Theories and Practices of Development

Second edition

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ROUTLEDGE

Routledge Perspectives on Development

6 Environment and development theory

- Relationships between population and environment
- Modernization theory and environment
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Many of the theories and approaches addressed so far in the book have included implicit reference to the natural environment, but in this chapter, the ways in which 'development' and 'environment' have been considered will be at the centre of the discussion. Theories of economic growth are related to questions of resource use and distribution. Many of these resources come from the natural environment and in many cases development processes can lead to the destruction of significant parts of this natural environment.

Thomas Malthus' perspectives on population and resources

One of the earliest elaborations in the Global North of the relationship between people and natural resources was that of Thomas Malthus. In his 1798 *Essay on the Principle of Population* he wrote about the effect of rising population on the natural resource base (Malthus 1985 [1798]). While he did not talk specifically about 'development', his arguments are important for later development debates on this topic. According to Malthus, populations and food supply expand in different ways. Food supply increases arithmetically, i.e. with every generation food supply increases the same amount, by, for example, bringing new land into cultivation. This leads to a linear pattern of growth. In contrast, even if the number of children per family remains the same, the population will grow geometrically because in each generation there will be more

people to have children (see Figure 6.1). As a result of these different growth rates, Malthus argued that the human population was doomed unless limits were put on population growth rates. Eventually, population would outstrip the food supply and there would be mass starvation and famine and so the population would be reduced. For Malthus, therefore, if humans did not control their reproduction, there would be disastrous consequences. In development terms, these ideas (as we shall see later) have been used to shape later development approaches in the Global South.

Malthus' work has been greatly criticized, not least because of his assumptions regarding the growth of food supply. He did not consider the ways in which new technologies may develop to increase food supply at a much greater rate. Ester Boserup (1965) highlighted how new methods and technologies can be developed to address crises such as limited food supplies in response to increasing population densities. Later technological developments, including fertilizers and new forms of seeds have been important in increasing agricultural productivity. However, just because sufficient food is produced to feed a population does not mean that everyone has access to this food. Issues of distribution are also important.

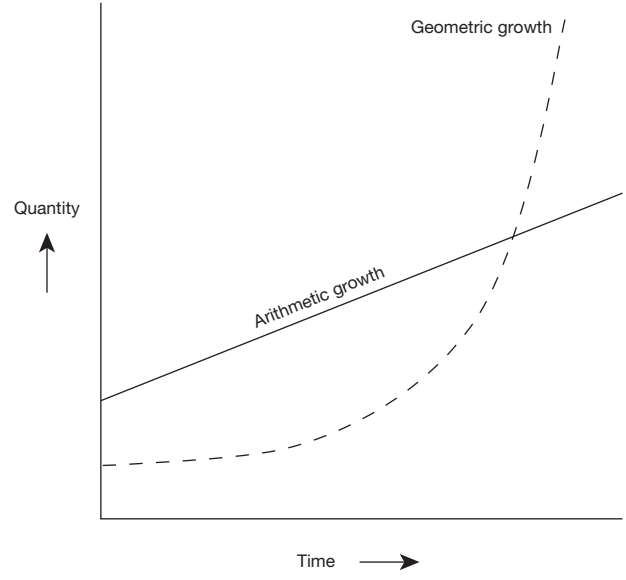

Figure 6.1 Arithmetic and geometric growth.

Environmental determinism

In Malthus' approach, the natural environment acted as an obstacle to population growth. In the environmental determinism approach, the natural environment acts not just as an obstacle, but actually shapes the nature of human society and activity. It is a form of naturalist theory as outlined in Chapter 5. Environmental determinism was popular in the late nineteenth and early twentieth centuries, and stressed the ways in which human behaviour was conditioned or determined by the physical environment.

Following this form of argument, some argued that the differing levels of prosperity, economic development or what some called 'civilization' could be explained with reference to the differences in natural environment (Huntington 1915; Semple 1911). By rooting these explanations in the natural world, some theorists argued that people from the temperate parts of the world were naturally 'better' than those from the tropical zones, and so justified the domination of Europeans over the inhabitants of other places.

