
12.1 INTRODUCTION

*Our Common Future* (WCED, 1987) pointed out that we live in an interdependent world in which economic, ecological, environmental, demographic, political and social issues cannot be meaningfully compartmentalised when policies and possibilities for sustainable development are being considered. All these factors interact and determine the prospects for sustainable development and for environmental sustainability. However, determining prospects for the environmental future is by no means easy because the systems involved are highly complex. Consequently, prediction of the environmental future involves fundamental uncertainties not least of which is the likely future global political situation. Nevertheless, the presence of uncertainty does not imply absolute uncertainty about possible future environmental developments. Some predictability is possible, even if the powers of our predictability are limited and even if our predictions must be qualified. As Machiavelli (1963) pointed out more than 500 years ago in *The Prince*, the future is partly a matter of design and partly a matter of chance. This chapter is written from such a philosophical perspective while recognising that fundamental uncertainty is likely to become more pervasive the further into the future we try to peer.

In this chapter, recent trends in and projections of human population levels are considered and their possible environmental consequences are assessed in terms of the neo-Malthusian framework suggested by Ehrlich (1989). Then the more optimistic environmental future suggested by the use of environmental Kuznets curves is outlined and assessed. Particular account is taken of the possible environmental consequences of growing economic globalisation. This chapter concludes with a general assessment of global prospects for fostering environmental conservation and achieving goals for sustainable development.
12.2 GLOBAL POPULATION LEVELS: CHARACTERISTICS AND PROJECTIONS

An important influence on the state of the Earth’s natural environment is the level of human population. It is not the only important social influence but, other things equal, changes in the Earth’s natural environment become more pronounced as human population increases. Malthus (1798) placed considerable stress on the increasing food scarcity that might arise from rising populations given the ‘niggardliness of nature’ and the assumption of diminishing returns in agriculture (see Chapter 1). He did not foresee the more pervasive adverse environmental consequences likely to arise from growing levels of human population. Emphasis on this aspect came in the second half of the twentieth century with the development of neo-Malthusian concerns about the resource and environmental consequences of sustained population growth and continuing economic growth globally.

Human population levels have shown exceptionally high rates of growth in modern times, but the rate of growth of the world’s population, although estimated to be 1.2 per cent annually in 2002, has declined. The United Nations estimated the world’s population to be 6.3 billion in 2002 (United Nations Population Division, 2003). It was just over 6 billion in 2000, more than treble its estimated level at the beginning of the twentieth century. By 2050, the medium estimate of the United Nations is that the world’s population will reach 8.9 billion, a level exceeding 40 per cent of the 2002 level. However, if current fertility rates were to remain constant, the world’s population would more than double in this period. In any case, it is highly likely that substantial rises in the world’s population will be recorded for several decades yet.

The trends in the world’s population levels and demographic structures vary markedly between regions. Most of the world’s population growth is likely to take place in less developed regions. In developed countries as a whole, population levels are anticipated to remain relatively constant into the middle of this century. However, many developing countries will experience population declines as a result of low fertility rates and this will be accompanied by an ageing population structure.

Despite downward population trends in many higher income countries, massive absolute increases in the world’s population can be expected for some decades yet. This is likely to further degrade natural environments, particularly in less developed regions of the world.
12.3 ENVIRONMENTAL CONSEQUENCES OF POPULATION GROWTH AND ECONOMIC DEMANDS

Given predicted global population increases, it is difficult to see how further negative impacts on natural environments can be avoided, particularly in developing countries. Most of the world’s population growth is going to be in developing countries. It is expected that more than 85 per cent of the world’s population will be located in developing regions in 2050.

