create and enhance the institutional environment to enable capacity building, within which a regulation system to enable capacity building is expected to be set up to fully increase the administrative ability of the government in capacity building;
- to create and enhance the policy environment to enable the capacity building, including establishing a national master plan of capacity building and its implementation strategy, to enact relevant incentive policy and mechanisms, etc.;
- to create and enhance the financial supporting environment to enable capacity building, e.g., to create and enhance international cooperation channels, to ensure enough financial input for capacity building, to attract private capital's input, etc.;
- to create and enhance the enabling environment on an information service platform covering a series of communication approaches and tools such as related database, website, magazine, newsletter, etc., to promote information sharing;
- to create and enhance the enabling environment on human resource capacity, which aims to establish an expert network specifically for capacity building; increase climate protection awareness of various stakeholders including public, enterprise, government, and so on.

3.3 China’s initial national communication on climate change and its national greenhouse gas inventory

3.3.1 Relevant capacity building activities

There are three major activities on capacity building related to the Initial National Communication on Climate Change.

- Enabling China to prepare its Initial National Communication. The project budget is US$ 3.5 million, provided by GEF. The project implementation duration is June 2001 to December 2004. The project implementation agency is the National Development and Reform Commission (NDRC) on behalf of Government of China. The Office of the National Coordination Committee on Climate Change established a Project Management Office in charge of the project administration. Hundreds of scientific organizations and more than four hundred experts were involved in this project, including contracted institutes for the national GHG inventory, namely the Energy Research Institute (ERI) of NDRC, Institute of Atmospheric Physics (IAP) of Chinese Academy of Sciences, Agrometeorology Institute of Chinese Academy of Agricultural Sciences, Forest Ecology & Environment Institute (FEEI) of Chinese Academy of Forestry, and Center for Climate Impact Research (CCIR) of Chinese
Research Academy of Environmental Sciences. This project enhanced China’s capacity to develop its national GHG inventory.

- Targeted Research Related to Climate Change. GEF funded US$ 1.5 million for this project. According to the schedule, this project began on June 2002 and will end in June 2005. This project aims to build up China's capacity to develop its GHG inventory and upgrade its national communication on climate change. About one hundred experts from several dozens of authorities and research institutes have been engaged in this project.

- The Canada-China Cooperation on Climate Change Project - the special project for capacity building related to national communication. This project was funded by the Canadian International Development Agency (CIDA). The main objective of this project to support China’s ongoing national communication activities and to help Chinese experts enhance and build capacity to settle problems in data management and developing forecasting tools. This project introduced Canadian techniques, tools, models, lessons and experiences related to climate change to Chinese experts through extensive study tours, workshops, regular fora and cooperative research.

In addition to the above projects, since 1992, the Government of China and its relevant research institutes have carried out many international cooperation research projects on climate change in the form of bilateral or multilateral cooperation. With respect to GHG estimation, all these projects have simply or deeply discussed and assessed China’s GHG emissions from various sectors. Specific examples of these projects included “Response Strategy on Global Climate Change in China” funded by the Asian Development Bank, “China: Issues and Options in GHG Control” funded by UNDP & GEF, “China Climate Change Country Study” funded by U.S. Department of Energy, and “sian Least-cost Greenhouse Gas Abatement Strategy” funded by ADB, etc..

3.3.2 Capacity assessment

Capacities to develop the national communication (NC) on climate change are defined on the following three levels:

- Systemic ability: the ability of the whole system framed by all the stakeholders involved in national communication activities to finish the NC report.

- Institutional ability: the ability of the institutes engaged in the NC activities to organize, cooperate and ensure the quality of the NC report.

- Individual ability: the ability of individuals engaged in the NC activities to collect data, analyze existing information, report writing, and calculate the uncertainty.

Specific criteria for capacity assessment are preliminarily designed as follows:

- Criteria on system ability: the ability to establish a database system and manage the data and information.
Criteria on institute ability: organizing and cooperating ability, quality assurance ability.

Individual ability: data-collecting ability, information analysis & synthesis ability, writing ability, uncertainty calculation ability.

In reference to China's Initial National Communication on Climate Change to the United Nations Framework Convention on Climate Change, and based on the questions and difficulties encountered in the course of developing the initial national communication, a self assessment was made using the above criteria and it was judged that China now already has the basic capacity to develop the national communication on climate change.

If comparing China's capacity between the three level abilities of system, institute and individual, it was agreed that the institutional ability is a little stronger than individual ability and system ability. And judged from the contents of the initial NC report, China is still a little weak at vulnerability assessment and adaptation capacity. Current deficiencies in national communication mainly include imperfect existing statistical system, weak ability to control the quality of NC report and the GHG inventory, and poor individual report-composing ability and uncertainty calculation ability.

3.3.3 Key needs for capacity building

In view of the preliminary assessment, focus needs for capacity building related to national communication on climate change mainly include the following respects:

- Focus needs for capacity building related to the contents of the NC report are: vulnerability assessment and adaptation capacity, as well as education, training and public awareness.

- Focus needs for capacity building related to the three levels of abilities are: system ability and individual ability.

- Focus needs for capacity building related to specific assessment criteria are: system ability on data management and database system, individual ability on information analysis and synthesis, and institutional ability on quality assurance.

It is recommended to take the following measures and activities to close the capacity gap:

- Upgrading the existing statistical system and enhancing its supporting capacity to meet the data demands of the national communication. Firstly, the existing energy statistical system and indexes should be upgraded and improved. Secondly, some important indexes such as forest resources that have close relationship with the NC report should be incorporated into the national statistical system.

- Accelerating emission factor testing and measurement to better reflect China's specific condition. Extensive efforts will be needed to obtain China's specific emission factors, and
capacity building related to emission factors testing is very urgent as China is still weak in this respect.

- Strengthening research on inventory quality control and vulnerability assessment and adaptation, which will contribute to the scientific quality of the NC report. In order to reduce the uncertainty of assessment, global climate change models and their simulating results should be modified to reflect Chinese regional features. China should develop its own regional climate change models and impact assessment models. The imported models should be thoroughly verified and modified before application.

- Strengthening the training of the research workers engaged in the national communication activities to boost up their professional qualification and standards. As UNFCCC revises its Guidelines for the preparation of national communications from Parties not included in Annex I to the Convention and IPCC revises the guidelines for national GHG inventories, China will carry on and upgrade its national communication, which demands NC researchers to have higher qualification to fulfill this job and appeals for developed countries’ financial aid and technical support to help Chinese NC researchers to improve their technical level and ability through extensive training and academic exchanges.

- Carrying on studies on inventory data collection and management system to improve the management of national GHG inventory. For the effective inventory data and information management, China should strengthen relevant capacity building and accelerate the development of a national GHG inventory database management system to meet the demand of inventory data analysis and quality control.

3.4 National climate change programme

3.4.1 Relevant capacity building activities

Up to now, various activities of capacity building related to national climate change programme has been done in China, including:

- Capacity building for the preparation of the initial national communication on climate change. Through the preparation of the initial national communication, the Chinese government has gained a more systematic understanding on the climate change related national circumstances, inventory of greenhouse gas emission sources and sinks, policies and measures for mitigation and adaptation, and other basic information for the national programme. All these efforts laid down a base for the development of the national programme and the relevant policies and measures.

- Research project for the outlines of national climate change strategy. This project is supported by the Norwegian government through UNDP. Preliminary outlines of national
climate change strategy have been established through this research project, which will be a good reference for the preparation of the national climate change programme.

3.4.2 Capacity assessment

The capacity of preparing and implementing the national climate change programme can be examined qualitatively or quantitatively through capacity in the following aspects:

- Timely develop, implement, update, propagate and popularize the national climate change strategy or programme;
- Develop and implement specific programmes in energy, transportation, industry, agriculture, forestry, waste management and other sectors and promote technology transfer and cooperation on R&D activities;
- Project future greenhouse gas emissions;
- Integrated assessment on the effects of domestic policies and measures for climate change mitigation and adaptation;
- Analyze the impacts of international actions responding to climate change on the national climate change programme;
- Harmonize and coordinate policies and measures for climate change by putting them under the framework of social economic development.

Although several capacity building projects have been implemented, there are still big gaps to meet the requirement of preparing the national programme as these projects addressed some aspects but none of them could do a systematic and thorough summary for the domestic effort. In order to develop the national programme, international financial support is urgently needed. Besides, the experiences of preparing national climate change programs from foreign countries can be used as a reference for China.

Meanwhile, climate change is a global issue. For this aspect, China is lacking of global models that are capable of analyzing the impacts of policies and measures from major countries or major groups of countries on its domestic policies. Strengthening the capacity in this area is a prerequisite to meet the requirement of supporting the relevant decision-making processes of the national government.

Through our investigations, major difficulties in this field are listed as the followings:

- Shortage of funds: China is a country with huge population and big variation across its sub-regions in the levels of social economic development and technology development. China is facing big challenges in developing the national programme and action plan. Without sufficient financial and technical support, we cannot manage the development of a national programme with high quality in its systematic coverage and characteristic as guidelines.
- Insufficient capacity of science and technology to support the development and implementation of the national programme: when facing the specific national circumstances
of socio-economic, technology development and ecological and environmental aspects, China will encounter more difficulties.

In a word, China has a certain base of capacity in this field. However, this capacity is still weak and it cannot fully meet the need of policy-making processes. More intensified capacity building is required, especially the capacity to assess the effects of implementing the policies and measures.

3.4.3 Key needs for capacity building

Based on the analysis, key areas of capacity building for national climate change programme including the followings:

- **Systemic capacity**: strengthen scientific knowledge on climate change mitigation and adaptation; establish coordination mechanism to respond to climate change under the framework of sustainable development, aiming at the inclusion of climate change aspects in the social economic development policies and plans at various levels and in various areas.

- **Institutional capacity**: improve the level of research of major domestic research institutions; improve the capacity of providing technical support to policy-making processes; improve the capability of scientific policy-making and effective participation in global climate change negotiations and international cooperation on climate change from major domestic organizations of climate change policy-making.

- **Individual capacity**: improve public awareness on climate change and encourage their voluntary activities; improve Chinese scientists’ ability to participate in relevant IPCC assessment activities.

Accordingly, the needs for capacity building (gaps between current capacity and targeted capacity) focused on the following key points:

- **Use international experiences of developing national climate change programme as reference.**

- **Improve the capacity of integrated assessment of global and domestic climate change policies and measures.** Strengthening scientific research capacity in these areas is a must to realizing scientific policy-making.

- **Intensify capacity for scientific policy-making.** The capacity improvement of scientific policy-making by relevant government organizations is of great importance to harmonize climate change response with social economic development plans, which is a practical way out of responding to climate change under the framework climate change.

In responding to these needs, we suggest the following measures and pathways towards a solution:

- **Solving of funding issue largely depends on actively seeking opportunities of international cooperation, where multilateral cooperation is preferred, to solve the present urgent**
need of financial and technical support for the national climate change programme.

- Learn from international experiences, actively seeking international cooperation with research organizations with advanced level in climate change policy assessment, improve the capacity of assessing the impacts of climate change policies and measures on social economic development.

- Actively implement capacity building activities with various approaches and at different levels to further improve China’s capacity of developing and implementing the national climate change programme.

### 3.5 Vulnerability and Adaptation (V&A)

#### 3.5.1 Relevant capacity building activities

In the aspect of assessments on vulnerability and adaptation, the following activities have been done for capacity building in China:

- **National Scientific and Technological Planning Research Program:** *Assessments on Impacts of, and Adaptation to Climate Change.* This program is funded with 3,500,000 RMB during 2001—2005. Organized by *Ministry of Science and Technology (MOST)*, this program has been focusing on assessing the crucial impacts of climate change on key economic sectors in China, as well as the different and crucial vulnerabilities due to their exposure and sensitivity to climate change.

- **China-UK Collaborative Project:** *Investigating the impacts of climate change on Chinese agriculture.* This project is funded by UK *Department of Environment, Food, and Rural Affairs (DEFRA)* with £300,000 in 2001—2004. The project is undertaken by *Agrometeorology Institute (AMI), Chinese Academy of Agricultural Sciences (CAAS), Institute of Quantitative and Technical Economics, Chinese Academy of Social Sciences, and College of Resources and Environment, China Agricultural University under the organization of MOST.* Through the collaboration with the Hadley Centre for Climate Prediction and Research, Cranfield University, fruitful results have been obtained in future climate change projection under SRES scenarios, simulation on impacts of climate change on Chinese agriculture, future socio-economic scenarios, land use change scenarios, as well as integrated impacts assessments and adaptation options in China, the capacity is enhanced for quantitative assessments on projecting climate change impacts on Chinese agriculture.

- **China-Canada Collaborative Project:** *Vulnerability and adaptation to climate change impacts.* This project is funded with C$300,000 in 2002—2004. The project is organized by *Office of the National Coordination Committee for Climate Change (ONCCCC), National Development and Reform Commission for China (NDRC)*, and undertaken by *AMI, CAAS,* and
National Climate Center (NCC), etc. Obvious improvements have been obtained in analyses on sensitivity and impacts, extreme events, vulnerability, and adaptive capacity, the mapping on vulnerable regions, meanwhile, knowledge and understanding on impacts of, V&A to climate change have been increased for policy-makers in national-level and provincial-level in several provinces.

3.5.2 Capacity assessment

The historic, present, and future climate change impacts assessments are included in the assessments on vulnerability and adaptation. Monitoring is the basis of the observed impacts assessments, while modeling is the basis for future impacts assessments.

- On the assessment: the assessment on future climate change impacts is still at the initial stage, the necessary methodologies for assessments were known by national and regional (provincial) academic institutions and some of the colleges and universities via implementing National Scientific and Technological Planning Research Programs, some of the simulation models used are self-developed, but the models are mainly introduced abroad or modified according to China’s circumstances after introduction. In addition, little research has been done on assessments on impacts of vulnerability to climate change of some of the important areas, such as human health, finance and insurance, even the assessments done for these areas are still preliminary, and still face a lot of uncertainties.

- On the vulnerability assessment: assessments on crop yield variation and vulnerability mapping over a few sectors, e.g., agriculture, had been done by Chinese scientists combined with the climate change projections. But there is still lack of the integrated assessment on climate change impacts for ecology, resources, environment, as well as society, and the economy.

- On the assessment of adaptation: there is still lack of assessment on adaptation options to climate change, therefore, the policy-makers have less understanding for the roles of adaptation options to mitigate the adverse impacts of climate change, cost of the adaptation options and the consequence to society, therefore it is hard to take effective measures to cope with the negative impacts of climate change.

3.5.3 Key needs for capacity building

When assessing the vulnerability and adaptation, we believe that the following aspects should be reinforced in China:

- To strengthen the capacity for understanding and assessing the impacts of climate change, it is needed: to strengthen the research and application in regional-level, to enhance the research on the cross-sector impacts and cross-sector, to try to identify the impacts of climatic factors from non-climatic factors, to increase the assessments on the impacts of ex-
treme events and coping measures, to increase the combination of impacts assessment models and policy-making techniques, therefore provide technical support to policy-makers for policy-making.

- To strengthen and complete the monitoring and analyses on already occurred climate change impacts, to identify the impacts of climate change from the other factors; to introduce and develop the impacts assessment models with international comparability and suitable to China's circumstance, to continuously improve the capacity of the assessment on the future climate change impacts and reduce uncertainties.

- To strengthen the capacity to implement the adaptive measures to climate change, especially to involve in implementing the following specific adaptive measures to climate change, to carry out relevant capacity building activities in planning, organization, talents, technological development and application, as well as risk management: to adjust the farming pattern and alter the crop varieties and strains in a planned way to strengthen the capacity to adapt to climate change in agriculture; to promote forestation in multi-forest, multi-tree, multi-form, and multi-level fashion to strengthen the management for present forest and heighten the quality of present forest to increase the capacity to adapt to climate change for forestry, to strengthen the construction of infrastructure for preventing floods, combating droughts, and supplying water; to strengthen the protection of sea and oceans, resources of coastal zones, and comprehensive management and capacity for disaster forecasting and warning, to enhance prevention of coastal zones and the adaptive capacity to climate change.

To meet the needs for the above-listed capacity building, we suggest that the work should be done widely and deeply in the following aspects:

- To make serious plans for adaptive options for agriculture, forestry, water resources, coastal zones, and environment protection, etc., to select the ‘non-regret’ options and measures positive to adapt to climate change and improve economic development, and incorporate them into long-term planning for national economy and social development, to ensure China's long-term food security and ecological environment security.

- To incorporate the scientific research, technical development, and construction of infrastructure on adaptation to climate change into various national scientific and technological development programming and planning, to form a comprehensive scientific and technological supporting system to cope with climate change and implement United Nations Framework Convention on Climate Change (UNFCCC).

- To establish relatively steady financial ways for implementing the measures to adapt to climate change, especially to accumulate funds from multi-lateral sources, to attract various kinds of foreign funds from foreign governments, international organizations, and international financial setups, to find effective cooperation mechanism for international funding, to encourage foreign and domestic private investors to be actively involved, and to raise the
management level and efficiency of using foreign funds.

- To strengthen international collaboration, and continue to obtain the support from GEF for target research to improve understanding of vulnerability and adaptation to climate change in China, to improve and complete the contents in the follow-up *National Communication* concerning the vulnerability and adaptation, to implement the China-UK, China-Canada, China-Australia bilateral collaborative projects on China's vulnerability and adaptation to climate change.

### 3.6 Mitigation policy option assessment

#### 3.6.1 Relevant capacity building activities

Some research organization in China have undertaken various studies on mitigation policy assessment with support from international and domestic organizations, some achievements were reported. So far major research projects include:

- **“Tenth-Five Year Plan” Key Research Project**, supported by Ministry of Science and Technology (MOST). Project topic is “Global Environment Change Policy and Technology Study.” This project focuses on fundamental science and mechanisms of global environment problems including global climate change, biodiversity and ozone depletion, analyzing future global and domestic trend. Assessment of various impact of policies and strategies on social economy development, and important topics for international negotiation were also included. This project supported national strategy making for adaptation and mitigation of global environment change.

- Energy Research Institute (ERI) collaborated with Pacific Northwest National Laboratory (PNNL) on GHG mitigation policy assessment in China by developing SGM model for China. PNNL provide financial support with US$50,000 for this study. This project established a model database for China, the model was revised from source code to match the situation in China and made SGM models for China to be one component of a modeling framework name Integrated Policy Assessment model for China (IPAC) developed in ERI.

- ERI collaborated with the National Institute for Environment Studies (NIES) of Japan to work on GHG mitigation technology assessment for China. This collaboration started from 1994 and continuing. After 2000, NIES provided more than 20million JPY to support this study. AIM/endues model developed by NIES was constructed for China and be renamed as IPAC-AIM/technology model, also to be one component of the IPAC modeling framework.

- ERI collaborated with the Indian Management Institute (IMI) and, Asian Institute of Technology (AIT) on the research project of Integrated Model Development in Developing Countries.” This study started from 2003 and will be finished by 2006, with financial support
of US$300,000 from APN. The major objectives are to develop integrated assessment model for developing countries and support international research activities.

3.6.2 Capacity assessment

In China the study for policy assessment on mitigation options already exists. However in some aspects the ability of assessment of mitigation policy options is still week, mainly on:

- Mitigation policy options for non-energy sector. There are relative few studies and needs far more research.
- Study of impact of mitigation options on economy. Many studies now focus on the technology and policy option itself, rather than integrated assessment by including social economic factors.
- Assessment for policy options under global mitigation target. So far many studies in China focus on domestic issues, not much on the global scale. It is very lack of methodology, data and financial support.
- Assessment for global response mechanisms. In China the study for global or regional collaboration mechanism is still very weak, and needs more participation.
- Modeling development ability, especially global model development and application. This is a common problem for developing countries and recognized by IPCC. Much more effort should be put in this area to reduce the gap.

3.6.3 Key needs for capacity building

Objectives: In the area of research of capacity building on assessment for mitigation policy options, the main objective is to make an in-depth study on policy options and strategy to response to climate change for China to support domestic policy making process; the long-term objective is to increase the ability for policy assessment over a wide area to reach the same level of international research association.

Countermeasures for capacity building include: ① further international research collaboration to look for financial support and research methodology; ② More funding for domestic research to make more effort on domestic relative studies. Put climate change policy study into national research program and support the study into the national five year key research program, also include in other domestic foundation programs such as research foundation of Chinese Academy of Science and Natural Science Fund etc. ③ more support from government ministries or local government for policy oriented research, to support policy making processes.

Possible barriers and countermeasure: ①Major barriers for assessment on mitigation policy options capacity building include funding and methodology for research projects. As a developing country, there is difficulty to provide large amounts of funds to support climate
change policy research in China, it is therefore hard to make further in-depth studies. We need much more effort to catch up with developed countries, especially for modeling studies which need large amounts of investment. ② Major measures include to further enhance and promote international collaboration, enlarge domestic input, to establish active research groups, and in the meantime make efforts for education in universities for future research resources.

3.7 Research and systematic observation

A basic prerequisite for effective response to the climate change issue is to reduce or eliminate the uncertainties existing in regional climate change. Promoting the systematic observation of the climate system and developing the climate database, having a comprehensive and systematic understanding of the different spheres of climate system and their interactions through a robust systematic climate observation network, constitute a foundation for promoting the research on climate change, choosing the response strategy to climate change and assessing the effects of adaptation and/or mitigation. These capacity building activities are also required by the UNFCCC of the parties.

3.7.1 Relevant capacity building activities

The capacity building activities in research and systematic observation mainly include:

- Scientific research on climate change got started early in China. Since the mid-1980s, Chinese scientists have taken part in major international research programs on climate change, such as the IGBP and WCRP and, to a certain extent, in the preparation of the IPCC scientific assessment reports. Some research activities were undertaken on the reconstruction of historical global and regional climate, detection of regional climate change, projection of future climate change and climate system modeling is underway;

- Since the 1980s, assessments have been made of various aspects of the climate change, including the China Climate Change Country Study, Impact of Climate Change on The Ecological Environmental And Human Health And Adaptation Strategies, Assessment on The Environment Evolution In Western China. The National Climate Change Assessment is under preparation.

- An Outline of National Climate Programme of China was developed by the China National Climate Committee in 2002.

- The International Symposium on Climate Change (ISCC) was held in China in 2003. The capacity building activities in the systematic observation mainly include:

- There are various types of observation networks related to the climate observation in China, covering atmosphere, ocean, hydrology, cryosphere, terrestrial ecology etc.. Those networks are organized and operated by various institutions such as the meteorology, ocean,
water, environmental protection, agriculture, forestry and Chinese Academy of Science. The data collection, storage and maintenance are processed in different systems. Their staffs are also trained separately in different institutions.

*The Climate Observation Program in China* was developed under the auspices of the Chinese GCOS Committee in 2002, which brought up a preliminary common framework for the climate monitoring networks.

### 3.7.2 Capacity assessment

1. Research

The questionnaires show that relevant research has played a positive role in raising the awareness of the government on climate change. However, those researches are undertaken in the context of a single discipline and are unable to meet the requirements of the climate change response strategy for the convergence of disciplines. There is no unified long-term plan or sufficient funds for the research projects. They do not cover cutting-edge research issues, such as the biological geochemistry and the climatic effect of aerosols. The scientific questions of climate change are not well linked to the socio-economy and sustainable development. Low-level redundancies exist in the research process. The research outputs are not integrated well with the government's policy-making process on the response strategy for climate change.

China has a vast area with varied landforms. The different geographical characteristics and landforms reflect the interaction between different spheres and their effects, posing difficulties to the observation of climate system and the research on climate change. Moreover, the environmental changes caused by the increasing human activities and socio-economic development are also disrupting the processes in land—hydrology—atmosphere and their interactions in China, which makes this issue much more complicated. There are still a lot of uncertainties in the interactive process among different spheres and the impact of their changes on the regional environment and climate change in East Asia and the world. Both the integrated multi-sphere physical model for the land-atmosphere process on different landforms and its afore-mentioned parameterization are indeed theoretical difficulties and technical “bottlenecks” in the current climate change research.

The climate change research is now undertaken by different institutions in China. A high-level climate change research team is mainly composed of young scientists has not been set up yet. Few innovative scientific findings have been brought up by the Chinese scientists and fewer research findings are well known in the world. The citation intensity of these findings is very low. Only a small number of experienced young scientists are capable enough to participate in major international scientific research programs.
(2) Systematic observation

A number of meteorological observation and remote sensing systems and agrometeorological monitoring systems have been established in China. However, the observation and data collection in the fields of atmosphere, ocean, ecology and etc., related to the climate observation are now undertaken separately by the institutions in meteorology, ocean, water, environmental protection, agriculture, academia etc.. The elements and methodologies of the observations are established and operated out of the needs of their own sectors and disciplines and thus there is no unified design that can fully meet the needs of climate system observation.

Almost every observing network has the following problems in varying degrees. The layout is improper; there are no standardized data collection instruments and common observation practices; the observing elements do not meet the needs for climate system monitoring, prediction and research; the data processing is not well standardized; and there is an absence of any data-sharing mechanism.

