



The People's Republic of China Initial National Communication on Climate Change

Executive Summary



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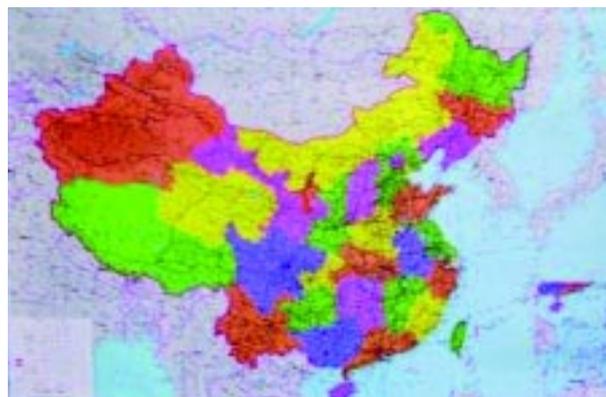
The United Nations Framework Convention on Climate Change (UNFCCC) stipulates that all Parties to the Convention should, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities, protect the climate system for the benefit of present and future generations of mankind. The Convention requires all Parties to submit national inventories of anthropogenic emissions by sources and removals by sinks of greenhouse gases (GHGs), as well as to promote exchanges of information on climate change and measures to deal with it. In accordance with the Guidelines for the Preparation of Initial Communications by Parties Not Included in Annex I to the Convention as contained in Decision 10/CP.2, the National Coordination Committee on Climate Change prepared the Initial National Communication on Climate Change of the People's Republic of China by consulting officials and experts from relevant government departments, social organizations, scientific research institutions, universities and enterprises. The contents and nationwide data in this report do not include that of the Hong Kong Special Administrative Region, the Macao Special Administrative Region and Taiwan Province except for division of administrative areas, territory and other points specified.



