

REGIONAL SUSTAINABLE DEVELOPMENT REVIEW: CHINA

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Keywords: Sustainable development, China's Agenda 21, Administrative Center for China's Agenda 21, China Council for International Cooperation on Environment and Development, social-economic-natural complex ecosystem, assessment of sustainable development, eco-planning, eco-engineering, eco-management, comprehensive experimental community for sustainable development, eco-county

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Summary

It has been proved that sustainable development is the only way to promote economic growth, rational utilization of resources, and environmental protection. To this end, China's government and people have made great efforts and have witnessed achievements in the last ten or more years. But the task is certainly not complete. In other words, this is only the first step of the "long march." There is much more to do, both in theoretical research and in implementation of sustainable development. China is a very large developing country and the shortage of natural resources, deteriorated environment, frequent natural disasters, poverty, and low educational level are the main obstacles to realization of sustainable development in the future. For further implementation of the strategy of sustainable development in China, the following may be regarded as the primary objectives:

- Propagating the strategy of sustainable development and other relevant knowledge, such as ecological and environmental protection, and the rational exploitation and utilization of natural resources.
- Developing suitable and sustainable techniques, especially environmentally sound techniques, and gradually establishing a set of techniques of sustainable development for different regions and different sectors.
- Improving the technological systems used in the implementation of sustainable development with Chinese characteristics.
- Studying in depth the indicator system for assessing sustainable development

- according to different objectives.
- Paying much more attention to capacity-building for decision-making, at professional, technical, and user levels.
 - Emphasizing the important roles of women and NGOs in the implementation of sustainable development.
 - Enforcing international co-operation, from the initial exchange of information and personnel to jointly sponsored workshops and training course research and development projects.

1. Introduction

Sustainable development is the main theme of economic development in China and the whole world today and in the twenty-first century. In the 1960s many countries, especially the economically developed ones, sensing the gravity of the conflicts between economic development, resource utilization, and environmental protection, set out to explore ways of continuously developing the economy. This became an issue after the UN Conference on the Human Environment in 1972. Since then, the strategy of sustainable development, as the best development model, has been accepted by almost every government. Various important milestones have been passed, such as:

- The report entitled *Our Common Future* submitted to the Forty-second Session of the UN General Assembly in 1987 by the World Commission on Environment and Development giving the definition of sustainable development.
- The 1992 UN Conference on Environment and Population is probably the greatest problem in the Development, and *Agenda 21* adopted by the conference.
- The 1996 Conference calling for “Sustainable Development from Concept to Action.”

The Chinese Government has been taking care of sustainable development. This is not only because China’s highest leaders take it seriously, but also because it will help to create a sound environment for sustainable economic development, for deepening reforms and opening to the outside world, and for establishing a socialist market economy. Since the 1980s, the Chinese Government has considered the two state policies of family planning and environmental protection to be fundamental to socialist modernization. Environmental protection has been included in medium and long-term plans for national economic and social development. The government has formulated and implemented a series of laws and policies concerning environmental protection. There has been great progress in co-ordinating the relationship between economic development and environmental protection and in creating China’s own mode of sustainable development with Chinese characteristics. More and more people have realized that the future for China’s development lies in co-ordinating the relationships among economic and social development and resources and the environment. The Preamble of China’s *Agenda 21* points out “only by adopting the road of sustainable development through harmonizing socio-economic development with natural resources and environment, will China identify its future.”

2. Current state of China's population, resources, and environment

2.1. Population and poverty

Population is probably the greatest problem in the development of China's society. As the largest developing country in the world, its population makes up about 22 percent of the earth's total. Figure 1 shows population growth in China from 1949 to 1997. A vast population not only puts pressure on limited natural resources, but also poses a major obstacle to poverty reduction.