The variables on the interaction among different spheres are not covered in the current observations, which are important for studying and understanding the climate change. There are few observations in the key areas that are seriously affected by the climate change or observations on the distinctive landforms such as the land-atmosphere, ecosystem-atmosphere, human activities and environment-atmosphere process etc.. Therefore, the research on and assessment of climate change, to some extent, are hindered from further development, especially the improvement of the climate disaster prediction models.

Although the capability in weather observation and management has been found in China, there is a lack of cooperation and coordination among the observation systems sponsored by different institutions. The communication among different institutions on the climate change is not smooth. Therefore, a department should be designated for coordination in order to establish an effective communication mechanism. Generally speaking, the competence of those staff engaged in the climate observation should be further enhanced.

3.7.3 Key needs for capacity building

(1) Research

As can be seen from the above analysis, climate change research in China remains at an elementary stage. At this stage, the first priority is to develop an overall design and plan for the climate change research and to propose the priority research areas taking into account the implementation of the UNFCCC commitments and the research needs required by the Chinese government in this connection; the fragmented research resources should be integrated in order to improve the overall capability on the climate change research in China.

By using the integrated climate change prediction and impact assessment models, im-
pact assessment and adaptation strategies could be prepared for the areas and industries that are vulnerable to climate change; scientific advices could be provided to the government for reducing the uncertainties in the economic development planning, large projects, regional development, preparation of environmental protection policies, ecosystem reconstruction etc.. This will help with the Chinese government in incorporating the research results on climate change in the relevant policy making process. At present, relevant research outputs remain at an elementary stage and play a very limited role in the government's policy making process. Training of relevant technical staffs and studies and application of methodologies will contribute to the improvement of capabilities on climate change.

The young Chinese scientists are seriously expected to improve their capabilities in participating in the international scientific cooperation programs as well as the international scientific assessment activities such as IPCC; keep informed of the progress in the world sciences related to climate change; indicate the research needs on climate change in China; accumulate experience of participating in the international exchanges; reduce the incapabilities in participating in the relevant international activities on climate change.

(2) Systematic observation

The decentralized and non-unified climate related systems in terms of establishment and management are a big obstacle for China to effectively collect the relevant data on the climate system and systematically apply them to the scientific research and response strategies in this regard.

There is an urgent need to take a census of the climate observation networks sponsored by different institutions, to make an assessment of the coverage of the regional climate monitoring and the integrity of the observing elements, to carry out studies and simulations on how to develop a scientific layout for the climate observation networks in China. This is a fundamental task for the systematic climate observation in China.

Due to the fragmented management of the observation networks, an effective data-sharing platform for the observation data of the climate system in China, which is easy of access by the relevant climate change researchers and institutions, has not been established. This has greatly restricted the overall benefits of the data resources and hindered the scientific communities and scientists from expanding their research on climate change. In this regard, an important aspect for the capacity building in the systematic climate observation in China is to study and investigate the data sharing mechanism and format on the climate data in order to keep the Chinese data consistent with those of the global climate observation system.

In summary, the climate observation infrastructures in China are still not advanced. Manned observations are mainly adopted in most regions. Basic observations in some remote and essential areas, such as the Tibetan Plateau, are quite inadequate. Technology transfer is seriously expected on the telemetry, remote sensing, automatic monitoring instruments and
technologies as well as on the atmospheric background and atmospheric chemical composition. Improving the competence of the relevant staff is also a pressing need.

3.8 Technology development and transfer

3.8.1 Relevant capacity building activities

China has carried out a series of preliminary capacity building activities for policy practice in technology development and transfer field. These activities are centered on the legislation for promoting technology introduction, policy coordination, investment environment improvement and intellectual property protection etc.. The Tentative Regulation on Directing Foreign Investment and the Guiding Catalogue for Foreign Investment Industry are the direct policy toward foreign investment in China and technology introduction.

The central and local governments have made a series of efforts to improve the environment for foreign direct investment and management of technology transfer, including safeguard the operational and management rights of foreign investor; protect the legal rights of the stakeholders; improve and consolidate the implementation of intellectual property protection regulations; increase working efficiency and reduce management procedures; improve and simplify approval procedures for foreign investment projects; accelerate the establishment of unified, open and competitive market; break the local barriers and sector monopolies and grant the national treatment to foreign investment enterprises gradually.

In order to support the Convention Negotiations, the People's University and Energy Research Institute have collected and followed the relevant information and development on international technology transfer. Some issues have been studied to increase the understanding of the field.

As for technology development and transfer capacity building, some relevant international cooperation projects have been implemented such as the China Climate Change Country Study, carried out by the Ministry of Science and Technology in China and Department of Energy of the US. The project provides preliminary assessment and analysis of greenhouse gas emission reduction technologies and accumulates useful experience and information for technology need assessment. NREL and State Planning Commission etc., have been cooperating under the TCAP framework and providing useful experience on technology demand assessment methodology application, collection of special technology information and development of potential technology transfer projects.

3.8.2 Capacity assessment

It is fair to say that China has certain capacity in the aspects of macro technology demand
assessment, awareness of technology transfer and expert quality. The more urgent need is the demand for technology itself. However, capacities in the areas of systematic assessment for certain sectors and technology, technology and information dissemination, development of technology transfer projects and foreign and domestic financing are weak and lack of general planning and coordination. The continuity of technology transfer projects is not strong.

The barriers in implementing technology transfer capacity building activities are likely:

- Due to the slow progress of international technology transfer negotiations, technology transfer capacity building activities may not occur;
- The lack of support from the government, such as lack of policy and funding will create difficulty for preparing the capacity building activities.

3.8.3 Key needs for capacity building

According to the definition of technology transfer, its capacity building should cover the various activities ranging from institutional, organizational (including enterprises) and individuals levels. The main contents are: the identification and evaluation of environmentally friendly technology; technology information acquisition and dissemination; soft and hard technology information need and acquisition; establishment of technology information channel; technology transfer barrier analysis and countermeasure formulation; technology exchanges and cooperation; technology research and development; technology demonstration; technology digestion and absorption; technology improvement and duplication; skills in the adaptation, installation, operation and maintenance of environmentally friendly technologies; institutional establishment; personnel, knowledge and capacity training and formulation of standards and mechanisms.

Based on the above definition and analysis, the critical needs for capacity building in technology transfer field are the following:

- Capacity in the identification and evaluation of transferred technology;
- Capacity in acquiring soft and hard technology information;
- Capacity in overcoming technology transfer barriers;
- Capacity in technology exchanges, cooperation, research and development, demonstration, digestion and absorption, improvement and duplication;
- Capacity in human resource development, knowledge and technical training and dissemination;
- Capacity in financing and mechanisms in technology transfer project development.

To meet these needs, the proposed measures are:

- Policy support from relevant government bodies;
- International cooperation and exchanges at various levels;
- Formulation of human resource development and personnel training plans;
Establish technology transfer information centers;
Establish national technology transfer management center;
Establish leading institution to coordinate technology transfer matters and provide necessary funding.

3.9 Clean Development Mechanism

3.9.1 Relevant Capacity Building Activities

Since 2001, some activities with the aim of building CDM capacity have been implemented in China under the financial support of the Chinese Government as well as several foreign governments and international organizations. These include:

- Formulating and putting into effect *Interim Measures for Operation and Management of Clean Development Mechanism Projects in China*, establishing domestic CDM project approval mechanism, and thus providing a platform for CDM project application by domestic enterprises;
- Conducting CDM theoretical and case studies, with close cooperation between domestic and foreign organizations. Relevant projects include: China CDM Study supported by the German Government, the Swiss Government and the World Bank, Opportunities for the CDM in China’s Energy Sector supported by the Asian Development Bank, China-Canada Cooperation on Climate Change supported by Canadian International Development Agency, Building Capacity for the CDM in China supported by UNDP, UNF, the Italian Government and the Norwegian Government, Canada-China Pilot Project: Local CDM Capacity Building supported Canadian Department of Foreign Affairs and International Trade, as well as many others supported by the Chinese Government. Those activities are mainly aimed at such aspects as CDM regime, international rules and methodologies, etc., and have played a crucial role in promoting the understanding of CDM by major stakeholders in China.

3.9.2 Capacity assessment

The main criterion for the assessment of current capacity is that relevant organizations and people should have the capacity to ensure the effective identification, development, implementation and management of CDM projects in China.

To be more specific, the government should formulate reasonable, efficient, transparent and fair CDM policy, establish high-efficiency management system, and the policy makers should have keen and precise understanding of CDM; relevant technical supporting organizations should possess sufficient expertise, thus could provide high-quality technical service to project developers; enterprises should have comprehensive understanding of the CDM rules,
benefits and risks associated with CDM; the financial sector has deep understanding of the CDM and thus could provide necessary financial services to project developers; the media and the public have basic understanding of the CDM, and could thus participate actively in the evaluation of potential CDM projects and support eligible ones; and other relevant organizations have necessary CDM capacity consistent with their functions.

Currently, Chinese policy makers in charge of the climate change issue have rather deep understanding of the CDM and have already formulated China’s interim CDM rules, but those in charge of the industry and the energy issue have very limited understanding of the CDM. A symposium was conducted in Inner Mongolia Autonomous Region with participants from the regional and local governments as well as the industrial enterprises, and it was found that even in such an area with many energy-intensive industries, the officials from the regional government who are in charge of the industry and the energy issue know little about the CDM, not to mention the use of CDM to improve the energy efficiency in the region's industries and thus to promote local sustainable development.

In the questionnaire designed specifically for this project, one question is about the main barrier for fulfilling China’s obligations under the United Nations Framework Convention on Climate Change. “Lack of financial resources” is seen as the main barrier, accounting for 38.8% of the total responses. However, in a following question which is “What kinds of financial resources could be utilized to deal with climate change” no one has mentioned CDM as a possible financial channel. In China, only a very limited number of experts and enterprises have very good understanding of CDM, some enterprises still doubt the value of participating in CDM cooperation due to lack of understanding and some with large emission reduction potential are not very active towards CDM. The financial sector lacks knowledge about CDM and thus cannot provide necessary financial services to CDM project developers. No organization in China has so far applied for operational entity, and the number of qualified experts that could help enterprises to develop CDM projects is still very limited. The public and the media have little understanding of CDM. Currently, one can get access to the China CDM Website through a direct link on the China Climate Change Website. From a questionnaire survey, it was found that only 25% of the interviewees are familiar with or know the China Climate Change Website.

In brief, what has been done by now is very preliminary, both the expertise necessary for developing, implementing and managing CDM projects, and the knowledge about the CDM of the public is very limited, considering the significant CDM project potential in China as well as the wide distribution of these projects in different areas and sectors.

3.9.3 Key needs for capacity building

It can be concluded from the study that the urgent CDM capacity building needs are
mainly concentrated in the following aspects:

- Promote and support the application of operational entity by Chinese organizations and support their future operation, thus improving the technical service capacity regarding CDM of Chinese organizations.
- Train policy makers in charge of industry and energy issues at various levels, with the main focus on basic concept of CDM and possible benefits of developing CDM projects, and consider the possible integration of CDM project development and relevant programs of these governmental agencies.
- Enlarge domestic CDM experts teams, especially eligible expert teams at the provincial level, and establish provincial level CDM expert networks, through more local CDM capacity building activities, with the experiences gained from relevant past activities taken fully into consideration.
- Train representatives from industries with significant emission reduction potential, identify a large number of potential CDM projects and promote participation in CDM of enterprises through some successful cases.
- Provide legal, technical and financial assistance to Chinese organizations applying for operational entity and support their applications, thus hopefully reducing the transaction costs of developing CDM projects and promoting CDM project development in China.
- Promote direct contact and cooperation between domestic enterprises and foreign investors through various means and channels.
- Develop a national database for potential CDM projects, thus reducing project searching and identification costs for international investors.
- Strengthen public awareness of CDM and obtain their support to CDM project development.

In conclusion, CDM capacity building activities in the next phase should aim mainly at speeding up the development of specific CDM projects, not methodological or policy study. Furthermore, sufficient financial resources should be provided to these activities, considering the risks associated with CDM project development. Risks of domestic enterprises in developing CDM projects could be reduced by various means such as providing them with funds for the feasibility studies of CDM projects.

3.10 Education, training and public awareness

3.10.1 Relevant Capacity Building Activities

Centring on climate change, those educational and outreaching activities carried out in China include:
- Research on The National Strategy on Climate Change Awareness and Outreaching: From 2002 through 2003, the Office of National Coordination Committee on Climate Change has organized experts in compiling The National Strategy on Climate Change Awareness and Outreaching. The Strategy defines goals and guidelines of education and outreaching in the field of climate change in China. It describes priority groups, measurements and the guarantee mechanisms needed for the strategy.

- Training materials and training programs: From 2002 through 2003, Initiative National Information Report Group, Renmin University of China and Nanjing University had respectively compiled training materials on the knowledge of climate change, policy information and skills of project development. These materials have been applied in training programs for decision makers, local experts, researchers, trainers and journalists from provincial and municipal departments of planning, energy, agriculture, forestry, environmental protection, and water conservancy.

- Research on public awareness promoting of specific topics: Under the framework of C5, CEEC has conducted specific research on awareness and outreach.

- Nationwide surveys on public awareness of climate change: From 2003 through 2004, surveys on public awareness of climate change had been carried out twice by Research Centre for Public Policy of China Academy of Social Science, focusing on people's knowledge, recognition, means of information access, extent of concern and willingness to take actions regarding issues of climate change. This has provided primary data for understanding the baseline of public awareness on climate change, evaluating works carried out in this areas and figuring out outreaching countermeasures.

- Pilot projects on climate change awareness and outreaching: Since 2002, series of pilot projects facing various stakeholders have been carried out by governmental departments and NGOs through community campaigns, mass media and internet dissemination, school activities, conferences and workshops. The survey in 2004 shows a trend of improving people's knowledge, recognition and willingness to take actions by the public. People's understanding of the cause and effect of climate change is shifting from experiential to rational style.

3.10.2 Capacity assessment

Having done a lot through middle school and university education, China has gradually built up the capability of enhancing people's awareness on global climate change. However, that of decision makers from local governments, enterprises and the public still remains weak. Furthermore, there exist big problems in fostering senior expertise, professional training and communication regarding international training.

For example, in the survey, 27% respondents hold the opinion that information exchange in the Protocol implementation is not effective while answering the question “What
is the obstacle regarding capability in the implementation of UNFCCC”. Some hold the opinion that people’s understanding of climate change is still at the fundamental stage and research on dissemination and countermeasures should be strengthened. Due to the constraints of budget, experience and capability of outreaching, the coverage and extent of educational activity on climate change is still limited.

There has been no awareness and outreach strategy or plan on climate change existing in China, neither in the form of legislation nor regulatory document by the government. Adaptation to climate change is a new topic in China. This is reflected in the unclear division of responsibility and entitlements of governmental department. The survey shows the lack of knowledge and expertise on climate change among departments of macro economy management and decision making, environmental protection and natural resource management. There exists a huge shortage of investment for awareness and outreach to achieve the goals set by the National Strategy, facing the reality of 1.3 billion Chinese people and varieties of target groups with different background. The scope of international cooperation on climate change education and outreach is still limited.

It is discovered from the survey that “lack of awareness” is the most common problem reflected. People expressed their opinions such as, ‘need to strengthen the education on climate change from both institutional and technical sides’ and ‘key tasks being training and awareness improving’. While answering the question ‘whether there was enough opportunity to obtain skills coping with climate change’, only 32.9% respondents said ‘yes’. It can be seen from the answer the urgent need of awareness and capability improving. Therefore, in the area of awareness raising, China needs professional institutions with expertise of climate change knowledge, public education and media experience. Broad and in-depth cooperation with developed countries in this area is also required.

3.10.3 Key needs for capacity building

Based on the above analysis, the difficulties and obstacles confronted in the area of awareness raising and outreaching covering the following issues:

- Lack of regulative base;
- Weak network system and unclear responsibility division among awareness and outreaching professional institutions for climate change;
- Lack of human resources;
- Lack of financial support and;
- Weak international communication.

Based on the above evaluation, we may conclude the priority goals include:

- Draw regulations, policies and mid and long-term plans;
- Set up network system in compliance with international trends and foster expertise;
Conduct various educational and awareness-raising activities focusing on stakeholders with different backgrounds: professional training directed at technician and management people in the area of climate change; integrating the topic into mainstream education system, i.e. primary and secondary schools, and university; produce educational materials through media and publishing houses; and training programs directed at decision makers and trainers.

The following counter-measures are suggested for achieving the above mentioned goals:

- Take awareness-raising into the working scope of the government.
- Integrate climate change into the syllabus of formal educational system, making climate change a part of ethics education; develop studies related to the topic, fostering high level professionals.
- In the area of non-formal education, develop training regarding knowledge and skills dissemination and awareness-raising, starting from decision makers, entrepreneurs, journalists and teachers; try to put the topic of climate change into training for civil servants and other types of non-formal education.
- In the area of awareness raising, conduct education and communication activities among various target groups through radio, television, newspapers, internet, symposia, and publications etc.; explore the way of awareness-improving suitable for the situation of China.
- Improve investment to education of climate change by the government and Develop international cooperation on awareness and outreaching of climate change.

Obstacles such as lack of investment, weak support from the legal system and misunderstanding from the public might be encountered in practice. Solutions are expected from international cooperation, legislation and supports by mass media.

3.11 Information network and database

3.11.1 Relevant Capacity Building Activities

The climatic change information mainly includes the information necessary for understanding climatic change mechanisms and impacts, information necessary for adaptation activities to climatic change, information necessary for mitigating climatic change and information necessary for carrying out the international cooperation on climatic change.

The capacity building in respect of climatic change information will directly serve the country in understanding climatic change mechanisms, coping with the impacts brought about by climatic change, enhancing capacity building and taking actions for adapting to and mitigating climatic change, and will promote the country to take part in widespread international cooperation. The weak capacities in respect of climatic change information will directly result in the obvious reduction of the country's sustainable development capacities and
bring about big negative influences to the international cooperation on climatic change. It is, therefore, very important to strengthen the capacity building in respect of climatic change information.

The capacity building in respect of climatic change information is closely linked with other aspects of climatic change capacity building activities and is a part of basic capacity building.

Up to now, there is almost no support from specific capacity building projects in respect of climatic change information. As said in the previous sections, the capacity building in this regard is interspersed among the capacity building activities dealt with in other sections.

3.11.2 Capacity assessment

China already has a certain degree of climatic change information base. A domestic climatic change observation network has been established to some extent. Scientific data involves in international exchanges within a given scopes. Government sectors, research institutions, administrative bodies and some individuals have accumulated a wide scope of climatic change information, and much of the information is reserved in databases. The social and economic development has advanced requirements for the climatic change information, and industrialized information services for public benefits have preliminarily been developed.

As a developing country, however, China is still weak in the overall climatic change information groundwork (e. g., database, information network, information service and etc.) that has to be strengthened in a systematic way. Furthermore, it need to be specifically pointed out that China lags far behind in the climatic change information service and application. Even so, the information service based on the existing information base is still confronted with the shortage of long-term and stable support. For example, although China has set up a Climatic Change Information Website and a China Clean Development Mechanism Website, she still lacks continuously updated and replenished information and financial support for long-term maintenance of those websites. Another example is that a great deal of information gathered, compiled and produced during the process of working out the national communication wants a supportive mechanism for information management.

China faces the following major barriers in enhancing climatic change information capabilities:

- Understanding on the importance about climatic change information is insufficient.
- Information sharing mechanisms, related laws, policies, standards and platforms have not been established. A mass of climatic change information is controlled by sectors, institutions and individuals, and therefore, it is difficult to disseminate and share the information.
- Information services and applications are at low level. There exists a serious situation of disconnection between and among the information about the climatic change policies,
science, technology, industries and markets, as well as the social support and service. There is a shortage of good links and channels between the information provider, information demander and information service provider. The information emerges mostly in the form of primary products.

- Public benefit information and commercial service information are not well differentiated for climate change information. Such a situation has exerted negative influences for climatic change information service to develop in an industry approach. The influence gives those information exchange platforms a direct expression of their difficult maintenance and development.

- The international cooperation capability in the field of climatic change information is low.

### 3.11.3 Key needs for capacity building

The overall objectives for climatic change information capacity building are:

- Set up complete climatic change information systems and information service systems, the systems with databank and information flow supports and oriented by information applications;

- Make it easier for people to acquire climatic change information; and

- Support governments, industrial sectors, research institutions and social public work together to seek ways to cope with, adapt to and mitigate climatic change and take actions to this end.

The key areas of climatic change information capacity building are to reinforce the flow and application services of climatic change information, mainly include: ① information collection, compilation, storage and updating; ② information processing and upgrading; ③ information dissemination, and ④ information application.

The requirements for climatic change information capacity building are principally related to three aspects:

- Foster the enabling environment for climatic change information flow and sharing, including: ① to urge governments at all levels, all social organizations, enterprises and general public to understand the importance of climatic change information; ② to develop policies and standards for climatic change information sharing; ③ to develop and improve the distributed databanks and to establish integrated Meta-data databanks for climatic change information, and ④ to establish network-based climatic change information sharing platforms.

- Build up application oriented climatic change information systems and information service systems, aimed at ① strengthening the processing capabilities of climatic change information to facilitate the formation of information products easily acceptable to all sorts of clients; ② developing the public benefit oriented and industrialized information service
systems, and reinforcing information dissemination to policy-makers and general public and information services for industries and markets, so as to boost up the climatic change related policy-making capabilities and public awareness, as well as to lead and support the development of climatic change-related industries (especially those for energy-conservation, new energy and renewable energy); ③ promoting climatic change information dissemination to financial and investment sectors, organizations and enterprises to reinforce the financing capabilities for climatic change actions; ④ propelling climatic change information dissemination to the social support and service systems and industries (e.g., those for disaster reduction, public sanitation and of insurance) to enhance the capabilities to cope with climatic change and its impacts, especially climate disasters; ⑤ strengthening the linkage among all aspects of climatic change information and avoiding their disconnection, especially information about climatic change policies, science, technology, industries and markets as well as social support and service.

● Strengthen China's capabilities of participating in international information cooperation on climatic change, especially in the international actions for climatic change observations.
4 Conclusions: Priority Areas and the Corresponding Securing Measures

Enhancing the capacity building for developing countries is a very important instrument to deal with climate change. This issue will be increasingly more important with the progress of international negotiations. The significance is evident with regard to the effective implementation of the capacity building activities and the effective evaluation on the effectiveness of the implementation. For developing countries, the appropriate identification of priority areas for their capacity building needs for climate change, in combination with the properly proposed capacity building targets and implementation measures, is the necessary basis for GEF, multilateral donor organization and other bilateral donor organizations.

This report overviewed almost all relevant capacity building activities in China since the entry into force of the UNFCCC. Such capacity building activities could be classified into three categories based on the source of funding. They are the capacity building activities supported by multilateral organizations represented by GEF and UNDP, bilateral donors represented by some developed country governments, and domestic funding from Chinese governmental departments. The previous capacity building activities rather insufficiently covered some areas of climate change such as institutional capacity, national communication, national strategy, evaluation on vulnerability and adaptation, CDM, and education/training and public awareness. However capacity building activities aiming at development and transfer of technologies, specific mitigation measures, research and systematic research, adaptation, human resources development, coordination and cooperation are relatively few and weak and need to be strengthened.

All in all, as a developing country, the capacity to deal with climate change in China is still very weak. The carried-out activities are very initial and huge gaps exist comparing to the capacities and capabilities as requested by the implementation of the UNFCCC and the Kyoto Protocol.

4.1 Priority areas needed for the near term capacity building

The most urgent capacity building needs are as follows:

- With regard to the institutional capacity building, the establishment of the CDM
management center will be the priority in the near term. The implementation of such an institutional capacity building includes system construction, office facilities, personnel allocation, channeling of maintenance funding, information and networking, etc.. Meanwhile the indicators and methodologies need to be developed to evaluate the effectiveness of the capacity building activities.

- With regard to the national communication and the corresponding organizational, expertise and database construction and maintenance, the most urgent need is the initiation of the second national communication through which to enhance the national capacity in this regard.

- With regard to the policy-making improvements, one near term focus will be the formulation and development of a national climate change strategy or national programme. Through the policy studies in this field, further considerations will be made with the aim of integrating climate change issues into the studies on national social and economic development strategies and programs. Also the linkage between the macro economic development and the issues of climate change will be set up. Another near term focus will be the studies on the relevant laws and regulations. Specifically laws and regulations relevant to CDM need to be further developed or amended.

- With regard to the CDM capacity building, more training, studies, demonstration projects are needed. Capacity on the project development and management needs to be enhanced. The web based project information inventory needs to be developed.

- With regard to the evaluation of mitigation options, focus will be given on the development of integrated assessment models. Based on this the assessment on the impacts of mitigation options will be made. Also evaluation will be made on the effectiveness of the simulated policies and programmes. The assessment on the mitigation options and mitigation technologies from social, economic, environmental and technological aspects is another near term priority.

- With regard to impact and adaptation, targeted research and studies on impacts assessment and adaptation are urgently needed. Also preliminary studies on a national adaptation program are a near term priority.