As we shall see in the rest of the chapter, there is wide-ranging evidence of the ways in which human behaviour is influenced by the natural environment, but the crude theories adopted by environmental determinists are certainly out of place. They lost favour in the mid-twentieth century, not least because of the ways in which the ideas were used by certain political groups in Europe to justify racial domination. They have also been criticized because they do not consider the role of individuals, communities and governments, among others, to deal with perceived environmental constraints.

Modernization

The modernization approach outlined in Chapter 2 was built on the ideas of mobilizing technology to use resources more efficiently, not least through industrialization and the mechanization of agriculture. The basic attitude to the natural environment was one of seeing natural resources as inputs into a human-devised system. Very little, if any, attention was paid to the potential environmental damage or the long-term sustainability of such an approach.

During the Industrial Revolution in England, the environmental impacts of rapid urbanization and industrialization were clear. For example, in his descriptions of England's northern towns during the 1840s, Fredrich Engels in his book, *The Condition of the Working*

Class in England, describes the results of over-crowding, poverty and unregulated industrial processes:

> Bradford, which, but seven miles from Leeds, at the junction of several valleys, lies upon the banks of a small, coal-black, foul-smelling stream. On week-days the town is enveloped in a grey cloud of coal smoke, but on a fine Sunday, it offers a superb picture when viewed from the surrounding heights. Yet within reigns the same filth and discomfort as in Leeds. . . . In the lanes, alleys and courts lie filth and *debris* in heaps; the houses are ruinous, dirty, and miserable.
>
> (1984: 74)

Not only were these 'development' processes affecting the natural environment, they were also indirectly affecting the health of the urban populations.

Modernization and the attempts to use ever increasing areas of land for agriculture have also had severe environmental impacts. The 'Dust Bowl' of the US Mid-West in the 1930s is often used as an example of how modern technology was used to push for increased agricultural production in environmentally marginal zones. With the extension of the railways westwards in the mid-nineteenth century (see Chapter 2), large swathes of prairie land were cultivated using horse-drawn ploughs. Drought-resistant varieties of wheat were planted and farmers were able to make significant profits. However, the agricultural processes meant that during periods of drought there was often insufficient vegetation cover to protect the fine soils and high winds eroded large amounts of topsoil creating severe dust storms. With the Great Depression of the 1930s, farmers tried to increase their yields, leading to further damage (Barrow 1995; Worster 2004). Approximately 80 million hectares of grain-producing land were destroyed (Kassas 1987, in Barrow 1995). This environmental tragedy also contributed to furthering the misery of the farmers, leading many to flee the area seeking their fortunes in other parts of the USA. It did, however, trigger government action to improve policies to reduce soil erosion and help farmers use appropriate techniques.

Despite the known environmental impacts of such approaches to development, similar patterns were encouraged in the Global South; both by donor governments and agencies, and by national governments themselves. The long-term environmental problems were disregarded in favour of the goals of economic growth and development. Top-down large-scale projects such as dam building,

mining, industrialization and rapid mechanization of agriculture were all promoted as suitable routes to development. The approach was very much one of 'grow now, clean up later'. Unfortunately the 'cleaning up' process is often very long and costly, if it is possible at all. Much environmental damage involves the destruction of ecosystems beyond repair (Box 6.1).

Box 6.1

Destruction of mangrove swamps in Thailand

Between 1961 and 1992, the area of mangrove forest in Thailand fell from approximately 365,000 hectares to approximately 174,000 hectares (Jitsanguan, 1993 in Bello *et al.* 1998: 189). This destruction was due to a number of factors, including factory and household pollution, logging for charcoal and shrimp farming.