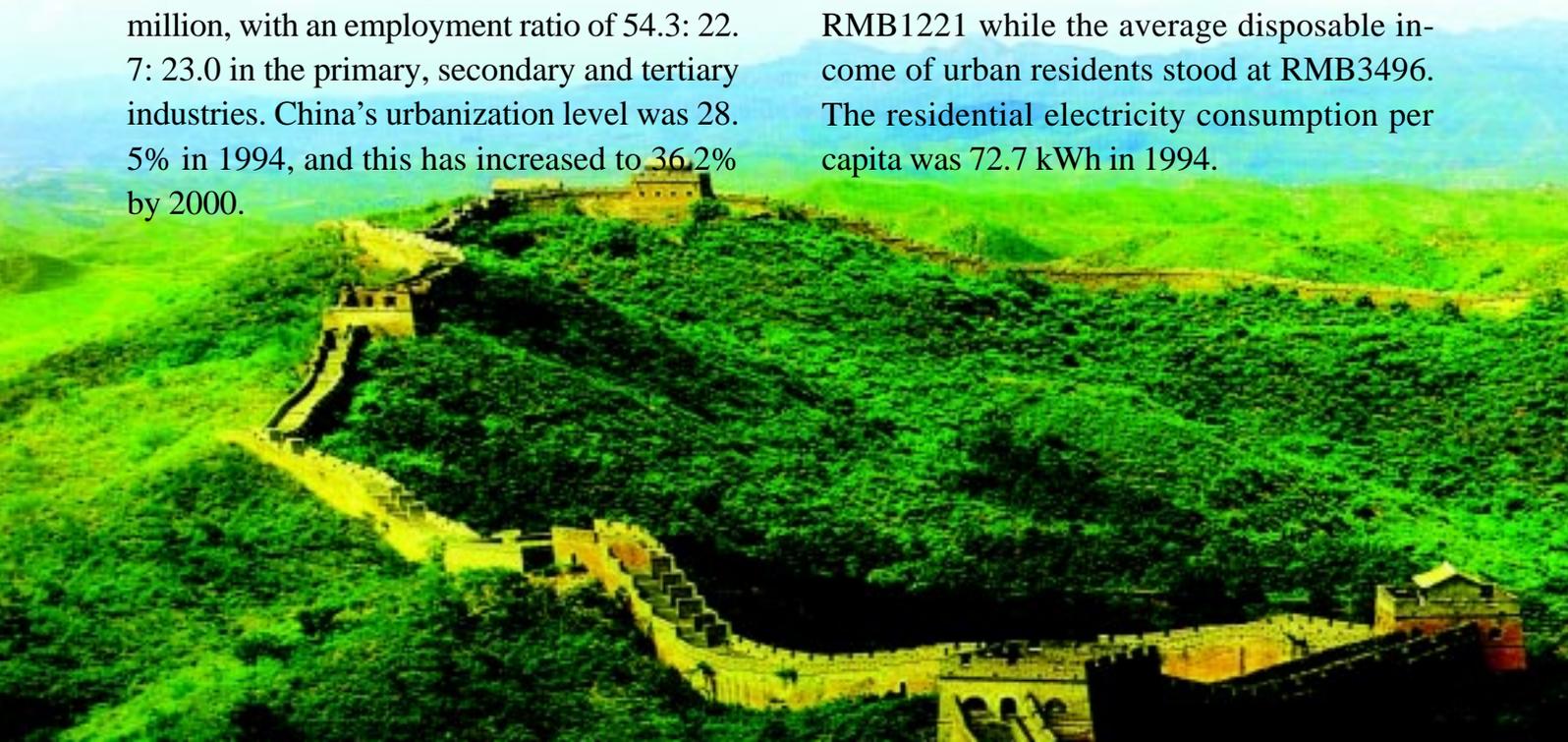
1. National Circumstances

China covers a land territory of approximately 9.6 million square kilometers and an adjacent sea area of some 4.73 million square kilometers. China's climate is characterized by two distinct types, the continental monsoon climate and the complex climate. The precipitation in China varies markedly between the seasons, with rain falling mostly in summer, and is distributed very unevenly from region to region. Topographically, China slopes from the west to the east, forming three distinct terraces. Mountainous regions, hilly areas and plateaus comprise 66% of the total territory. China has a shortage as well as an uneven distribution of water resources. China's per capita water resources are about one fourth of the world average and per capita energy resources are less than half of the world average.

China is the world's most populous country. In 1994, China's mainland population was 1.185 billion and those employed totaled 674.55 million, with an employment ratio of 54.3: 22.7: 23.0 in the primary, secondary and tertiary industries. China's urbanization level was 28.5% in 1994, and this has increased to 36.2% by 2000.



China is a low-income developing country with a prominent disparity in economic development in different regions. China's total GDP in 1994 was RMB4.6759 trillion with a per capita figure of only RMB3901. The ratio of per capita GDP between China's eastern, central and western regions was 1: 0.59: 0.44 in 1994, highlighting the disparity in regional development levels. The breakdown of the GDP across the primary, secondary and tertiary industrial sectors in that year was 20.2: 47.9: 31.9. The annual net income of rural residents averaged RMB1221 while the average disposable income of urban residents stood at RMB3496. The residential electricity consumption per capita was 72.7 kWh in 1994.



2. National Greenhouse Gas Inventory

The National Greenhouse Gas Inventory for China in the year 1994 includes estimated net anthropogenic GHG emissions from the energy sector, industrial processes, agriculture, land-use change and forestry, and wastes, and reports on emissions of such gases as carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O).

The energy activities inventory mainly covers emissions of CO_2 and N_2O from the combustion of fossil fuels, emissions of CH_4 from coal mining and post-mining activities, fugitive emissions of CH_4 from oil and natural gas systems, and emissions of CH_4 from the burning of biomass fuels. The industrial processes inventory includes emissions of CO_2 in the production processes of cement, lime, iron and

steel, and calcium carbide, as well as emissions of N_2O in the production process of adipic acid. The agricultural activities inventory covers emissions of CH_4 from flooded rice paddy fields, animal enteric fermentation and manure management as well as emissions of N_2O from croplands and animal waste management. The land-use change and forestry activities inventory mainly covers changes in the stocks of forests and other ligneous plants as well as emissions of CO_2 due to the conversion of forests to non-forest land. The waste treatment inventory mainly covers emissions of CH_4 from treating municipal solid waste and that from treating municipal domestic sewage and industrial wastewater.





The 1994 Inventory has been prepared with methods provided by the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* and using *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* as a reference. The inventory agencies established the technical approaches for developing the 1994 National Inventory on the basis of defining China's sources of emissions, ascertaining the key sources of emissions, the availability of activity data and emission factors and analyzing the applicability of the IPCC methodologies.

