

### **3 Chinese Perspectives on PUB and the Working Group Initiative**

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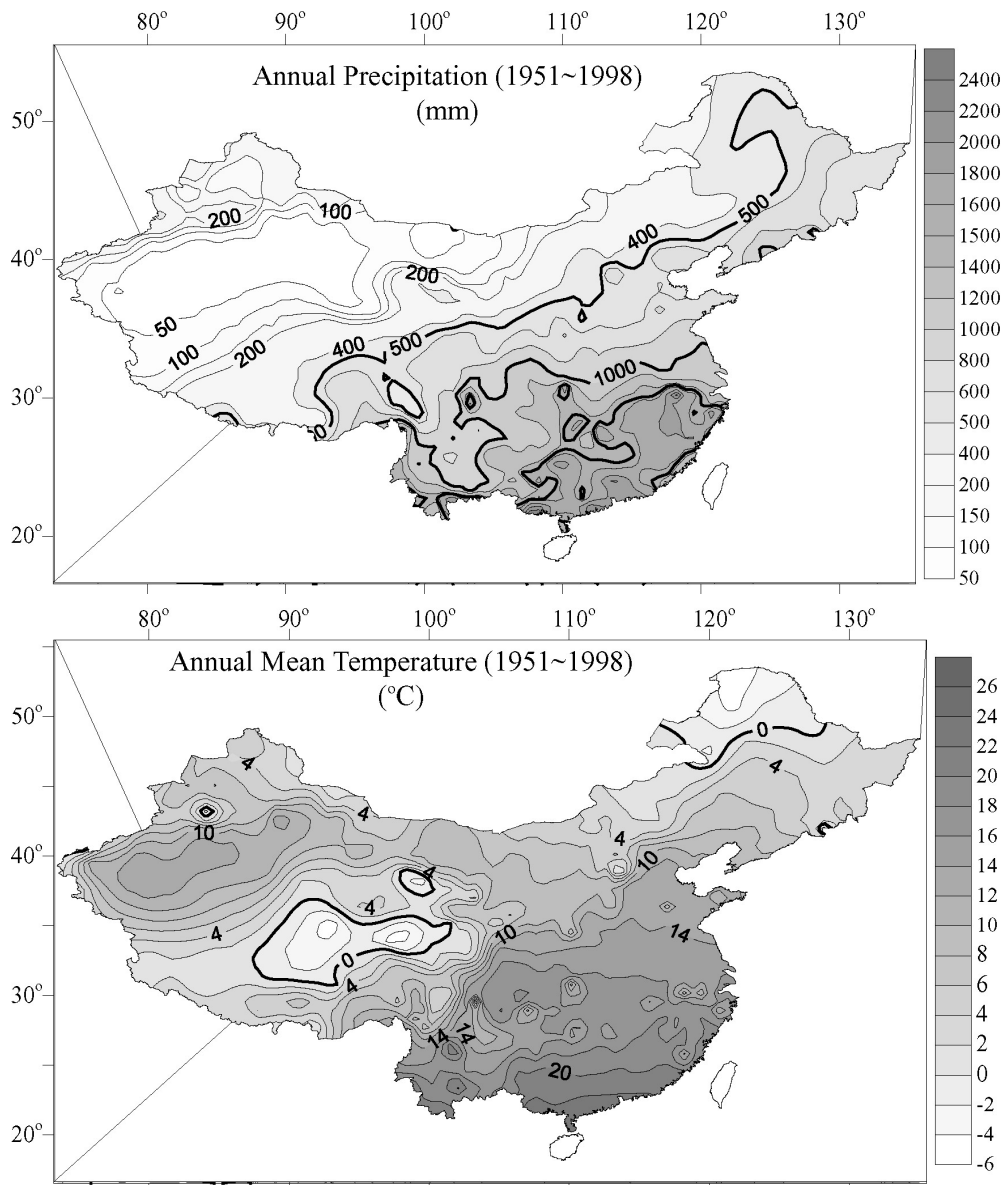
#### *INTRODUCTION*

China's climate ranges from the temperate to the tropical zone, and it varies from arid, semiarid, semihumid to humid (Fig. 3.1). The population in China (Fig. 3.2) has tripled during the last 50 years, reaching 1.3 billion, which is the largest in the world at the present time. Under the pressure of an increasing population, the scarcity of water resources is a major constraint for social and economic developments in northern China and has led to widespread degradation of the natural ecosystem and environment. Nearly one-third of the population (about 381 million) is living under conditions of water scarcity. On the other hand, flooding is a great threat to most areas in southern China. The potential risks of flooding are increasing with the growth of the population and as a result of economic development. Accurate predictions of droughts and floods are extremely important to the social and economic safety of these regions.