- With regard to research and systematic observation, near term priority needs to be given to the following: survey on the overall situation of the observing stations dispersed and managed by different sectors in China; evaluation on the coverage of China's regional observing system and the completeness of the monitoring elements; design and development on China's GCOS implementation plan; study the proper mechanism for data and information sharing; enhance and improve China's climate modeling development and application.

- With regard to public awareness for climate change, near term focus needs to be given to the awareness raising for different stakeholders particularly at the local level. Media,
thematic workshops, focus groups are the major means for knowledge sharing. It will be a great and long term challenge for the Chinese government to raise the awareness of many thousands of government officials, entrepreneurs, professional researchers and the general public.

- With regard to the information network and the information database, near term priority will be the enhancement and maintenance of the already established climate specific website. Meanwhile the sources of information need to be broadened, which depend on the enhancement of the overall capacity in some way. Starting from the policy studies and the corresponding implementation, improvement and amendments to the existing statistics and indicators need to be researched. Based on this the institutional and technological arrangement for more effective information sharing needs to be developed.

4.2 Main measures for capacity building enhancement

Based on the ongoing capacity building activities, the future objectives and possible measures, the experts identified for the different areas did careful analysis regarding the constraints for capacity building activities in China. Four types of constraints were identified in this regard. They are organizational, financial, technological and human resource constraints. For the enhancement of climate change relevant capacity building activities, the barrier of the financial shortage stands out as the major constraint.

The capacity building needs in each specific area were identified above. The process of meeting all these needs is that of overcoming the four aspects of barriers in the meantime. Considering the barriers, the following measures for capacity building in China are elaborated.

- On the basis of improving and completing the institutional and organizational arrangement to deal with climate change, an integrated approach will be taken to consider capacity building as the key part of climate change strategies and action plans. Partnerships and networking between different stakeholders which include governmental authorities, policy study institutions, education and training organizations, technology research/development and dissemination promoters, media, and other non-governmental organizations should be set up at both national and local levels. Some capacity building centers should be established aiming at different key sectors.

- Indicators and methodologies will be explored to evaluate the effectiveness of the capacity building activities, which will be helpful for guiding, supervising and monitoring the capacity building activities.

- Establish stable budget channels to ensure the daily management of capacity building activities. To ensure the broader scope of, long term, and deepened capacity building activities, the measures of channeling more resources, using the existing funding in an integrated and synergic manner, leveraging more international funding and private funding are very important.
Both international and internal cooperation will be enhanced to carry out capacity building activities by using different approaches and different means.

- Strengthen personnel training, particularly the training aiming at policy makers and the trainers, with the aim of setting up a professional team of capacity builders.
- Using the financial resources, human resources and the information in a holistic way to increase the degree of sharing and thus improve the efficiency.
5 Appendix

List of interviewees and their organizations

<table>
<thead>
<tr>
<th>Type of organizations</th>
<th>No.</th>
<th>Name of organizations</th>
<th>Location of interview: Beijing City</th>
<th>Name of interviewee</th>
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<td>Gao Guangsheng</td>
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<td>Department of Environmental Protection of Beijing Chemical Industry Research Institute, SINOPEC</td>
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<td>Associations</td>
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<td>Department of Environmental Protection and Resources Conservation, China Electric Power Enterprise Union</td>
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<td>China Iron &amp; Steel Association</td>
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<td>China Non-ferrous Metal Association</td>
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Total: 9 interviewees, 9 organizations
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Total: 23 interviewees, 10 organizations
Reports of National Capacity Self-assessment for China’s Implementing International Environmental Conventions

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Total: 11 interviewees, 11 organizations

Location of interview: Huhehaote, capital of Inner Mongolia Autonomous Region
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Total: 22 interviewees, 16 organizations
### Reports of National Capacity Self-assessment for China’s Implementing International Environmental Conventions

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Total: 15 interviewees, 14 organizations
Total in all: 80 interviewees, 60 organizations
Part III

National Capacity Needs Self-assessment for Implementing UNCCD
1 Overview of Desertification in China and Its Action in Negotiating of UNCCD

1.1 Overview of desertification in China

Desertification means land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities. Soil erosion caused by wind and/or water, deterioration of the physical, chemical and biological or economic properties of soil and long-term loss of natural vegetation are included. Desertification means degradation of land resources, deterioration of eco-environment, economic and life quality degradation. It is not only an ecological problem, but also an economic problem.

China is one of the countries seriously affected by desertification. The desertification affected area is about 2.674 million km$^2$, which is 27.9% of the total land area, of which sandy desertification area enlarged at the rate of 3 436 km$^2$ annually (Note Based on the Communique of Desetification and Sandyfication of China issued in June, 2005, total desertification land area in China is 2.6362 million km$^2$, and desertification has reversed since 1999.). There are about 400 million people affected by desertification in China and eco-refugees have appeared in some regions due to desertification. The annual economic loss caused by desertification is about $US 6.5 million. And desertification has seriously affected regionally economic and social sustainable development of China.

1.2 UN Convention to Combat Desertification (UNCCD)

After Rio Earth Summit in 1992 and UN 47/188 resolution, one special team named Intergovernment Negotiation Committee (INCD) on UNCCD was organized by UN in 1993. After 5 meetings from May, 1993 to June 1994, the text of United Nations Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (UNCCD) was formulated on June 17, 1994, and left for open signature in Paris. The UN 49th Assemble Resolution declared that from 1995, June 17 each year was the World Day for Combating Desertification and Mitigating the Effect of Drought.

UNCCD integrated environment protection with economic development, and pointed
out that desertification was caused by combinations and interaction of natural, biological, political, cultural and economical factors. Therefore, desertification combating is not only an environmental issue, but also a social and economic issue. It should be controlled comprehensively under the framework of sustainable development. Because desertification mostly occurs in developing countries and the priority task in these countries is to realize sustainable development, desertification control should be integrated into general economic development and poverty alleviation plans. Only in these ways can sustainable development be realized.

UNCCD has set up a set of international cooperation mechanisms. It affirms the importance of international cooperation and South-North cooperation in combating desertification and mitigation of drought. Based on UNCCD, developing countries frame national sub-national and regional action plans to combat desertification and developed countries have promised to support these action plans under their agreements. These supports include funds and other types of assistance as well as technical transfers. In financial mechanisms, besides the existing bilateral and multilateral channels, UNCCD have also set up a global mechanism to promote developed countries to provide funds to these affected countries. UNCCD also encourages South-South Cooperation among developing countries, such as cooperation under the Regional Implementation Annex to formulate regional and sub-regional action plans to coordinate, complement and improve national action plan efficiency. These co-operations in multi-channels and multi-sectors will promote international coordination in combating desertification and boost combating desertification worldwide.

UNCCD emphasizes public participation in combating desertification. To combat desertification is not only to frame national action plan (NAP) by the government departments, but also to mobilize public participation, raise public awareness and actively support grassroots organization works in combating desertification. UNCCD also emphasizes participation of women, NGOs and other social communities in combating desertification. There are some special provisions for propaganda, education, training, public awareness-rising and capacity building in combating desertification. These give combating desertification in both bottom-up and top-down approaches in establishing national action plans and its implementation.

UNCCD also emphasizes the importance of science and technology in combating desertification. In part three, there are special articles on scientific cooperation, which include information collection, analyses and exchange, scientific research and technology transferring, etc. A Committee on Science and Technology (CST) had been established as a subsidiary body of the Conference of the Parties (COP) to provide information and advice on scientific and technological matters relating to combating desertification and mitigating the effects of drought. It emphasizes that effective combating desertification should be under direction of science and technology.
UNCCD is one of the fruits of Rio Earth Summit and one of the important UN Conventions after Rio Earth Summit together with UNFCCC and UNCBD in environmental protection and sustainable development worldwide. The main aim of UNCCD is to setup a set of international cooperation mechanisms to promote global cooperation in combating desertification and mitigating the effects of drought.

1.3 Chinese Government and UNCCD


After signature of UNCCD, the Chinese Government has participated in all the COPs and their annex institution meetings. Chinese delegates have been elected as vice president of CST and coordinators of special groups in the first COP. Promoted by the Chinese delegation, the Committee for the Review of Implementation of the Convention (CRIC) was set up in COP5 and it has played an important role in the implementation of UNCCD. In COP6, Chinese delegates had been elected as vice president of COP6 and the chairmen community.

Chinese delegation also actively participated in side meeting of COPs of UNCCD. In COP3, a poster introducing Chinese strategies in combating desertification was welled organized. A Chinese senator also took part in COP5’s parliament meeting of UNCCD. The Combating Desertification Law of China was also introduced at COPs. NGOs from China also took part in the COPs and their related meetings of UNCCD. The Chinese Government also support establishment of a Roster of Expert organized by Secretariat of UNCCD in combating desertification. The Chinese Government had sent human and fund resources to The UNCCD Regional Representative Office in Asia from 2001 to 2004.
2 Activities in Capacity Building for Implementation of UNCCD in China

Since signature of the UNCCD in 1994, the Chinese Government has been active in implementation of the UNCCD. China National Action Plan to Combat Desertification had been compiled in 1996 and revised in 2003 based on the new data. In past ten years, a series of activities have been carried out to implement UNCCD and to combat desertification.

2.1 Institution building

China is one of countries seriously affected by desertification in the world. The Chinese Government had paid much attention to combat desertification. After signature of UNCCD in Oct. 1994, lots of activities had been carried out in implementation of UNCCD. China National Committee for Implementing the United Nations Convention to Combat Desertification (CCICCD), China National Desertification Monitoring Center, China National Training Center on Combating Desertification and China National Research & Development Center on Combating Desertification, and Senior Experts Consultant Group in Combating Desertification had been established successively. Related institutions for combating desertification had been setup in related provinces and autonomous regions (Fig2.1.Framework of institutions for combating desertification in China).

2.1.1 Establishment of Coordinating & Leading Group on Combat Desertification

Facing the serious situation of desertification, Chinese Government (State Council) set up a National Coordinating Group on Combat Desertification in 1991. After signing of the UNCCD in 1994, this had been renamed as National Coordinating & Leading Group on Combat Desertification and alias as the China National Committee for Implementing the United Nations Convention to Combat Desertification (CCICCD) to strengthen coordination & leadership in desertification combating. In April, 2001, 17 CCICCD member institutions had been reorganized as follows: State Forestry Administration(SFA), Ministry of Foreign Affairs, Ministry of Finance, State Development & Reform Commission, Ministry of Science & Technology, Ministry of Railways, Ministry of Communication, Ministry of Land & Resources, Ministry of Water Resources, Ministry of Agriculture, People's Bank of China,

2.1.2 Establishment of Secretariat for implementation of UNCCD

The office of National Coordinating & Leading Group on Combat Desertification, attached to State Forestry Administration (SFA), has also acted as Secretariat for implementation of UNCCD, which was the working institution of CCICCD and in charge of negotiation and implementation of UNCCD. Since the signature of the UNCCD, the Chinese Government took part in all the activities related to UNCCD, which include attending COPs, CST meetings. The Chinese Government organized the first session of Asia-Africa Forum on Combating Desertification in 1996, Beijing Ministerial Conference on Regional Cooperation to Implement the UNCCD in Asia in 1997, Rounded Table Meeting for Combating Desertification in 2001. It was China that suggested and organized the Asian Thematic Program Network on Desertification Monitoring and Assessment thematic programme networks (TPNs) in Asia, and TPN1 was undertaken by China. Secretariat of CCICCD organized a Roster of Expert in combating desertification, published Traditional Techniques for Combating Desertification, and participated in organization of Project of Prevention of Dust & Duststorm in Northeast Asian. All these activities were highly appreciated by the Secretariat of the UNCCD.

Fig 2.1  Institutional Framework for combating desertification in China
2.1.3 Establishment of National Bureau to Combat Desertification

The National Bureau to Combat Desertification has established in SFA by State Council, which is one of administration departments in SFA and also the working institution of CCICCD. It is responsible:

- to make policies, guidelines and regulations in combating desertification and supervise their implementation in China;
- to formulate long and medium-term national program to combat desertification, to guide provincial departments for formulation of local long and medium-term national program to combat desertification, and to organize and implement inter-provincial and inter-regional projects to combat desertification;
- to make annual working programs and be in charge of project guiding, inspecting and checking & approval;
- to organize and coordinate national desertification monitoring;
- to be in charge of information collection, analyses and statistics;
- to organize personnel and technical training & extension in combating desertification;
- to implement UNCCD and international cooperation;
- to act as project office of Beijing & Tianjin Sand-wind Source Control Program;
- to guide desertification combating in Three North Protective Forest Program (Green Great Wall Program);
- to supervise the China National Society for Sand Control and Sand Industry, China National Desertification Monitoring Center, China National Training Center on Combating Desertification and China National Research & Development Center on Combating Desertification; and
- to undertake routine work as Secretariat of CCICCD.

2.1.4 Establishment of Senior Experts Consultant Group in Combating Desertification

The National Senior Experts Consultant Group in Combating Desertification, established in 1994 and reorganized in 2001, consists of 20 senior experts with 7 academicians and 13 famous professors in different fields from research institutions and universities in member ministries. Its main task is to provide consultation in national key program and policy making in combating desertification. It had played important roles in making NAP, national desertification monitoring and national report to combat desertification.

2.1.5 Establishment of China National Training Center on Combating Desertification

China National Training Center for Combating Desertification (CTCCD), attached to Beijing Forestry University, was established in 1995. Its main tasks are: (1) to train officials
for desertification affected areas and raise their management level and awareness in combating desertification; (2) to carry out the technical training and extension to increase benefits of the projects; (3) to raise public awareness and mobilize the public to combat desertification; and (4) to carry out international training for developing countries in combating desertification. In the past few years, CTCCD has trained more than 1,000 persons including officials and technicians from different ministries, provinces and counties.

2.1.6 Establishment of Research & Development Center on Combating Desertification

Research & Development Center for Combating Desertification (R&DCCD), attached to Chinese Academy of Forestry, was established in 1995, its main tasks are: (1) to organize key scientific research for desertification combating projects; (2) to introduce techniques from foreign countries; (3) to carry out technical consultation and extension; and (4) to maintain Desertification Information Network (DIN) and provide desertification information for the public.

Based on resolutions of the Asia-Africa Forum on Combating Desertification, China, in cooperation with the UNCCD Secretariat, opened a new International Training Centre (ITC) on Combating Desertification on October 15, 2004 in Beijing. The primary objective of the Centre is to offer cross-border exchange and capacity-building opportunities for experts who develop sustainable land management solutions. It has been situated at the International Network for Bamboo and Rattan (INBAR) in the Beijing, China.

2.1.7 Establishment of China Desertification Monitoring Center

The China Desertification Monitoring Center, attached to Chinese Forestry Academy of Surveying and Planning, was established in 1995, its main tasks are: (1) to formulate technical method for desertification monitoring, data process and management and forecast the trend of desertification; (2) to guide the establishment of local desertification monitoring system; and (3) to formulate national and regional desertification project feasibility report and progress assessment. Up to now, the center has participated in two terms of national desertification monitoring and drafted out “China Desertification Monitoring Technical Regulations” and “China Desertification Monitoring Indicator System”.

2.1.8 Establishment of local desertification combating institutions

Based on the characteristic of desertification patterns in China, 14 provinces and autonomous regions facing serious desertification in north China have set up their own desertification coordination or leading groups and special institutions which are in charge of desertification combating management. In most these regions, the members of Coordinating & Leading Group on Combat Desertification are similar to CCICCD in central government, and
the working offices are located in department of forestry. Even if the government institution reforming in 1998, the desertification coordination or leading group have been reserved in most provinces and autonomous regions. Local institutions in charge of combating desertification management were established in some local governments such as Chifeng and Hothot in Inner Mongolia and Yulin in Shaanxi Province. In addition, there are about 1,058 forest farms in north China, of which 503 located in desertification region. All these constitute a perfect system for desertification combating management from central government to local governments, which promotes desertification combating in China and makes desertification combating program well organized and progress as planned.

2.2 Legislation system building

After 20 years, a perfected desertification combating legislation system has been setup in China. At present, the laws related to combat desertification include Law on Combating Desertification, Forest Law, Land Contract Law, Land Management Law, Soil and Water Conservation Law, Water Law, Environment Protection Law, Grassland Law. These laws are related to land degradation control, forest protection and management, desertification combating, soil and water conservation, farmland protection, water resources protection and allocation, etc.

The Law on Combating Desertification, entering in to force on Jan.,1, 2002, is the first integrated law to desertification combating. It has 7 chapters and 47 articles, including desertified land prohibition and protection, desertified land control, desertified land development and management, promotion mechanism for combating desertification, etc.

The Forest Law, revised in the second meeting of ninth people's congress in April 1998, has 7 chapters and 48 articles, including forest protection, tree planting and afforestation, forest cutting and management, promotion mechanism for forestry construction, etc.

The Soil and Water Conservation Law, entered into force in June, 1991, having 6 chapters and 42 articles, including soil erosion and soil & water conservation, steep slope farming and management, promotion mechanism for soil & water conservation, etc.

The Grassland Law, passed in 1985, revised in Dec., 2002 and entered into force on March, 1, 2003, has 9 chapters and 75 articles, including grassland protection & construction, grassland use and management, promotion mechanism for grassland construction, etc.

The Land Management Law, enacting in 1986 and revised in 2004, includes farmland protection and subsidy policy for farmland impropriation, measurement used to land degredation control, farmland reversion to forest and grassland, grassland reversion to lake, contractor’s incumbency, bylaws in contracting barren mountain, barren beach, barren gully and barren sand, regulations in developing eco-agriculture and improving eco-environment, etc.
In addition, the Land Contract Law entered into force in Aug., 2002.

The Environment Protection Law entered into force in Dec., 1989 which includes environment management, protection and improvement, etc..

The Water Law, entering into force on Oct., 1, 2002, declared that national long-term water planning and long-term watershed plans should be based on features of watershed resources in China and that the national economic development plan, inter-watershed water resources transportation, ecological water uses, and water saving techniques should be assessed scientifically, etc..

Following development and perfection of the legislation system, a lot of bylaws, regulations and outlines have been established in the past few years, which include The China National Planning Program for Social and Ecological Environment Improvement, China Agenda 21, China National Agenda 21 for Environment Protection, Forestry Action Plan of China Agenda 21, China National Action Plan for Implementation of UNCCD, Regulation for Reversion of Farmland to Forest, Opinions for Grassland Protection and Construction, Provisions to Promote Individual & Enterprise in Combating Desertification, Administration Regulation in Desertification Combating for Profits, Decisions to Speed up Forestry Development, etc.

At the same time, a lot of local laws and regulations (including implementation regulation) have been issued by local governments, such as Forest Resources Management & Protection Regulation in Beijing issued by Beijing Municipal Government, Regulation for Implementation of Law on Combating Desertification in Gansu issued by Gansu Province. In Yulin region, local government had passed the favorable policy that combating desertification achievements can be inherited to promote public participation in combating desertification. In Wulanchabu, Inner Mongolia, the local government advocated a policy of farmers seeding 1 mu (Chinese land area unit which equal to 1/15 ha) corn and reverse 3 mu desertified land to grass. All of these promoted local farmers and herders to participate in combating desertification and speeded up the combating of desertification.

2.3 National Desertification Combating Program

2.3.1 Forestry Ecological Program

Since 1978, the Chinese Government has started a series of ecological Programs aimed to protect eco-environment and combating desertification. Which include the Three North Protective Forest Project (Green Great Wall Project) started in 1978. In 2001, Government integrated all these forestry ecological programs into 6 forestry ecological programs, i.e. Natural Forest Protection Program, Conversion of Cropland to Forest Program, Key Protective Forest Program in Three North and Yangtze River, Combating Desertification Program in Blown-sand Source Area Around Beijing & Tianjin, Wildlife Conservation & Natural Reserve Development Program, Forestry Industries Base Development Program in Key Regions with a Focus on Fast-growing & High-yield Timber Plantation, etc., of which the Combating Desertification Program in Blown-sand Source Area Around Beijing and Tianjin and the Fourth Phase of the Three-North Protective Forest Program cover more than 85% of Chinese desertified lands, forming the main body of the effort of national combating desertification program.

(1)”Three North” Protective Forest Program (Green Great Wall Program)

“Three North” Protective Forest Program (Green Great Wall Program), started in 1979, straddles 13 provinces and autonomous regions in west of northeast, north and northwest of China with a total area of 4.069 million km², covering 42.4% of territory area of China.

The on-going Fourth Phase of the Three-North Protective Forest Program involves 13 provinces and autonomous regions with 590 counties; its planned duration is 2001 to 2010. Construction tasks include forest resources management, artificial planting, mountain and sand closure for forest regeneration, air-seeding, protective forest planting for sand fixation and for farmland and grassland protection, planting for soil & water conservation. It aims at establishing stable protective forest with rational structure and high efficiency. Through the program, the serious desertification areas in Mu Us, Kerqin and Hulunbeir will be controlled. Desertification in surrounding regions of eight sandlands of China will be basically controlled. High standard shelterbelt systems for farmland protection will be constructed in oases and the natural forest (Populus diversifolia, Tamarix spp., Holoxylon spp.) in west Alashan (Alaxa), lower reach of Tarim River will been recovered. The spread of deserts will be limited. Ecological environment in these regions will be improved and the weather of duststorm will been decreased. Non-state-owned economy have been encouraged in the construction of the program and since 2001, more than 13 million ha desertified land had been controlled, 1.4 million ha of forest planted and 1.1 million ha of mountain and sand closure for forest regeneration.

By these integrated controls, timber volume had increased from 720 million m³ in 1977
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1.0 billion m³ in 2003. 20% of desertified land in these regions and 40% of soil erosion area in Loess Plateau had been basically controlled. 65% of farmland (21.3 million ha) had been protected by protective forest. Annual grain yield increase by 11.07 million tons. The spread of desert has been limited in a part of the “three north” regions and the ecological environment had been improved.

(2) Combating Desertification Program in Blown-sand Source Area around Beijing and Tianjin

The Combating Desertification Program in Blown-sand Source Area around Beijing and Tianjin involves 75 counties in Beijing, Tianjin, Hebei, Shanxi and Inner Mongolia. Total project area is 0.46 million km², and duration is from 2001 to 2010. It aims to solve the sandy and dust storm weather to realize the green Olympics.

Construction tasks: to stop cutting and promote protection of vegetation, closure for forest and grass regeneration; to converse the steep slope cropland into forests & grassland; artificial replanting; to close mountain and sand for forest and grass regeneration; air-seeding; shelterbelt forest planting for sand fixation and for farmland and grassland protection; to adjust animal husbandry structure and improve production manner, implementation of pen to speed up grass recovery; to plant forest for soil & water conservation and to construct water conservancy to keep ecological water uses; to implement ecological immigration in these ecological fragile regions; to establish stable protective forest with rational structure and high efficiency.

Objectives of program: To harness the whole sandy desert land area which can presently be controlled, to decrease sandy and dust storm weather in these regions by combinations of biotic and abiotic measures, and to improve ecological condition and optimize agricultural structure.

At the end of June of 2004, the total controlled area reached 4.91 million ha, occupying 33% of ten year target. It was this project that has effectively improved the ecological environment of the Capital and its surrounding regions. Based on monitoring in 19 sampled counties at end of 2003, compared to those in 2000, the total sandy desertification area had decreased by 436,900 ha, or 16.08%, desertified farmland area decreased by 265,400 ha, or 26.77%, desertified grassland area decreased by 82,800 ha, or 5.05%, the number of towns affected by desertification decreased from 259 to 227, the population affected by desertification decreased from 296.03 million to 278.72 million. Vegetation (forest & grass) covering rate increased by about 20% and whole ecological regime has become better and significantly improved in some regions. Desert spread had been preliminarily kept within limits and sandy & dust storms decreased markedly. The inhaled particles in atmosphere in downtown Beijing has decreased by 7.8%. Sediment in Miyun Reservoir has decreased by 100,000 t.
(3) Conversion of Farmland to Forest Program

The Conversion of Farmland to Forest Program started as trials in 1999 and covered 363 counties in Hebei, Beijing, Tianjin, Shanxi, Inner Mongolia, Henan, Shannxi, Gansu, Qinghai and Ningxia. The main task is reversion of farmland to forest and afforestation. In order to implement them successfully, the government enacted special regulations for the program.

The objectives of this Program are to restore forest ecosystems in these regions, to improve the eco-environment in middle and west of China, especial in middle and upper reaches of the Yellow River, to accelerate economic development of West China, and to adjust economic structure in the countryside and to ensure poverty alleviation for local people.

The Program is the most participatory program in forestry history of China. It started trials in 1999 and now has implemented in 25 provinces (municipals and autonomous regions). Since then, afforestation area has reached 13.3258 million ha, including conversion of farmland to forest by 6.4365 million ha, afforestation in bare mountain by 6.8893 million ha. Forest cover rate increased by an average 2% per year. Soil erosion & desertification were controlled and the desert spread kept within limits in some regions. About 97 million people in 20 million households benefited from the Program.