According to the estimated results, China's total net emissions in 1994 are: CO₂, 2666 million tons (728 million tons of carbon equivalent), among which emissions from energy activities amount to 2795 million tons and emissions from industrial processes amount to

278 million tons whilst emission removals by sinks from land-use change and the forestry sector amount to 407 million tons; CH₄, 34.29 million tons, among which emissions from agricultural activities amount to 17.2 million tons, emissions from energy activities amount to 9.37 million tons and emissions from waste treatment amount to 7.72 million tons; N₂O, 850,000 tons, among which emissions from agricultural activities amount to 786,000 tons, emissions from industrial processes amount to 15,000 tons and emissions from the energy sector amount to 50,000 tons. Calculated according to the Global Warming Potential (GWP) values provided by the IPCC's Second Assessment Report, China's total GHG emissions in 1994 was 3650 million tons of CO₂ equivalent, with CO₂, CH₄ and N₂O contributing to 73.05%, 19.73% and 7.22% of the emissions respectively.



In order to reduce uncertainty on the estimated results of the GHG inventory, efforts were made to perfect work on data quality, methodology and reporting format. To ensure accuracy of the data, official statistics were used as far as possible coupled with sample surveys and on-the-spot examinations and at the same time taking into account the default values recommended in the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* and the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. With regard to the method used, while IPCC methodologies were followed in general, some improvements were made in accordance with the national conditions of China, thus ensuring the comparability, transparency and consistency of the estimates in the inventory. As to the format of report, the format recommended by *Guidelines for the Preparation of Initial Communications by Parties Not Included in Annex I to the Convention* was adopted to the extent possible.

There are still some uncertainties in the inventory, the reasons for which are: Firstly, as a developing country, China has a relatively weak position with regard data, and in particular has many difficulties in obtaining activity data for estimating GHG emissions; Secondly, though sample surveys and on-the-spot examinations were carried out to some extent in the energy, industrial processes, agriculture, land-use change and forestry, and waste treatment sectors to collect the basic data for inventory development, the time span and specific sample observation points may not be fully representative due to the constraints in funding, time available and other factors.

The principal factors affecting China's future GHG emissions are: population growth and increasing urbanization, the changes in the pattern of economic development and consumption, the expansion in people's daily necessities, the adjustment in economic structure and technological progress, and the changes in forestry and ecological preservation and construction. Analysis shows that on the one hand, the growing need for daily necessities and economic development in China in the future will result in more GHG emissions, whereas on the other hand the implementation of a sustainable development strategy will enable China to do its best within the limit of its capacity and development level to reduce the growth rate of GHG emissions. Thus China can make positive contributions to mitigating global climate change while emissions have to be necessarily increased.



3. Impacts of Climate Change and Adaptation

Chinese scientists began to assess the impacts of and vulnerability and adaptation to climate change since the early 1990's. The studies were concentrated on the four areas closely related to the economy, namely, water resources, agriculture, terrestrial ecosystems, and the coastal zones including offshore marine ecosystems. The models used for assessing the impacts of climate change have mainly been introduced from abroad, whilst few models have been developed in China. The assessment on the impacts of climate change is preliminary and there are still a lot of uncertainties. The initial results are now outlined.

The trend of climate change in China in the past century is corresponding to the general trend of global climate change, and the 1990's was one of the warmest decade in the last 100 years. In terms of geographical distribution, it can be seen that the warming trend was the most obvious in northwest, northeast, and northern China, while not so obvious in the areas south of the

Yangzi River. Furthermore it can be seen that the warming increment in winter is the most obvious effect during the seasonal cycle. China experienced abundant precipitation in 1950's and then a progressive decrease since 1950's onward, which has led to a warm and dry climate in northern China. Though some differences exist between different simulations of global climate models (GCMs), it can be seen that an overall general trend from most GCM projections are that the warming would continue and the precipitation would increase under the scenarios where equivalent CO₂ concentration in the atmosphere continues to increase from 1990 onwards and taking into account the interaction with the levels of sulfate aerosols. Several studies on the extreme weather/climate events also show that the extreme cold events are likely to decrease, while the extreme hot temperature events are likely to increase, and the drought and flooding are likely to be enhanced.



