

# 3 Drivers of Environmental Changes in Asia

## 3.1 Environmental changes and drivers in Asia

Environmental changes are often related to natural and human-induced factors. Under the context of fast growth in Asia, the human-induced factors play a crucial role in understanding and addressing the environmental problems in the region. Human-induced factors include both direct and indirect ones. The direct factors consist of land use, resources exploitation, pollutant discharge, while the indirect ones are composed of population growth, economic development model, technology change, social institutions and social-political frameworks, and value systems, among others. The trend of environmental changes often depends on these indirect factors. As a result, assessing the changes of these factors can not only help predict the future trend of environmental changes, but also affect their future trend by changing these factors.

For this reason, most of the drivers are indirect and underlying ones, whose change will also reflect the socio-economic process that affects the environmental conditions. It should be noted, however, the features and importance of these drivers vary within and among the countries and regions (UNEP, 2007), especially between the developed and developing countries.

Zbicz et al. (2009), in *Asia's Future: Critical Thinking for a Changing Environment*, defined six primary drivers identified as most affecting Asia's future environment in immediate future and in the next 10-20 years, i.e., rapid economic development and rising living standard, globalization of trade and demand for Asian natural resources, rise of Asian science and technology, exploding energy demand in Asia and globally, projected effects of climate change and Post-Kyoto Protocol mitigation approaches, continued population growth and urbanization. This research reflected

the fundamental trend of socio-economic development and environmental changes in Asia.

Assessing the major drivers of environmental changes in Asia provides basis for policy design, and for addressing environmental problems in the region. Many studies have already been undertaken on the drivers of environmental impact, one of which is the IPAT Equation, a Simple Conceptual Model that explains the impact of human activities onto the environment (Ehrlich et al., 1971; Commoner, 1972). The Equation describes the human impact on the environment as a combined result of population growth, economic growth and technical change. Although it has been widely used, it still fails to cover all the possible drivers, some more specific drivers and new drivers such as climate change.

To give a broader picture on the basic trend and its major drivers of environmental change in Asia, the report, in addition to the above-mentioned drivers, also takes into account other factors, such as population structure, urbanization process, the transformation of consumption model and living style, investment demand and orientation, international trade and globalization process, industrialization or economic restructuring, as well as policy and institutional changes.

## 3.2 Analysis of drivers of environmental changes in Asia

### 3.2.1 Population growth

Population growth is known as a key driver of environmental changes. In general, when other conditions remain unchanged, the expanding population will often increase the human needs for food, water resources and energy and lead to more wastes, which, in turn, produce a greater pressure on natural resources and the environment.

With the largest population size and percentage, Asia is also the most densely populated region in the world, with its population density well above the world average level. Presently, more than 4 billion people live in Asia, accounting for over 60% of the total population worldwide. Since the middle period of last century, the population in the region has been growing at a fast speed. The statistics of UN (2008) indicate that, from 1950 to 2005, the population in Asia rose sharply from 1.4 billion to 3.9 billion, with an annual growth rate of 1.9%, high than the world average level of 1.7%. It is predicated that although its population growth rate may slow down in Asia in the next four decades, its total population in the region may reach up to 5.2 billion by 2050 (medium variant), up 33% compared to 2005, and representing 57% of the world population (UN, 2008) (Figure 3.1 and Table 3.1).

The huge population size and its continuous growth is putting the