Based on monitoring in 16 sampled counties in 2003, compared to those in 1998, sandy desertification area has decreased by 420,000 ha, or 24.01%. In the trial regions of Yulin and Yan-an regions in Shaanxi Province, bare and lower vegetation cover land area decreased by 7.81%, middle and high vegetation cover land area increased by 8.45% and in some regions the beautiful landscape reappeared. In Sichuan Province, river sediment content decreased by 22%~24% after reversion from farmland to forest in just 2~3 years. The sediment to the Yangtze River decreased 560 million tons since 1999.

The mid-term assessment by the China International Project Consultant & Assessment Cooperation concluded that the policy of the Conversion of Farmland to Forest Program issued by Chinese Government was right, the favorable regulations were deliberate and executed strictly, which were supported and appreciated by local governments and farmers. The project had been well implemented and some benefits had appeared.

(4) Natural Forest Protection Program

The Natural Forest Protection Program in China was implemented due in part serious flood in China in 1998. The project ranges involve 734 counties and 167 forestry centers in 17 provinces (autonomous regions), its duration is from 2001 to 2010.

The program aims to improve ecological environment and adjust agricultural and economic structure of countryside. The main tasks of the program are to stop cutting the natural forest and re-arrange resultant unemployed forestry workers. Farming on steep slopes was banned, ecological forests planted, and nurseries established.

Since implementation, log cutting amount reduced. Natural forest cutting had completely
stopped in 13 provinces (autonomous regions) in upper reach of Yangtze River and middle and upper reaches of Yellow River since 2000. The cutting levels in Northeast and Inner Mongolia decreased from 18.53 million m³ in 1997 to 11.02 million m³ in 2003. The aim of reducing cutting quotas by 19.905 million m³ yearly had been realized. In the past 6 years, the total reduction of forest resources consumption was 320.0 million m³, equal to two years national wood consumption in the tenth five year plan. Ecological forest area increased by 9.8 million ha and 95.33 million ha of natural forest had been better managed.

The implementation of the Program had kept the over-consumption trend of natural forests within limit, increased forest resources and improved ecological environments. Based on on-site investigation in 22 counties in upper reach of Yangtze River and middle and upper reaches of Yellow River, compared to those before implementation, soil erosion area decreased by 5.99%, the trend of forest ecological function degradation had been reversed in some key national forest regions and ecological environment markedly improved.

2.3.2 Soil & Water Conservation Program

The Soil & Water Conservation Program, based on national ecological construction strategies in China, is a national key program combating serious soil erosion. It includes many projects: Project of Sediment Control in Middle Reach of Yellow River, Sand Fixation in Agro-Pastoral Transitional Area, Inland River Watershed Ecological Recovery, National Key Soil & Water Conservation Projects in 7 Watersheds, Soil and Water Conservation in Blown-sand Source Area Around Beijing and Tianjin, Water Resources Protection in Beijing, Tarim River Watershed and Heihe River Watershed Integrated Harness Project, Soil and Water Conservation Monitoring Network & Information System Construction, World Bank Loan Project for Soil and Water Conservation in Loess Plateau, Soil and Water Conservation Ecological Restoration Project, Check-dam Construction Project in Loess Plateau, Land Protection in Northeast Blackland, Soil and Water Conservation in Upper Reach of Pear River. In the ninth five-year-plan period, the total area controlled was 230,000 km² and preventing area 200,000 km². In the past 5 years, the central government invested 6.75 billion Yuan RMB for soil and water conservation, equal to the sum of investment from 1949 to 1997 and 20 time of the eighth five-year-plan period. Total area controlled reached 266,000 km² and mean annual controlled area was over 50,000 km², equal to two times of the previous period.

Through implementation of the Program, soil erosion has been kept within limits, ecological environments in the controlled regions improved, great ecological, economical and social benefits achieved, production and living conditions improved, sediment to the rivers and lakes decreased. Based on the survey, the total yield for grain has increased by 15 billion kg and fruit by 20 billion kg, which solved food problem for 12 million people, sharply increased income for 23 million people and trapped 250 million tons sediment annually.
2.3.3 Integrated Management in Yellow River and Inland Watersheds

The Yellow River, Heihe River and Tarim River Integrated Management and unified water allocation had gotten off successfully. Since 1999, the government has implemented unified water allocations in the Yellow River. The drying-up period decreased in lower reach of the Yellow River in the premise of ensuring basic water uses for living and industries and agriculture along the river. From 1990 to 1998 prior to unified water allocation, the river bed dried up every year in the lower reaches with maximum of 226 days in 1997, while after unified water allocation, drying-up days decreased to 42 days in 1999, 8 days in 2000 and even zero days in the drought year of 2001.

The Tarim River Integrated Management Project started in 2000. Using abundant water in Kaidu River and high water level in Boshiteng Lake, about 2.38 billion m³ water from Boshiteng Lake and about 1.764 billion m³ through the Daxihanizi Reservoir discharged to lower reaches of the Tarim River and into Taitemahu Lake for four times. Especially in 2003, with additional water from Cherchen River, the area of Taitemahu Lake reached 200 km², the historic record in the past hundred years. Regional ecological environmental conditions had improved and the confidence of governments and the public for restoration of the Tarim River ecological environment was further enhanced. Based on the plan, water will be supplied to lower reaches annually after 2007.

In 2000, the State Council started up the emergent project of water resources management in Heihe River. Based on the water allocation scheme, Zhangye City, whilst getting 1.58 billion m³ water resources from upper reaches in normal years, must increase by 255 million m³ its water discharge to lower reaches for 950 million m³ of the water allocation scheme to ensure productive and ecological water uses. Since 2000, the water allocation scheme had been implemented successfully for the past three years and the water reached to East Juyanhai Lake and ecological environment has been improved in the lower reaches. It was this project which reversed the threatening basic environment in the lower reaches of the Heihe River. In 2004 the normal water allocation scheme was implemented to transport water to lower reaches in the Heihe River.

2.3.4 Grassland Protection and Restoration Program

In order to implement the Grassland Law and Opinions for Grassland Construction and Protection issued by state council, eight projects, i.e. grassland prohibiting and fencing, rotational grazing, artificial seeding, air seeding, grassland improvement, grassland irrigation infrastructure construction, grassland reserve construction and rodent extermination, have been implemented in the past few years. Northern part of China was listed as a key region to implement fencing, artificial seeding, grassland improvement and infrastructure construction,
grazing closure for restoration, rotation grazing, grassland ecological environment monitoring, etc., about 9 billion Yuan RMB has been invested and grass-seeding applied to area of 42.67 million ha, fencing applied to area of 26 million ha (planned area 42.67 million ha). Through implementation of household responsibility system, grassland protection and restoration activities were undertaken, including 1.5 million ha of air seeding area, 16 million ha of artificial and improved grassland, 10 million ha of fencing area, 90 million ha of rodent extermination area and 11 natural grassland reserves set up. Grassland yield increased 6～10 times. From 2003 to 2004, removal trials of livestock for grassland restoration project started, State invested 2.82 billion Yuan RMB and controlled 12.67 million ha of degraded grassland. This project is characterized by low investment and quick returns, and can be used to adjust agriculture and animal husbandry industry structure, to extend industry to control 66.67 million ha of grassland.

The Program covers 96 counties in Inner Mongolia, Xinjiang, Qinghai, Sichuan, Yunan, Gansu, Ningxia, and the middle degraded rangeland in grassland, desert and resource region of Yellow River and Yangtze River in east Qinghai-Tibet Plateau.

The main tasks of this Program are: to protect grassland and to accelerate natural vegetation recovery through self-resilience of grassland by means of prohibiting and fencing, rotation grazing, pen raising, etc.. After Removal of livestock from the project areas, the fodder base should be established for pen raising. Emigration measures can be adopted in some regions that are unfavorable for pen raising.

The objectives of the program are (1) to control 66.67 million ha of degraded rangeland in West China and to recover grassland in these regions, (2) to restore grassland and keep dynamic equilibrium between livestock and grass, and (3) to establish grassland ecosystem suitable to sustainable development of animal husbandry industry.

2.3.5 Eco-Agriculture and Countryside Energy

In order to control unplanned farming causing desertification, government implemented the Eco-agriculture and Energy Project, dryland water-saving irrigation and protective farming project, and balance fertilizing and soil enriching project in the countryside. Ecological counties reach 300 which covered 6.67 million ha or 7% of total farmland in 30 provinces of China, about 305,000 ha or 60.5% of sandy degraded farmland has been controlled. In addition, 450 rainfed farming demonstration counties have been established. In arid areas, about 60 ecological counties have been established in west China, 1.099 million households in 843 counties participated in ecological construction projects. Since 2002, 92 rainfed farming and protective cultivation demonstration counties have been established with an area of 670,000 ha, it is planned to extend that to 10 million ha in the coming 5～10 years to accomplish protective cultivation in an 18% of dryland. Protective cultivation zones will also be estab-
lished around Beijing and in northwest sandy areas.

2.3.6 Integrated Agricultural Development Program

The Integrated Agricultural Development Program aims to improve productive condition, increase yields and control desertification as well as to protect ecological environments, through lower yield farmland improvement, water conservancy and perfection of irrigation conditions, tree planting and grass seeding, inter cropping, and agro-forestry, etc.. In the past 5 years, newly planted forest reached 109 million ha, artificial seeding and grassland improvement 730,000 ha. 5.23 million ha farmland has been protected by newly-established shelterbelt systems and 28,500 km² of soil erosion controlled.

2.3.7 Natural Reserve Construction Program

By the end of 2003, there had been about 1999 natural reserves in different types and levels in China (excluding Hong Kong, Macao and Taiwan), with an total area of 143.9805 million ha (137.95 million ha for land area and 6.03 million ha for marine area), accounting for 14.37% of territory area of China, in which 30 reserves with an area of 38.6 million ha are distributed in desert regions for desert biodiversity conservation and another 28 key desert natural reserves will be established in the future.

2.3.8 Wetland protection and desertification combating

Chinese government has issued and implemented the China Wetland Protection Action Plan and authorized the National Wetland Protection Plan (draft). In northwest region with serious desertification, wetland areas were reduced even dried up by drought and overuse of water resources in upper reaches of rivers. Some original lakes and wetland, such as Luobubo and Juyanhai had disappeared and even become the sources of dust-storm, simultaneously biodiversity in arid regions is facing serious threat. The key tasks for wetland protection in arid regions are ① to establish wetland reserves, and ② to enhance water resources conservation management and water resources coordination to protect and restore wetlands. In the cold Qinghai-Tibet Plateau, the key task is to protect ecological security, through wetland reserve setup and revegetation, of sources region of key rivers of China, such as the Yangtze River, the Yellow River and the Lancangjiang River. For example, the Natural Reserve in Sources Area of Three Rivers of Qinghai, covering 2/5 of Qinghai Province, was called the “Chinese Water Tower”, desertification is serious in this region because of overgrazing, unplanned mining. Combating desertification and wetland protection are two sides of the same coin.

2.3.9 Combating Desertification and Poverty Alleviation

The Chinese government has issued and implemented National “8.7” Poverty Alle-
viation Program. In China, poor populations are mainly located in the western region. The “poverty” counties in desertification affected areas account for 22% of the total number. By the end of 2003, the absolutely poor population has decreased to 29 million from 80 million in 1993. The poverty population rate decreased to 3.1% from 8.7% in countryside and the United Nations Millennium development Aim of 50% reduction of poor population has been realized in advance.

2.4 Financial mechanisms

China had set up financial mechanisms for combating desertification by year-by-year efforts. Because most of the desertification regions are in less developed regions of China, local governments and people are very poor and even face shortage of food in some regions and incapacity to invest in combating desertification, the framework of financial mechanisms for the desertification combating related projects will be invested mostly by central government, matched in part by local governments, and fund raised from NGOs and international cooperations. In recent years, new investment methods have been sought, such as grain subsidy methods used in the Reversion of Farmland to Forest Program. At same time some favorable policies were issued to promote individuals and enterprises to participate in combating desertification. All these have got good results.

Central government financial mechanisms: combating desertification had been brought into the National Social & Economic Development Plan. Central government had special funds for combating desertification, subsidy loans, special funds for integrated agricultural development; poverty alleviation funds can also be used partly in combating desertification and desertified land development. Based on statistics in 2003, central finance investment was 5.51 billion Yuan RMB in natural forest protection, 47.2 billion Yuan RMB in reversion of farmland to forest, and 8.515 billion Yuan in the project of Combating Desertification in Blown-sand Source Areas around Beijing and Tianjin. Government has adopted repayment policy for ecological forest. Central government had special subsidies for individual and community ecological forests. From 2001 to 2003, central finances subsidized 1 billion Yuan RMB each year for ecological forest and it is estimated to reach 7.5 billion in the coming years. It is the fundamental policy for commonwealth forest management. National ecological programs are invested in mainly by central government. For local fund raising, local governments shared investment for national ecological projects and also invested in local project for environmental protection based on national planning.

Over the past several years, many laws and favorable regulations have been issued to promote public raising of funds to participate in combating desertification in different ways and through different channels. They include, central government issued favorable taxes
incentives, such as the 10-year tax free policy for these products from reversion of farmland to forest; ② central government issued subsidized loan policy for combating desertification; ③ central government has introduced a policy for desertified land development and management. The Management Regulation for Beneficial Development of Combating Desertification policy encourages individuals to contract in the reversion of farmland to forest, afforestation and closure for regeneration, all the benefits will belong to the contractors; ④ central government provide subsidy to farmers who implement reversion of farmland to forest; ⑤ central government has a policy of auction use rights of barren mountain, barren gully, barren floodplain and barren sandland (four barren lands). About 23.33 million ha of “four barren lands” now have clear developers in China, and 6.5 million ha had been auctioned and about 2 billion Yuan fund collected by these activities; ⑥ Forest Law regulates that in China, citizens who is 11～60 years old for male, 11～55 years old for female have obligation to plant 3～5 trees every year; ⑦ in order to encourage afforestation and ecological construction, China Green Foundation had been established to collect funds domestically and internationally.

In June 2003, the Central government issued the Decision to Accelerate Forestry Development to adjust forestry system, mechanism and policy. The decision emphasizes on: ① property rights. It aims to clarify forestry property rights of owners and managers; ② non-state owned forestry development. Government encourages non-state owned forestry development in the first time; ③ forestry supporting policy. Ecological forest is enclosed into public fiscal budget and favorable tax policy had been issued to ecological forest; ④ afforestation investment. Central government investment is used partly to purchase individuals and other social community's non-state owned ecological forest; ⑤ fair play. Every investment in different economic matters of afforestation should be treated equally. All these changed policies have eliminated restrictions for forest development in policies and system and have created a level platform for forest development. It will encourage all parties of society in forest construction. Based on the present situation, the Chinese government is working to issue new favorable policy for combating desertification.

2.5 Scientific and technological supporting

2.5.1 Education for Combating desertification

Special courses related to combating desertification have been established in many universities and colleges since late 1950s. These were merged and renamed as the Specialties of Soil & Water Conservation and Combating Desertification from “Soil & Water Conservation” and “Combating Desertification” when specialties were adjusted in 1998 by the Ministry of Education of China. There are 11 universities and colleges that offer courses
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2.5.2 Scientific research for combating desertification

Scientific research institutions: a lot of research institutions have been established for combating desertification from national, provincial to local levels since 1950s. The national institutions in Chinese Academy of Sciences include Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences (CAREERI, CAS) which was newly re-organized as an institute in June 1999 from three institutes in Lanzhou, i.e. the Institute of Glaciology and Geocryology, Institute of Desert Research and Institute of Plateau Atmospheric Physics, The Institute of Geographical Sciences and Natural Resources Research, Eco-environment Center, Xinjiang Geographical Research Institute, Shenyang Applied Ecological Research Institute, Northwest Soil & Water Conservation Research Institute, Botany Research Institute, etc.. The research institutions under the leadership of ministries include: Chinese Academy of Forestry (State Forestry Administration), Chinese Academy of Agriculture (Ministry of Agriculture), Huanghe Academy and Soil & Water conservation Stations located in Tianshui, Suide and Xifeng (Ministry of Water Resources), Chinese Academy of Environment Science, Lake and Environment Science Institute in Nanjing, Sino-Japan 21st Century Environment Research Center (State Environment Protection Administration), etc..

Provincial research institutions include Gansu Desert Research Institute, Shaanxi Desert Research Institute, Liaoning Desert Research Institute, Ningxia Desert Research Institute, Forestry Research Institute of Inner Mongolia, Forestry Research Institute of Xinjiang, Shaanxi Soil and Water Conservation Research Institute, Gansu Soil and Water Conservation Research Institute, Shanxi Soil and Water Conservation Research Institute, Liaoning Soil and Water Conservation Research Institute, Qinghai Soil and Water Conservation Research Institute, and agricultural research academies in different provinces.

As a national key research program, the Ministry of Science and Technology had implemented many research projects in the field of desertification monitoring, combating desertification techniques and demonstration, and sand fixation techniques. In the period of the ninth five-year-plan, the basic researches have been carried out in fields of dynamics of desertification, landscape ecology, sustainable development of drylands, water resource uses, desertification control models, etc., research and demonstration for sand fixation around
Capital (Beijing) had also been implemented. Many research results, such as sand fixation along railways, techniques for soil and water conservation, air seeding, etc., had been extended into combating desertification practices. In the period of the tenth five-year-plan, the government had invested 400 million Yuan RMB into scientific research on combating desertification, including key research 250 million Yuan, and techniques extension 150 million Yuan. The national key research projects in the period of the tenth five-year-plan include Control and Demonstration in Key Eco-fragile Zone of West China, Key Techniques for Sand Fixation and its Demonstration, Key Techniques for Forest Ecological Construction, Agricultural Techniques Transforming in Development of West China, etc. Many field stations were also established and a lot of technicians trained under the research programs.

At the same time, government included combating desertification into hi-tech research programs (it is named “863”) and basic research programs (national science research foundation) and research result extension programs. The government regulated that 3% of investment in the national 6 forest ecological programs should be used as scientific research supporting funds to solve the problems in the program and many hi-tech experiment of zones were established to promote the uses of new techniques in the programs.

In recent years, sustainable development strategy studies in desertification related fields have been completed successfully, in which Sustainable Development Strategy Study on Forestry in China put forward 7 strategies for desertification combating, Strategy Study on Water Resources Allocation, Ecological Construction and Sustainable Development in Northwest China formulated 10 strategies for ecological re-building in arid northwest China, all these studies provide scientific reference in theory for combating desertification and regional sustainable development in China.

2.5.3 Technical training for combating desertification

Many types of technical training activities had been carried out by governments in combating desertification, such as training seminars, TV specials, visiting & exchange. The training contents include project management techniques for project officials, traditional & practical techniques training for grassroots, training of local leaders in key desertification regions, training women for combating desertification. The government also organized technical visiting & exchange abroad, and some experts have been invited to China to introduce key techniques, project design and implementation, and policy for combating desertification. Training was also combined with international cooperation in combating desertification.

2.5.4 Techniques extensions & service for combating desertification

Chinese government had established a set of techniques extension & service systems (they were called techniques extension & service stations) in agriculture since 1954, which related
to agriculture, forestry, water conservancy, animal husbandry, etc. However, after twice reforming and changing the system, these techniques extension & service systems have faced shortage of funds, human resources and institutions. At present, techniques extensions & service systems have developed in various ways. The first is an evolution of the traditional techniques extension & service system; the second is media such as broadcast and TV agricultural channel; the third is internet. Since signing of the UNCCD, the government has paid much attention to extension of techniques & services in combating desertification. Technical brochures have been published and experts organized to conduct field consultation. A series of manuals for combating desertification, traditional as well as practical, have been published, of which one was in English (Traditional Knowledge and Practical Techniques for Combating Desertification in China). and it was presented in COP2 and appreciated by international societies and UNDP had awarded it the Best Practical Award in Combating Desertification. In 2004, five ministries organized experts to the countryside to solve the problems faced by farmers. Agricultural & forestry scientific and technical books have been sent to the fields. All these efforts have achieved much in combating desertification.

At the same time, the government has established many demonstration zones in desertification affected areas to extend and apply new technologies, and established many models and techniques in integrated measures, water conservancy measures, horticultural methods, grassland protection and regeneration measures, tree planting techniques and shifting sand fixation, such as techniques for vegetation regeneration in these regions along key communication lines and around enterprises, shifting sand fixation along railway, oasis development and protective forest techniques for farmland protection, desertification monitoring techniques, sandstorm forecasting techniques, agro-forestry techniques, water saving irrigation techniques, watershed management, protected farming, crop residue for soil conservation, deep soil preparation and mulching techniques, anti-drought by chemicals, measure-based soil fertilizing, dryland farming, water tanks, terracing, soil salinization control, degraded rangeland fencing and enclosure techniques, improved livestock species introduction, breeding and propagating, planting of replacement fodder, natural vegetation protection and regeneration techniques in desert and degraded land, afforestation for sand fixation, air seeding, water-conserving artificial vegetation building techniques, cash tree planting and Chinese herb medicine introduction and rearing, artificial rain-making, etc..

2.6 Desertification monitoring

China is one of the few countries in the world which has carried out two terms (1994, 1999) of national desertification monitoring since signing of the UNCCD. National desertification database has also been established. These were admired by the Secretariat of UNCCD. The
third term of national desertification is currently under way. The results of national desertification monitoring not only provided support for decision making in implementation of the national combating desertification program, but also played very important role in Western Development of China Program.

Desertification monitoring of China consists of national monitoring (including drought monitoring), key (sensitive) regions and on-site monitoring, desertification project benefit monitoring and sandstorm monitoring.

National desertification monitoring: undertaken by means of 3S techniques and taking one province as a monitoring unit, the period is 5 years.

Key (sensitive) regions monitoring: Puts emphasis on those regions where desertification is active but controlled effectively. The scope and periods are determined based on case by case situations.

On-site monitoring: Monitoring stations in different typical regions have been setup for a long time and system monitoring of detail of causes, control measures and benefits. It provides detailed support for national monitoring.

Benefits monitoring for desertification controlling projects: it is implemented to national key projects for desertification control and aimed at perfecting project management. It includes project quality monitoring and benefits monitoring.

Sandstorm monitoring: China Meteorological Administration (CMA) is in charge of sand storm monitoring in cooperation with State Forestry Administration, State Environment Protection Administration, and Chinese Academy of Sciences. China Central Meteorological office has released sandstorm broadcasting since 2001 and it can be monitored and broadcasted on time. At the same time, the sandstorm website was also established by CMA, which provides a platform for the public to exchange information in raising public awareness in sandstorm prevention and reducing sandstorm damages. China Desertification Monitoring Center, of the State Forestry Administration, had also set up GIS-based national desertification, sandy desertification and sandstorm disaster assessment system. At present, China has formulated sandstorm emergence prevention plan to reduce effects of sandstorm to the economy and people’s life.

2.7 Diversified economy and combating desertification industry

There exist rich rare bio-resources in desertification regions of China. As the market economy progresses in China, it comes better and better in resource development and diversified economy in desertification affected areas. For example, E-lion Company in Kubuqi Desert, developed desert industry by establishment of *liquorice* base, fast growth timber base, caragana bush base, Helianthus tuberosus base, Ginseng base, Cistanche spp base, sheep
commercial industry and 100 km eco-tourism line, and had gotten great achievements in combating desertification with high ecological, social and economic benefits. They also developed tourism industry by uses of local desert landscape and minority grassland cultures. Dongda Company in Dalate Banner developed a desert-based industry by planting bushes and fixing shifting sand, achieving ecological, economic and social benefits simultaneously.

2.8 Raising public awareness for combating desertification

The Chinese government pays attention to combating desertification awareness education. Combating desertification has been included into the curriculum of national higher education. The Chinese government, in cooperation with the Secretariat of UNCCD, held UNCCD public awareness training seminar in 1995. At the same time, the government also awarded 10 National Model Institutions, one National Hero, 10 National Model Individuals to Combat Desertification; National Model Institutions and Individuals in Soil & Water Conservation to raise public awareness and to attract the attention of the whole society to combating desertification.

From 1997 to 2000, integrated with UNDP/China Project of Capacity Building in Combating Desertification, more than 1,500 people were trained by different awareness seminars and classes. The trainees came from central ministries and local government departments as well as technicians and grassroots workers. By these activities, public awareness has been raised, information exchanged and management levels improved. Sustainable development ideas were impressed on farmers and herdsmen. Advanced dryland management ideas were also introduced from abroad. In recent years, county level leaders training classes have also been held by Ministry of Personnel to raise their awareness in combating desertification.

Since 1994, on June 17 every year, the World Day of Combating Desertification, large scale activities have been organized to raise public awareness by poster, TV tape, broadcast, newspaper, seminars, workshops, etc. All these activities have been greatly successful in raising public awareness.