Shrimp farming began in Thailand in the mid-1930s for domestic consumption, but was intensified in the 1970s as a response to a crisis in the fishing industry caused by reduced access to fishing grounds and the rising cost of fuel for boats. Growing demand for shrimps from the USA, Japan and Western Europe provided an opportunity for job creation and foreign exchange earnings. Government support for intensification led to a rapid rise in production, with the number of farms rising from 3,572 in 1980 to 15,072 in 1990 (Thailand Environmental Institute, 1997 in Bello *et al.* 1998: 189). However, these numbers are likely to be underestimates, given the potential for unlicensed farming. By 1991 Thailand was the world's leading shrimp producer.

Mangroves may be cleared for shrimp farms, or mangrove ecosystems may be severely affected by the chemicals and antibiotics used in intensive aquaculture. The clearing of mangroves not only destroys that ecosystem, but it leads to increased soil erosion resulting in increased sediment loads being deposited in the marine environment, devastating coral reefs and seagrass forests. Mangroves also have an important coastal management role, providing protection in the case of tsunamis and rising sea level.

The Thai government has sought to introduce conservation laws and controls on mangrove destruction through the use of zoning. However, environmental protection regulations are sometimes contradicted by economic development policies. There are also major problems with implementing regulations. As coastal areas have become polluted, shrimp farming has moved inland, again causing environmental problems.

Source: adapted from Bello *et al.* (1998: 187–91); Huitric *et al.* (2002); Páez-Osuna (2001).

'One-quarter of the people in developing countries – 1.3 billion in all – survive on fragile lands, areas that present significant constraints for intensive agriculture' (World Bank 2003: 59). African populations are particularly affected, with over one third of the total population living on fragile lands (Figure 6.2). Given these figures, a heavy-handed approach to agricultural modernization will lead to rapid environmental degradation and impoverishment of rural populations. Just as in the case of the US Dust Bowl, inappropriate technology has often been used in the name of agricultural progress in the South.

The so-called 'Green Revolution' of the 1950s and 1960s was a perfect example of modernization approaches to agriculture. The term was used to describe how scientific principles were applied to agricultural processes to improve yields in the South. It was clearly an attempt to escape from Malthusian limits on food supply. The main elements of the 'revolution' were high-yielding varieties (HYVs) of maize, wheat, rice and barley, as well as developments in fertilizers, herbicides and pesticides. There were some very positive results including India achieving self-sufficiency in wheat by 1980 and Indonesia moving from being a rice importer to a rice exporter (Willis 2006). However, environmentally there were problems.

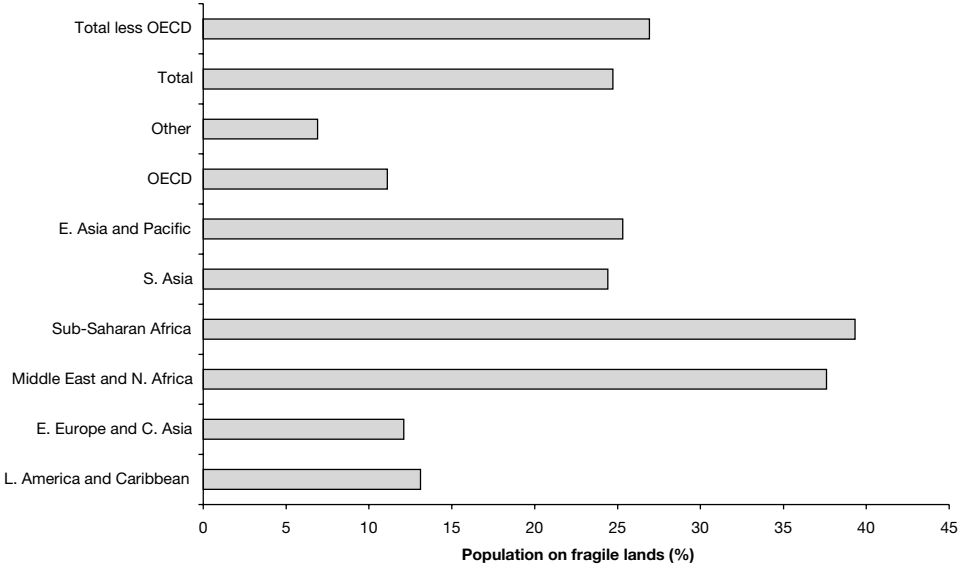

Figure 6.2 Percentage of population living on fragile lands by global region, 2000.