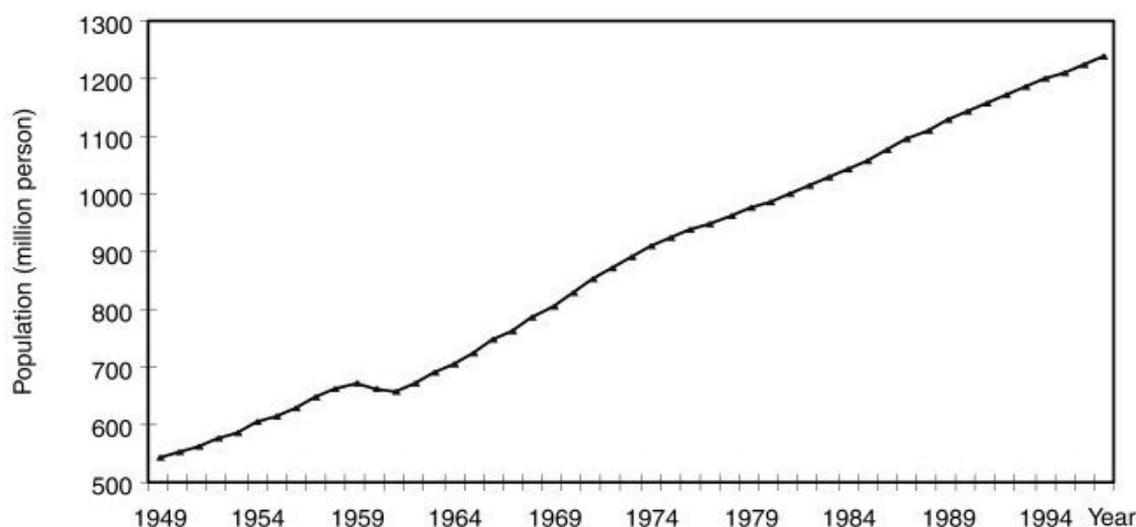


Figure1: Population growth in China from 1949 to 1997

For a long time in the past, China was bedeviled by poverty, for various reasons. Since the founding of the People's Republic of China in 1949, and especially since the end of the 1970s, when China introduced the policy of reform and opening up to the outside world, the Chinese Government, while devoting considerable efforts to all-round economic and social development, has implemented nationwide a large-scale program for development-oriented poverty relief in a planned and organized way. With the main objective of helping poverty-stricken people to solve the problems of food and clothing, this program has gone a long way toward alleviating poverty. Between 1978 and 2000, the number of poverty-stricken people without enough to eat or wear in the rural areas decreased from 250 million to 30 million, and the proportion of poverty-stricken people in the total rural population dropped from 30.7 percent to about 3 percent. The strategic objective set by the Chinese Government for enabling all poverty stricken people in rural areas to have enough to eat and wear by the end of the twentieth century has basically been realized.

From 1978 to 2000, this program largely underwent the following three stages:

- *The First Stage.* "Structural Reform Promotes Poverty Relief" (1978–85). In 1978, the poverty-stricken population numbered 250 million, making up 30.7 percent of the total rural population, according to the poverty standard designated by the Chinese Government. According to statistics, from 1978 to 1985 grain output per

capita increased by 14 percent in the countryside, cotton by 73.9 percent, oil-bearing crops by 176.4 percent, and meat by 87.8 percent; the net income per peasant grew 3.6 times; the number of poverty-stricken people with problems in feeding and clothing themselves decreased from 250 million to 125 million, down to 14.8 percent of the total population in the rural areas; and the number of poverty-stricken people went down by an annual average of 17.86 million.

- *The Second Stage.* “Large-Scale Development-Oriented Poverty Relief Drive” (1986–93). In the mid-1980s, the economy of the overwhelming majority of the rural areas in China, stimulated by the policy of reform and opening-up and relying on their own capacities, grew in leaps and bounds, but a small number of areas still lagged behind because of economic, social, historical, natural, and geographical conditions. Thanks to the efforts made over the past eight years, the net income per peasant in the poverty-stricken districts to which the Chinese Government had attached special importance increased from 206 Yuan in 1986 to 483.7 Yuan in 1993; the number of the rural poor dropped from 125 million to 80 million, with an annual decrease of 6.4 million on average, and an average annual decrease rate of 6.2 percent; and the proportion of poverty-stricken people in the total rural population went down from 14.8 percent to 8.7 percent.
- *The Third Stage.* “Tackling the Key Problems of Poverty Relief” (1994–2000). In March 1994 China implemented the Seven-Year Priority Poverty Alleviation Program (a program designed to lift 80 million people out of absolute poverty by the year 2000). China’s development-oriented poverty-relief work began to tackle the key problems. The Seven-Year Priority Poverty Alleviation Program clearly stipulated that China should concentrate human, material, and financial resources, mobilize the forces of all walks of life in society and work hard to basically solve the problem of food and clothing of the rural needy by the end of 2000. For three years running (1997–9), China solved the problem of food and clothing for eight million people per year: a record for the 1990s. By the end of 2000, by and large, the basic objectives of the Seven-Year Priority Poverty Alleviation Program had been realized. The number of poverty-stricken people in rural areas with problems obtaining sufficient food and clothing decreased from 250 million in 1978 to 30 million in 2000; and the impoverishment rate there decreased from 30.7 percent to about 3 percent. Of this, the number of poverty-stricken people in the impoverished districts, to which the Chinese Government gave priority in its poverty alleviation efforts, decreased from 58.58 million in 1994 to 17.1 million in 2000. This number mainly comprised destitute people living in areas with adverse natural conditions, a small number of people receiving social security assistance, and some handicapped people.