2.9 International cooperation in combating desertification

China has cooperated with more than 70 countries and tens of international institutions (as UNEP, UNDP, WFP, FAO, ADB, UNESCAP) in the field of desertification combating. Chinese has held desertification combating seminars and training classes for UN bodies and organized the third international conference on desert development. Under the Framework of Sino-African Cooperated Forum, training classes had been held for African counties. In recent years, a lot of experts were sent to African countries to help these countries to combat
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2.9.1 Cooperation under framework of UNCCD

The Chinese government cooperates actively with the Secretariat of UNCCD. The Asia-Africa Forum on Combating Desertification also held in Beijing in 1996. Ministerial Conference on Regional Cooperation to Implement the CCD in Asia was held in Beijing in 1997 and passed the Declaration of the Beijing Ministerial Conference on Regional Cooperation to Implement the CCD in Asia. The Thematic Program Networks (TPNs) framed priorities projects in Asia were outlined. The Chinese Government also actively undertook TPN1 (The Asian Thematic Programme Network on Desertification Monitoring and Assessment) in Beijing. The starting meeting of TPN1 was held in Beijing in July, 1997 and passed its aims, structure, the main plan, priorities action plan as well as operation guideline as annex. There are 20 member countries in TPN1, i.e. China, Japan, India, Iran, Jordan, Kazakhstan, Kyrgyzstan, Kuwait, Lebanon, Mongolia, Pakistan, Philippine, Syria, Tajikistan, Thailand, Turkmenistan, Uzbekistan, Vietnam, Yemen. The first expert working meeting of TPN1 was held in Nov. 2001 and assessment and monitoring baseline and indicator system were put forward. At present, the TPN1 website is operating (http://www.asia-tpn1.net). The Asia-Africa seminar on early warning and second focal point meeting of Asia were held in China in 1999 simultaneously. China also actively participated in other TPNs in Asia ad hoc meeting of assessment and monitoring baselines and indicators. The Coordination Meeting on Partnership Building and Resources Mobilization for UNCCD Implementation in China co-organized by Secretariat of UNCCD, GM, UNDP, ADB, was held in 2001, about 11 countries and 17 UN institutions attended the meeting. It was this meeting that promoted cooperation and exchange in combating desertification between China and the rest of the world. Thereafter, the Strategy Recalled Seminar on Implementation of UNCCD in China was held. In Cooperation with UNESCAP, UNEP and the Secretariat of UNCCD, the National Consultation Meeting on Prevention of Duststorm in Norhest Asia was held in May 2005 in Beijing, about 20 representatives from 10 international institutions, 5 countries and 15 representatives from ministries of China attended the meeting. Based on the framework of UNCCD, it deepened understanding by presenting parts to China’s implementation policy on UNCCD and harmonized aiding plans of UNDP, ADB, and Germany to China. In Oct. 2004, CST and its expert meeting were held in Beijing and International Training Center on Combating Desertification of Secretariat of UNCCD was established in Beijing, China, which plays an important role in strengthening regional and global cooperation.

2.9.2 PRC-GEF partnership on combating land degradation in dryland ecosystem

This is GEF’s first nationally implemented project for combating land degradation in
dryland ecosystem in the world, under framework of OP12 of GEF. It aims to promote adoption of the integrated ecosystem management (IEM) approach to address land degradation (LD) problems, and provides technical and financial support to solving problems of inter-agency and cross-regional natural resource management. Through development of partnerships with target countries, the medium- and long-term programming approach was used to integrate environmental objectives into national development planning and strategy.

The general objectives of the project are to support to sustainable development in the Western China and to protect global environment. The project has drawn one 10-year national framework plan, and under this framework, a series of projects will be funded and implemented according to their importance values to control land degradation. PRC-GEF partnership on combating land degradation in dryland ecosystem has undergone 3 stages from preparing of the partnership, formulation of the Country Program Framework and implementation of a project for land degradation control under the Country Program Framework (CPF).

From October 2000 to March 2001, a consultant team including domestic and international consultants was organized to draft the Program Framework for the Partnership on LD Prevention and Control in the Western China and its 6 annexes. Requested by ADB, an international workshop was held on April 3, 2001 to discuss the framework. From Jan. 2002, ADB consulting expert team started preparation of Country Program Framework, and, expert team toured to six provinces (regions) organized by the Project Management Office (PMO), the CPF Brief was submitted to and approved at the GEF Assembly and the Council Meeting held in Beijing in October 2002.

The CPF is a 10-year program framework and will be implemented sequently. The first project (Project One) of the framework is “Strengthening the Enabling Environment and Building Institutional Capacities”, which will be implemented from 2003 to 2006. This project covers all 6 northwestern provinces/regions (Shaanxi, Gansu, Qinghai, Ningxia, Inner Mongolia, Xinjiang) and contains 6 components: (1) improving policy, legal and regulatory framework; (2) improving national and within-province coordination; (3) improving province/region and county level operational arrangement; (4) improving institutional capacities; (5) developing operational mechanism for LD monitoring and evaluation; and (6) implementation arrangements.

Ministry of Finance (MOF) is the GEF focal point of the Chinese Government; State Forestry Administration is the implementing agency of the project. Each province has set up its own implementing agencies. It is estimated that a total US$ 1.5 billion over ten years will be spent for the PRC-GEF partnership on combating land degradation in dryland ecosystem, of which, GEF will fund US$150 million. Project One started in July 2004 and with a budget of US$15 million and GEF shared US$7.7 million, ADB shared US$1.0 million in technical
Assistance (TA) and rest of US$6.3 million is shared by the Chinese Government.

2.9.3 Other international cooperation projects

Since 1990, a lot of international cooperated projects, which relate to desertification combating and land degradation control, have been carried out by different channels.

(1) Bilateral projects

- China-Australia Joint Project: Desertification Combating Project in Alashan of West Inner Mongolia.
- China-Japan joint project: including Afforestation for Sand Fixation Project in Yanchi of Ningxia, Shelterbelt Planting Project in Ningxia, Afforestation Project in Daning, Shanxi Province and Japanese Loan Afforestation Project (Shaanxi, Ningxia, Gansu, Inner Mongolia).

(2) Multilateral Cooperation

The Chinese Government has been actively in cooperation with other international institutions in environmental protection since the middle of 20th century, such as WFP, FAO, UNDP, GEF, IFAD, WB, ADB, UNESCAP and other international institutions. Of these, WFP has funded projects in China the longest, but most of their projects are integrated agricultural development and poverty alleviation projects. After UNCCD came into force, only a few project focused on combating desertification in China. Some projects related to desertification combating are listed briefly as follows.

- WFP Projects: including Integrated Development Project in Qinghai Province, Poverty Alleviation and Environmental Protection in Guyuan of Ningxia, Integrated Agricultural Development in East Qinghai Province, etc.
- FAO Projects: including Sandland Control Project in Hebei Province, LADA Project and Salinized Land Control in Heilongjiang Province, etc.
- UNDP Projects: including Capacity Building for Implementation of UNCCD in China (CPR/96/111) and Gansu Desert Control Project (CPR/91/111).
- International Fund for Agriculture Development (IFAD): including Agriculture De-
velopment Loan in Hainan Zhou of Qinghai Province, at same time, IFAD also implemented projects related to combat desertification in Ningixa, Shaanxi and Shanxi Provinces.

- World Bank (WB) project: including Project of Soil & Water Conservation in Loess Plateau, Irrigation, & Immigration Integrated Project in Hexi Corridor of Gansu Province, Watershed Integrated Management Project, etc.

- Asia Development Bank projects (ADB): including the Grassland Development Project in North China, Combating Desertification Project in West China, Desertification Combating Project in Gansu Province (TA3663/PRC), Prevention of Dust & Duststorm in Northeast of Asia (TA-ADB-GEF RETA 6068), etc.

2.9.4 Cooperation with NGOs

International NGOs are also active in combating desertification in China, such as International Union for Conservation of Nature (IUCN), World Wildlife Foundation (WWF) and another 10 institutions. These NGOs pay more attentions to biodiversity protection and only limited work have been focused on combating desertification.

Other NGOs, such as NGOs in Korea and Japan and even some enterprises also participated in combating desertification and the shifting sand fixation in China. For example, Northeast Forestry Forum of Korea, Desert Green Jointed Agency (China agency), Japan Tokuyama Company, Korea Real Estates Association, Toyota Auto Company, have donated funds for afforestation and sand fixation as well as duststorm prevention in China.

In addition, ECO foundation in Albert University of Canada also funded afforestation in Changping, suburb of Beijing. TC foundation of Belgium, NGOs in Germany, USA as well as in Hong Kong also donated funds to China for combating desertification, for example Chinchshe in Hong Kong has implemented projects to combat desertification in mainland of China.

By implementation of these international cooperation projects, firstly, environment in the project regions has been improved by aid of international fund, a lot of advanced management experiences and techniques have been learned, the management level has improved. For example, advanced and strict management techniques from project planning to quality control, financial management, inspecting and auditing have been introduced into China in afforestation by China-Germany Afforestation Project, which provides management experiences to the Program of Reversion of Farmland to Forest in China. Secondly, advanced techniques have been introduced into China which includes techniques of resources monitoring, remote sensing, combating desertification, water-saving irrigation methods, integrated ecological assessment, etc. Thirdly, the implementation of international cooperation projects has advanced the Chinese participant's technical levels of project management. Some technicians were trained overseas and these become valued human resources for future cooperation.
Fourthly, ideas have been changed and people's environmental protection and legal awareness have been raised. The participatory idea in project management has been formed gradually.

2.10 Enterprises, societies and NGOs in Combating desertification

The participations of Chinese domestic enterprises, societies and NGOs in combating desertification in China have undergone course from understanding to participating. It is only recently that Chinese domestic enterprises, societies and NGOs have actively participated in combating desertification in different ways and manners.

Domestic enterprises have participated in combating desertification in two ways, i.e. donation and investment. Since 2000, some enterprises have participated and invested in the program of demonstration plots construction for combating desertification, which were organized by Ministry of Science & Technology. About 20 enterprises participated in the program. At same time, some enterprises invested into desertification combating related projects. For example, the milk industries of Yili, Mengniu and Wandashan, based on the national program of grassland restoration, built milk stations in pasture areas to collect milk from herdsmen which solves the difficulty for these herdsmen to sell their milk. It has promoted implementation of the national program of grassland restoration in pasturing areas. Other resource development enterprises, like Dongda Group in Erdos, invested to establish paper-making factory by use of sandland shrub resources. The enterprise purchase shrub in sandland regions, which provides ways to use shrub resources and increase income to local people, and in turn, encourages local people to plant shrubs in sandlands.

There are more than 2,000 NGOs in environmental protection and desertification combating. Societies related to combating desertification in China include China National Sand Control & Desert Industry Society (CNSCDIS), Soil & Water Conservation Society of China, Forestry Society of China, Ecological Society of China, etc.. These societies and associations play an important role in combating desertification planning and ecological project implementations. They organized science & technology exchange, technical consulting and integrated scientific investigation and participated in science popularizing, technology extension and consulting to promote desertification combating in China. In order to encourage social participation, China Green Foundation was set up in 1985 and about 60 million Yuan RMB have been collected and 37 pieces of international friendship forest planted and more than 60 international greening projects implemented.

The real NGOs in China are young and less in number, but they are also active in participating in combating desertification and environmental protection, such as Friend of Nature and Earth Village. Even if NGOs in China are at an initial stage, they have been playing a role in reflecting public wishes and communication between public and government.

There are also volunteers all over China. Every year in Tree Planting Day, World
Environment Day, Water Day, and World Day to Combat Desertification & Drought, a lot of volunteers participate in planting trees and combating desertification. Even in spring every year, some volunteers from other northeast Asian countries jointed tree planting in China for the Earth greening and sand fixation. Many special forests named as Journalists Forest, Youth Forest, Forest of Labor Union, Women Forest, Friendship Forest have been planted in past years.

At same time, over the past decades, a large number of model institutions and individuals in combating desertification have been awarded prizes, such as Ms. Niu Yuqin and Mr. Shi Guangyin in Shaanxi province, Ms. Wang Guoxiang in Ordos and Mr. Tang Chen in Chifeng, Inner Mongolia. In 2003, National Greening Committee, Ministry of Personal and State Forestry Administration jointly awarded more than 100 model individuals for their contribution to desertification combating, and asked people to learn from these model individuals.

2.11 Local government (province) activities in combating desertification

Limited by economic conditions, local governments of desertification affected areas have not enough funds to implement combating desertification project, most of them just organize and implement projects funded by central government. In some regions with better economic conditions, local governments invest themselves into desertification combating projects. In order to ensure implementation of national desertification projects as expected, local governments have set up special project management institutions in departments of forestry, agriculture, water resources, environmental protection.

Local governments also promulgate local regulations to prevent desertification and encourage public participation in combating desertification. Inner Mongolia, Ningxia and Shaanxi Provinces have promulgated some regulations to ban grazing in rangeland, which effectively controlled rangeland desertification caused by over-grazing. In some regions, governments prolong land contract periods to encourage the public and enterprises to participate in combating desertification and invest in resources and desertified land development. All these have achieved much in combating desertification.

Annex: Activities for combating desertification in 6 Key province

(1) Inner Mongolia Autonomous Region

Inner Mongolia Autonomous Region is the only province which 6 National Forestry Ecological Programs involved. In recent years, regional protective forest systems, consisting of shrub, tree and grass, and in shape of piece, belt and network, have been established in some
regions, about 3.33 million ha of farmland and 5.33 million ha rangeland have been protected by establishing protective forest, about 8 million ha of land implemented soil & water conservation projects. Vegetation cover recovery in the Mu Us Sandland and the Kerqin Sandland have reached to 20% and 15% respectively. Ecological conditions in the Hunshandake sandland have been improved significantly. The number of natural reserves administrated by the departments of forestry is 131 with areas of 9.0 million ha, occupying 7.6% of territory area of Inner Mongolia Autonomous Region, of which 14 are national, 34 provincial, and 83 at county level.

In recent years, central government started programs of restoration of natural vegetation (artificial grassland construction and fencing), rangeland fencing projects (fencing and rotation grazing) and rangeland restoration (graze banning, rotation grazing). The artificial grassland area has reached 6 million ha.

Measures used in changing production methods include from extensive management to intensive management by extension of mechanized protective farming, dryland farming, protective farming, etc. Modern farming techniques have been used to protect farmland from desertification. Ecological emigration measures had been adopted in some sandy regions to accelerate restoration of natural vegetation. Emigration projects include civil affairs emigration, poverty alleviation emigration and forest ecological project emigration, which were also classified into emigration from sand source region, ecological fragile region, arid rangeland and mountain regions.

(2) Shaanxi Province

Shaanxi province, in the tenth five-year-plan outline for social and economic development, determined detailed tasks for agriculture, forestry, water conservancy, environmental protection and soil & water conservation.

- Under an agriculture aspect, tasks include that from 2003 to 2015, 333,000 ha farmland is reversed to forest, 33,000 ha grassland seeded by air-seeding, 80,000 ha farmland protected, 37,000 households of biogas developed in the countryside by 2005, and 74,000 expected by 2010;

- Under a forestry aspect, tasks include planting 82,000 ha of forest for sand fixation and 24,000 ha of forest for soil & water conservation, 6,000 ha of natural forest in sandland area, 153,000 ha of forest planted by air-seeding, 2,000 ha of artificial forest planted, 240,000 ha of farmland reversed to forest;

- Under a water conservancy aspect, tasks include Yaozhen Reservoir in Shenmu County being constructed as soon as possible, water pools in the south and water tanks in the north, and wells in central province should be selected to provide water resources for agricultural production and local people's life;

- Under environmental protection aspect, tasks include establishing 15 ecological
protect demonstration zones at county or city level, 40 ecological demonstration zones at township level, and 300 ecological demonstration zones at village level, improving 13 natural reserves and establishing 26 new natural reserves, natural reserves would total 50 with an area of 837,000 ha, about 1,067 ha of abandoned land in mined areas would be reclaimed;

- Under soil & water conservation aspect, the controlled area would reach 821,000 ha, including 113,000 ha terrace, 164,000 ha forestation, 163,000 ha cash and fruit orchard, 147,000 ha of grass-seeding and 234,000 ha closed, 2,533 check dams built.

(3) Gansu Province

In the tenth five-year-plan outline for social and economic development and Agricultural Sci & Tech Development Outline (2001-2010), Gansu Province plans that pollution and degradation in ecological environment would be kept within limits, soil erosion would be controlled.

By 2005, reversion of farmland would reach 330,000 ha (all the farmland with over 25 degree slope to forest), forestation 670,000 ha, closure of 630,000 ha of mountain to vegetation recovery and raise forest cover rate to 10.3%.

For soil and water conservation, the controlled area would reach 18000 km², by year of 2010, target to return farmland with slope over 16 degree to forest 330,000 ha, afforestation in mountain regions 670,000 ha, closure for vegetation restoration 630,000 ha.

The main projects consist of soil & water conservation in the Loess Plateau, inland rivers and Yangtze River Watershed of Gansu province, harness and development of salinized soil and sand industry development.

(4) Qinghai Province

In the tenth five-year-plan period: Qinghai Province plans to undertake the following ecological projects related to desertification combating:

- Program of natural forest protection. The program covers 37 counties in sources region of the Yangtze River, the Yellow River and the Lancang River, Qianlian Mountain and Valley of Hehuang River with area of 303,300 ha, from 2001 to 2010, 1,983,300 ha of natural forest will be protected, 7,500 ha of artificial forestation planted, 29,000 ha of mountain closed for regeneration, 136,000 ha forest planted by air-seeding. Up to now, 6, 600 ha of artificial afforestation and 88,700 ha of closure for regeneration have been completed;

- Program of reversion of farmland to forest. This trial program was from 2000-2001, 365,000 ha of farmland revers to forest and 729,000 ha artificial afforestation in mountains has been planned within ten years, 167,000 ha of farmland has reversed to forest and 208,000 ha of barren mountain afforested, about 200,000 households consisting one million people have benefited from this program;

- “Three north” protective forest program (Green Great Wall Program). In the fourth
period of the program, 300,000 ha of artificial afforestation, 360,000 ha of mountain prohibition, 200,000 ha of air-seeding afforestation are planned, and 77,900 ha of artificial forestation and 293,700 ha of mountain closure have been completed.

- Construction of natural reserves in source regions of three rivers, Chaidamu Basin and Qinghai Lake. There are 8 natural reserves in these regions, including 5 at national level, 3 at provincial level with a total area of 207,600 km². 4 infrastructure constructions in the core region of the Three River Resource Natural Reserve have been completed.

- Rangeland construction program. Through 2 years of implementation, 103,000 ha of degraded “black soil” rangeland has been controlled, 2,666,400 ha of rangeland fenced, 1,827,000 ha of rangeland expected to be protected from grazing and rodent damage area deceased from 200 million per ha to 120 million per ha.

5) Ningxia

In the tenth five-year-plan period, Ningxia plans that forest cover will reach 12%, 330,000 ha of farmland with over 25 degree slope will be returned to forest in the south loess hill region, green cover in cities will reach 20%, sewage treated will reach 76%. At the same time, The Tenth Five-year-plan Period Combating Desertification Plan, Ecological Investigation Report of Ningxia, Ecological Zoning in Ningxia, Land Resources Remote Investigation of Ningxia and Wetland Protection Feasibility Report have been compiled and authorized.

6) Xinjiang

Xinjiang implemented 5 key national forest programs, i.e. Natural Forest Protection Program, Conversion of Farmland to Forest Program, “Three North” Protective Forest Program, Wildlife Conservation & Natural Reserve Development Program, and the Forestry Industries Base Development Program in Key Regions with a Focus on Fast-growing & High-yield Timber Plantation. Xinjiang Autonomous Region has been ranked as one of the 11 test provinces in forest classification management and ecological subsidy. The subsidy is 75 Yuan RMB per ha.

Under the agriculture aspect, water saving irrigation projects has been implemented in Xinjiang. Since 2000, the quantity of water consumed for farming has deceased at the rate of 5% every year, 8 dry farming and water conserving demonstration sites, will be established in the “10.5” period. Under the water conservancy aspect, the Tarim River Ecological Environment Integrated Control Program has been implemented. Under the rangeland management aspect, restoration of natural rangeland by fencing, rangeland protection from grazing projects are also implemented.
3 National Capacity Needs Assessment for Implementation of the UNCCD in China

Since signature of the UNCCD in 1994, many of the activities have been carried out by the Chinese Government for implementation of the UNCD and also achieved much. The achievements in combating desertification in China have been highly praised worldwide, and a lot of experience also summarized. At the same time, China is one of the largest developing countries with serious desertification; desertification is still expanding, which affects not only production in industry & agriculture and people's life, but also national sustainable development, even national as well as world environments. Therefore, it is very important to understand the problems existing in capacity building for implementation of UNCCD and also helpful in confirming the priorities and action plan in capacity building.

3.1 Institution construction and operation mechanism

China is a developing country with 27% of desertification area; sandy desertification enlarges at the rate of 3,436 km² each year. Desertification has badly affected regional social & economic sustainable development in the 21st century. As functions prescribed by state council, department of forestry is in charge of desertification management. Implementation of the UNCCD involves a lot of sectors and relates to many departments. The National Coordinating Group on Combat Desertification, consisting of 16 ministries, was established in early 1990s and reorganized in 2001. The State Forestry Administration (SFA) set up the National Bureau to Combat Desertification, the Secretariat for implementation of UNCCD, Senior Experts Consultant Group in Combating Desertification and three centers in desertification monitoring, training, research & development.

3.1.1 Problems

(1) Coordination among departments at central government level

CCICCD consists of 17 ministries institutions related to departments of planning, finance, foreign affairs, law, tax, science & technology, agriculture, forestry, water, communication, environment protection, meteorology, poverty alleviation, etc., therefore, it needs active cooperation and coordination among departments. Limited by awareness, number
of personnel and other factors, some problems still exist in the operations of the CCICCD. Although an inter-ministry joint meeting system has been set up by National CCICCD, squabbles for department's benefits still exist even over trifles. All these have constrained the exertion of manpower, material resources and financial resources in combating desertification.

(2) Institution construction at local government level

For desertification management in local governments (provincial level or lower levels), there is no clear responsibility classification in desertification management among different departments. Except that a few provinces affected seriously by desertification have special institutions for desertification management, most provinces and lower level governments have no special institutions. In particular, at county and grassroots level, relevant institutions also face shortage of outlay and personnel resources for most of regions. Especially after government institution reform in 1998, coordination capacity of desertification management department (forestry) has been reduced greatly in project planning, arrangement and implementation. This has somewhat affected desertification combating.

(3) Roles of Senior Experts Consultant Group not effective

The establishment of Senior Experts Consultant Group in Combating Desertification is to provide policy and technical consulting for central government and to heighten decision making capacity in combating desertification. In review, the operation of the Senior Experts Consultant Group in Combating Desertification in recent years, their functions have been limited by many factors. It works only in meetings and participates little to guide key programs.

(4) The functions of the training center and R&D center are limited

Affected by operational mechanism and shortage of funds, functions of the training center and R&D center on combating desertification have been limited. Since 2000, the training center and R&D center on combating desertification have almost been in maintenance states. They can not effectively organize large training activities on research and development projects. Cooperation with the UNCCD Secretariat, International Training Centre (ITC) on Combating Desertification established in 2004, but it has not received any funding and nor to host any training activities.

3.1.2 Needs

Based on the present institutions situations in combating desertification and for capacity building, first priority is to pay attention to capacity building in institutions establishment and perfection at central government, provincial government and grassroots levels. At the central government level, national UNCCD implementing institutions capacity should be strengthened in program planning, project management and decision making; capacity in coordination and cooperation among ministries should also be strengthened. At the provincial government level, while perfecting institutions, management capacity should be strengthened in
combating desertification. At the grassroots level, institutions should be established and perfected and the essential management facilities and equipment should be installed (i.e. traffic & communication tools). Management capacity should also be strengthened. The functions of Senior Experts Consultant Group in Combating Desertification and the Training Center and R&D Center on Combating Desertification should be strengthened.

3.2 Law and policy in combating desertification

In recent years, a series of laws have been promulgated and revised. They include Law on Combating Desertification, Forest Law, Land Contract Law, Land Management Law, Soil and Water Conservation Law, Water Law, Environment Protection Law, Grassland Law, Mineral Resources Law. A lot of bylaws and regulations also issued, such as the Administration Regulation in Desertification Combating for Profits, Resources Administration Regulation for “4-barren lands ” development in Countryside, etc. All these laws and regulations have played important roles in combating desertification.

3.2.1 Problems

(1) The laws articles are rough with low flexibility

Most of laws and regulation related to combating desertification are formulated only in principle and the laws articles are rough with low flexibility. Irrational human activities are difficult to be controlled by laws. For example, the Law on Combating Desertification passed in 2001, still lacks implementation regulations and problems come out while implementing.

(2) Poor relation and weak coordination among laws

Each law in China has its own independent system and was drafted out by a different department of government; therefore, it carries administration department's opinions and leads to poor relations and weak coordination between laws.

(3) Low attention to law popularity and implementations

Due to shortage of special fund, laws related to combating desertification have not been well popularized. At the same time, many problems exist in the law execution environment. Limited by undeveloped economic conditions, public laws awareness is poor. In some regions bureaucracy is more powerful than law, which has negative impacts on legally combating desertification.

(4) Present policies difficult to mobilize whole society in combating desertification

The present policies and mechanisms, especially the policies and measures in financial supporting, favorable taxes, land use policy as well as investor right protection to encourage individuals and non-state owned economic sectors to participate in combating desertification, need further perfecting. Only in this way, can whole society be mobilized to participate ac-
tively in combating desertification.