Source: based on data from World Bank (2003: 61)

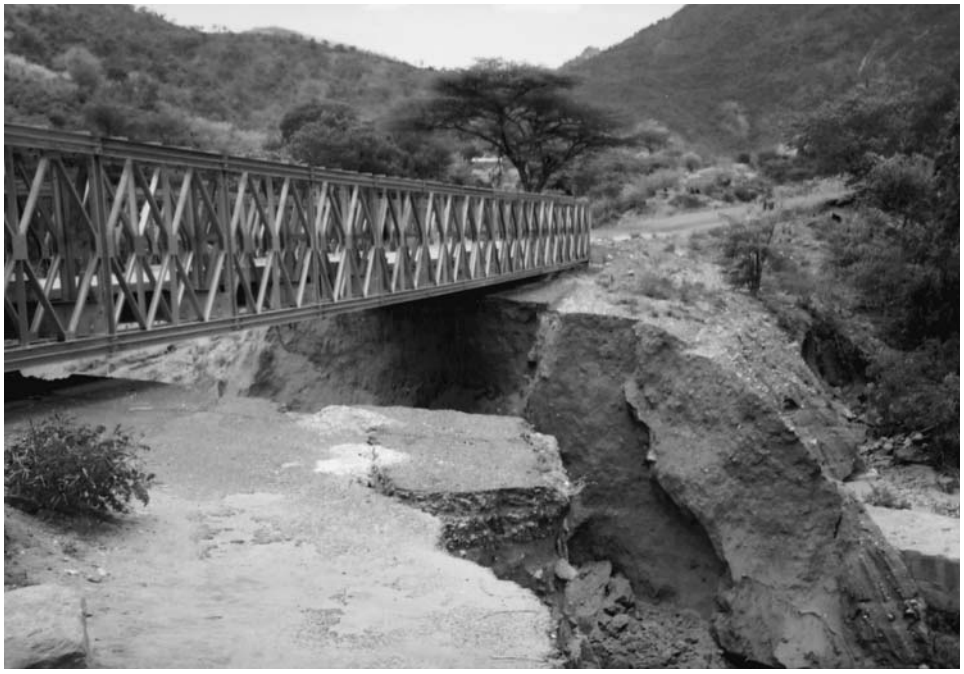

Plate 6.1 Temporary road bridge, Ortum, Kenya.
Credit: Katie Willis

These included reductions in genetic diversity, increased demand for water because of irrigation needs and pollution from agrochemicals (Barrow 1995). In addition, the Green Revolution resulted in increased inequality as those farmers who could afford to participate reaped the benefits, while others were often forced to abandon their own land and become agricultural labourers (Shiva 1991; Yapa 1993). Current debates about genetically modified (GM) crops reflect similar positions. For some, GM crops represent a technical solution to food shortages, while for others, they are an environmental threat and will contribute to the growing dominance of the agro-chemical companies and reduced autonomy for small farmers.

The original Green Revolution techniques were adopted mainly within Latin American and Asian countries. However, the language of the Green Revolution in terms of using science and technology to improve agricultural production remains, most notably in the Alliance for a Green Revolution in Africa (AGRA). In contrast to earlier schemes, however, there is a strong commitment to environmental protection and maintenance of crop diversity, rather

Plate 6.2 Slash and burn agriculture, Sarawak.
Credit: Katie Willis

than the monocropping that was often found in the earlier period (AGRA 2010). Carol B. Thompson (2007) highlights some of the potential tensions around such aims, including the roles of transnational agribusiness, external donor expectations and national governments.