It can be seen from observations during the past 40 years that the runoff of the major rivers in China has decreased. There has been a continuous drought in the North China Plain since the 1980s, while flooding disasters have happened frequently in southern China. This impact has been especially enhanced since the 1990s. It can be seen from the assessments on the impacts of climate change under the SRES (IPCC Special Report on Emission Scenarios) scenarios A2 and B2 that the amount of runoff is likely to decrease in northern China and increase in southern China. This will intensify the water shortage in northern China and consequently affect the sustainable development of society. Since climate warming occurred in the 20th century, the mountain glaciers in China have been shrinking, the glacier area in the west China has reduced by 21% over this period. The melting of glaciers does seem to mitigate the reduction of mountain runoff to some extent in the near future, but also threaten the future exploitation of the glacier as water resources. Climate warming would speed up plant growth and shorten the crop growing period, and consequently would affect the accumulation of dry biomass and the grain yield. It seems that the adverse impacts of climate change would increase the costs of future agricultural production. Current assessments show that there would be an overall decreasing trend for the major crops in China due to climate change. Climate warming would influence the distribution of climate resources over time and space, and accordingly induce changes in cropping systems. Under the scenario where the concentration of CO₂ in the atmosphere doubles, the single crop season area would reduce by 23.1%, whilst the double cropping area would extend to the middle of the present

single cropping area. The triple cropping area would increase from its current levels of 13.5% to 35.9% and its northern boundary would extend 500 km northwards, from the present Yangzi River valley to the Yellow River basin. Likewise, changes would also take place in the distribution of major crops in China. Simulations indicate that the potential food production would decrease by 10% due to climate change and extreme climate events during 2030~2050, under the present cropping system, present crop varieties, and present management levels. There would be an overall decreasing trend for wheat, rice, and maize yield.

The impacts of climate change on the ecology of China can be predicted from observations such as the advance of the seasonal cycle in northeast, north China, and along the lower reaches of the Yangzi River where records since the 1980's show the temperature has been increasing in spring. The vegetation zones or climate zones would move to high latitudes or westwards, and there would also be corresponding changes for scope, acreage, and demarcation lines of vegetation zones. Climate change would have the most obvious impacts on the forests in southwestern, central, and southern parts of China. Climate change would not have obvious impacts on the geographical distribution of preliminary productivity of forest, but the productivity and yield of forests might increase to some extent. However, the forest fixed biomass might not increase because of the increased likelihood of more disease and pest problems and the increased likelihood of forest fires due to climate change, the suitable area for the current tree species might decrease. The climate over the pasture in northern China would become warmer and drier, and



the pasture varieties in the arid areas would move to the wet areas, i.e., the present demarcation lines of grassland would move eastwards. It is also shown from the simulation that there would be great impacts of global warming on the frozen earth, marshes, and deserts in China.

With regard the impacts on coastal zones, it can be seen that there is an increasing trend of sea level rise along China's coast since the 1950s and this trend has become significantly more obvious in the past few years. The sea level currently has a rate of rise of 1.4~2.6 mm per year. Chinese scientists have used a sea level rise model to project that the relative sea level rise over five typical coastal zones would range from 31cm to 65 cm by 2100, which would aggravate the coastal erosion. The intrusion of seawater into the river mouth would be enhanced, and it would degrade the fresh water quality and adversely affect the fresh water supply along the river mouth.

The relevant adaptation measures already taken mainly include: promulgating 13 related laws and regulations; constructing water conservation projects, such as strengthening the embankments against flooding along major rivers, diverting water from the South to the North; adjusting the agricultural structure and cropping systems; cultivating and spreading the new drought-resistant varieties; establishing the

nature reserve zones, forest parks, and natural forest conservation zones.

The relevant adaptation measures to be taken mainly include: developing water-conservation agriculture and industry; protecting and improving ecological environments; cultivating disease- and pest-resistant varieties; converting some of the cultivated land to pasture, forest, and grassland; improving agricultural infrastructure, curbing and stopping deforestation and ecological damage; expanding the use of nature reserves; setting up and strengthening the monitoring, forecasting, and early warning systems for control of fire, disease, and pests of pasture and forest; raising the standard of embankments; strengthening the construction of coastal infrastructure against the tide.





4. Policies and Measures Related to Climate Change Mitigation

Since the 1980s, China, in accordance with its own national conditions and capacity and through carrying out various policies and measures, has succeeded in supporting a rapid economic development with a relatively low growth rate of energy consumption and greenhouse gas emissions, thus making a positive contribution to relieving the increase of greenhouse gas emission and protecting the global climate.