2.2. Arable land

Although China’s land area ranks third in the world, the land area per capita is only 0.777 ha, one-third of the world’s average. The area of arable land in China in 2000 was 128,233,100 ha. The area of arable land per capita was 0.101 ha, less than half of the world’s average per capita and the regional distribution is uneven (Figure 2). The rate of use of arable land was high, with the current rate of cultivation having reached 13.7 percent, 3.5 percent higher than the world’s average level.

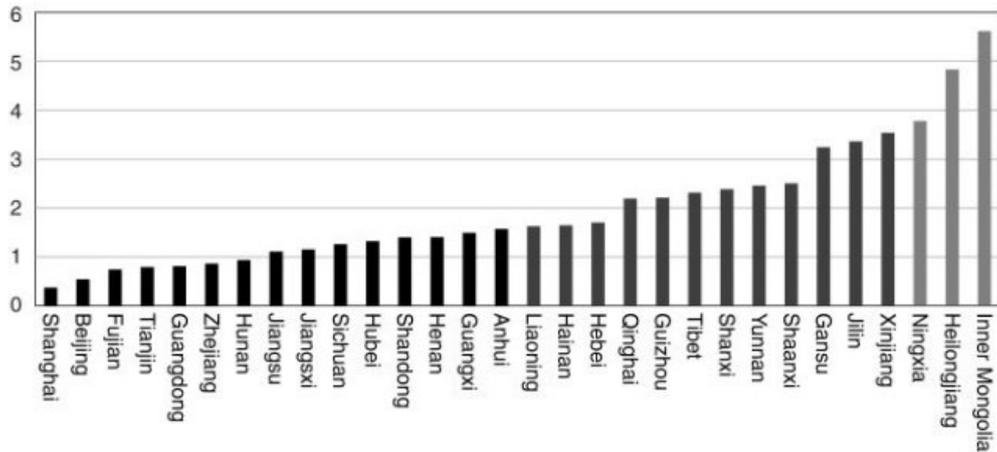


Figure 2. Comparison of per capita arable land in different province, autonomous regions and municipalities (based on the National Land Use Survey in 1996)

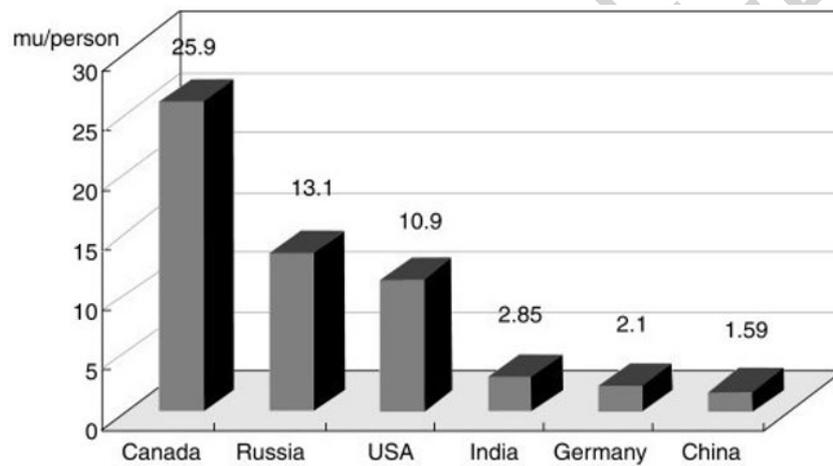


Figure 3. Comparison of per capita arable land between China and other selected countries