Socialist approaches to the environment

The modernist aims of many communist or socialist governments have also resulted in the implementation of development strategies which are extremely environmentally destructive. The control or taming of nature has often been a key element in the development strategies of centrally-planned economies, with rhetoric regarding the superiority of such societies being reflected in the domination of nature. According to Marx, development involved human ability to transform nature to increase standards of living. In *Capital*, Marx's perspectives on humans' dominance of nature is reflected in this description: 'He [sic] develops the potentialities slumbering within

nature, and subjects the play of its forces to his own sovereign power' (1909: 283).

Some of the largest individual development projects have been implemented within centrally-planned economies. This is partly a reflection of the desire to be seen to be achieving greater infrastructure successes, but also because of the ability of governments in such economies to marshal resources to achieve these aims. The USSR provides us with a number of examples of such mega-projects, the environmental effects of which are still evident today. For example, in the 1950s the Soviet leader Nikita Khrushchev sought to increase agricultural production by bringing new lands into cultivation. The so-called 'Virgin Lands Scheme' was launched with the intention of bringing 250,000 km^2 of land into wheat cultivation in Northern Kazakhstan and Western Siberia. While cultivation was expanded and production went up, the environmental damage was enormous. Massive areas were exposed to soil erosion leaving vast swathes unusable for any purpose. Soviet attempts to increase cotton production in Central Asia also had disastrous effects, not least on the Aral Sea (Box 6.2).

Plate 6.3 Abandoned ship, Aralsk, Kazakhstan.

Credit: © Oliver Wolff/VISUM/Specialist Stock

Box 6.2

The Aral Sea basin crisis

Since the early 1960s the Aral Sea in former Soviet Central Asia has been shrinking. In 1960 it was the world's fourth largest inland water body and covered about 67,000 km^2, but by 2006 it had shrunk to 17,382 km^2 and had split in two. This is having a devastating impact on both the natural and human environments. As water levels fall and the lake bed is exposed, salt and dust are blown into rivers and irrigation systems, leading to increases in pollution and a deterioration in human health. In addition, populations earning a living from the Aral Sea are suffering as it shrinks, leaving fishing boats high and dry (Plate 6.3). For example, the fishing port of Aralsk now lies 60 km from the shore. In addition, the two smaller seas have increased levels of salinity making them unsuitable for many forms of aquatic life.

The roots of this crisis lie in the Soviet period (see Chapter 3). The Soviet ideology stressed the power of humans over nature and many large-scale environmentally-damaging schemes were adopted to further economic growth. Vast quantities of water were diverted from the Amu Darya and Syr Darya rivers to irrigate cotton. As these rivers were the main source of water for the Aral Sea, this diversion meant far lower inputs into the Aral Sea and a subsequent shrinking. Cotton acreage in Uzbekistan increased from 1.3 million hectares to 2.1 million hectares in the period 1960–80. This increase and improved yields because of irrigation led to rising Soviet cotton yields from 2.2 million tons in 1940 to 9.1 million tons in 1980. Yields in Uzbekistan are now down to 1960 levels because of land degradation and salinity problems with irrigation waters.

With the collapse of the USSR, the problem has not improved. Attempts at coordinating a strategy are limited by the fact that there are now a number of national governments involved. While Kazakhstan, Turkmenistan and Uzbekistan border the Aral Sea, the other Central Asian states of Kyrgyzstan and Tajikistan also need to be involved as the two main rivers run through their territory. The five Central Asian countries set up the International Fund for the Aral Sea (IFAS) in 1997, both to coordinate policies to protect the Aral Sea and to channel funds from external donors such as the World Bank. However, over 90 per cent of the water taken out of the Aral Sea basin continues to be used for irrigation. Despite the importance of agriculture to the economies of all five Central Asian countries, it is vital that changes are made. These could include more efficient irrigation systems as well as a move towards crops which are less irrigation dependent.