#### *PRINCIPAL HYDROLOGICAL PROBLEMS IN CHINA*

The middle and lower part of the Yellow River basin, and the whole of the Haihe River basin, are located in that part of China where the annual mean temperature is 10–15°C, the annual precipitation ranges 400–800 mm (Fig. 3.1) and the population has the greatest density (Fig. 3.2). The present situation of water resources in this region is chaotic. The Yellow River basin (Huanghe in Chinese) has about 100 million people and around 1200 million ha of farmland. With the development of irrigation, drying up of the main river along the lower reach of the Yellow River has occurred since 1972, and aggregated in the 1990s. In the most serious situation in 1997, the main river close to the sea dried up for more than 226 days, and the no-flow distance reached 704 km from the river mouth. The Haihe River basin contains two large cities, Beijing and Tianjing. It supplies the water resources of more than 100 million people. With increasing population and economic development, water shortage is becoming a serious problem facing to the 21st century. The shortages in this region relate not only to surface water in this region; the same serious situation applies to the degradation of groundwater. The safety of water resources in northern China has drawn a lot attention.

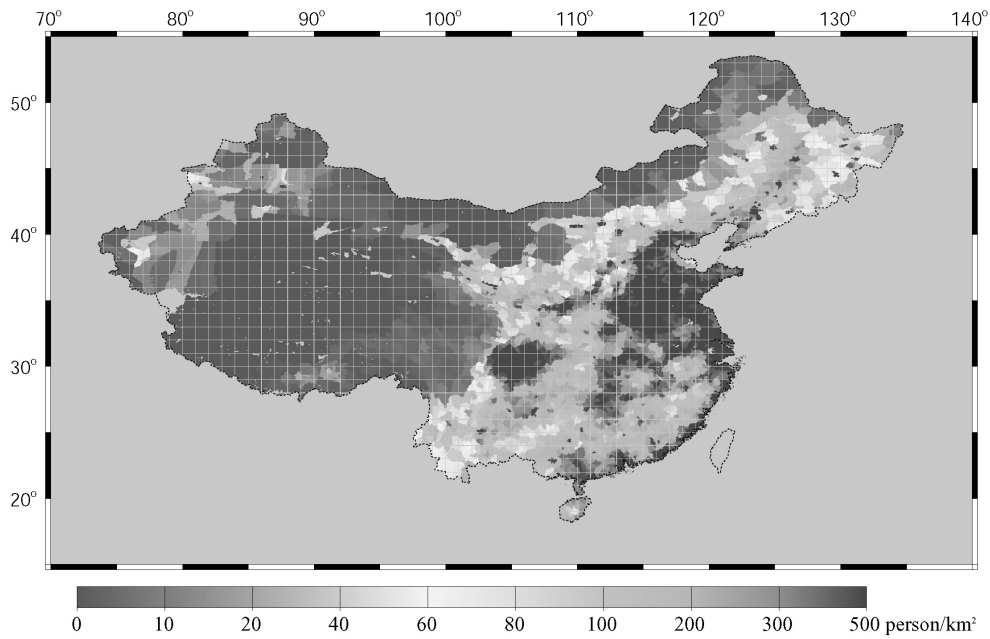
High flood risk is the biggest problem in the Yangtze River basin (Fig. 3.3), such as the great flood in 1998. Under the high population pressure, farmers have occupied the planned flood detention areas and cultivated the lands with steep slopes. Together with the deforestation in some mountainous areas, the flood situation is becoming more