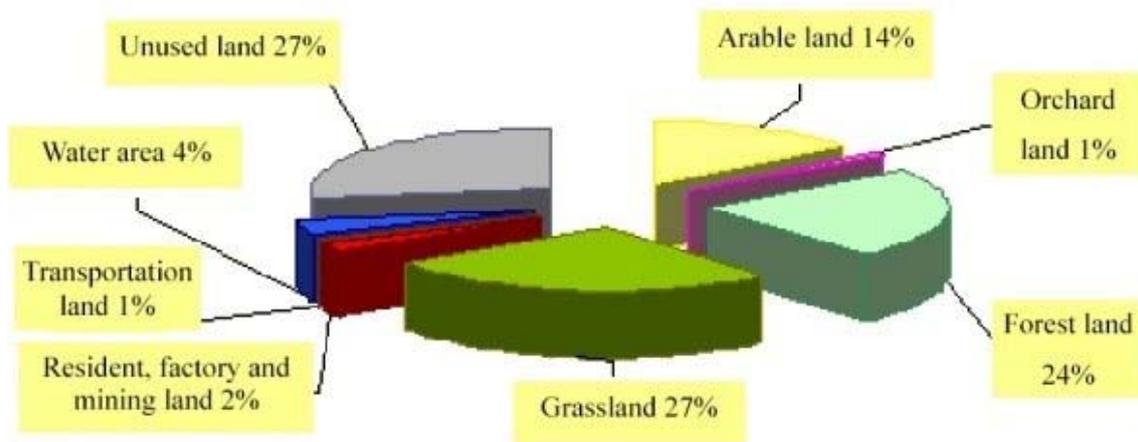


Fig.4 Land use structure in China

In 2000, 1.566 million ha of arable land were used for other purposes. Among these, 163,000 ha were used for construction, 763,000 ha returned to forestry and grassland for ecological restoration, 578,000 ha for agricultural restructuring, and 62,000 ha were destroyed by natural disasters. 291,000 hectares of land were added: 184,000 ha through exploiting unused land, 66,000 ha through reclaiming abandoned land, and 42,000 ha through land reconditioning. So the actual area of land used for other purposes in 2000 was 1.275 million ha (see Figure 4).

2.3. Water resources

| Regions | Catchment Area (km ²) | Annual Precipitation (10 ⁹ m ³) | Annual runoff of rivers (10 ⁹ m ³) | Annual ground-water (10 ⁹ m ³) | Repeated amount (10 ⁹ m ³) | Annual total (10 ⁹ m ³) |
|---|-----------------------------------|--|---|---|---|--|
| Rivers in North-eastern China | 1,248,445 | 637.7 | 165.3 | 62.5 | 34.9 | 192.9 |
| Haihe River | 318,161 | 178.1 | 28.8 | 26.5 | 13.2 | 42.1 |
| Yellow River | 794,712 | 369.1 | 66.1 | 40.6 | 32.3 | 74.4 |
| Huaihe River and others in Shandong Peninsula | 329,211 | 283.0 | 74.1 | 39.3 | 17.3 | 96.1 |
| Yangtze River | 1,808,500 | 1936.0 | 951.3 | 246.4 | 236.4 | 961.3 |
| Zhujiang River | 580,641 | 896.7 | 468.5 | 111.5 | 109.2 | 470.8 |
| Rivers on South-east Coast | 239,803 | 421.6 | 255.7 | 61.3 | 57.8 | 259.2 |
| Rivers in South-west China | 851,406 | 934.6 | 585.3 | 154.4 | 154.4 | 585.3 |
| Inland rivers | 3,374,443 | 532.2 | 116.4 | 86.2 | 72.3 | 130.3 |
| National total | 9,545,322 | 6188.9 | 2711.5 | 828.8 | 727.9 | 2812.4 |

Table 1: Water resources in China

The total volume of water resources in China is approximately 2.8×10^{28} cu m (see Table 1), ranking it sixth in the world. However, the per capita share of the water is only 2,400 cu m (25 percent of the world mean value), ranking China 109th in the world. Water shortages restrict China's agricultural, industrial, and urban development. In the 1990s, drought-prone land area covered almost 267,000 sq km, and China's grain output had stagnated at the same level for the fourth consecutive year, and had decreased by 3,500 million kilograms compared to previous years. Although the potential irrigated area that could be developed totals 640,000 sq km, the area irrigated is only 500,000 sq km, and the area properly irrigated is only 400,000 sq km. In the late 1980s and 1990s, many electric-power plants and factories in the large and medium size cities in northern China had to suspend production due to water shortages, and some cities in northern China were also affected. Excessive pumping of water leads to a drop in groundwater

level and to the destruction of the water-bearing aquifers. The lowering of the water table in coastal cities is causing seawater encroachment, resulting in salinized groundwater, and exacerbating the problems of meeting the demand for water.