The global population increase will mainly occur in tropical areas – areas subject to considerable natural climatic variation. In such areas, population increase would seem more risky environmentally than in the temperate areas where most developed countries are located. While adverse environmental effects did result from the population and economic growth in today’s high income countries, these environmental impacts possibly were, it can be argued, smaller than they would have been if these countries had been located in the tropics. For example, the natural degree of biodiversity in tropical areas is much greater than in the temperate zones, so one might expect greater loss of biodiversity from economic growth in the tropics compared to that in temperate areas, all other things equal.

Norman Myers et al. (1993) have pointed out that less developed nations can be expected to become the biggest single source of global pollution in the twenty-first century. This is primarily because of the considerable increase expected in their already large populations, their rising income aspirations and the likelihood that they will increasingly adopt technologies from the West (e.g. equipment using carbon-based fuel) which are globally more damaging than indigenous technologies.

Ehrlich (1989) argues that the adverse environmental impact to be expected from population increases in less developed countries is considerable because it is likely to be combined with environmentally damaging increase in consumption per head as well as new investment (capital formation) using technology more damaging to the environment than that used earlier in such countries. His (‘heuristic’) formula is

\[ I = P \times A \times T \]

where I is adverse environmental impact, A indicates consumption per head, P is population and T represents the use of environmentally damaging technology. He argues that these factors interact in a multiplicative way, i.e. together their effects are compounded (Ehrlich et al., 1989; Ehrlich and Ehrlich, 1990).
Myers et al. (1993, p. 5) state that this equation ‘makes clear why developing nations with big populations, albeit with little economic advancement, can generate an enormous impact on the planetary ecosystem, i.e. because the P multiplier on the A and T factors is so large: consider the vast repercussions that stem from coal burning or CFC manufacture in e.g. China or India’. They go on to point out that controlling increases in greenhouse gas emissions from industrial expansion in China or India is going to be a major problem even though the agriculture of these countries can be expected to be affected seriously by the greenhouse effect. Soon the population of these two nations will comprise almost two-fifths of humanity. Myers et al., conclude that control of greenhouse emissions cannot be achieved without extremely stringent population controls.

A more general type of Ehrlich-relationship would be \( D = f(P, y, T) \) where \( D \) indicates environmental drain, \( P \) represents the population, \( y \) is the production of man-made commodities per capita, and \( T \) represents use of technologies arranged in increasing order of their environmental damage. We would expect the partial derivatives of \( D \) with respect to the \( P, y \) and \( T \) to be positive, that is, other things equal, we would expect environmental damage or drain to increase with higher population levels, higher man-made production per capita and more environmentally unfriendly technologies. Thus, this neo-Malthusian theoretical approach predicts a deteriorating environmental future if population and man-made production are rising unless there is scope to introduce sufficiently compensating more environmentally friendly technologies. It suggests that economic growth is not likely to be very conducive to environmental improvement. In fact, economic growth is likely to be associated with environmental deterioration.

### 12.4 ENVIRONMENTAL KUZNETS CURVES: DO THEY PROVIDE GROUNDS FOR ENVIRONMENTAL OPTIMISM?

A contrasting view is often based on relationships portrayed by environmental Kuznets curves. Proponents of this view argue that environmental pollution/degradation intensities are usually related to national per capita income levels in a way that results in an inverted U-shaped curve, similar to that suggested by Kuznets (1955) for the relationship between income inequality and the level of per capita income. The environmental Kuznets curve was originally proposed by Selden and Song (1994) and implies that with sufficient economic growth resulting in large enough
rises in per capita income in a country, pollution/environmental degradation will become a diminishing problem. Therefore, it often results in the crude policy assertion that greater economic growth is the key to improving the world’s environmental situation. It may well be so, but there are also grounds for being cautious about such a conclusion given the nature of environmental Kuznets curves (EKC) and possible global environmental constraints or thresholds (Tisdell, 2001). Consider these matters.

Although EKCs are mostly assumed to be of an inverted U-shape, the evidence in favour of such a relationship is mixed (Cavlovic et al., 2000). Holtz-Eakin and Selden (1995) expressed reservations about the hypothesis in relation to CO₂ emissions and Harbaugh et al. (2000) found that there was little empirical evidence to support an inverted U-shaped relationship between the intensity of emission of several important air pollutants and the level of national income.