Since 1992, the Chinese government has taken a series of actions and measures and effectively pushed forward the process of China's sustainable development. In 1994, China's sustainable development strategy, China's *Agenda 21*, was formulated and released. In 2003, the Chinese government formulated the *Program of Action for Sustainable Development in China in the Early 21st Century*. In compliance with the principles and spirit of sustainable development, China enacted numerous laws on protecting natural resources and the environment. Beginning from the late 1980s, the Chinese government started paying more attention to the transformation of the economic growth pattern and the adjustment of the economic structure. A key component of China's industrial policies is to reduce consumption of energy and other resources, improve the comprehensive utilization and efficient use of resources and energy, promote cleaner production and prevent and control industrial pollution. The State Council and its relevant departments respectively promulgated the *Decision on the Focus of the Present Industrial Policy*, the *Outline Program of State Industrial Policy in the 90s* and the *List of Industries, Products and Technolo-*

gies Currently Encouraged by the State. Since the 1990s, the government has closed down a large number of enterprises that used backward technologies or had high consumption of energy and materials or caused serious pollution. The Chinese government has drafted and implemented a series of incentive policies in terms of finance, credit and taxation toward energy conservation projects, including interest payment rebates, differential interest rates, revoking of import taxes, reduction of income tax of enterprises and accelerated depreciation, etc. These measures have been applied to energy conservation technical upgrade projects and purchases of energy conservation equipment. Other tax reductions or exemptions have been applied for projects in the areas of comprehensive utilization of resources, power generation from municipal wastes, wind power generation and renewable energy in rural areas.

Since the 1980s, the Chinese government has carried out a series of reforms, policies and measures in the energy sector, optimized the energy structure and promoted the technical progress and raising of the sector's efficiency. Marketization has been achieved in the investment and pricing of the coal industry. The petroleum and natural gas industry has been reorganized with the establishment of the China National Petroleum Corporation (PetroChina) and the China Petroleum and Chemical Corporation (Sinochem). International practice has been followed in the pricing of crude and refined oil products. Pluralistic investment and ownership in the electricity industry has been established and the separation of government and enterprises in the electricity sector



completed. Beginning from the drafting of the Sixth Five-year Plan for National Economic and Social Development, the Chinese government has incorporated energy development and conservation plans into the national economic and social development plans. By the year 2000, the Chinese government had formulated energy conservation plans from the sixth to the tenth five-year plan periods and energy conservation plan for each year, identifying concrete development goals, key projects and principal policies for energy development and conservation. From 1995 to 2000, China's installed capacity of hydroelectric power witnessed an average annual increase of 8.7%. In 2000, the installed capacity of nuclear power generation in operation stood at 2.1 GW with a further 6.6 GW under construction. 26 wind farms were built and connected to the grid with their installed capacity growing from 30 MW in 1994 to 375 MW in 2000. From 1990 to 2000, 13.1 GW of small thermal power units were substituted. From 1996 to 2000, about 10 GW of coal-fired condenser units, which were below 50MW each, were shut down. From 1995 to 2000, the proportion of the thermal generating plant with unit rating 300MW and above rose from 22.5% to 34.4% as a percentage of the total capacity. In the same period, the installed capacity of combined heat and power units rose from 16.54 GW to 28.68 GW, averaging an annual increase of 11.6%. The share of oil and natural gas in China's primary energy production went up from 19.5% in 1994 to 25.2% in 2000. In compliance with the goals of national poverty eradication and energy development in the rural areas, the state has formulated a series of policies and measures for supporting and fostering the devel-

opment of new and renewable energy. By 2000, hydropower stations in more than 1,500 counties in China had been developed comprising some 40,000 rural hydropower stations with the total installed capacity of 24.8 GW and generating about 80 billion kWh of electricity per year. In addition to wind power and small-scale hydropower stations, China has energetically popularized firewood- and coal-conservation stoves, biogas, solar energy and geothermal technologies in rural areas. In 1994 and 2000, the utilization of renewable energy equaled to respectively 10.26 million tons and 33.57 million tons of coal equivalent.

For a long time, the Government of China has persisted in the principle of "developing and conserving energy simultaneously, with conservation put in the first place". After the 1980s, the State Council and government departments in charge at various levels formulated and implemented a series of energy conservation rules and regulations, set up a three-tier energy conservation management system at the central, local/industrial and enterprise levels and implemented a series of policies on energy-conservation technologies. They launched the national "energy-conservation publicity week", established and applied standards, labeling and certification of energy



efficiency and effectively boosted the work on energy conservation and raising energy efficiency. From 1980 to 2000, China's energy intensity went down by an average annual rate of 5.32%.

The Government of China has also consistently focused on energy conservation in the energy intensive industries. From 1990 to 2000, the output of iron and steel doubled, yet its total energy consumption increased only by 34%. During the same period, the energy consumption for each RMB10, 000 of production output in the chemical industry declined by an annual rate of 5.15%. The building materials industry has also undertaken a series of measures and lowered the per unit energy consumption of their products.