In terms of water resource *per capita*, China is one of the thirteen countries in the world with a serious shortage of water. UN agencies regard countries with less than 1,000 cu m of renewable water per year per head of population as being in a condition of water scarcity. There are nine regions in China in which the water resource per capita is only 500 cu m. Out of more than 600 cities in China, almost 400 are short of water, and there are more than 130 cities with a serious lack of water. The shortfall of water in these cities is 6 billion cu m per year, or more than 16 million cu m per day. The lack of water has caused great financial loss – more than 120 billion Yuan to agriculture and industry – and the loss is increasing.

2.4. Forest

In 2000, the existing area of forest in China was 158,941,000 ha. The percentage of forest cover is 13.92 percent. The forest growing stock is 11,785 million cu m. According to the statistics announced by the UN Food and Agriculture Organization (FAO) in 1995, China's forest coverage, per capita area of forest, and per capita forest growing stock rank respectively the 111th, 119th, and 160th among the 179 countries and regions in the world. China is one of those countries with the lowest areas of forest per capita. China's forest regions mainly consist of the north-east forest region, the south-west Alpine forest region, the north-west mountain forest region, and the hill-land forest region in the south. Area, volume, and ratio of forest categories are shown in Table 2, and area, volume, and rate of age groups in Table 3. Table 4 gives the comparison of forest coverage and changes between China with other countries.

As the member of the international community with the largest population, China fully understands her responsibilities in forestry development and protection of the global environment, and has made unremitting efforts in this regard. Up to now, the established area of plantation in China has reached 33 million ha. Through afforestation and enhancement of forest protection, China has achieved “dual increases” in both the forest area and the stocking volume under the prevailing circumstances of general decline in global forest resources.

However, being a country deficient in forest resources, it is still a great task for China to develop forestry and improve the environment. In order to speed up forestry development, and give a full role to the importance of forestry in modern development, the former Ministry of Forestry has worked out the Forestry Action Plan for China's *Agenda 21*, according to the UN *Agenda 21*, and China's *Agenda 21*, and defined the strategic goals for the development of China's forestry. By the early twenty-first century, the forest cover in China will reach 17 percent, and the gross national forestry output value will be 1,000 billion Yuan; by the middle of the twenty-first century, a relatively complete forestry ecosystem and a relatively developed forestry-related industry system will have been set up.

| Region | Total of stand | | Timber forest | | Protection Forest | | Firewood Forest | | Special Purpose forest | |
|--|----------------|-------------|---------------|-------------|-------------------|-----------|-----------------|-----------|------------------------|-----------|
| | Area | Volume | Area | Volume | Area | Volume | Area | Volume | Area | Volume |
| The North-east forest Region | 33,238.4 | 2,934,858.7 | 30,563.1 | 2,651,892.2 | 903,5 | 95,224.7 | 264.7 | 11, 022.6 | 1,507.1 | 176,719.2 |
| | 100% | 100% | 91.95% | 9.036% | 2.72% | 3.24% | 0.8% | 0.38% | 4.53% | 6.02% |
| The Southwest Forest Region | 19, 020 | 3 455,650 | 11,960 | 2 166,620 | 5,810 | 1,067 910 | 460 | 30,290 | 790 | 190,830 |
| | 100% | 100% | 62.88% | 62.70% | 30.55% | 30.90% | 2.42% | 0.88% | 4.15% | 5.52% |
| The Hill-Land Forest Region in the South | 31,620.4 | 1,414,031.1 | 26,568,8 | 1,202,544.8 | 2,547.2 | 148,007.8 | 2,147.9 | 20,649.2 | 356,5 | 42,829.3 |
| | 100% | 100% | 84.02% | 85.04% | 8.06% | 10.47% | 6.79% | 1.46% | 1.13% | 3.03% |
| Northwest Mountain Forest Region | 2,242.3 | 330,961.0 | 1,004.1 | 149,652.3 | 854.0 | 128,692.7 | 48.4 | 1,136.8 | 335.8 | 51,479.2 |
| | 100% | 100% | 44.78% | 45.22% | 38.09% | 38.89% | 2.16% | 0.34% | 14.97% | 15.55% |