3.2.2 Needs

Legal construction in combating desertification should be accelerated, including implementing the regulations of Law on Combating Desertification, law implementation system (to strengthen law execution forces, to improve law execution conditions, to enhance law execution levels, and to increase law execution supervision capability). Attention should be paid to laws propaganda and education. While in combating desertification, priority should be given to preventive measures.

New policies for combating desertification should be formulated based on the broad and detailed investigation, for example, land ownership, use-right and managing rights should be separated to encourage people to combat desertification. Land use rights can be bought by different economic components, land used for ecological construction and its use right should be allowed to be inherited and transferred, etc..

3.3 National project to combat desertification

Since 1990, especially in the last ten years, the Chinese government has invested huge funds in implementing the National Action Plan to Combat Desertification. Many projects (Forestry Ecological Program, Soil & Water Conservation Program, Grassland Construction Program, Integrated Agricultural Development Program, Natural Reserve Construction Program and National Poverty Alleviation & Development Program) related to combat desertification have been implemented and great achievements have been realised.

3.3.1 Problems

(1) Investment

Desertification in China is serious with large areas and huge damages. At the same time, economy is less developed and life in desertified regions is poor. In these regions, even if huge funds had been increased to the program of combating desertification by central government, the total investment to combat desertification is still relative short of needs; the effects in combating desertification had been restricted seriously.

(2) Projects planning and management

Desertification combating related projects have been planned and implemented by different departments (i.e. forestry, agriculture, water conservancy, integrated agricultural development, environmental protection, etc.), hence projects are often like broken pieces and lack of a unified plan. This situation has restricted their effects on combating
desertification. In recent years, government at different levels has invested and implemented a lot of projects in combating desertification; their benefits have been restricted because of limitation of departments and decentralization of projects as well as management by different departments.

(3) Shortages of effective project management mechanism

Most projects for combating desertification are not effectively implemented according to strict project management procedures. Poor quality control, auditing, inspection, checking and approval have led to a lot of quality problems and restricted the effects in combating desertification.

(4) Shortage in anti-drought strategy in the National Action Plan (NAP)

There are shortages of anti-drought strategy and activities in the National Action Plan (NAP). More attention has been paid to harness resources and less to conservation in the implementing projects, which lead to a lag in conservation measures.

3.3.2 Needs

A sustainable national investment mechanism in combating desertification should be established and perfected, and the domain of government's investment be clarified. Non-state owned economy participation in combating desertification should be encouraged by policy guiding and inspiring. Public participation into combating desertification should be mobilized by laws, favorable policy and by perfecting subsidy and service mechanism for ecological benefits. At the same time, demonstration of the policy and mechanism to attract private participation in combating desertification should be perfected.

Cooperation and coordination among departments should be enhanced; the national ecological project to implement inter-departmental, inter-industries, inter-regional and national combating desertification programming unified. At the same time, project management should be enhanced and modern project management ideas (project planning, assessment, examining and approving, auditing and inspecting) carried out. The process of project supervising, auditing, inspecting and approval should be implemented to enhance project benefits.

In cooperation with the national combating desertification program, items of anti-drought should be added. Different types of models and demonstration plots should be established in ecological treatment coordinated with economy development and of high standard, in high quality and characteristics. These models and plots should be used as demonstrations and seed functions in implementing combating desertification projects. They can also be used as windows to extend the results of combating desertification domestically and abroad and accelerate social economy development.
3.4 Scientific research and technical extension

3.4.1 Problems

(1) Scientific research

Problems in scientific research include theory shortages and lag time to practices in combating desertification program construction, which has affected the speed of combating desertification and its effects. The first problem in scientific research in combating desertification is that science and technology have not been incorporated into practice in combating desertification, research and production, demonstration and extension, education and training have been disjointed. The second problem is a shortage of systemic research in combating desertification, coordination among departments is not done well, Science and technology resources are separate and have no powerful key research group, which has affected breakthrough in key researches and the achievement's extension and application; The third problem is that some key technical issues have not been solved yet, including combating desertification & social economy sustainable development, desertification monitoring & assessment techniques, degraded rangeland protection, restoration & improvement techniques, etc..

(2) Technical extension

The first problem existing in traditional technical extension is that the extension system faces fund shortages and personnel instability. In the last 10 years, affected by family responsibility, market economy and institution reforming in local government and grassroots, the technical extension institutions (including forestry, agriculture, water conservancy, animal husbandry, etc.) and system in county and its lower levels are seriously challenged, which makes advanced techniques not extended in time and the projects have lower benefits. The second problem is that a multi-extension mechanism is still under construction. Restricted by infrastructure, some of the techniques extended by TV, radio broadcasts, even networks, can not be received in some rural regions, the only method is the activities of sending techniques and books once each year, which also can only cover a small area and few people. The third problem is that, at present, scientific & technical extension and production are separate, some of the research results have no extension funds and cannot be transformed into productivity. In addition to shortage of theory in desertification dynamics and key techniques in combating desertification, the benefits in combating desertification projects have been affected negatively.

3.4.2 Needs

The key researches in combating desertification should be enhanced, the rate of transforming scientific results into projects of combating desertification be increased, and theory
research reinforced further in order to provide technical support to combating desertification projects.

At same time, establishment and multiplication of technical extension and services system (extension fund, extension system and large scale application) should be promoted, stable and a sustainable extension system established to extend advanced technology and research results. Some advanced results should be selected and used in projects to combat desertification. Scientific supporting organizations should also be enhanced to ensure the functions of the Senior Experts Consultant Group.

### 3.5 Information exchange and sharing

#### 3.5.1 Problems

1. Poor intra-national desertification information exchange and sharing mechanism

   Although the Desertification Information Network (DIN) of China was established in 2000 (www.din.net.cn), it has been still in a standing state and issued some information periodically. Restricted by an integrated mechanism in information exchange and sharing in China, it is difficult to get material information from the DIN website. At the same time, restricted by funds, technical maintenance personnel are few and it is difficult to exert their functions in information exchange and sharing.

2. Information exchange and sharing mechanism is lacking at local level

   Restricted by funds, human resources and other technical conditions, information exchange and sharing mechanisms at local level are lacking. Some provinces lack special institutions charged with management of desertification or it is difficult to get information related project implementation from such institutions and more difficult to get the former data, not say nothing for information exchange and sharing.

3. Poor in scientific research data and results exchange and sharing

   There are many research institutions related to desertification, these institutions belong to different departments and have little exchange and sharing, which sometimes leads to makes the same research topics being studied by many institutions in same region without cooperation. At the same time, because of lack in data sharing, some research works cannot get complete preceding data for different periods by different institutions in the same region. All these factors lead to waste of manpower, material resources and financial resources.

#### 3.5.2 Needs

Firstly, national desertification information sharing mechanism should be improved, the relation of DIN with international networks of desertification strengthened to take DIN as a
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platform to introduce international desertification information and resources; at the same time, domestic information on progress and achievements of national programs of combating desertification and on implementation and the experience of international cooperation projects should be shared through DIN to provide useful information for different organizations and personnel interested in combating desertification.

Secondly, local information sharing mechanism should be established. Trial sites in information exchange and sharing could be carried out in these provinces and counties which have rich data, better facilities and higher quality staff. For those county governments with serious desertification, detailed database can be acquired, established and undated in cooperation with local government.

Thirdly, trial sites of scientific research data exchange and sharing mechanism should be established; on-site monitoring stations participated in by multi-departments can be used as pilot to establish on-site monitoring data exchange and sharing mechanisms to explore scientific research data exchange.

3.6 Public awareness and participation

3.6.1 Problems

(1) Public awareness of combating desertification

The first problem of public awareness of combating desertification is lack of understanding of desertification causes and effects. Especially in their social transforming period, the public pays much more attention to economic issues and less to environmental issues, which leads to disregard and ignore potential desertification consequences. The second problem is the unclear understanding of the definition of desertification. Affected by translation, scientific speciality classification and previous propaganda, most people think desertification as simply desert encroachment, which leads to too narrow a sense of the term. The third problem is that local officials have not enough understanding of the importance of desertification; they pay much more attention to economic development and ignore environmental issues, which lead to ignoring decision making on combating desertification and its effects.

(2) Public participation to combating desertification

The first problem for public participation to combating desertification is an unperfected mechanism. The second problem is the lack of a smooth channel for public participation; the channels for public participation and feedback have not been established in some government departments. The third problem is that no legal provision regulating public opinion consultation in decision making process. The fourth problem is that restricted by local people's
knowledge level, public participation awareness is low in public affairs management, which affects public participated quality and effectiveness. The fifth problem is that the society lacks any monitoring mechanism for public participation and can not ensure public opinion in decision making.

At the same time, restricted by historic reasons, most societies and associations are approved by administrations, their operation funds come from these administrations or governments; it is difficult for them to act as real non-governmental organizations.

In China, the other NGOs are young with shortage of experiences and fund, hence their levels of participation are very limited. Restricted by poor social cognition and their behavior, the trusted and communication channels have not formed between NGOs and government agencies. Even those NGOs that can provide platform for the public to express their wishes and opinions, they act more emotional than rational. Some activities from extremists or opportunists for environmental protection have also affected NGOs’ participation in combating desertification.

As for enterprises, lack of favorable policy regulations (i.e. favorable tax incentives) has somewhat restricted activities of their participation of combating desertification.

3.6.2 Needs

Overviewing the half century of experiences in desertification combating in China and facing the situation of desertification controlled in part and expanded as a whole, much attention should be paid to public awareness raising and education, so that the public can understand the severity of the problem and the importance, necessity and arduousness of desertification combating. By propagandizing, the importance of “prevention first and integrated prevention with control” should be imposed on local leaders and communities. Desertification combating must be combined with environmental protection, local economic development, and regional sustainable development. Modern tools such as TV, radio broadcast, newspaper, poster and other mass media measures should be adopted to raise public awareness of ecological environment construction. Some environmental protection content should be included in the textbooks for high school students. At the same time, effort should be made to help people understand the future of desertification combating and resources development to mobilize whole society to participate.

Meanwhile, attention should also be paid to widen the channels and encourage scientific societies and associations, NGOs and enterprises to participate in combating desertification.
3.7 Desertification monitoring and assessment

3.7.1 Problems

(1) Imperfect monitoring system at national level

Although two terms of national desertification monitoring in China have been carried out and the third one is in progress, the monitoring system is still imperfect because of limitations in techniques, facilities and instruments. Firstly, due to the shortage of human resources, desertification monitoring are carried out by unqualified technicians in some regions; secondly, due to the scale of desertification in a large country such as China, shortage of facilities and instruments is still seen in some regions, although government has invested huge funds to purchase facilities and instruments for desertification monitoring; thirdly, the monitoring methodology and techniques for micro- or watershed level are still imperfect, for example, monitoring indicator system and expert system and other key techniques are still only at initial stage and can not meet the needs for desertification monitoring.

(2) Participatory monitoring and assessment are not carried out

Desertification monitoring at national level is to provide decision making support for the central or provincial governments. At county and lower levels, the aim is to provide detailed suggestions and plans of desertification combating for local government and people. Therefore, participatory desertification monitoring and assessment at county and lower levels are essential. This provide basis for implementation of national macro decision making. FAO has started the project of Land Degradation Assessment in Dryland (LADA) and China has been involved as a pilot country. Participatory assessment method is used by FAO in LADA. However, it is not implemented yet.

(3) Shortage for UNCCD implementation monitoring

Since the Chinese government signing UNCCD, much work has been carried out for its implementation. However most of works are carried out based on the ecological environment situation and ecological environment construction plan of China. Although all the work forms parts of the UNCCD components, it may not be undertaken conforming totally to UNCCD. The monitoring for UNCCD implementation is still weak and more work should be done on this.

3.7.2 Needs

Firstly, monitoring system building at national level should be enhanced. Based on the present desertification monitoring system of China, training of technicians, reinforce learning of advanced monitoring techniques from abroad, supplement facilities and instruments
purchased to perfect infrastructure in desertification monitoring, studies of basic theory and techniques in desertification monitoring strengthened to improve and perfect desertification monitoring and assessment system.

Secondly, trial and demonstration sites of participatory monitoring and assessment in counties and lower levels should be started up, which can be implemented on the basis of established on-site monitoring to accelerate desertification monitoring and assessment in surrounding areas.

Thirdly, capacity in implementing of the UNCCD should be enhanced and improved, experts could be invited to assess and monitor the capacity of implementing of the UNCCD in manner of projects. By these independent experts' assessments, constructive suggestions can be drawn and it will be helpful to combine into national combating desertification programs with implementing of the UNCCD.

3.8 International cooperation

3.8.1 Problems

(1) Some international cooperation projects are not well combined with national key programs

The Chinese government has invested huge funds and implemented a lot of programs in combating desertification. These programs have great importance in improving regional environment on the basis of local natural and social conditions. In the given period, these programs are the national foci in combating desertification. Only international cooperation projects combine with these programs, can they get greater exertion in resources, ideas and experience. At the same time, they should pay attention to laws and regulations, such as Law to Combat Desertification, Grassland Law, and to make these projects become carriers to deliver implementations of these laws. While establishing international cooperation projects, much attention should be paid to understanding the situation of China and to combine strategy and measures of desertification combating to select cooperation directions. Local opinion as well as farmers' and herders' opinions should be also heard. Ideas and working manners used in international cooperation must be fitted to the local conditions. Only international cooperation projects combine with national key programs can they be guaranteed the human resources, materials and financial resources for successful implementation.

(2) Shortage of combating desertification project

Up to now, many international cooperation projects have been implemented in ecological environmental fields of drylands by UN bodies and developed countries, which make great contributions to improve environment and alleviate poverty somewhat in the arid regions of
China. But projects focusing on desertification combating are few. In the past ten years, the representative projects in combating desertification were the UNDP projects of Capacity Building for Implementation of UNCCD in China (CPR/96/111) and Gansu Desert Control (CPR/91/111). The projects focusing on desertification combating can combine well with national programs and domestic allocated funds. The results from international cooperation projects can also be extended and play an important role in combating desertification in China.

(3) More unilateral fund and less bilateral exchange

The Chinese government has paid much attention to combating desertification. A lot of experiences and number of techniques have been achieved in the past years. These experiences, models and techniques are helpful for other developing countries in combating desertification. But China is also a developing country with serious desertification which also needs help from the rest of the world. Most of international cooperation projects in China are aid-received projects. Although some bilateral training projects have been carried out by China for the developing countries, but the number of technical exchange projects are still few due to the lack of mature channels and models. Therefore, international aid is needed to accelerate technical exchange and cooperation to share the techniques for combating desertification worldwide.

3.8.2 Needs

Firstly, the international cooperation framework for combating desertification should be completed. The framework can be finished based on the national programs and the ongoing key projects in the manner of project consultation and used as a guideline for international cooperation in a given period to avoid blindness or subjectivity of donors or sequaciousness of aid recipients to ensure successful project implementation and the expected results.

Secondly, international cooperation project focused on combating desertification should be enhanced. Attention should be paid to deepen world understanding of desertification in China and to widen cooperation channels. World societies should support China in the field of combating desertification.

Thirdly, supported by the third parties, technical exchange and cooperation should be undertaken among developing countries. The Secretariat of UNCCD and other UN bodies can act as bridges and cooperate among developing countries by supporting from donors or parties to UNCCD. Chinese techniques can thus be exported to other developing countries.

3.9 Negotiation capacity for implementation of UNCCD

3.9.1 Problem

China has done much and played an important role in framing UNCCD and its
implementing negotiations. Limited by funding, human resources constitution of UNCCD implementing member ministries and institutions, the negotiation capacity for UNCCD implementing in the member ministries and institutions are insufficient. The first problem is that the funds for thematic study of UNCCD implementation is too little, which can not provide supporting for UNCCD implementing negotiations. The second problem is that, restricted by personnel number in implementing negotiation of UNCCD, some of the related seminars have no Chinese delegates (technicians) or representatives. The third problem is shortage of personnel in studies of international desertification issues such that negotiators are unfamiliar this issue worldwide and affect negotiation effectiveness.

3.9.2 Needs

Considering the problems in UNCCD implementing negotiation, capacity building in these issues should be undertaken first to improve negotiator capacity and negotiating skills, to study policy, mechanisms and related techniques of UNCCD, to develop international cooperation and learn international negotiation experiences. Second, exchange among the member ministries of CCICCD and with international organizations should be strengthened, including official training abroad in related fields of international conventions. Third, GEF funds should be applied to train Chinese negotiators in fields of UNCCD and to support CCICCD in capacity building for implementation of UNCCD.
4 Priorities & action plans for capacity building in implementing of UNCCD

Priority 1. To perfect institutions and enhance management

Facing serious desertification over large areas, severe damages and formidable tasks in combating desertification, and combining the patterns of institutions in management of combating desertification, in light of capacity building, attention should be paid to enhance institutional capacity for management at central, local and grassroots levels. At the central level, while enhancing capacity of UNCCD implementing agency to improve management levels in programming, project management and decision making, more attention should be paid to improve coordination among member ministries of CCICCD. At the provincial level, attention should be paid to strengthening institutions and improve management capacity. At the grassroots level, essential facilities and instrument (traffic and communication tools) should be put in place to improve management capacity.

Firstly, leadership both in government and CCICCD and their coordination capacity should be enhanced. A perfected institutional system for desertification management from central government to grassroots should be established. All the member units related to desertification combating should cooperate and coordinate closely to promote desertification combating.

Secondly, obligations for local government should be clarified. Central government should allocate to provinces fund, tasks and aims together with responsibility, power and benefits. Target responsibility systems should be established to realize green management. Green GDP could be used in leaders examinations.

Thirdly, by means of modern media such as TV, radio broadcasting, newspapers and posters, different types of education and propaganda should be carried out to raise public awareness and understanding of the importance so as to mobilize the whole society to participate in combating desertification.

Priority 2. To perfect laws and regulations, enhance law popularization, improve law implementing environment, and strengthen law execution

Legal construction in combating desertification should be advanced, including drawing
of bylaws under the Law on Combating Desertification; the law implementing system construction (substantiate law implementing force, improve law implementing environment, improve law implementing level and increase law implementing degrees) and to enhance law popularization and education.

New policies and regulations for combating desertification should be issued after systemic studies. For example, land ownership rights, land use rights and management rights should be separated in desertification regions. Different economic components are encouraged in some situations to buy land use rights. Use rights of land used in ecological construction could be allowed to be inherited and transferred.

Priority 3. To enhance the program and project management to heighten benefits

National ecological programs should be planned as integrated, interregional and intergovernmental. Consolidated national desertification combating program should be encouraged. Meanwhile, attention should be paid to enhance projects management. Modern project management ideas including project planning, assessment, auditing, inspecting and approval should be popularized to enhance quality control and improve project benefits.

At the same time, different models and demonstration plots or zones of advanced standards, high economic benefits, combined with national programs, and consolidated with local economic development should be established in different regions. They can be used as windows and popularized domestically and internationally to accelerate social and economic development.

Priority 4. To enhance human resources training

Human resources are the important tools in combating desertification. Effective training activities in different types, by different means and for different personnel (manager, technician and grassroots) should be carried out. At the central government managerial level (member units of CCICCD), coordination as well as desertification awareness should be raised. Attention should be paid to enhance and improve project management capacity. Different technical training should also be carried out to popularize and extend advanced techniques. At the grassroots level, attention should be paid to raise awareness. Special training should be carried out for leaders of the key regions to raise their awareness and enhance management capacity. Modern media such as TV, radio broadcasting, posters and newspapers can also be used to extend and popularize modern techniques to mobilize farmers to participate in combating desertification.

Combined with national desertification monitoring, training activities in remote sensing, use of GIS and GPS, networks and forecasting should be carried out to train technicians for desertification monitoring.
Priority 5. To enhance information sharing

Taking the Desertification Information Network of China as a cut-in point, contact and exchange with international desertification related organizations should be enhanced. Meanwhile, domestic information sharing should be accelerated to provide information resources for different personnel. Trial sites of establishment of information exchange and sharing mechanism at provincial and county level should be carried out to explore information exchange, updating and sharing mechanisms. National on-site monitoring stations can be used to establish scientific research information exchange and sharing mechanisms.

Priority 6. To enhance scientific support capacity

National key research should be enhanced to solve the key techniques in combating desertification. National scientific and technology special research for combating desertification should be attend to basic theory and results extension so as to provide support to combat desertification. At same time, technical service and extension system should be perfected to extend and popularize advanced techniques and research results. Attention should also be paid to establish scientific support system and the functions of the National Senior Experts Consultant Group in Combating Desertification should be exerted further.

Priority 7. To enhance capacity in desertification monitoring

Combined with national desertification monitoring, attention should be paid to studies of monitoring indicator systems, monitoring methods and techniques. Human resources for desertification monitoring should be trained to improve monitoring technical levels. Research for desertification monitoring should put emphasis to networking techniques, 3S (RS, GIS, GPS), assessment indicator systems, expert systems, sandstorm warning and forecasting techniques. New and advanced equipment should be in place and kept updated to improve monitoring capacity. Attention should also be paid to international cooperation and exchange.

Priority 8. To enhance international cooperation

International cooperation in the field of combating desertification should focus on (1) demonstration constructions in sandy desertification control. Tested and demonstration bases can be established by international cooperation projects in different regions to extend advanced technologies domestically and internationally to improve technical content in combating desertification; (2) cooperation in the field of desertification monitoring capacity building should be carried out as a basis of present desertification monitoring by means of advanced techniques and instruments; (3) joint research should focus on applied research to solve the representative problems in given regions as well as technical extension; (4) training
and technical extension. It is suggested that training and technical extension should be one of the aiding items and it can be implemented in different regions based on local conditions; and (5) public awareness raising and propaganda, which can emphasize laws popularization and human activities and desertification combating. It is also suggested that public awareness raising can be as one of items in international cooperation in combating desertification.

Priority 9. To improve negotiation capacity

Negotiation capacity should be emphasized to improve negotiator operation level and skills. Studies in techniques, policy and mechanisms related to UNCCD should be carried out. International cooperation and exchange should be implemented to learn UN convention from negotiation experiences. Exchanges among member units of CCICCD and overseas training should be carried out. GEF should support developing countries in negotiator training in combating desertification and aid more delegates to participate UNCCD activities. GEF should provide special aid to the Secretariat of CCICCD in capacity building for implementation of UNCCD in China.
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Part IV

National Capacity Self-assessment Report on Cross-cutting Areas of Protecting Biodiversity, Addressing Climate Change and Combating Desertification
Reports of National Capacity Self-assessment for China’s Implementing International Environmental Conventions
1 Brief introduction to the Sub-project on NCSA Crossing-cutting Areas

1.1 Background

1.1.1 Cross-cutting issues

Biodiversity, climate change and desertification can all be characterised as complex and integrated environmental issues due to their occurrence, changing effects and impacts. The complex and integrated characteristics determine that, on the one hand, each issue intrinsically has its own specific behaviour and outlook, and on the other hand, each issue extrinsically interacts and inter-relates with the other two issues.

Long-term scientific researches indicate that to comprehend all aspects of the phenomena and their working mechanisms of the above-mentioned serious environmental issues, knowledge about one single discipline is insufficient. Comprehensive and integrated multidisciplinary knowledge is necessary.

Human activities in the past also show proof that those serious global environmental issues cannot be dealt with independently. They need coordination and collaboration between and among efforts of various initiatives.

Because all things are generally inter-related, “cross-cutting areas” and “synergy” often exist in relationships. Therefore, in understanding and addressing these environmental problems under the three Conventions, as a result of extensions and overlap of understanding policies and actions from the different perspectives of each, inevitably cross-cutting issues will form during implementation. Specific cross-cutting areas emerge for attention in national implementation of capacity building under the three Conventions, the United Nations Convention on Biological Diversity (UNCBD), the United Nations Framework Convention on Climate Change (UNFCCC) and the United Nations Convention to Combat Desertification (UNCCD).

1.1.2 Development of cross-cutting issues in international societies

“Cross-cutting areas” and “synergy” are issues only recently recognised in efforts
for the implementation of the three conventions. Over the past several years, these topics have appeared more frequently. One may observe this from two aspects:

Firstly, a number of international workshops on these topics were held. For example, a UNCBD / UNCCD joint working-group meeting was held in Bonn, Germany in May 1—2, 2001, the UNFCCC Workshop on Synergies and Cooperation with other Conventions was held in Espoo, Finland in July 2—4, 2003, and a workshop “Forests and Forest Ecosystems: Promoting Synergy in the Implementation of the three Rio Conventions” was held in Viterbo, Italy in April 5—7, 2004.

Secondly, some international negotiations touched on the relevant issues in the conferences to the parties for implementing the three Conventions. However, comparing with the attention received on those issues directly related to implementing the three Conventions, the attention paid to these topics or issues related to “synergy” is much lower. Such a situation clearly indicates the positioning of “cross-cutting area” and “synergy” issues in international societies.

There are different views as to what constitute the issues of “cross-cutting areas” and “synergy”. In the mean time, there are no very clear or exact answers for a number of questions: How to identify cross-cutting areas? How to achieve synergy in cross-cutting areas? Is synergy in cross-cutting areas able to facilitate the implementation of the three Conventions with marked effectiveness? An important reason to promote “cross-cutting areas” and “synergy” is to avoid duplicating of efforts so as to raise cost-effectiveness of funding resources. However, is synergy in cross-cutting areas able to really support the improvement of cost-effectiveness? At current stage, no one can give satisfactory answers to these questions. To answer these questions, a process of learning by doing is required. It is anticipated that the answers to these questions would be diverse, taking into account the differences at global, regional and country levels, and considering the different situations in different countries.