Since the 1980s, the State Council and its relevant departments successively promulgated and implemented a series of policies and regulations to direct and standardize the energy conservation work of the construction sector, such as the *Circular on Opinions on Accelerating Innovation in Wall Materials and Popularizing Energy-conservation Buildings*, the *Policies on Energy-conservation Technologies in Buildings and the Regulations on Management of Energy Conservation in Civil Buildings*. The released standards for energy conservation in buildings mainly include the *Design Standards for Energy Conservation in Civil buildings (the part of heated residential buildings)*, the *Grading of Insulation of the Outside Windows of Buildings and Its Testing Method*, the *Design Standards for Lighting in Civil Buildings*, the *Design Standards for Thermal Engineering in Civil Buildings*, the *Design Standards for Energy Conservation in Thermal Engineering and*



Air Ventilation in Tourist Hotel Buildings, the *Technical Directive Rules on Energy Conservation Renovation of the Existing Residential Buildings* and the *Design Standards for Energy Conservation in the Residential Buildings in Areas Unusually Hot in Summer and Cold in Winter*. Starting from 1992, the Ministry of Construction began a pilot program for energy conservation in buildings and at the end of 2000 had accumulatively built around 180 million square meters of energy-conservation buildings. During the 1996 – 1998 period, the China Green Lighting Program popularized a total of 267 million high-efficiency lighting products and saved 17.2 billion kWh of electricity.

Since the 1980s, the relevant government departments drafted and implemented regulations and standards such as the *Provisional Detailed Rules on the Management of Energy Conservation in Railways*, *Policy on Energy Conservation Technologies in Railways*, *Detailed Rules on the Implementation of Energy Conservation Law in the Transportation Industries*, *Standards for the scrapping of motor vehicles*, *Regulations on Energy Conservation in Railway Engineering Design*, *Rules for the Publication of Energy Conservation Products of Automobiles and Vessels*,



Limits for Automobile Emission of Pollutants and Their Testing Method. Certain progress has been made in the development and application of substitute fuels for motor vehicles. By the end of 2003, the Air Cleaning Program – Clean Automobile Action set up nationwide 16 key demonstration sites for clean automobiles. Gas-driven automobiles numbered 193,000 and 594 gas stations were built.

Since the 1980s, China has widely applied the household-based contract system to the pastures, identified the responsibilities, rights and interests in the construction and protection of pastures and mobilized the enthusiasm of the great masses of herdsman in developing animal husbandry and protecting the grassland. In breeding and popularizing good strains of forage grass, every year the acreage of seeding reached 40,000 hectares, that of aerial seeding 1.5 million hectares and the vegetation coverage of pastures rose to above 80%. Accumulatively 16 million hectares of artificial and improved pastures and 10 million hectares of fenced pastures were built. In total, 90 million hectares of pastures were prevented from rat and pests damage.

Since 1980, China successively formulated and amended the forestry laws and regulations such as *Rules on the Implementation of Forest*

Law, Rules on Forest Fire Prevention, Rules on Plant Disease and Pest in Forests, Regulations on Converting Cultivated Land to Forest and Regulations Concerning Urban Afforestation. The systems of compensation for forest ecological benefits, voluntary tree planting by the people, pricing of forests, forest funds, loans for afforestation and forest certification were established. China successively carried out ten forest ecological programs including the shelterbelt development programs in the “Three Northern regions”, upper and middle reaches of the Yangtze River and other key regions as well as natural forest resources protection programs. In 2000, the acreage of conserved artificial forests nationwide was 46.667 million hectares and the acreage of hillsides closed for afforestation reached 30.19 million hectares.

In the past decade or so the Chinese government has issued a series of such administrative regulations, policies and criteria for waste treatment such as the “*Rules on the Management of Urban Appearance and Environmental Sanitation*”, “*Rules for Handling Municipal Garbage*”, “*Notice for Issuance of Opinions on Pushing Forward Industrialization Development for Municipal Sewage and Garbage Treatment*”, “*Notice of Strengthening Management Work on Landfill Gas Emissions*” “*Pollution Control Criteria on Landfills for Domestic Garbage*” and “*Policy on Technology for Treatment of Domestic Garbage and Pollution Prevention*”. All these regulations have provided the basis for the treatment of municipal wastes and the prevention of pollution in the course of treatment. Up to the end of 2001 there were a total of 741 garbage treatment sites in China, of which 571

were used for sanitation landfill, 134 for compost and 36 for incineration.