Table 2. Area, Volume and Ratio of Forest Categories in China Unit: area 1,000hm², volume 1,000m³

| Region | Total of Stand | | Young Growth | | Middle-aged Forest | | Submature Forest | | Mature Forest | | Overmature Forest | |
|--|----------------|-------------|--------------|-----------|--------------------|-------------|------------------|-----------|---------------|-----------|-------------------|-----------|
| | Area | Volume | Area | Volume | Area | Volume | Area | Volume | Area | Volume | Area | Volume |
| The North-east forest Region | 33,238.4 | 2,934,858.7 | 10,249.1 | 371,324.2 | 13,422.0 | 1,129,403.4 | 3,424.7 | 434,006.2 | 4,665.2 | 725,610.2 | 1,657.4 | 274,964.7 |
| | 100% | 100% | 30.83% | 12.65% | 40.38% | 38.48% | 9.76% | 14.79% | 14.04% | 24.71% | 4.99% | 9.37% |
| The South-west Forest Region | 19,020 | 3,455,650 | 3960 | 176,910 | 3,960 | 403,830 | 2,370 | 339,730 | 4,440 | 1,053,570 | 4,290 | 1,481,610 |
| | 100% | 100% | 20.82% | 5.12% | 20.82% | 11.69% | 12.46% | 9.83% | 23.34% | 30.49 | 22.56% | 42.87 |
| The Hill-Land Forest Region in the South | 31,620.4 | 1,414,031.1 | 15,455.8 | 262,855.8 | 10,967.7 | 646,208.6 | 2,879.8 | 236,128.9 | 1,634.2 | 182,043.1 | 682.9 | 86,794.7 |
| | 100% | 100% | 48.88% | 18.59% | 34.68% | 45.70% | 9.11% | 16.70% | 5.17% | 12.87% | 2.16% | 6.14% |
| North-west Mountain Forest Region | 2,242.3 | 330,961.0 | 368.4 | 18,276.1 | 701.3 | 80,261.9 | 391.1 | 55,765.2 | 522.5 | 103,283.8 | 259.0 | 73,374.5 |
| | 100% | 100% | 16.43% | 5.52% | 31.28% | 24.25% | 17.44% | 16.85% | 23.30% | 31.21% | 11.55% | 22.17% |

Table 3: Area, volume and Rate of Age Groups in China

| <i>Country</i> | <i>Forest area in 1990 (1 000 ha)</i> | <i>Forest area in 1995 (1 000 ha)</i> | <i>Changing rate %</i> |
|----------------|---|---|----------------------------|
| China | 133 756 | 133 323 | -0.06 |
| USA | 209 572 | 212 515 | 0.28 |
| Canada | 243 698 | 244 571 | 0.07 |
| Japan | 25 212 | 25 146 | -0.05 |
| India | 64 969 | 65 005 | 0.01 |
| Brazil | 563 911 | 551 139 | -0.46 |
| Russia | 763 500 | 763 500 | 0.00 |

Table 4: Forest coverage and change from 1990 to 1995

2.5. Wetlands

China, with the largest area of wetlands in Asia, has been successful in protecting wetlands. In 1992, China became a contracting party to the Ramsar Convention on Wetlands of International Importance, pledging to take part in co-ordinated international conservation action for protecting wetlands. The State Forestry Administration (SFA) of China has set up a Ramsar Convention Implementing Office to take charge of promoting international co-operation in this field.

Some of China's natural wetlands are of a unique type, and are important for biodiversity conservation. Wetlands play very important roles in modulating the weather and maintaining underground water resources. According to investigation, the number of wetland plant, animal, and fish species in China are estimated at 5,000, 3,200, and 770, respectively.

However, China once held that "natural wetland equals waste land," and listed it as reserved resources for agricultural purposes. Almost half of the whole country's mudflats and one-tenth of the country's lakes disappeared during decades of excavation and reclaiming. Scientists say that the floods, droughts, red tides, and sand storms that have afflicted China frequently in recent years, are closely related to the shrinking of natural wetland. Related ecological damage has caused economic losses equivalent to 4–8 percent of the country's Gross National Product.