Reviewing the discussions in those relevant international workshops and the negotiations in the conferences to the parties for implementing the three Conventions, issues about “cross-cutting areas” and “synergy” were touched on at international and country levels. At international level, the secretariats for the three Conventions are expected to harmonise their efforts. At country level, national policies and their practice are expected to be fit with each other. About the latter one, “synergy” was formulated according to specific problems and conditions. For example, the main purpose of the Viterbo workshop was to encourage local level actions for forests, forest ecosystems and their related applications and protections according to the obligations and commitments under UNCBD and UNCCD, so as to push forward synergy for implementing the three conventions more effectively.
It should be noted that emergence of “cross cutting areas” and “synergy” issues does not simply rely on the characteristics of stages and the trend in the process of implementing the three Conventions. In discussion in relevant workshops and negotiated in those conferences to the parties for the three Conventions, “cross cutting areas” and “synergy” issues also touched on the financial responsibilities and obligations of developed countries supporting developing countries so that the latter ones can enhance their capacities to implement the three Conventions. Discussions also touched on the wishes that some countries to simplify or integrate procedures and actions under different conventions. It is also mentioned that at international level, each Convention emphasized more on its own objectives and actions and little coordination and collaboration.

It should be noted that with the emergence of “cross-cutting areas” and “synergy” issues, all the parties to the three Conventions should equally take actions and address these issues. Moreover, in seeking the answers to the questions related to “cross-cutting areas” and “synergy” issues, due to their higher social and economic development and stronger capacities to deal with environment problems, developed countries should and can serve as models for developing countries. At present, international consultations and actions on these important issues are still too few.

All in all, upon the emergence of “cross-cutting areas” and “synergy” issues, very complicated contents already existed within these issues. Complexities and difficulties are expected in the learning-by-doing process regarding “cross-cutting areas” and “synergy” issues, including difficulties to identify cross-cutting areas.

1.1.3 Implementing Conventions and capacity building in the cross-cutting areas in China

UNCBD, UNFCCC and UNCCD are three international conventions related to global environmental and developmental issues. They guide and help to merge environment protection concerns into actions of socio-economic development. Implementing these conventions not only relates to environmental issues, but also to socio-economic development. Therefore, it is required to take systematic national actions and to develop international cooperation under the framework of sustainable development.

China pays great attention on environment issues of biodiversity, climate change and desertification, and actively taking actions to implement the three Conventions. Under the sustainable development framework, China has integrated its efforts of dealing with these environment issues into national strategies, policies and actions for sustainable development. China actively involved in the establishment of UNCBD, UNFCCC and UNCCD, and developed wide international cooperation under the framework of the three Conventions. Just as seen in other countries, the realization for environment and development harmonization in China need a process of efforts. Furthermore, as a developing country that is experiencing
high-speed socio-economic development, such a process inevitably will be a long one. It is well recognized by the international society that China has made active and effective efforts in such a process.

In order to enhance national actions for implementing the three Conventions and enhance its contributions to global environment benefits, China places emphasis to promote collaborated actions at both domestic and international levels. National capacity building assessment in cross-cutting areas will be an important basis for China to effectively work with Global Environment Facility (GEF) and other international partners and to strengthen capacity building in cross-cutting areas and in aspects of collaborating actions.

1.2 Objectives

The objectives of this sub-project on cross cutting areas are:

- To facilitate the understanding about “cross-cutting areas” and “synergy” issues, under UNCBD, UNFCCC and UNCCD and under the national framework of implementing the three Conventions;
- To identify the emphases of capacity building in cross-cutting areas;
- To propose, in cross-cutting areas, those capacity building orientations and contents in priority for a certain period henceforth, and to provide guidance for funding sources to support those capacity building activities in cross-cutting areas.

1.3 Implementation

“National Capacity Needs Self-assessment for Global Environmental Management” (NCSA) is a project funded by GEF. United Nations Development Program (UNDP) is responsible for project organization and implementation at the international level. On behalf of the Government of China, the International Department of the Ministry of Finance is the project coordination agency for the China project of NCSA. Closely working with other ministries and agencies in relation with UNCBD, UNFCCC and UNCCD, this agency also directly provides coordination for this sub-project, and jointly offers guidance for the implementation of the sub-project.

Through bidding procedure, a task force of senior experts with expertise of biodiversity, climate change and desertification areas was selected to carry out this sub-project, and to work out the assessment report.
1.4 Report Structure

This assessment report is composed of 5 sections. In the first section, some background information about the sub-project is introduced. In the second section, methodology that this sub-project applied is described. In the third section, the needs for capacity building under the three Conventions are reviewed. Those cross-cutting areas are identified in the fourth section. Finally, based on analyzing the bases already have and the barriers to be overcome, needs of capacity building in priority in five cross-cutting areas are presented.
2 Methodology and Working Procedures

The principles that this sub-project follows are intended to be simple and to be applicable, underlining the analyses and assessments based on the reports of other sub-projects of NCSA. By doing so, work within this sub-project is concentrated, and dealing with concrete matters relating to work is ensured.

For capacity building in cross-cutting areas, there is no designated contents that are well accepted internationally. Thus, the methodologies and approaches for capacity building need assessments under the three Conventions cannot be completely followed. The most basic considerations in this sub-project are to sufficiently absorb the views and opinions from government sectors and from experts and to determine the contents of cross-cutting areas and relevant capacity building needs within them, based on the understanding about “cross-cutting areas” and “synergy” issues and according to the awareness established in national capacity building need assessments under UNCBD, UNFCCC and UNCCD.

The working procedures that the task force has implemented during this sub-project are:

- Formulating a work plan and an assessment report scheme;
- Conducting deep desk-reviews on the reports of national capacity building need assessments under UNCBD, UNFCCC and UNCCD;
- Discussing with UNCBD, UNFCCC and UNCCD related government officials and experts, and working out the outline of the assessment report;
- Drafting the assessment report of capacity building needs in cross-cutting areas;
- Discussing with UNCBD, UNFCCC and UNCCD related government officials and experts, and revising the assessment report;
- Finalizing the assessment report.
3 Brief introduction to the National Capacity Building Needs under UNCBD, UNFCCC and UNCCD

3.1 Brief introduction to the national capacity building needs under the three Conventions

Through a process of assessment, national priority capacity building needs under UNCBD, UNFCCC and UNCCD were determined. A brief introduction is given here, and for more information in details, please refer to the full reports of national capacity building needs under UNCBD, UNFCCC and UNCCD.

3.1.1 National capability building needs under UNCBD

Based on thorough analyses and assessment, twelve areas in priority of capacity building were determined in the report of national capability building needs under UNCBD, including:
- Construction of related policies, laws, regulations and institutions;
- Identification, inventory and monitoring of biodiversity;
- In situ conservation of biodiversity;
- Ex situ conservation of biodiversity;
- Safety management of genetically modified organisms;
- Management and control of alien invasive species;
- Access to and benefit sharing from genetic resources and traditional knowledge;
- Scientific research, human resources and technology transfer;
- Publicity, education and public participation;
- Data management and information exchange;
- Capacity building of local government;
- Capacity building of non-government organizations.

3.1.2 National capability building needs under UNFCCC

Based on thorough analyses and assessment, eleven areas in priority were determined in the report of national capability building needs under UNFCCC, including:
- Institutional and organizational capacity building;
Creation and enhancement of enabling environment;
China’s national communication on climate change and national greenhouse gas inventory;
National climate change program;
Vulnerability and adaptation;
Mitigation policy option assessment;
Research and systematic observation;
Technology development and transfer;
Clean Development Mechanism (CDM);
Education, training and public awareness;
Information network and database.

Among them, the most urgent capacity building needs in the near term are as follows:
Establishment of the CDM management center;
Initiation of the second national communication, through which to enhance the national capacity in this regard.
Formulation and development of national climate change strategy or national program, and policy studies with the aim of integrating climate change issues into the studies on national socio-economic development strategies and programs;
Capacity for CDM project development and management;
Development of integrated assessment models, and assessments on the mitigation options and mitigation technologies from social, economic, environmental and technological aspects;
Further enhancement of the studies on impacts of and adaptation to climate change;
Enhancement of technology transfer, and development and implementation of pilot projects;
Enhancement of systematic observation, and improvement of climate model development and application;
Enhancement of public awareness;
Establishment and maintenance of integrated climate change information networks and databases.

3.1.3 National capacity building needs under UNCCD

Based on thorough analyses and assessment, nine areas in priority for capacity building were determined in the report of national capability building needs under UNCCD, including:
To perfect institutions and to enhance management;
To perfect laws and regulations, enhance law popularization, improve law implementing environment, and to strengthen law enforcement;
To enhance the program and project management to heighten benefits;
- To enhance human resources training;
- To enhance information sharing;
- To enhance scientific support capacity;
- To enhance capacity building in desertification monitoring;
- To enhance international cooperation;
- To improve negotiation capacity.

3.2 Common shared priority areas and their comparisons

The priority areas common to all the national capacity building need assessment reports under the three Conventions include:
- Policies, regulations, infrastructure and coordination;
- Public awareness;
- Scientific research;
- Morning and assessment;
- Information sharing and dissemination.

However, having shared priority areas does not mean that within each category of these areas, the national capacity building needs under the three Conventions are the same. Therefore, specific comparisons about the contents in each of these areas are necessary.

(1) regarding policies, regulations, infrastructure and coordination, the following needs are identified for:
- UNCBD: improving laws, policies, regulations and technical standards; revising national strategies and action plans; integrating biodiversity protection into national development strategies and plans; improving the coordination mechanisms between and among government sectors for convention implementation at both national and local levels; making assessments on institutional needs in aspects of biodiversity protection, research, monitoring and management, and strengthening relevant capacity buildings.
- UNFCCC: carrying out studies on national strategies and plans, analyses linking national macro-economic policies and climate change issues, and studies for formulating and improving regulations and standards; improving the construction in aspects of policies and institutions for CDM activities.
- UNCCD: improving laws, policies and regulations of combating desertification; enhancing the construction of enforcement regime for those laws, policies and regulations.

(2) regarding public awareness, the following needs are identified for:
- UNCBD: working out and carrying out promotion and education plans; further bringing the initiatives of mainstream channels, media and volunteers into play, and therefore improving public awareness for decision makers, professionals and social public in
various ways such as training, publicizing science and common promotion; implementing studies on establishing rules of and systems of public consulting and hearing for government decision making in aspects of biodiversity related affairs; carrying out studies on policies and mechanisms, such as those for basic public and private sectors involvement; enhancing training of human resources.

- UNFCCC: putting emphasis on public awareness of local level stakeholders (particularly local decision makers, business persons, research and development institutions and so forth) and general public; enhancing training of human resources.
- UNCCD: enhancing training and improving awareness for understanding and coordination of desertification issues; implementing systematic training for local decision makers in areas with severe desertification; strengthening the publicizing of those combating desertification laws; raising public awareness on desertification issues; carrying out large scale training for practical techniques dissemination, and widely applying those techniques; enhancing training of human resources.

(3) regarding scientific research, the following needs are identified for:

- UNCBD: further enhancing basic studies, including those on climate change impacts on biodiversity; strengthening technology development and applications; conducting policy studies; improving biodiversity research and protection institutions, including basic infrastructure and scientific research capacity.
- UNFCCC: building up and promoting scientific research teams, and of multidisciplinary climate change studies; strengthening those capacities for development and application of climate system models.
- UNCCD: further enhancing basic studies; pushing forward resolving of key technical problems for combating desertification; improving science and technology (S&T) research and improving transformation of S&T achievements in combating desertification activities; establishing and improving the service systems of technique dissemination for combating desertification.

(4) regarding monitoring and assessment, the following needs are identified for:

- UNCBD: reinforcing the construction and maintenance of those monitoring systems for biodiversity and important specie resources in various types of ecosystems and in nature protection areas of the country.
- UNFCCC: implementing surveys and investigations on monitoring network resources in all climate system related sectors; assessing the spatial coverage of regional climate monitoring, and assessing the completeness of monitoring elements; undertake the design of an implementing plan of climate system observation in China; enhancing the capacity for understanding and assessing climate change impacts.
- UNCCD: strengthening the studies on aspects of indicator systems, methodologies and
techniques for desertification monitoring and assessment; enhancing human resource training and improving monitoring capacity; improving techniques of desertification monitoring networks, and reinforcing applications of techniques of Global Positioning System, Geographical Information Systems and Remote Sensing; further developing desertification assessment techniques; further enhancing international exchanges and technological cooperation in aspects of desertification monitoring.

(5) regarding information sharing and dissemination, the following needs are identified for:

- **UNCBD**: building up and improving national biodiversity information network and system and all kinds of databases, better utilizing those existing databanks in all sectors and institutions in a coordination mechanisms; establishing data exchange and sharing mechanisms; enhancing and improving China’s national biodiversity information clearing-house mechanism, and on such a basis building up stable and smooth channels for international information exchange.

- **UNFCCC**: improving and maintaining those on-going national level websites; setting up channels for information collection; making studies for proposals on improving and/or updating on-going relevant statistical indicators; in aspect of management infrastructure and techniques, developing measures and approaches for information sharing.

- **UNCCD**: pushing forward information sharing activities within the country from the starting point of building up China desertification information networks; establishing pilot demonstrations of desertification information exchange and sharing mechanisms at provincial and/or county levels, and setting up mechanisms for data and information updating, exchange and sharing in domestic regions; establishing pilot demonstrations of scientific data exchange and sharing mechanisms, and setting up such mechanisms with the support of on-site monitoring stations.

The above comparisons indicate that in the needs for national capacity building under the three Conventions, the specific contents present big differences even though they are in the same category of priority area. There are some reasons behind this. National capacity building efforts under the three Conventions place different emphases on different aspects and foci of convention implementation activities and of that stakeholders show concerns. Meanwhile, resources employed and obstacles to be overcome differ from one to another. These facts show clearly that it is not appropriate to define the cross-cutting areas by only simply referring to the similar category of priority. In addition, these facts indicate that the process of linking priority areas under different Conventions together is not in itself able to satisfactorily meet the capacity building needs for the country implementing the three Conventions.
4 Identification of Cross-cutting Areas

4.1 Criteria for identifying cross-cutting areas

Apart from the self-assessment practices for national capacity building needs under the three Conventions, there are no direct bases such as international decision documents or the long-term domestic experiences to guide the determination of capacity building cross-cutting areas.

At the same time, because of the difference between countries, it is difficult to design a single set of criteria, which can be apply to all the corners of the world, for determining capacity building cross-cutting areas.

There are shared areas but with different emphases in national capacity building needs under each of the three Conventions, as shown in the analyses in section 3. This report will determine capacity building cross-cutting areas based on such, and with the further considerations to facilitate national mainstream activities for implementing the three Conventions and to promote synergy and efficiency.

It needs to be stressed that the synergy within those determined capacity building cross-cutting areas should not lead to any cost increase in activities of implementing each of the three Conventions. One of the important considerations for promoting “cross-cutting” and “synergy” is to raise cost-effectiveness in use of any available funding resources. Such resources include not only those from international cooperation channels but also from domestic channels for implementing the three Conventions.

It should also be stressed that the cross-cutting areas and priorities determined in this report focus on the capacity building needs in only one period of time, and keep an open mind about capacity building needs and priorities in different time phases. Since any one project can only provide limited resource inputs and achieve limited outputs, doing so also reflects considerations that this report will help GEF and other international funding organizations to select and support national capacity building projects.

4.2 Identification of the cross-cutting areas

To determine the cross-cutting areas of capacity building, it is necessary to judge the
restriction of those criteria in Section 4.1 on the shared priority areas of capacity buildings under the three Conventions. Firstly, in those shared priority areas, there are no barriers of applying the criteria. Therefore, the shared priority areas of capacity buildings under the three Conventions can be used as cross-cutting areas. Secondly, as indicated in Section 3.2, in the needs for national capacity building under the three Conventions, the specific contents present big differences even though they are in the same category of priority area. Thus, it is necessary to have further integrated understanding about the priorities in capacity building cross-cutting areas with the criteria in Section 4.1. The logic process is composed of understanding the bases, identifying the barriers or problems, and finally, determining the priorities in each of capacity building cross-cutting areas.

Based on the needs for national capacity buildings under the three Conventions, particularly the shared priority areas, the cross-cutting areas of capacity building proposed in this report are:

- Policies, regulations, infrastructure and coordination;
- Public awareness;
- Scientific research (‘scientific research’ here referred to include researches in fields of natural science, humanities and social science);
- Monitoring and assessment;
- Information sharing and dissemination.

To determine the priorities in capacity building cross-cutting areas, according to the criteria in Section 4.1, the following aspects are considered in this report: ① to develop capacity building in cross-cutting areas based on those national capacity building efforts under the three Conventions, and to ensure and facilitate the mainstream activities for implementing the three Conventions; ② to seek synergy among national capacity building efforts under the three Conventions; ③ to be practical, i.e. to be capable of leading to specific issues and showing pilot demonstrations with good practices; and ④ to be able to enhance cost-effectiveness of using funding support, on the basis of the above three considerations.
5 Priorities of Capacity Building in Cross-cutting Areas

5.1 Policies, regulations, infrastructure and coordination

5.1.1 Bases

In order to implement UNCBD, UNFCCC and UNCCD, relying on its own resources and using the so-called “learning-by-doing” approach, China gradually built up and improved its national-level infrastructure and mechanisms of coordination and management for implementing convention activities.

For UNCBD, in 1993, the Government of China approved establishment of a coordination mechanism the China UNCBD Implementation Coordination Group. This coordination mechanism, led by the State Environment Protection Administration (SEPA) and currently composed of 22 member Ministries and Agencies, is responsible for inter-ministerial coordination of affairs about biodiversity protection and management and of implementing UNCBD within the country.

For UNFCCC, in 1990, the Government of China established the National Climate Change Coordination Group, and later renamed it as the National Coordination Committee on Climate Change (NCCCC), with the National Development and Reform Commission (NDRC) as the lead agency. Currently, NCCCC is composed of 15 member Ministries and Agencies, and owns a standing office, the NCCCC Office in NDRC.

For UNCCD, after signing UNCCD in 1994, the Government of China renamed the National Coordination Group on Combating Desertification that was established in 1991 the China National Committee for Implementing the United Nations Convention to Combat Desertification (CCICCD) in international cooperation, so as to strengthen coordination and leadership in domestic desertification combating activities. Currently, CCICCD is composed of 15 member Ministries and Agencies, and the State Forestry Administration (SFA) acts as its lead agency.

Since their establishment, these national-level infrastructures have played key roles in organizing and guiding activities in aspects of involving China in international negotiations on global environment issues and of working out and coordinating relevant national policies and
measures. Through formulating rules of official business on coordinating environment issue related countermeasures and setting up contacts between and among government sectors, national coordination mechanisms involved with multi-ministries and -agencies for implementing the three Conventions were built up preliminarily.

China has made continuous efforts to improve those infrastructures and coordination mechanisms, so as to push forward activities for and to enhance effectiveness of implementing the three Conventions. In such efforts, the “learning-by-doing” approach was followed.

There are considerable overlaps of ministry or agency members between and among above three National Coordination Groups. Such a situation forms advantages for the Ministries and Agencies who are in overlaps to make integrated considerations on policy-making and taking actions to implement different Conventions, though those integrated considerations are still in an initial phase. In the meantime, enhancing synergy between and among those infrastructures and coordination mechanisms does not mean that it is necessary to establish any new and higher-level infrastructure above the three National Coordination Groups. The current coordination mechanisms have been the bases to make comprehensive and integrated considerations based on activities of implementing each of the three Conventions. It is the applicable and practical approach for the three coordination mechanisms to strengthen information exchanges and contacts in relevant fields.

To ensure national activities for implementing conventions, China has big and relatively independent teams under each of the three Conventions. Each team has large capacity building needs and large needs of financial support. While each carries out activities for implementing its specific convention, they also construct the bases of domestic activities for “cross-cutting” and “synergy” issues. However, team members who work across all three teams are few. This is a kind of reflection of those domestic activities for implementing the three Conventions at the current stage. With the enhancement of capacities within each team, team members will foster their understandings and methodologies, expand and coordinate their actions and activities, and therefore result in synergy in “cross-cutting” areas. If unbalancing and/or over emphasizing enhancement of policies and of teams in “cross-cutting” areas, the rational phase-by-phase arrangements will be unreasonably overdone, and thus bring about significant negative impacts on those domestic activities for implementing each of the three Conventions, including weakening the mainstream activities and specific financial support intensity for implementing each of the three Conventions.

Under the national framework for sustainable development, China, at both national and local levels, has formulated and enforced a number of laws, strategies, policies and regulations for protecting biodiversity, addressing climate change and combating desertification. Those laws, strategies, policies and regulations are still in a process of updating and improving. With its socio-economic development, China wins recognition and reputation from the international
society for its achievements in aspects of formulating and enforcing laws, strategies, policies and regulations. China GEF projects made their contributions to such a process by offering some financial and technical support.

5.1.2 Barriers and/or problems

(1) The laws, policies and regulations at both national and local levels on protecting biodiversity, addressing climate change and combating desertification are not well developed and do not form a completed system in which all components mutually support each other. Moreover, the enforcement of those exiting laws, policies and regulations is not strong enough.

(2) Due to the impacts of sector by sector management regime of the country, the mechanisms at both national and local levels are still lacking or very weak in coordination among those government sectors who have roles for protecting biodiversity, addressing climate change and/or combating desertification.

(3) Local governments are not active in environment protection activities. Most of the foci of local governments are on pursuing economic development as shown GDP indicators. To a large extent, activities on environment protection are often subordinate to the needs for local economic development.

(4) Related institutions in local governments are not well developed and human resources are lacking. Local governments, especially at basic levels, have seldom set up specific institutions or arranged specific staff responsible for affairs of protecting biodiversity, addressing climate change or combating desertification. Related sectors at and below provincial level lack robust technical institutions or teams to provide support.

(5) There is a lack of active exchange and interaction in activities and staff between and among the different institutions and teams for implementing the three Conventions.

5.1.3 Needs for capacity building

On the basis of enhancing specific capacity building for policies, regulations, infrastructure and coordination under the three Conventions, the needs for capacity building in cross-cutting areas are:

(1) To reinforce the development of laws, regulations and policies at both state level and local level. Focusing on specific issues and specific targets, it is needed to strengthen the integration of more comprehensive considerations on protecting biodiversity, addressing climate change and combating desertification into further laws, regulations and policies, to push forward the formulation, development and interlinking and continuous improvement, to gradually set up a complete regime in which these laws, regulations and policies support each other, and to continuously enhance enforcement. In the mean time, starting from specific issues and focusing on specific regions and targets, it is needed to encourage and promote strengthening,
at local level, construction of laws, regulations and policies on the bases of the local natural conditions and of socio-economic development characteristics.

(2) To improve the coordination of management activities between and among administrations at both state and local levels. Starting from specific issues and focusing on specific regions and targets, it is needed to promote those administrations to have comprehensive understandings and considerations on protecting biodiversity, addressing climate change and combating desertification, and to push forward the coordination, within the current infrastructure regime for implementing the three Conventions, of management activities between and among administrations.

(3) To encourage local governments to play a more active role in environmental protection activities and to enhance local institutions and their capacities to provide technical support. Starting from specific issues and focusing on specific regions and targets, it is needed to promote local government in aspects of gradually deepening their understanding, reinforcing their capacity of management and required technical supports, and realizing the local balance between environment and development, in an approach of comprehensively understanding and dealing with the relations of environmental benefits with social benefits, and especially with economic benefits in the efforts of protecting biodiversity, addressing climate change and combating desertification.

(4) To enhance capacity of the infrastructure and teams that support implementing the three Conventions. Focusing on specific issues and targets, it is needed to promote those team members, who support implementing UNCBD, UNFCCC and UNCCD, to strengthen their comprehensive understandings on, and expansion and collaboration of their activities of protecting biodiversity, addressing climate change and combating desertification. In ways of formulating an expert roster and etc., the contacts among and activity involvement from different teams that support implementing the three Conventions should be enhanced, including fostering more experienced experts that can contribute to international negotiation and provide more technical support.

5.2 Public awareness

5.2.1 Bases

One key point in pushing forward sustainable development of the country is to raise public awareness and to guide rational public activities. Improving well-balanced relationship between socio-economic development and environment protection has been a concept widely accepted by the social public, and moreover, has been gradually apparent in the common actions of the Chinese people.
In recent years, in the trend of information society development and of globalization and under the framework of sustainable development, public awareness in China on protecting biodiversity, addressing climate change and combating desertification has been raised much more than previously. Such a progress effectively promotes improvement of social behaviors and activities within the national market economic system, and exerts profound impacts on socio-economic development. For example:

(1) Government agencies and social organizations have undertaken many actions and activities through various websites, media, publications etc., to promote popularization of science and dissemination of knowledge to the general public. Doing this has resulted in improved social understanding on environment protection.