The Chinese government has all along attached great importance to international cooperation in the field of climate changes and it has conducted extensive exchanges and cooperation respectively with a number of countries and international organizations. In the fields of energy efficiency and renewable energy development, the relevant departments of the Chinese government have, by using the support of the UNDP, World Bank and the Global En-

vironment Facility, implemented the projects such as the “China End-Use Energy Efficiency Project”, the “China Energy Conservation Project” and “Capacity Building for the Rapid Commercialisation of Renewable Energy in China”. In the forestry field, the recent 10 years have witnessed the execution by the State Forestry Administration of international cooperation and aid programs totaling 269 in all in more than 20 provinces, autonomous regions and municipalities directly under the central government.

5. Research and Systematic Observation



China has established a large three-dimensional network for comprehensive observation of the atmosphere.

Currently it owns 143 reference climate stations, 530 basic weather stations and 1,736 ordinary weather stations. Presently the main problem for meteorological observation lies in the uneven distribution of observation stations that are laid out densely in the east but sparsely in the west. Along with the increasing urbanization, the environment for meteorological observations has changed. Furthermore the work to standardize airborne observation equipment and measurements needs improving. The measures for airborne observation were simplistic in some way. There were few airborne observation stations over the Qinghai-Tibet Plateau and insufficient atmospheric trace gas observations have been made. Furthermore there is a weak basis with regard to the observation equipment and methods, testing and analytic measures and quality control.

China has set up a relatively integrated marine observation and monitoring system consisting of stations for ocean observation, voluntary observation vessels, buoy observations, marine investigation vessels, a nationwide network for ocean tide testing, seashore ice-monitoring radars and “China Haijian” airplanes. However, most of the ocean observation stations are con-

centrated along the seashore of China’s mainland and are limited in number and also distributed unevenly. The observation equipment and facilities are backward while the observation data is mostly for oceanic hydrometeorology with only a few observations made for sea-atmosphere interaction.

The terrestrial observation system mainly consists of a network measuring data for hydrological systems, ice-snow, ecological systems, agro-meteorology and environmental protection and so on. The main problem currently is that the network of different channels has not been integrated into a sizable and coordinated one necessary for continuous observations.

The Chinese meteorological satellite for remote-sensing observation has played an important role in the monitoring and warning of the weather and meteorological disasters. With regard the monitoring and study on climate changes, the weaknesses of the remote-sensing observation lies in the limited number of weather parameters monitored, the short time-series available, the non-standard data-processing and the relatively weak domestic ability in climate analysis and modeling techniques.

There is currently a certain infrastructure for the construction of a climate information system in China and especially in the regular management of the data obtained in atmospheric observation. However, at present the collection, storing, quality control and dispersion of the climate observation data lack an integrated, coordinated and common standard approach.

In the future, China will further develop and improve the national and regional network for systematic climate observation on the basis of extensive international cooperation, strengthening the management and sharing of the climate system data, and thereby adapt effectively to the impact of climate changes in its own territory.

China has done a lot of work in the scientific study of climate changes. Over the past 20 years, the Chinese scientists have carried out a great deal of work in such studies as on the historical facts and possible causes of climate changes in China, possible climate change scenarios induced by human activities in future, the possible impacts of climate change on China's sensitive economic sectors and vulnerable areas, the possible impacts on China's economy entailed by international policies and measures for mitigating climate changes as well as the national strategy for addressing climate change and so on and so forth. In these aspects China has conducted a lot of research work and has achieved a series of initial results, thus providing scientific support to the country in working out policies to deal with the climate change problem and to implement the UNFCCC, and has also laid a foundation for the development of climate science in the future.

In terms of international cooperation for the study of climate changes, the Chinese departments concerned have carried out many projects for capacity building and cooperative studies together with such international organizations as the World Bank, Asian Development Bank, the UN Development Program and

the Global Environment Facility and with the governments of the United States of America, Canada, United Kingdom, Norway, Italy, Germany and Switzerland.

Nevertheless, there still exist several problems in the scientific study on climate changes in China. These problems include the limited investment for the study of climate change and the fact that a system for climate change detection and modeling hasn't been established yet. Furthermore China does not have enough trans-disciplinary studies between the natural sciences and social sciences and has not had many innovative scientific results that can be practically applied. Going forwards, China will further strengthen the support for the scientific studies, carry out activities for scientific assessment of climate changes and continue to take an active part in the relevant activities of the IPCC and strengthen international cooperation and information exchanges. By way of strengthening scientific research China will work hard to provide the international community and domestic departments concerned with more comprehensive and more reliable scientific information for dealing with climate changes.