Even if we accept that the relationship between the intensity of emissions of many important pollutants and per capita income of a nation tends to be of an inverted U-shape, care is needed in drawing inferences from the relationship. It is sometimes mistakenly believed that total emissions per period of time will decline once the peak of an EKC is passed. However, this is incorrect because the intensity of pollution emissions is an average relationship. Given the type of relationship shown in Figure 12.1, the marginal level of pollution emissions will still be positive at \( y_1 \) and is only likely to become zero for a level of income well in excess of \( y_1 \), say \( y_2 \) (Tisdell, 2001, p. 188). Thus total pollution emissions per unit of time will continue to rise until income levels reach \( y_2 \). It is only for income levels higher than this that total emissions of pollutants per unit of time will decline.

The EKC approach models pollution problems as essentially involving flows rather than stocks of pollutants. However, while flows of some pollutants do result in serious human impacts, for example, increase morbidity and mortality of humans, accumulation of stocks of pollutants is sometimes a greater problem.

If the rate of emission of pollutants exceed the capacity of the natural environment to ‘absorb’ or neutralise them, then stocks of pollutants accumulate in the environment. Depending upon accumulation thresholds, pollution emissions may cause the stocks of pollutants in the natural environment to continue to rise even when pollution emission intensities have passed their peak and even when the total level of emissions per period of time have declined. Furthermore, in many cases, the greater the level of accumulated stocks of a pollutant in the natural environment, the lower is the capacity of the environment to absorb extra pollution. In such cases, a
level of pollution intensity above the peak of an EKC will be more damaging environmentally than the same level below it.

It is also theoretically possible for the accumulation of the stock of pollutants or for the cumulative loss of environmental assets to trigger a major environmental upheaval or change before the theoretical peak of an EKC can be reached and for this to prevent income levels ever reaching that corresponding to the peak of the EKC. For example, in Figure 12.1 such an event might happen when income levels reach $y_0$. Hence, income levels could then fall as a result of environmental deterioration and continue to do so as cumulative pollution increases. The position may only stabilise once the rate of emissions of pollutants comes into line with the absorptive capacity of the natural environment.

Another feature that is easily overlooked when using EKC analysis is its assumption of perfect reversibility. This arises primarily because this analysis does not take account of stocks of pollutants, and in the case of living resources because it ignores the essential irreversibility of genetic loss. When these various limitations are considered, doubts seem justified about the EKC-based hypothesis that economic growth provides the solution to environmental problems, particularly global environmental problems.

*Figure 12.1* Environmental Kuznets curves are widely believed to be typically of the form shown. They are often used to support the view that economic growth will eventually result in environmental improvement and a sustainable future.
Most Bretton Woods institutions, for example, the International Monetary Fund and the World Bank, and bodies such as the World Trade Organization (WTO) see increasing economic globalisation as an important contributor to economic growth. They are highly oriented towards economic growth. This is partly a consequence of their missions which favour the increased production and marketing of produced commodities. Their views about the impact of economic growth on environmental conditions and its implications for sustainable development are not completely clear. However, their observed behaviour is consistent with a belief in the relevance of EKC-type relationships and in weak conditions for sustainable development. They believe that win–win outcomes are achievable in relation to economic growth, environmental improvement and sustainability.

