

Chapter 2

Development and the Environment in China: An Overview

China, as the biggest developing country in the world, has seen rapid increases in income levels for many decades. However, in recent years the average annual growth speed as measured by the GDP index has decreased to about 7 %. The industrial sectors have also experienced huge transformation. The primary and tertiary industries are both growing steadily at a 4 and 8 % annual rate respectively while the growth rate of the secondary industry has dropped markedly during 2010–2014. The secondary industry in China usually relies heavily on natural resources and cheap labor. However, the comparative advantage of neither of these resources will last forever. In the past decades, economic development in China relied on high rates of investment, huge energy consumption and excessive environmental pollution. The processes of urbanization, industrialization and infrastructure construction in China need continuous investments. To some extent, the traditional development pattern in China has reached its limit. Extensive environmental pollution is now posing a serious threat to human health and further economic development.

China's industrialization and development has consumed so much of natural resources and created a great deal of pollution. Smoke and acid rain caused by the coal industry are becoming more and more of a serious concern, especially in Central China. Water pollution in industrial cities is endangering not only the animals and plants, but also the drinking water of city residents. Statistics show that two thirds of China's rivers and more than ten million hectares of farmlands are polluted. Taking SO₂ and smoke as representatives of pollutant gases, we can see neither of them has experienced a great decrease during 2010–2014. The emission of wastewater even raised a lot in the recent five years. However, according to the statistics, the Chinese government has invested great money in industrial pollutant governance and environmental protection. However, the practical results of the government's investment in pollutant governance are far from being satisfactory, and the resulting pollution constitutes a hindrance to the sustainable development of the Chinese economy.

According to the Environmental Kuznets Curve (EKC) model, the relationship between environmental pollution and economic development can be traced by an inverted- U curve, which means that environment gets worse with economic improvement until a certain point, and then becomes better along with increases in the residents' average income. The EKC analyzes such a relationship from the perspectives of the scale and structure effects of the economy, the function of technology, as well as the demand for environmental regulations. Although the EKC may not suit all regions or all types of pollutants, it still roughly manifests a general trend of changes in the environment quality and informs the choice in policy-making. Useful conclusions concerning the EKC can be drawn from our empirical analysis in later chapters of this book. Among other findings, empirical results in this book show that with regional population controlled for in our regressions, as regional income or regional per capita income grows larger, pollution emission and emission intensity first increases and then declines. However, China has a long way to go in improving its environmental quality and achieving a process of green development. The degradation of China's natural environment will not eventually be curbed if long-term measures are not implemented in time.

Since China's economic reform and opening up, rapid economic growth has induced massive consumption of energy and natural resources. This led to heavy emissions of industrial pollution and the resulting exacerbated damage to the natural environment. Early economic reform was implemented at a heavy cost in China's ecology and natural environment. The mid-1990s was a period in which China began to realize the severity of its environmental problem and came to follow a sustainable development strategy. Subsequently, China made efforts in achieving improvement in energy utilization efficiency so as to narrow its natural deficit. The environmental loss measured as part of GDP dropped considerably. As China entered the new millennium, the concept of green development became an integral part of the notion of 'science based development'. In the new century, China sees an ecological surplus. There has been a significant decline in GDP losses through natural disasters while there has been a substantial increase in green investment.

The Five-Year Plan is an important dividing scheme for the planning decisions made by the Chinese government. The period of the First Five-Year Plan was an important period in which China undertook nearly two hundred major industrial projects, with the energy industry given the top priority. The major industrial projects consumed huge amounts of China's energy, resources and raw materials. The growth rate of energy consumption in that period by far exceeded that of economic growth. Economic growth during the time of the 'Great Leap Forward' was mostly due to the development of ecologically costly industries throughout China. Growth was achieved at a huge cost of in environmental and in human resources. Subsequently, to remedy the industrial chaos during the Great Leap Forward, China placed renewed emphasis on central planning control over material deployment and investment in production to reduce energy waste. During the period following the Great Leap Forward, the fueled by high consumption of resources, the Chinese economy grew at a quite high pace. The growth was accompanied by high levels of pollution emissions. With the development of its

energy industry, China underwent the transformation from an impoverished, self-sufficient country to one that was a major producer of resources. But China followed a resource-intensive and energy-intensive path of industrialization.