Sources: adapted from Micklin (2007); Spoor (1998); World Bank (2003)

The environmental impacts of such mega-projects are still on-going but this has not prevented the continued use of such projects in some centrally-planned countries. The most high-profile example today is that of the Three Gorges Dam across the Yangtze River in China. Despite significant evidence suggesting the potential environmental damage resulting from the project, not to mention the social problems arising from the mass relocation of an estimated 1.3 million people (IRN 2009), the project progressed. It has not been funded by the World Bank, reflecting some change in multi-lateral agency approaches to such mega-projects. However, it should also be recognized that electricity generation through hydro-electric power is much cleaner than coal-burning power stations. It is estimated that the new dam will save the annual burning of 50 million tons of coal and the release of 100 million tons of carbon dioxide (Xiong 1998, in Woodhouse 2000: 146).

Limits to growth

Modernist projects with their focus on technological solutions to perceived limitations of the natural environment were challenged by the increasing environmental movements in many parts of the world during the 1960s. A number of high-profile environmental cases in the North drew attention to the possible environmental problems which could accrue from particular forms of development. For example, in 1962 Rachel Carson's book *Silent Spring* was highly significant in drawing the attention of a Northern, particularly US, audience to the environmental side effects of certain forms of modernization. Her book dealt with the environmental impacts of the insecticide DDT, in particular the way that it was stored in organisms that ingested it, and so was passed up the food chain in larger and larger quantities, leading to the deaths of mammals and birds.

In addition, in 1972 Donella H. Meadows *et al.* published *The Limits to Growth* commissioned by the Club of Rome, a non-governmental research organization dealing with 'global problems'. The report placed the relationships between economic growth and the natural environment at the centre of the debate. However, unlike the environmental movement, which stressed the issue of environmental destruction as a problem in its own right, the Club of Rome's focus was much more on how current development methods would lead to catastrophe for the human population in terms of both rapidly

declining populations (as predicted by Malthus) and huge decreases in rates of industrial growth. Meadows *et al.* stated 'we can thus say with some confidence that, under the assumption of no major change in the present system, population and industrial growth will certainly stop within the next century, at the latest' (1972: 126).

The basis for these doom-laden predications, were the results of a complex systems model which looked at five main processes: population growth, non-renewable resource use, pollution, food supply and industrialization. The relationships between these different factors and the current and predicted levels were also included in the model. By running the model with changes in the levels of the different factors, estimates could be made of when the 'limits to growth' would be reached (see Figure 6.3). The authors stressed that while the predicted levels may not be completely accurate, the overall trends were correct. These predictions about future catastrophe led these researchers and others with similar views to be categorized as 'neo-Malthusian'.

As we saw above, Malthus has been criticized for not considering the ways in which technological advances could increase the food supply. Meadows *et al.* ran their model to include a range of technological advances, such as improved mining techniques to increase access to minerals, but they still came to the same

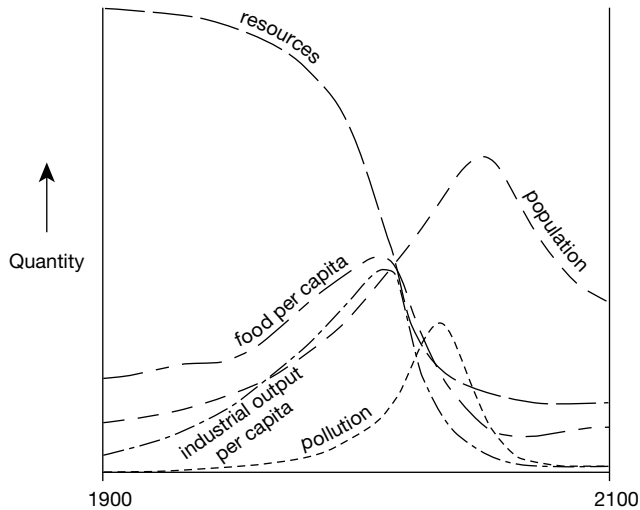

Figure 6.3 Limits to growth model.

