

# Preface

China has always had a problem of inadequate supply, low quality, and uneven geographic distribution of forest resources. However, the second half of the twentieth century saw the greatest deforestation in the country's history, as the rapid increase in the nation's population, coupled with rapid economic development, resulted in enormous consumption of forest resources. Forest coverage decreased from 30–40 % in 1949 to about 10 % in the late 1990s. By the end of the twentieth century, while China's population accounted for 22 % of the world's population, the forest area in China was only taking up 4.1 % of the world's land mass, and the stocking volume was merely 2.9 % of the world's total (Lei 2002). This was clearly not sufficient to meet the production and livelihood needs of the country. However, even more pressing were the environmental problems that decades of deforestation had created.

Excessive commercial logging, and the cutting down of the forest on hillsides for cultivation in the upper and middle reaches of the river basins, led to severe consequences in downstream areas. Using data from China's second soil census of the early 1980s, Yang (1994) found that around 8 % of the country's cultivated land was affected by "intensive" erosion, and another 26 % was affected by "light to medium" erosion. By the turn of the millennia, 170 million ha, 18.2 % of the country's land, were desertified, affecting 400 million people. On the other hand, 360 million ha of soil nation-wide were eroded, which accounted for 38.2 % of the country's total land area, or more than three times the world average (Lei 2002; Huang 2000). Soil losses reached 5 billion tonnes annually (Lei and Zhu 2002; World Wildlife Fund and State Forest Administration 2003).

The situation was particularly dire in the watersheds of the Yangtze and the Yellow rivers. The main channels of Yangtze River flow through 11 provinces in China. The size of the river basin is roughly 1.8 million km<sup>2</sup>, or 18.75 % of China's land area. The river basin is an extremely important area for the economic and social development of China, since it produces 42 % of China's GDP and hosts 43 % of the country's fixed investment. The Yellow River basin covers over 900,000 km<sup>2</sup>, and flows through nine provinces. With a total population of some 190 million

people, it is not only economically, but also culturally, important, being the birthplace of the ancient Chinese civilization.

According to official estimates, at the turn of the century the soil erosion area in the Yangtze and Yellow river basins reached 75 million ha, with sediments of over 2 billion tonnes (Li 2001). Overgrazing, and in particular farming on slopes, were the most important causes of soil erosion and desertification. Xu et al. (2006a) estimated that of the 34.07 million ha of farmland in the Yangtze and Yellow river basins, 4.25 million ha were on slopes of 25° or greater. Farming such slopes was estimated to increase erosion to 4,000 tonnes per km<sup>2</sup> per year. With proper forest coverage, 80–90 % of that erosion could have been prevented (Yin et al. 2005). On the other hand, the Loess Plateau (containing the upper watershed of the Yellow River) was estimated to contain 22 % of China's eroded land, and 19 % of China's cultivated area affected by "intensive" water erosion. On the Loess Plateau, uncontrolled grazing and poor maintenance of rangelands were the main causes of the extensive loss of grass cover, and contributed to soil erosion.

Increased soil erosion silted streams, reduced the hydraulic capacity of the rivers, and increased the frequencies of flooding and drought (Smil 1993; World Wildlife Fund and State Forest Administration 2003). While during historic times there were regular flooding disasters in the lower reaches of the Yellow River, towards the end of the twentieth century the situation reversed. During the dry season, the water flow sometimes ceased in parts of the lower reaches. This happened for the first time in 1960. After 1972 it happened frequently, and since 1992 it has been happening every year. In 1997, there was no water discharged to the sea for 330 days (Fu et al. 2004), and the water flow was interrupted for up to 700 km upstream from the river mouth. The seasonal interruption of the water flow cannot only be blamed on deforestation. The diversion of water for urban and farmland water supply also takes some blame. However, deforestation upstream contributed to the problem (Wang et al. 2001).

From June to September 1998 there were devastating floods in the middle reaches of the Yangtze River. The flood affected 180 million people, and resulted in some 4,000 death and 15 million homeless. A total of 13.3 million houses were damaged or destroyed, and 10 million ha were evacuated. The economic losses accounted for some US\$26 billion. Many environmental experts blamed these floods on soil erosion and deforestation (World Bank 2001). For example, Zong and Chen (2000) argue that the amount of precipitation over the catchment and the floodwater discharge from the upper basin did not exceed the historical maximum. Rather than being caused by the increasing precipitation, downstream floods were caused by extensive reclamation of lakes and fluvial islands, deforestation in the catchment area, and soil erosion and the resulting increasing deposit of sediments in reservoirs, which reduced their storage capacity.

By the late 1990s, it became obvious that China was facing serious environmental problems caused by decades of mismanagement of forest resources. At the same time, the Chinese government estimated that over the next 50 years the demand for

forest resources in China would reach at least 18.5 billion cubic meters, 1.6 times the forest resources that existed in the late 1990s (Lei 2002). These problems prompted the government to act, and in the late 1990s the Chinese government introduced a number of reforestation and ecological restoration programs, the most important of which was the Grain for Green (GfG) (also called Slope Land Conversion Program, SLCP).

The GfG was put in place primarily to reconvert steep slopes that had been cleared for farming to their original vegetation (trees or grassland), thereby reducing siltation in the rivers. As the prime managers of the reforestation processes, the farmers would be compensated for their labor and loss of agricultural land. Therefore, the GfG is not only a reforestation and ecological restoration program, but also a poverty alleviation program. The GfG started in 1999 in three selected provinces, and expanded nation-wide starting from 2000.

Bennett (2008) and Wu et al. (2009) reported that the program planned to convert a total of 32 million ha of land to its original vegetation (trees or grass) during the period from 2001 to 2010: 14.66 million ha of farmland (4.4 million of which was estimated to be on land with slopes of 25° or above), and 17.33 million ha of barren mountainous wasteland. By 2010, the forest and grass cover of the scheme's target area would be raised by 5 %; 86.66 million ha of soil- and water-eroded area would be brought under control, and 103 million ha of sand-fixation areas would be established (Lei 2002).

The GfG is the reforestation, ecological restoration, and rural development program with the largest investment, greatest involvement, and broadest degree of public participation in history. The program improves the ecological conditions of much of China, and the socioeconomic circumstances of hundreds of millions of people. The GfG directly involves 124 million people (32 million households) in 1,897 counties in 25 provinces and the Xinjiang Production and Construction Corps (Mao et al. 2013). The program was set to end 8 years after it initially began, but was extended for another 8 years in 2007. It is now set to end starting in 2015 (later in areas where it started later). By the end of 2015, the government is expected to have invested no less than Yuan 431.8 billion (National Development and Reform Commission 2008).

This book reviews the literature pertaining to, or related to, the GfG, published up to 2014. The book is organized in three parts. Part I introduces the conditions that led to the introduction of the GfG, and compares the GfG to the other main reforestation programs in China. Part II gives an overview of the GfG, describing the timeline of the program, the compensation paid to farmers, the rules concerning land and plant selection, and the extent to which these rules were followed. It also discusses the attitudes of farmers towards the program, and the way in which the program is organized and implemented by various state actors. Part III discusses the impact of the GfG, both from an ecological and from a socio-economic standpoint. The focus is on the socio-economic consequences of the program, and in particular the

economic benefits that result from participating in the GfG, the impact of the GfG on the local economies, and the redistribution of the labor force. We also consider the sustainability of the program, since the question arises as to what will happen to the converted land when payments to farmers end.

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