These bodies strongly support economic globalisation on the grounds that it fosters economic growth and increases the economic efficiency of resource-use. Increased economic efficiency in resource-use (which can be achieved by improved technology and superior allocation of resources) has the potential to reduce pollution emissions and environmental degradation relative to production levels. In other words, it has the potential to shift environmental Kuznets curves downward (Tisdell, 2001). Thus, potentially, globalisation could make for lower levels of pollution and greater sustainability of economic production. However, in practice, this favourable conservation effect is likely to be more than offset by expanding global production levels that add to pollution levels and resource-use (Tisdell, 2001, p. 190). Many of the countries that are now experiencing considerable economic growth as a result of the globalisation process, e.g., China and India, have still to reach the peaks of their EKCs, and will continue to add to global pollution substantially even after they pass such peaks. Particularly in the case of greenhouse gases, it seems increasingly likely that their rising global levels will trigger major climatic and environmental changes, despite the Kyoto Protocol. Economic growth in China and India has been stimulated by the process of economic globalisation and the contributions of these nations to global pollution is likely to rise significantly. That, however, does not mean that it would be just for them to forego economic growth of the type that was enjoyed by many of today’s higher income countries. Nevertheless, given the possibility of serious adverse global and ecological consequences of continuing world economic growth, an international co-operative approach is required. It could be wishful thinking to believe that continuing economic growth will
solve global environmental problems and that rising investment in man-made capital will ensure sustainable economic development, even if, given short-term political perspectives, this is an appealing prognosis.

12.6 CONCLUDING OBSERVATIONS

In the early 1990s, there were great expectations that with the transition of former communist countries to more market-oriented economic systems, their growing involvement in the global economy, and more peaceful international relationships that this would result in a ‘peace dividend’ that could be used by higher income countries to assist developing countries to achieve sustainable development (Jayawardena, 1990). However, it seems that very little use has been made of this possibility. On average, higher income countries reduced their aid to developing countries in the 1990s. Furthermore, given the preoccupation of the United States with its war on terror and the harsh criticism of the American administration of the United Nations, multilateral approaches to dealing with global problems faced an uphill battle in the first decade of the twenty-first century. The Johannesburg Earth Summit in 2002 indicated that much less international progress in supporting agendas for sustainable development had been achieved than hoped for at the United Nations Conference on the Environment and Development held in Rio de Janeiro in 1992. In addition, the Johannesburg Earth Summit did not provide an agreed plan for advancing the agenda of achieving sustainable development. Political and other obstacles including the quest for power and the pursuit of individual selfishness, not to mention the complexity of the situation, continue to hamper the resolution of the world’s environmental problems.

Even though individuals may realise that particular collective actions and decisions are socially necessary, they may, on the grounds of self-interest, try to avoid being bound individually by the collective decisions. For example, if it were agreed that reductions in per capita consumption and income per head in developed countries are necessary for global environmental reasons, there would still be the question of how to enforce the reduction in income and share it. Voluntary restraint is unlikely to work. Would shorter hours of work be the answer? Should the available hours of work be more widely distributed so that those currently unemployed in developed countries have a greater opportunity to share in the available work? Or should the nature of work be altered so as to include more activities that are less demanding of natural resources, e.g. service industries?

Rather than shorter hours of work, some see the solution to the environmental problem as one of encouraging the growth of industries which
are environmentally less damaging and more sustainable than many traditional industries. Knowledge-intensive industries and many of the service industries, such as the entertainment industries and the arts, may be of this nature, whereas heavy industries, such as steel, are not. Appropriate tax and other economic incentives could bring about such restructuring. But, to be effective globally, these measures need to be implemented globally. Otherwise, measures in one country may merely force ‘dirty’ industries offshore. The global impacts of dirty industries forced offshore could well be just as great as if they remained at home. Indeed, they may even have greater impact if greater pollution is tolerated offshore.

Given the growing global interdependence of countries, both economically and ecologically, we need increasingly to address issues on a global basis. While the United Nations provides a vehicle for this, it is not yet a world parliament but rather a collection of representatives of independent national states. It is not yet a satisfactory body for world governance. This would seem to require that people, rather than nations, should be represented and that existing nations forego some of their sovereign rights. In any case, our growing global ecological interdependence forces us to think more seriously about suitable structures for world government.

REFERENCES