Source: adapted from Meadows *et al*. (1972: 124)

conclusion – if current rates of consumption and economic development continued, disaster would strike before 2100. The model does not include the social dimensions of life because they are so complicated and difficult to assess. The authors are very explicit about their exclusion of these factors, but do state that decisions about income distribution, for example, could have significant impacts on when the 'limits' would be reached. In their final chapter, they state that it is crucial that decisions are made immediately about the trade-offs needed to achieve global equilibrium, i.e. not to reach the limits to growth. They state,

> As soon as society recognizes that it cannot maximize everything for everyone, it must begin to make choices. Should there be more people or more wealth, more wilderness or more automobiles, more food for the poor or more services for the rich? Establishing the societal answer to questions like these and translating those answers into policy is the essence of the political process.
>
> (1972: 181–2)

The concluding commentary from the Club of Rome executive states that it is crucial for the 'developed countries' to take a lead in this process as they are the major users of resources. Rather than stopping development in the South, resource use must be cut back in the North and attempts must be made to promote more effective and sustainable development throughout the world.

The Club of Rome report is, therefore, adopting a view of development which places economic growth at the heart of the process in terms of helping to improve poorer peoples' standards of living. However, the nature and rate of this growth must be controlled, so as to ensure that future generations have access to non-renewable energy sources, minerals and agricultural land, as well as a non-polluted environment. They do not make any specific suggestions as to the nature of policies which should be introduced, although they clearly do not suggest leaving this to market forces. Governments throughout the world are considered key in implementing policies to help reduce birth rates, conserve non-renewable resources and control pollution.

Intermediate technology

The concept of intermediate technology was developed by E.F. Schumacher and is outlined in his book *Small is Beautiful*.

The subtitle to the book is *A Study of Economics as if People Mattered* and demonstrates what he felt the focus of economics should be. Rather than concentrating on maximizing flows of money and economic growth, Schumacher argued that economic policies everywhere in the world, should be people-centred (see also Chapter 4). This was not only to allow individuals to be creative and experience the full range of what it was to be human, rather than merely a cog in a large economic machine, it was also in recognition of the environmental destruction that was occurring through the use of existing economic approaches. This environmental destruction was not only in terms of resource depletion, in particular the use of energy reserves, but it would also lead to the reduced carrying capacity of the world, i.e. the maximum number of people who could be supported using the world's natural resources.

For Schumacher the answer was not to return to a pre-industrial, 'primitive' stage; rather it was to implement policies which were appropriate to the needs of particular groups of people. In countries where there were large numbers of people without formal employment, Schumacher stated that it was bad practice to implement policies using high-tech equipment which could do the work of hundreds of people. Such an approach would result in a dual economy with the majority of the population scraping a living, while a few gained from being part of the modern capitalist economy. In contrast, Schumacher stressed the use of technology that would employ large numbers of people in productive activities, particularly in rural areas. This form of technology he termed 'intermediate technology' to highlight its position between the 'primitive' forms of tools used in the past and the very advanced high-technology equipment that had been introduced into many parts of the South in the process of development (Box 6.3).

Sustainable development

Many of the debates outlined so far in this chapter became subsumed under what has become known as 'sustainable development'. During the 1960s and 1970s the environmental impacts of various development processes were increasingly recognized by a range of groups. In 1983 the United Nations set up an independent organization, The World Commission on Environment and Development (WCED), chaired by the then prime minister of Norway, Gro Harlem Brundtland. The aim of the WCED was to

Box 6.3

Renewable energy: Small wind power systems in Sri Lanka

Over 80 per cent of Sri Lanka's population lives in rural areas (UNDP 2009), with most of these rural residents unable to access the mains electricity grid. Rural communities therefore tend to rely on kerosene lamps and car batteries. Charging the batteries is expensive relative to the local low cash incomes and kerosene burns are a common danger, particularly for children.

