

中国可持续发展
水资源战略研究综合报告

**COMPREHENSIVE REPORT OF
STRATEGY ON WATER RESOURCES
FOR CHINA'S SUSTAINABLE DEVELOPMENT**

中国工程院中国可持续发展水资源项目组 著
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Lin Bingnan
Zhang Wenzheng



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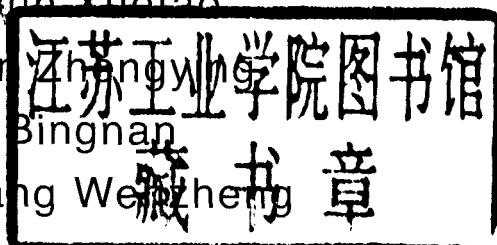
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PREFACE

This paper is a comprehensive report of the Academy Project entitled "Strategy on Water Resources for China's Sustainable Development in the 21st Century". The Project organized by the Chinese Academy of Engineering, involves 43 academicians and nearly 300 experts in addition, including one overview group and 7 topical groups. The members of the overview group responsible for the comprehensive report are as follows:

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Sun Xuetao, Senior Engineer, Secretary to Mdm. Qian Zhengying of the Chinese People's Political Consultative Conference.

Figure 1 Natural Situation of Water Resources

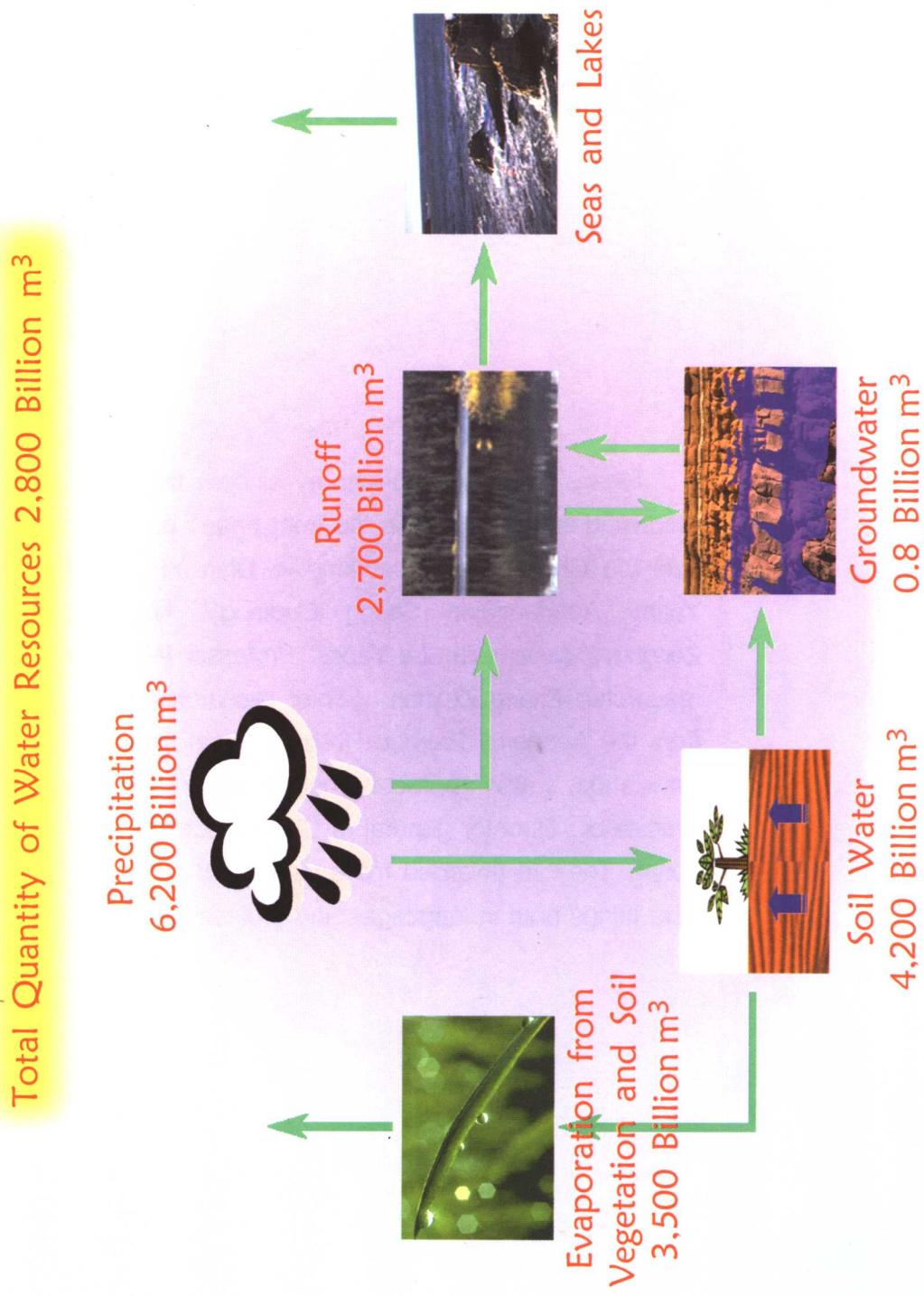
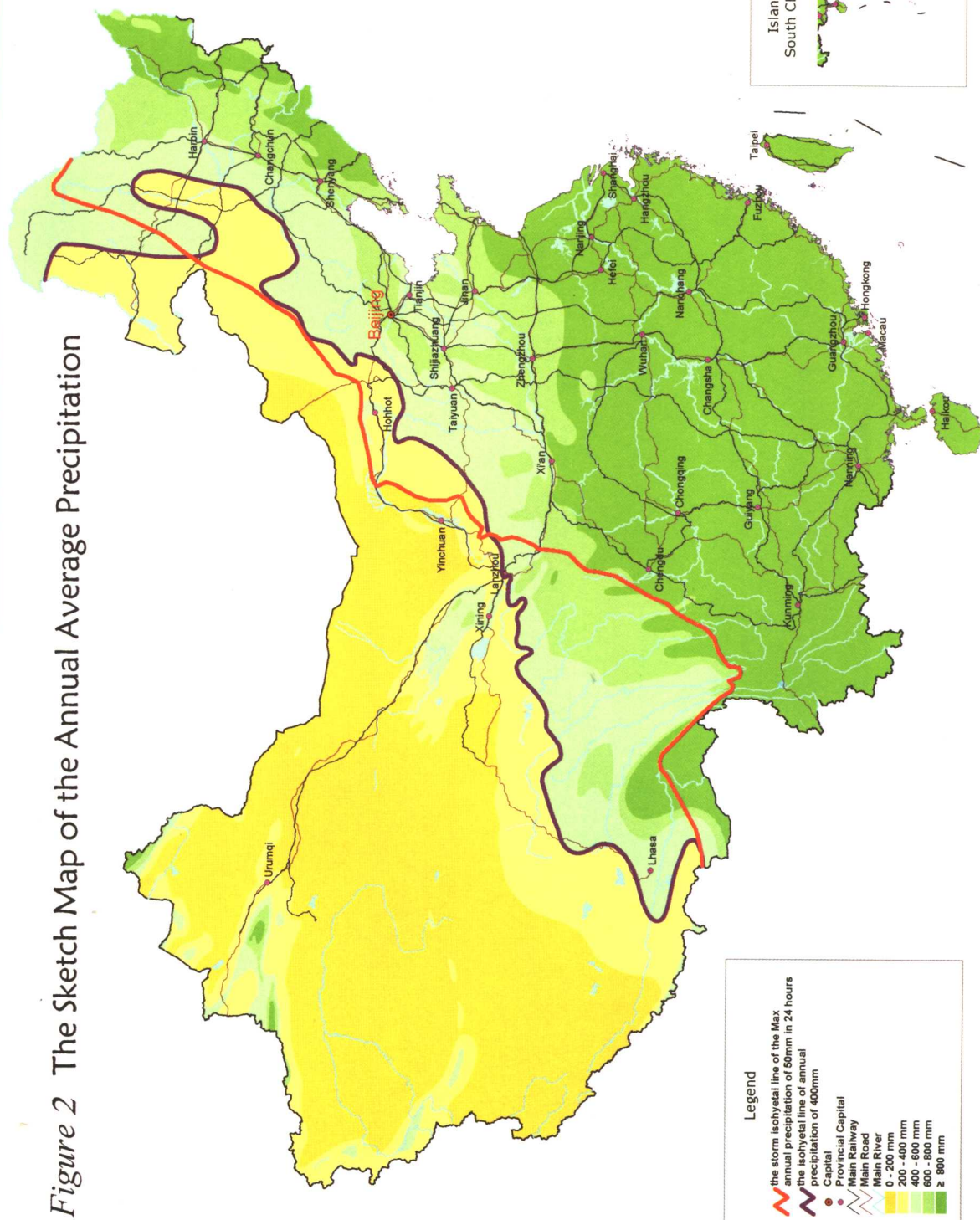