(2) Education for environmental protection began to be included in the mainstream education system. There have been some vivid examples, but the number of such examples is still limited.

(3) Being guided and orientated in social requirements and public activities, general public are absorbing the basics of environment protection education through various channels.

5.2.2 Barriers and/or problems

(1) The general public still lacks a good understanding about relevant international environmental conventions and about related environmental issues. Many, if not most, people poorly understand the exact meaning of and detail of those conventions, and the exact relevance to their life and themselves. This will of course inevitably influence the extent of social public involving in and contributing to national implementation of those conventions on biodiversity, climate change and desertification issues.

(2) In regions with backward socio-economic development, often the regions where environment conditions are fragile, enhancement of public awareness is given less attention, particularly on balancing the relationship between development and environment in basic local levels. Furthermore, current promotions mostly emphasize the possible or potential harms due to imbalance, and provide local people less operational alternative solutions. It is key how to link environment issues with their benefits in more approaches.

(3) Promotion of public awareness lacks specific funding support. Owing to short of funds, many activities can hardly be continued.

(4) Promotion and dissemination activities lack wide channels and diversified forms. Meanwhile, current promotion is not systematically organized and lacks effective support for more dissemination approaches.

(5) Awareness and capacity for public involvement are still lacking. The reasons are mainly because:
  • policies and mechanisms to encourage public involvement are not well developed;
channels for public involvement are not smooth; social atmosphere is not well developed for effective public monitoring; laws, policies and regulations requiring government agencies to have consultations with the public for their decision making related to environment issues are not well developed and improved.

Limited by factors such as education level and capacity, the general public in many regions, particularly regions with backward socio-economic development and often being significantly influenced with or from problems of biodiversity, climate change and desertification problems, lacks awareness and interest for pubic involvement in managing public affairs. This negatively influences on the quality and effectiveness of public involvement.

5.2.3 Needs for capacity building

Capacity building to improve public awareness in cross-cutting areas is the extension of the enhancement of capacity building under the three Conventions. Based on the latter one, the capacity building needs to improve public awareness in cross-cutting areas include:

(1) To set up and improve the connections between and among those contents and activities of capacity building for public awareness under the three Conventions. Starting from specific issues and focusing on specific regions and targets, it is needed to extend and connect those contents and activities of capacity building of public awareness under the three Conventions, and to gradually strengthen public understanding on those contents and activities related to the three Conventions and on the obligations and responsibilities they should undertake themselves, so as to enhance the specific public involvement.

(2) To strengthen environment education via mainstream channels of education. Starting from specific issues and focusing on specific regions and targets, it is needed to promote environment education via mainstream channels of education, such as compulsory education, higher education and professional education. By doing so, demonstration could be provided for further wide promotion of environment issues through mainstream educational channels in all regions of the country.

(3) To promote public awareness in regions with backward socio-economic development conditions based on the national actions and national support to the infrastructure construction in those regions, such as remote education and widely spread compulsory education.

(4) To improve laws and policies for public involvement, to enhance public understanding of rule-by-law for environmental protection, and to strengthen the guidance for public involvement actions.

(5) To enhance the involvement of various media, especially mainstream media, in environment promotion on protecting biodiversity, addressing climate change and combating desertification.

(6) To systematically strengthen science popularization and knowledge dissemination in
the whole society.

5.3 Scientific research

It needs to be indicated that “scientific research” here referred to include research in fields of natural science, humanities and social science.

5.3.1 Bases

To different extents, the three Conventions all emphasize important roles of science and technology to facilitate implementing the Conventions, and illustrate with specific articles and items on S&T cooperation, including collecting, analyzing and exchanging information, carrying out S&T activities and technology transfers, setting up S&T committees as subsidiary bodies to the Conventions to provide necessary S&T information and suggestions related to convention activities. Thus, carrying out S&T is one of the basic activities that all the three Conventions have defined.

Fields for scientific research under the three Conventions are not only independent but also inter-related as well as interactive. Since mid-1950s, Chinese scientists have clearly pointed out many times that further development of environment related sciences need support of integrated studies, that advantage of integrated multi-disciplinary studies should be sufficiently applied, and that the importance of cooperation should be stressed in all aspects between and among natural science, technology research and social science. Since the mid 1980s, in its research programs on global and regional environment issues, China has implemented a series of projects emphasizing multi-disciplinary and integrated studies specifically relevant to biodiversity, climate change and desertification issues.

In recent years, with GEF funding, China worked on the national report on implementing UNCBD including research about national conditions, national strategies and action plans. China also completed and submitted its Initial National Communication on Climate Change, and for doing so, organized researches in cross-cutting fields across many specific areas and sectors such as on climate change, agriculture, forestry, transportation, construction and energy. Upon the request from and with very limited funding from UNCCD, China worked out and submitted a progress report on implementing UNCCD with inputs from many sectors. This report more or less covered some researches in cross-cutting areas.

Focusing on politics, economics, culture, law, and morality issues, humanities and social science more directly provide services for policy-making and social-system construction. On some specific issues related to protecting biodiversity, addressing climate change and combating desertification, China has developed research capabilities in humanities and social science to some extent, including some relatively stable research teams, some research results and
research bases and gradually expanded international cooperation. Researches in humanities and social science in China started to touch some cross-cutting issues, but more often the issues extending from one research field to another, still lack comprehensive or thorough integrated study. Compared to nature science development on protecting biodiversity, addressing climate change and combating desertification, capacities in humanities and social science are much weaker.

5.3.2 Barriers and/or problems

China is a developing country. As such, the basis of scientific research, especially of humanities and social science faces several weaknesses:

(1)Lack of comprehensive and systematic organization. On cross-cutting and integrated studies on protecting biodiversity, addressing climate change and combating desertification, China lacks comprehensive and systematic organization in aspects of strategy, planning, institution development, team building and project arrangement, and research teams is poorly distributed and not well organized. This has negative impacts on making breakthroughs in key issues and on disseminating and applying research achievements.

(2)Restraints caused by the current research system. Those limited teams endeavoring to undertake cross-cutting and integrated studies are mainly distributed in national-level academic institutions and universities. However, under ministries or government agencies, there are also a number of research institutions. In many aspects, the researches of these latter ones over-emphasize the shades of academic disciplines and of sectors. This results in the limitation of their involvement in and contribution to cross-cutting studies.

(3)Prejudices within academic disciplines. On one hand, many researchers in humanities and social science think that addressing climate change, protecting biodiversity and combating desertification are within the scope of nature science and are barely related with humanities and social science, and therefore, seldom touch on these issues. One the other hand, many researchers of nature science think that humanities and social science are “soft science”. Such prejudice of academic disciplines also results in a lack of cross-cutting and integrated researches between nature science and humanities and social science in aspects of addressing climate change, protecting biodiversity and combating desertification.

(4)Lack of leading researchers and of stable research teams. Though there are relatively a large number of research teams addressing climate change, protecting biodiversity and combating desertification, too few leading researchers deal with cross-cutting and integrated studies. Backbone teams have not been formed, and teams with cross-cutting and integrated studies are unstable. Researchers capable of doing multi-disciplinary and integrated studies are particularly in short supply.
(5) Insufficient source of funding.

(6) Insufficient support in aspects of monitoring, assessment and information sharing, which are basic to meet research requests.

(7) Insufficient capacity for international cooperation. Especially in aspect of humanities and social science, researchers lack relevant studies and research outputs to support international dialogue.

5.3.3 Needs for capacity building

China possesses a vast territory in which natural conditions show significant diversity and socio-economic development is impressively rapid but with remarkable imbalance among regions. In such a national context, it is especially important for China to strengthen scientific research capacities on protecting biodiversity, addressing climate change and combating desertification. Based on this, the capacity building needs for cross-cutting research and integrated studies includes:

(1) To strengthen capacity for basic science development and for research inter-linkage. On specific requests of national sustainable development, it is needed to choose key research areas and appropriate starting points, to establish synergies among science studies on protecting biodiversity, addressing climate change and combating desertification, and to develop cross-cutting and integrated researches in selected typical regions and on typical cases, especially the multi-disciplinary studies in fields between and among natural science, humanities and social science, for example, the multi-disciplinary studies on regional ecosystems or regional environment systems which include human activities and their impacts.

(2) To enhance the service of scientific research for national sustainable development. It is needed, through promoting cross-cutting and integrated studies, especially the multi-disciplinary studies in fields between and among natural science, humanities and social science, to strengthen the capacities of transferring research outputs and outcomes into policies and actions for national sustainable development. This includes to provide operational proposals and schemes of resolution, and to offer direct and effective services for both state level and local level efforts in making and enforcing law and policy, conducting economic evaluation, reforming management regime, etc..

(3) To emphasize fostering human resources who possess multi-disciplinary and comprehensive knowledge, to encourage inter-exchange of those human resources among different sectors, institutions and agencies, to push forward the reorganization of those human resources, and to concentrate those human resources to support cross-cutting and multi-disciplinary studies.

- To foster human resources, education agencies and academic institutions should follow up the trend of science progress and of the development of basic sciences, and should
enhance fostering human resources in cross-cutting areas. In all sectors, institutions and agencies, great attention should be paid to cross-cutting and multi-disciplinary studies and forming the basic teams that can undertake cross-cutting and multi-disciplinary studies.

- Under the pre-conditions of keeping relatively stable teams, it is necessary to push forward academic institutions (including institutions under all ministries and industry sectors) to encourage inter-exchanges of researchers in various ways, and by doing so, to create cross-fertilization of academic ideas and to facilitate cross-cutting and integration of the knowledge in various subjects.
- Though China owns a number of academic institutions, most of them have narrow research scopes. It is necessary, for the development of cross-cutting and integrated studies, to reorganize human resources and facilitate the establishment and development of small-size and efficient key laboratories and research centers with multi-disciplinary scope(s).

(4) To remove prejudice that researchers have towards other disciplines. It is needed to promote dialogue between and among researchers from natural science, humanities and social science, to strengthen researchers to better understand other disciplines and share their understandings, and to facilitate the establishment of those basic conditions for cross-cutting and integration between and among natural science, humanities and social science. Meanwhile, focusing on specific issues, it is necessary to push forward researchers from natural science, humanities and social science to work together within joint research projects.

(5) To expand international cooperation, and to improve research methodologies and approaches.

5.4 Monitoring and assessment

5.4.1 Bases

Monitoring and assessment are the bases for understanding and addressing significant environmental issues of biodiversity, climate change and desertification, and one of the basic supports for establishing analysis methodologies and tools and making predictions.

As indicated in the self-assessment reports on capacity building needs under the three conventions, China has had some preliminary activities in aspects of monitoring and assessment on biodiversity, climate change and desertification issues. Such activities include:

(1) Support from operational business, scientific research and education. On one side, a number of national-, provincial- and local-level organizations (mainly research institutions) implemented many specific monitoring and assessment activities at all levels with targets on biodiversity, climate change and desertification issues. Preliminary preparations in aspects of human resources, techniques and equipment were thus realized. On other side, some univer-
Universities and colleges which have set up majors related to biodiversity, climate change and desertification issues may provide supports for necessary potential human resources.

(2) Support from monitoring sites. Several national-, provincial- and local-level monitoring site-based networks and a number of scientific experimental sites have preliminarily been established for biodiversity, climate change and desertification issues. However, specific indicators for monitoring must be identified and observation techniques and standards need to be upgraded.

(3) Support from international cooperation. In the past 20 years, international cooperation in aspects of monitoring and assessment has advanced related activities in China.

5.4.2 Barriers and/or problems

(1) The overall level in aspects of monitoring is low. In China, modern monitoring activities have only recently been launched. Currently, those teams for monitoring belong to single different agencies or organizations, monitoring networks are not well developed, instruments and equipment are still insufficient and out of date, methodologies and techniques need to be updated, monitoring indicators need to be agreed upon, improved and standardized. The monitoring systems under each of the three Conventions are in different phases of development. The above situations are not favorable to implementing collaborative or combined monitoring on biodiversity, climate change and desertification issues. Moreover, the international efforts of monitoring biodiversity, climate change and desertification remain rather independent.

(2) Assessment standards and assessment systems are not well developed. At present, the assessment standards and assessment systems for respectively biodiversity, climate change and desertification issues are not well developed, and standards are not generally applied. Furthermore, attentions from one assessment field to other possibly and/or potentially related fields and to the impacts by other fields are not enough. In such a context, it is difficult to formulate integrated assessment standards and systems for those issues.

(3) Funding for monitoring and assessment is inadequate and human resources are in short supply. As a developing country, China can hardly provide large sums of funding for monitoring activities, which is long-term, basic and expensive. In recent years, this situation has changed positively. However, funding at current levels for monitoring still cannot sufficiently meet the requirements either for implementing the three Conventions or for national development. Systematic activities in aspects of monitoring and assessment on biodiversity, climate change and desertification issues are still at a starting point.

(4) Current monitoring and assessment systems largely lack components about and services for socio-economic development. Because environmental issues of biodiversity, climate change and desertification bring about significant impacts on socio-economic activities
handicap decision making and enforcement in socio-economic development at all levels.

(5) It is imperative to enhance international cooperation. This gap shows itself in three aspects. Firstly, a lack of cooperation funding, which results in difficulties for setting up cooperation frameworks and platforms, for introducing and disseminating methodologies and techniques that could be acquired from international society. Secondly, there is a lack of an effective organizational system to support developing monitoring and/or assessment projects, which results in scattering of cooperation resources. Thirdly, there is a lack of playing a leading role in international cooperation of regional monitoring and assessment, which creates negative influences for China to make more global and regional contributions in aspects of monitoring and assessment, taking into account that China is a big developing country that is influenced by other countries and transfers influences other countries through natural processes and human activities.

5.4.3 Needs for capacity building

With gradual development of monitoring and assessment on biodiversity, climate change and desertification issues, it is necessary to launch and develop comprehensive monitoring and assessment. Considering the current level reached in international activities and the current stage of domestic work, it is hard for the capacity of comprehensive monitoring and assessment to exceed focusing on individual environment issues. Therefore, capacity building in this aspect can only facilitate the launch of relevant domestic work. Capacity building needs in aspects of comprehensive monitoring and assessment include:

(1) To strengthen demand and demonstration. Starting from specific issues and focusing on specific regions and targets, while undertaking monitoring and assessment on one of environment issues about biodiversity, climate change or desertification, it is needed to promote the possible consideration of associated activities on the other two conventions, for example, with the methodologies of comprehensively addressing regional ecosystems or regional environment systems in which include human activities and their impacts.

(2) To enhance capacity building for comprehensive monitoring and assessment. Starting from specific issues and focusing on specific regions and targets, it is needed on the one hand to establish and improve indicators, standards and regimes to support monitoring and assessment on biodiversity, climate change or desertification, to push forward comprehensive considerations and improvements of indicators and standards within different monitoring and assessment regimes, and on the other hand, to strengthen construction of infrastructure, software and hardware for monitoring and assessment, and to develop and improve methodologies and techniques for monitoring and assessment. In the above two regards, it is needed to include establishing socio-economic monitoring and assessment regimes and enhancing relevant capacity.
(3) To reinforce team building and improvement for monitoring and assessment. Focusing on specific issues, in the design and execution of monitoring and assessment on biodiversity, climate change or desertification, it is needed to facilitate those professionals to have comprehensive understandings on these issues.

(4) To enhance capacities for international cooperation. While participating in international activities of monitoring and assessment on biodiversity, climate change or desertification, it is needed to strengthen capacity for participating in international activities for comprehensive monitoring and assessment.

5.5 Information sharing and dissemination

5.5.1 Bases

China pays great attention to national sustainable development. Though her economic development needs more resource inputs, China takes firm actions, including facilitating and supporting information capacity building, for implementing international environment conventions. The bases of information capacity building in cross-cutting area is built up in such a process.

(1) Bases of information capacities at national-level

- Communication and network capacities. Both wire and wireless communication developed very rapidly in China. High-speed optical-fiber networks have extended to county-level, and computer network capacity began to extend to rural areas. Those basic infrastructure construction activities have provided favorable conditions for information collection and dissemination.
- More foci are gradually put into studies on and development of relevant standards. However, the progress in this aspect is limited.

(2) Bases at related sectors

- Information resources. As indicated in the self-assessment reports on capacity building needs under the three Conventions, there are different kinds of information resources, albeit limited, for nationally implementing convention activities, including information collection systems and databases.
- Equipment. Both in government sectors and research institutions, the basic capacity of infrastructure and equipment have been developed to some extent for information management, dissemination and application. However, supportive capacity and service capacity of the software component and hardware component and capacity as a whole integrated system are still low.
- Human resources. There are, to some extent, human resources in government sectors
and research institutions to support information collection, management and dissemination. However, the structure of those human resources is not well balanced.

5.5.2 Barriers and/or problems

Based on the information capacity building under each of the three Conventions, there are still a series of barriers to information sharing and dissemination in the cross-cutting areas.

(1)Requirements for information capacity building are not very clear. The objectives and tasks are clear in aspect of information under each of the three Conventions, and therefore there are clear relevant requirements for information capacity building under the conventions to guide implementation. However, information capacity building in cross-cutting area can not be just the mosaic of all those needed under each of the three Conventions, but should be for serving higher level integrated information and for facilitating finding resolutions about those issues in cross-cutting areas. Since the issues to be addressed in cross-cutting areas are not clear the results in the information needs are also not clear.

(2)It is difficult to construct a general system of information capacity due to lack of coordination and cooperation specifically on cross-cutting areas. China possesses vast territory and diverse natural environmental components. Thus, a general integrated system of information capacity must be build up based on the gradual enhancement of coordination and cooperation between and among mechanisms of implementing each convention. At present, one can hardly find a single institution that can shoulder such a responsibility.

(3)Standards are not well developed. Firstly, at both national and sector levels, there are no general standards on information affairs. Though some standards were issued within some specific fields, the country has not accepted them as generally applied. Even in the same field, such standards still lack the same restrictions under different government sectors, or relatively independent standards are still applied in different sectors. Secondly, the country lacks information sharing policies. Currently, there are no such of policies being issued. Therefore, with the conditions of information sharing being difficult within all specific fields, one cannot optimistically expect to easily realize information sharing between and among different fields and sectors.

(4)Understanding about information capacity building in cross-cutting areas is insufficient. Within the scopes of protecting biodiversity, addressing climate change, combating desertification or their cross-cutting areas, almost all issues are interconnected, and whichever issue on science or on policies or measures to deal with specific issues will connect with other issues. Owing to insufficient research and specific actions, staff do not reach high enough level of understanding about information capacity building in cross-cutting areas.

(5)There is no platform to support information transfer, exchange and service in cross-cutting areas. A fact is that even under the three Conventions, such kinds of information
platforms are inadequate. The supports for establishing such platforms in cross-cutting areas are insufficient.

(6) Human resources for information collection, management, application and service are inadequate. Human resources are one of the key supports for information capacity building in cross-cutting areas, there should be teams with comprehensive capabilities and with specific knowledge and skills about information technology and about more aspects of cross-cutting areas. Currently, human resources that can meet such a requirement are in short supply.

5.5.3 Needs for capacity building

On the bases of strengthening information capacity building under each of the three conventions, the needs for information capacity building in the cross cutting areas include:

(1) To make clear the relationship and reasonable work allocation between and among information capacity building within cross-cutting areas and under the three Conventions, and to clearly understand the demands for information capacity building within cross-cutting areas. There are close linkages between the information capacity building at comprehensive level and that at specific issue level. However, such linkages could not be used as the reasons for their substitution with each other. Therefore, starting from specific issues and focusing on specific regions and targets, it is needed to explore aspects of determining the functional roles and their relationship of the information capacity building at the above mentioned two levels, screening information demands, and formulating specific regimes of criteria and of standards.

(2) To establish the systems to support information acquisition. On the bases of the systems under the three Conventions to support information acquisition, starting from specific issues and focusing on specific regions and targets, it is needed to supplement more necessary types of information, and to improve information acquisition systems.

(3) To study and develop coordination mechanisms for collecting comprehensive information. Starting from specific issues and focusing on specific regions and targets, it is needed to carry out studies on and develop coordination mechanisms for collecting comprehensive information.

(4) To facilitate the establishment of favorable environment for developing information sharing policies. On the basis of absorbing international experiences, and launching from specific issues and addressing specific targets, it is needed to promote the efforts for formulating information sharing policies at both state and agency level.

(5) To establish information network systems. Starting from specific issues and focusing on specific regions and targets, it is needed to study and establish information network systems for cross-cutting issues, and to explore the ways to realize information collection, management, sharing service and development based on distributed information resources and in a “physically distributed and logically unified” approach. Such systems may be
composed of unified regimes of criteria and of standards, mete-data databanks, software and hardware systems for information collection, management, sharing service and development, and the professional teams to support information management, development and application, and sharing services.
### Abbreviations

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<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tr>
<td>ADB</td>
<td>Asian Development Bank</td>
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<td>AIT</td>
<td>Asian Institute of Technology</td>
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<td>AMI</td>
<td>Agrometeorology Institute</td>
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<td>APN</td>
<td>Asia-Pacific Network</td>
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<td>CAAS</td>
<td>Chinese Academy of Agricultural Sciences</td>
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<td>CAS</td>
<td>Chinese Academy of Sciences</td>
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<td>CASS</td>
<td>Chinese Academy of Social Sciences</td>
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<td>CBD</td>
<td>Convention on Biological Diversity</td>
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<td>CBIS</td>
<td>China Biodiversity Information System</td>
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<td>CCICCD</td>
<td>China National Committee for Implementing the United Nations Convention to Combat Desertification</td>
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<td>CCIR</td>
<td>Center for Climate Impact Research</td>
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<td>CDI</td>
<td>Capacity Development Initiatives</td>
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<td>CDM</td>
<td>Clean Development Mechanism</td>
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<td>CEEC</td>
<td>Center for Environmental Education and Communications</td>
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<td>CERN</td>
<td>China Ecosystem Research Network</td>
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<td>CHM</td>
<td>Clearing-house Mechanism</td>
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<td>CIDA</td>
<td>Canadian International Development Agency</td>
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<td>CMB</td>
<td>China Meteorology Bureau</td>
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<td>COP</td>
<td>Conference of Parties</td>
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<td>ERI</td>
<td>Energy Research Institute</td>
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<td>FEEI</td>
<td>Forest Ecology &amp; Environment Institute</td>
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<td>GCOS</td>
<td>Global Climate Observation System</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>GEF</td>
<td>Global Environment Facility</td>
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<td>GHG</td>
<td>Greenhouse Gas</td>
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<td>GMOs</td>
<td>Genetically modified organisms</td>
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<td>IGBP</td>
<td>International Geography and Biosphere Plan</td>
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<td>IPAC</td>
<td>Integrated Policy Assessment model for China</td>
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<td>IPCC</td>
<td>Intergovernmental Panel on Climate Change</td>
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<td>ISCC</td>
<td>International Symposium on Climate Change</td>
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<td>IUCN</td>
<td>World Conservation Union</td>
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<td>MOF</td>
<td>Ministry of Finance</td>
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<td>MOFA</td>
<td>Ministry of Foreign Affairs</td>
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<td>Abbreviation</td>
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<tr>
<td>MOST</td>
<td>Ministry of Science and Technology</td>
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<td>NC</td>
<td>National Communication</td>
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<td>NCC</td>
<td>National Climate Center</td>
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<td>NCCCCC</td>
<td>National Coordination Committee on Climate Change</td>
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<td>NCCCCG</td>
<td>National Climate Change Coordination Group</td>
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<td>NCSA</td>
<td>National Capacity Needs Self-assessment</td>
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<td>NDRC</td>
<td>National Development and Reform Commission</td>
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<td>NGO</td>
<td>Non-governmental Organizations</td>
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<td>NIES</td>
<td>National Institute for Environment Studies</td>
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<td>NREL</td>
<td>National Renewable Energy Laboratory</td>
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<td>ONCCCCC</td>
<td>Office of the National Coordination Committee for Climate Change</td>
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<td>PNNL</td>
<td>Pacific Northwest National Laboratory</td>
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<td>RUC</td>
<td>Renmin University of China</td>
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<td>S&amp;T</td>
<td>Science and Technology</td>
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<td>SEPA</td>
<td>State Environmental Protection Administration</td>
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<td>SFA</td>
<td>State Forestry Administration</td>
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<td>SGM</td>
<td>Second Generation Model</td>
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<td>SRES</td>
<td>Special Report on Emissions Scenarios</td>
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<td>TCAP</td>
<td>Technical Cooperation Action Plan</td>
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<td>TNC</td>
<td>The Nature Conservancy</td>
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<td>UNCBD</td>
<td>The United Nations Convention on Biological Diversity</td>
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<td>UNCCCD</td>
<td>The United Nations Convention to Combat Desertification</td>
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<td>UNDP</td>
<td>United Nations Development Programme</td>
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<td>UNEP</td>
<td>United Nations Environment Program</td>
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<td>UNFCCC</td>
<td>United Nations Framework Convention on Climate Change</td>
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<td>WCRP</td>
<td>World Climate Research Plan</td>
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<td>WWF</td>
<td>World Wide Fund for Nature</td>
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