The key goals of the Five-Year Plans were to promote China's social progress and economic development. The Plans, however, underwent a shift of emphasis from economic plans, to strategic plans, and then to comprehensive development plans over time. During the process, the Plans have shifted the weight from promoting a 'black' (polluting) economy to promoting a green economy. During the first to fifth Five-Year Plans, the main objectives were to develop the key industries and to promote the process of basic industrialization. Therefore, the early Five-Year Plans were characterized by their emphasis on heavy industry. The First Five-Year Plan, as mentioned already in the preceding paragraph, established the building up of the heavy industry as a priority. The Second Five-Year Plan placed the focus on the development of the steel industry while the following two plans, the Third and Fourth Five-Year Plans, established the strategic importance of the steel industry as the foundation for military preparedness. The Fifth Five-Year Plan aimed to initiate big progress in the manufacturing sector. The first five Five-Year Plans thus set the basic tone for China's 'black' industrialization. The 'black' industrialization was characterized by high levels of resources, energy consumption and pollution emissions.

Along with the initiation of China's reform and opening up, the Five-Year Plans also underwent consideration transformation. They gradually shifted their emphasis from solely economic planning to social development planning. The Plans progressively abandoned the path of the 'black' economy. Unlike the old approach, the Sixth Five-Year Plan placed an emphasis on steady and healthy development of the national economy. The Seventh Five-Year Plan aimed at promoting production through intensive utilization of capital and resources. The Eighth Five-Year Plan laid an emphasis on development and conservation through efficient energy use. The Ninth Five-Year Plan introduced two changes. That is, the change of the economic system from a traditional planned economy to a socialist market economy, and the change of the economic growth mode from an extensive mode to an intensive mode. The Ninth Five-Year Plan period signaled that China began to experience a transition from a period of 'black' development to one of green development. The Tenth Five-Year Plan saw even greater progress toward green development. In this period, objectives in ecological and environmental protection for the first time became the main objectives of a Five-Year Plan.

The Eleventh Five-Year Plan was the first Plan being designed under the guidance of the central government's 'scientific outlook for development'. In this Plan, 30 % of its objectives were associated with green development, with particular prominence given to energy conservation and environmental protection. The Twelfth Five-Year Plan was China's first full-fledged green development plan. This Plan contained both qualitative and quantitative objectives for wide variety of ecological and environmental targets. The Plan proposed to establish a resource-saving, environment-friendly society and to improve the level of ecological civilization. The Plan also aimed to save energy consumption, improve energy

utilization efficiency, and adjust the structure of energy uses. One section of the Twelfth Five-Year Plan was devoted to green development and set green development as a principle for ecological construction.

During the decade of the Eleventh and Twelfth Five-Year Plans periods, China's environmental indicators were better than those in the periods of previous Plans. For example, the trend of reduction in arable land was effectively controlled. Water consumption per unit of industrial added value declined markedly. Efforts made toward environmental and ecological protection began to show their effects. Deterioration in the ecological environment was initially curbed. Conservation areas were effectively protected and forest coverage was increased substantially. The proportion of green development indicators increased considerably in the Twelfth Five-Year Plan period. In addition, the Twelfth Five-Year Plan placed an emphasis on comprehensive and harmonious sustainable development of the economic system and social system. This Plan was a green plan in the sense that it aimed achieve dynamic growth through green development, wealth and welfare.

We end this chapter by presenting some detailed facts regarding the improvement as measured by the changes in major eco-environmental indicators during the past ten years of the Eleventh and Twelfth Five-Year Plans periods. The indicators for sulfur dioxide emissions and COD (chemical oxygen demand) emissions were increased by about 12 and 14 % points respectively during the Eleventh Five-Year Plan periods (2005–2010). The indicator for industrial solid waste treatment rate rose by about 12 % points during 2005–2010 and by about 5 % points during Twelfth Five-Year Plan period (2010–2015). The indicator for water consumption per unit of industrial value added rose by about 43 % points during 2005–2010 but dropped by about 10 % points during 2010–2015. The indicators for urban sewage treatment rate and urban life garbage treatment rate were raised by about 21 and 17 % points respectively during the Eleventh Five-Year Plan periods and by about 16 and 15 % points during the Twelfth Five-Year Plan period. The indicator for efficient utilization of agricultural irrigation water was increased by about 0.05 % points during 2005–2010 and then by about 6 % points during 2010–2015. The indicator for forest coverage rose by about 2 % points during 2005–2010 and then by about 6 % points during 2010–2015. The indicator for the proportion of state-controlled sections of seven major river systems better than Class III rose by about 18 % points during 2005–2010. Also during 2005–2010, the indicator for the proportion of cities with air quality standard above Class II rose by about 23 % points and that for natural wetland protection rose by about 5 % points. In the Eleventh Five-Year Plan period, the growth rates of two representative pollutant emissions, namely, industrial chemical oxygen demand emissions and industrial sulfur dioxide emissions were both negative, being -1.66 and -2.60 %, respectively.

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Models and Discussions

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