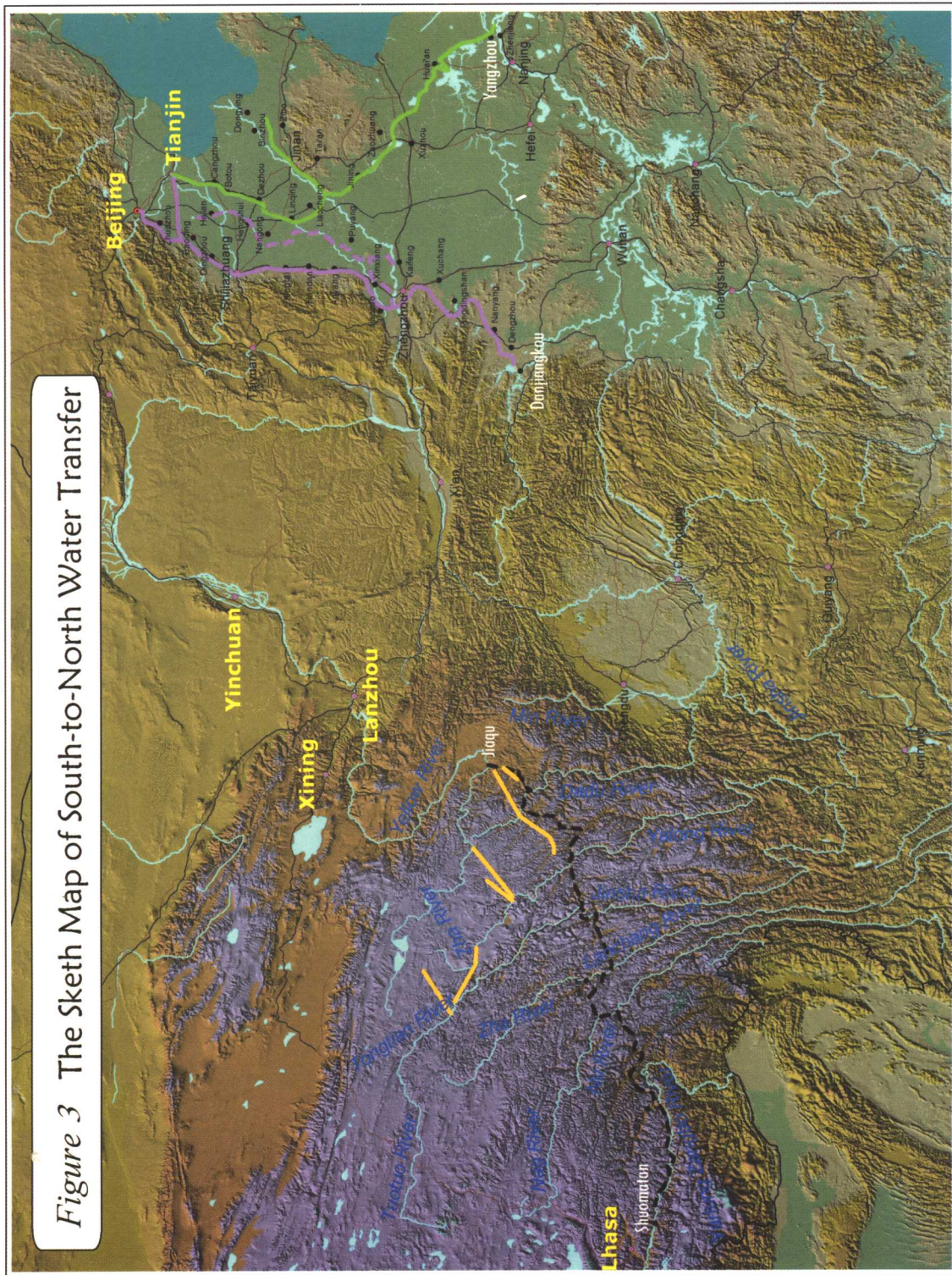
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* 2 0 5 5 6 4 8 6 0 *

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FOREWORD

Water resources are basic natural resources and are, among other things, major factors dominating the ecological environment. Moreover, water resources are also a nation's economic resources of strategic importance, constituting a component of the country's overall strength. Water resources are anticipated to exert increasing and far-reaching influences on the global environment and development in future and might under some circumstances even lead to conflicts among nations. Therefore, the study of a nation's strategy on water resources along with the related problems thereof is of global concern in the 21st century and would be one of the priority topics of research for all governments in the world at the turn of the century.