6. Education, Training and Public Awareness

Improving education, training and public awareness on climate change is an important measure for persuading the whole of society to jointly participate in activities for the mitigation of and adaptation to climate change. In recent years, China has strengthened the training and education on climate change with great efforts made in enhancing the public awareness of climate change and for promoting sustainable development. This is mainly carried out via the channels of China's existing educational system, which includes regular and non-regular education, and topics have included education on sustainable development and environment protection and climate change. Additionally China has also organized a nationwide questionnaire on the awareness of climate change amongst different segments of the population including students of institutes of higher learning, high-school students, civil servants, workers, farmers, urban residents and social communities. Efforts have also been made through the media for strengthening the publicity on climate change, such as the "China Youth Daily" starting a special column entitled "climate change" and the Central Radio Station of China special program of "climate change". China has also set up websites on climate change, such as www.ccchina.gov.cn, which has opened up an information channel for people to learn about the latest developments on climate change at the national and international level and to find out the relevant policies and measures adopted in this field in China. Many lectures have been held on the basic knowledge and reports on climate change, and many domestic and international scientific conferences and seminars have been organized which are

related to climate change. Aside from these public events, many internal talks and discussions have also been organized to consider the problem of climate change and the environment. Initiatives have been carried out to compile and publish various kinds of publications and publicity materials on climate change. China is also exploiting at every opportunity other important activities on the environment and related equipment fairs to popularize the training and education with regard to climate change.

All these activities have helped greatly to enhance the public awareness about climate change. However, the result of the survey of public awareness of climate change shows that there is much more to be done to further enhance the propagation of this knowledge and to ensure all segments of society continue to be educated about climate change. China will continue to carry out in an earnest way the education, training and public awareness on climate change as required by the UNFCCC. In the meantime, however, it is our hope that the international community will continue to support us in our education, training and awareness raising.



7. Needs for Funds, Technologies and Capacity Building



China is a developing country with a relatively low level of economic development and insufficient capability of technology development.

Thus China is simultaneously facing the pressures of both economic development and environmental protection. As one of the non-Annex I Parties to the Convention, and in order to honor effectively the commitments as stipulated by the Convention, China needs developed country Parties to provide assistance to it in terms of funds, technologies and capacity building in line with their obligations under the Convention, so as to strengthen China's capacity for the mitigation of and adaptation to climate change and improve the level of relevant studies.

The development of a greenhouse gas inventory is a complicated and continuous work requiring special scientific knowledge. It needs not only those personnel engaged in the development of the GHG inventory to have a certain professional quality and expertise but also it needs the continuity and stability of these personnel. It is necessary for developed countries to provide us with funds and technical support and to carry out capacity building activities and international exchanges so as to improve China's capability of preparing greenhouse gas inventories. There are certain differences between the existing statistics index system in China and that used in the international community. This is another area that requires the contribution of funds and technical support from the international community to improve the capability in obtaining the basic data for the greenhouse gas inventories and reduce

the uncertainties in the national greenhouse gas inventories. To scientifically determine the emission factors, the input of funds and technological support is also required to get the measurement techniques and equipments for obtaining emission factors for fuel combustion in industrial boilers and kilns, combustion of biomass fuels, emissions from rice paddy fields and animals, biomass quantities in forestry and carbon contents in soils.

The technical needs for climate change mitigation in China mainly include: technologies related to environmental protection and the comprehensive utilization of resources, various energy technologies, advanced technologies for transportation, advanced technologies related to material and manufacturing industries, building sector technologies, etc. China is relatively sensitive and vulnerable to climate change in the fields such as agriculture, natural ecology and forestry, water resources, sea level and coastal belts, desertification and natural disasters. Technical support and funds are also needed for mitigating or adapting in these above mentioned areas. In the area of climate system observation, China's major technical needs include: various advanced technologies in regard to the observation of atmosphere and ocean, satellite technologies concerning meteorology, oceanography and resources as well as other relevant technologies.

In view of the needs for capacity building in developing countries as presented in the Marrakech Accord, China is in general faced with all these needs. China has already started the project of "Needs Assessment of National Capacity Building" by the end of 2003, according to which China will carry out a comprehensive needs assessment of its capacity building requirements in the field of climate change and this is scheduled to finish by the end of 2004.