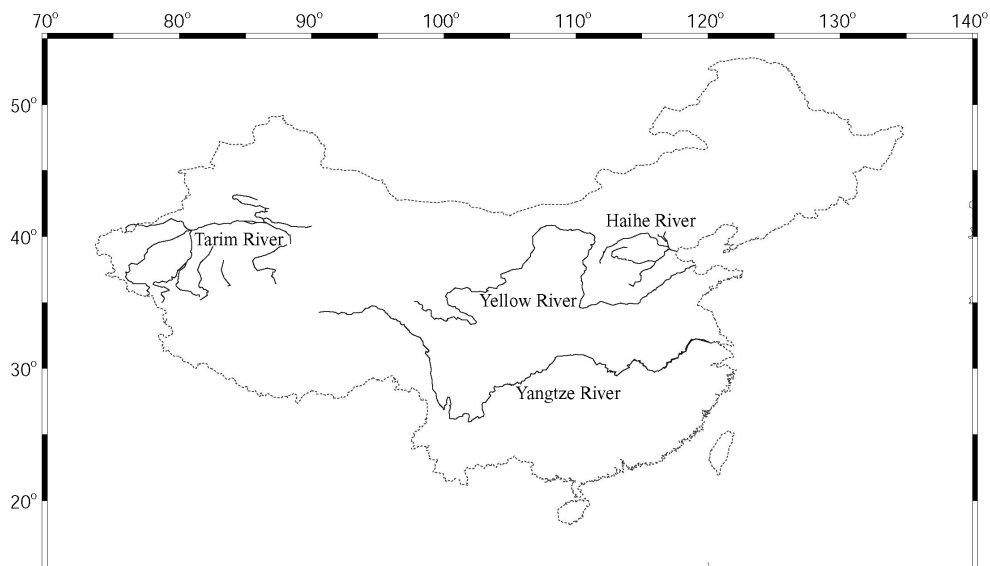
**Fig. 3.1** Climate conditions in China.

and more serious. With the recent economic development, the potential damage by floods is extremely high. The Chinese government is working towards the development of a flood prevention system in this basin. As a key component, flood prediction and forecasting are first necessary.

The inland basins and desert in China share nearly one third of the total national land area. Most of the inland basins are located in northwest China. The largest is the Tarim River basin (Fig. 3.3). From the hydrological cycle viewpoint, these inland



**Fig. 3.2** Distribution of population density (1995).



**Fig. 3.3** Study basins.

basins are located in the arid region, and each has two distinct parts: a high mountain area and a plain area. The precipitation is greater than evaporation in the mountain areas and the runoff is generated from mainly snowmelt and flows to the downstream through the rivers and groundwater. The precipitation in the plain areas is much lower

than evaporation. The runoff flowing from the upper mountain areas evaporates into the atmosphere, recharges into groundwater and is consumed by the human and ecosystem, and the river finally disappears in the desert. There is much competition between the human and the natural ecosystem for use of water resources in the plain areas.

Now, China is on the way to changing from traditional water resources development to water resources management for sustainable development. The advanced hydrology can play an important role in the water resources management with regard to hydrological predictions. China should be involved in and will benefit from the IAHS decade of Predictions in Ungauged Basins (PUB). At the same time, China should also contribute to promoting collaboration in hydrological research by sharing data and experience with international researchers. And, international interest and research in China should be encouraged and welcomed.

To promote PUB activity in China, the China PUB organization has been formed. And, as a result of the efforts of the China PUB organization, the China PUB Working Groups have been established. International researchers are welcomed to join these working groups.

#### ***CORE ISSUES TO BE ADDRESSED BY THE CHINA PUB WORKING GROUPS***

- Water shortage in northern China (uncertainty in long-term hydrological prediction).
- Flood in southern China (uncertainty of flood forecasting).
- Eco-environmental issues in northwest China (uncertainty of groundwater prediction).
- Water vulnerable related sustainable development in China (comparison of different river basins).

#### ***PROPOSED WORKING GROUP TITLES***

1. Hydrological Modelling and Water Resources Assessment in Northern China Under High Water Stress
2. Evaluation and Prediction of the Groundwater in Northern China
3. Flood Forecasting and Damage Estimation in Southern China
4. Prediction of Water Resources and their Consumption in the Arid Region of Northwest China
5. Study of the Ecologically Vulnerable Basins in China