The Chinese people have a long history in fighting against droughts and floods. Since the founding of the New China, large-scale constructions for water conservancy have been carried out and significant results have been achieved on disaster control. China is now feeding 22% of the world's population and developing her economy with only 6% of the world's renewable

water resources^① and 9% of the world's cultivated land^②. In the course of development of water resources, however, some new situations have arisen and new problems of greater complexity have been encountered. These include the 1998 great floods in the Yangtze and the Nenjiang Rivers, the desiccation of a long reach of the lower Yellow River, the aggravation of dust storms in North China since 1990's, and the pollution of rivers, lakes and coastal waters. Much urgent concern has been aroused in the Chinese people and even the world over. In facing the strategic goal of national development in the 21st century, will China's water resources be sufficient to support the food supply for 1.6 billion people and to ensure a sustainable economic development? How can these problems of flood control, water shortage and water pollution be resolved? People from all circles are offering their suggestions to address these issues.

In view of this and with the support of the State Council and the relevant Ministries, the Chinese Academy of Engineering initiated a comprehensive study on **"Strategy on Water Resources for China's Sustainable Development in the 21st Century"**. This study involves 43 academicians (including those from both the Chinese Academy of Engineering and the Chinese Academy of Sciences) and nearly 300 experts (non-academicians) in 7 topical groups. The study is based on the prospect of a population of 1.6 billion people by the year of 2030. These academicians and experts are specialized in geography, geology, hydrology, meteorology, agriculture, forestry, water resources, land, soil and water conservation, ecological environment, urban construction, environmental engineering, social economy, etc. After intensive studies lasting for one year, 9 special reports were submitted as follows:

-
- ① From three different sources, namely, "Water Conservancy Encyclopedia, China", "Report of Population Action International" and the journal "Water International", the world annual average renewable water resources are respectively 46,800 billion m³, 41,000 billion m³ and 42,780 billion m³. China's renewable water resources make up 5.79%, 6.61% and 6.43% of the world renewable water resources respectively.
 - ② The area of cultivated land in China as usually reported is 100 million hectares, making up 7% of the world total cultivated land. According to the 1996 survey made by State Land Administration (now named Ministry of Land and Resources), the cultivated land in China was 130 million hectares, accounting for 9% of that of the world.

1. *Present status of water resources and analysis of future trends of water demand and supply*
2. *Countermeasures for flood control and disaster relief*
3. *Water demand in agriculture and water-saving and high-efficiency agriculture*
4. *Sustainable utilization and protection of urban water resources*
5. *Countermeasures to protect rivers, lakes and seas from pollution*
6. *Rational allocation of water resources in North China and trans-basin water transfer from South China to North China*
7. *Ecological environment construction and water-resources protection and utilization*
8. *Water-resources development and utilization in Northwest China*
9. *Water-resources development and utilization in Southwest China*

On the basis of these reports, and after numerous discussions and deliberations on the principal findings by the program overview group, the comprehensive report entitled “ Strategy on Water Resources for China’s Sustainable Development ” is submitted.

1

STATUS QUO OF CHINA'S WATER RESOURCES AND PROBLEMS TO FACE

1.1 Natural Situation of Water Resources

Water resources are mainly derived from atmospheric precipitation and may occur in the forms of surface water, groundwater and soil water, renewable each year through hydrological cycle.

1.1.1 Total quantity and quantity of water resources per capita

As assessed by the Chinese Ministry of Water Resources in the early 1980's, the average amount of annual precipitation in China was 6,200 billion m^3 and the total amount of surface water and groundwater, renewable through hydrologic cycle, was 2,800 billion m^3 . This did not include the soil water, which was directly used by both natural and artificial ecological systems (Figure 1). The quantity of water resources per capita in China was accordingly 2,220 m^3 by 1997 census. It is predicted that by the year of 2030, the population will reach 1.6 billion and water resources per capita will then drop to 1,760 m^3 . By a standard widely recognized internationally, a nation possessing water resources averaging less than 1,700 m^3 per capita will be placed in the category of water-short country. Hence, China will face a very serious situation of water resources in the future.