Since 1992, great progress has been made in wetland conservation in China. Research results show that the number of birds migrating via China has increased over the past five consecutive years and the period that east Asia bird species stay in China has extended to as long as half a year. Certain unique wetland animal, plant, or fish species, such as the giant panda, golden monkey, dawn redwood, and Chinese alligator, have also received scientific protection. In a recent article commemorating the thirtieth anniversary of the founding of the convention, Delmar Blasco, Secretary General of the Ramsar Convention, described China as a respectable member.

China has now decided to abandon its original plan of developing 25 million ha of

natural wetlands into agriculture resources, in a bid to reinforce ecological protection. Natural wetlands will no longer be regarded as reserved resources for large-scale agricultural activities. The country will make efforts to increase its total grain output by land re-arrangement and reclaiming exhausted farmland, according to ministry officials. For example, Heilongjiang, which possesses one-sixth of the country's natural wetlands, has ceased land reclamation and excavation. Provinces along the Yangtze River, the Yellow River, and coastal cities have taken similar measures.

The most important thing is that the Chinese Government has started to implement an Action Plan for Protecting China's Wetlands for the next two decades, and set up thirty-nine key projects. According to the plan, China will work out a legal system for wetlands-protection and will set up an advanced monitoring network for the wetlands ecological system. Furthermore, China will enlarge its area of protected wetlands, encourage people to participate in wetlands protection, and strengthen technological co-operation with relevant international organizations.

The first batch of seven of China's wetlands was added to the List of Wetlands of International Importance in 1992. On the sixth World Wetlands Day, February 2 2002, China contributed to global conservation by adding fourteen newly-designated wetlands reserves of international importance, known as Ramsar Wetlands. The fourteen newly-designated sites have been evaluated and recognized by the Worldwide Fund for Nature as the seventy-first "Gift to the Earth." This "Gift" brought the total number of China's Ramsar Wetlands to twenty-one, with a combined coverage of 3 million ha.

China presently has 66 million ha of wetlands, accounting for one-tenth of the world's total. The country plans to set up another 333 wetlands reserves in the next ten years to bring the total to 643, which will protect over 90 percent of China's natural wetlands resources.

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Biographical Sketches

Honglie Sun, Academician of the Chinese Academy of Sciences (CAS), Professor of the Institute of Geographic Sciences and Natural Resources Research, CAS. He graduated from the Department of Pedoagro-chemistry at Beijing Agricultural University in 1954 with a BS degree and from Shengyang Institute of Forestry-soil, CAS in 1960 with an M.Sc. degree. He then engaged in integrated research on Natural Resources and regional development in CAS. Since the 1970s, he has devoted himself to the integrated scientific survey at Qinghai-Tibet Plateau, the establishment of the Chinese Ecosystem Research Network (CERN), and the promotion of regional sustainable development in China. Currently he is a Member of the Standing Committee and a Member of the Resource and Environmental Committee of the National People's Congress, Director of the Research Center for Regional Sustainable Development of CAS, Chairman of the Scientific Committee for CERN, and Co-Chairman of the Sustainable Agriculture Working Group at China Council for International Co-operation on Environment and Development.

Shengkui Cheng, Deputy Director and Professor of the Institute of Geographic Sciences and Natural Resources Research, the Chinese Academy of Sciences (CAS). He graduated from the Department of Agronomy at North-west Agricultural University in 1982 and 1985, gaining, respectively, his Bachelor and Master degrees. In 1990 he gained his Ph.D. degree at China Agricultural University. For a long period he has been engaging in the research on cropping system, macro-agricultural development, resources ecology, and integrated planning of agricultural development in Qinghai-Tibetan Plateau areas, and developmental ecology and regional sustainable development. At present he is in charge of some key projects, including regional sustainable development and the national resources report, amongst others.

Qingwen Min, Associate Professor of the Institute of Geographic Sciences and Natural Resources Research, the Chinese Academy of Sciences (CAS). He graduated from Nanjing Institute of Meteorology in 1983 and 1990 with his B.Sc. degree and M.Sc. degree, respectively. In 1999, he obtained his Ph.D. degree at CAS. He has engaged in research into crop meteorology, grassland meteorology, and agricultural resources exploitation and utilization. In recent years, he has been undertaking research into regional developmental ecology, resource ecology, resource and environmental security, and ecosystem service.