Small wind turbines have been adopted in some villages through a scheme run by the NGO Practical Action. The turbines provide cheap and safe power, which can be used to charge the car batteries and also power the lights, making the kerosene lamps redundant. Weerasinghe and his family are subsistence farmers in the village of Usgala in Sri Lanka. Following the installation of a wind turbine system, they no longer have to spend US$8 per month on charging batteries. In fact, they are able to earn a small amount of money charging their neighbours' batteries. Having electricity in the house also means Weerasinghe's children are able to do their homework after dark and therefore do better at school.

Because of Practical Action's focus on appropriate technology, villagers are trained to install and maintain the wind turbines, and local materials and labour are used to manufacture the turbine parts. In other parts of Sri Lanka, Practical Action are also using similar principles in introducing small-scale hydropower and solar power schemes.

Source: adapted from Practical Action (2010)

examine the problems of environment and development facing the world and to consider possible solutions. These solutions should be considered not just for current generations, but with an awareness of long-term issues.

In 1987 the WCED published its findings in a report entitled *Our Common Future* (although it is also known as *The Brundtland Report* after the WCED Chair). The Report laid out the environmental challenges facing the world, and examined how environmental destruction would limit forms of economic growth, but also how poverty and disadvantage contribute to environmental destruction. The Report stressed the importance of 'sustainable development' as a goal towards which the international community should work. According to the WCED, 'sustainable development' is: 'development

that meets the needs of the present without compromising the ability of future generations to meet their own needs' (WCED 1987: 43).

Building on this environmental focus, the United Nations held an international conference in Rio in 1992 to consider ways in which sustainable development could be achieved. Since then, 'sustainable development' has become a key element in development theorizing and policy-making. However, the term's meanings are highly debated. As Jenny Elliott (2006: 10) argues, 'the attractiveness (and "the dangers") of the concept of sustainable development may lie precisely in the varied ways in which it can be interpreted and used to support a whole range of interests and causes.'

A broad distinction can be made between 'light green' or 'technocentric' approaches to the relationship between humans and nature, and 'dark green' or 'ecocentric' approaches, although the boundaries between the two are certainly not clearly defined (O'Riordan 1981; Pepper 1996). In technocratic approaches the focus is on humankind and the improvements in human standards of living and quality of life. In general, these approaches do not involve

Plate 6.4 Community tree nursery, Marich, north-west Kenya.
Credit: Katie Willis

radical changes in the current economic and political systems, rather a technical approach is adopted. This may be in the form of improved industrial or energy-generating systems which reduce pollution for example. Other technocratic solutions would include changing resource management procedures, for example by using market mechanisms to regulate human-induced environmental problems (see below).

In contrast, dark green or ecocentric approaches start with the premise that it is the Earth which is much more important than ideas about human progress and rapid economic growth. Because of this, the approaches are much more radical and call for massive shifts in the economic and political structures. In particular, there is a focus on much smaller-scale, local forms of organization similar to Schumacher's ideas of 'small is beautiful'. For economically richer countries and groups, the ecocentric approach would involve a huge reduction in consumption.

The Happy Planet Index (HPI) is an attempt to evaluate the balance between environmental destruction and human development at a global scale. It uses measures of life expectancy at birth, life satisfaction and ecological footprint. The latter is the 'the amount of land required to provide for all their resource requirements plus the amount of vegetated land required to sequester (absorb) all their CO_2 emissions and the CO_2 emissions embodied in the products they consume' (Happy Planet Index 2010). Calculating the HPI gives an indication of the ecological cost of long and happy lives. National figures provide a different perspective on global development from that provided by more conventional measures (Figure 6.4).

Climate change and development

Since the rise of sustainable development as a focus of development policy, the agenda has been increasingly dominated by the challenges that climate change poses to development, particularly in relation to poverty alleviation in the Global South. For example, the 2007/8 *Human Development Report* was subtitled 'Fighting climate change: Human solidarity in a divided world' (UNDP 2007) and the *World Development Report 2010* was on the theme of 'Development and climate change' (World Bank 2010e).

While the impact of climate change is impossible to predict exactly, due to the complexities of the global climate system, there is

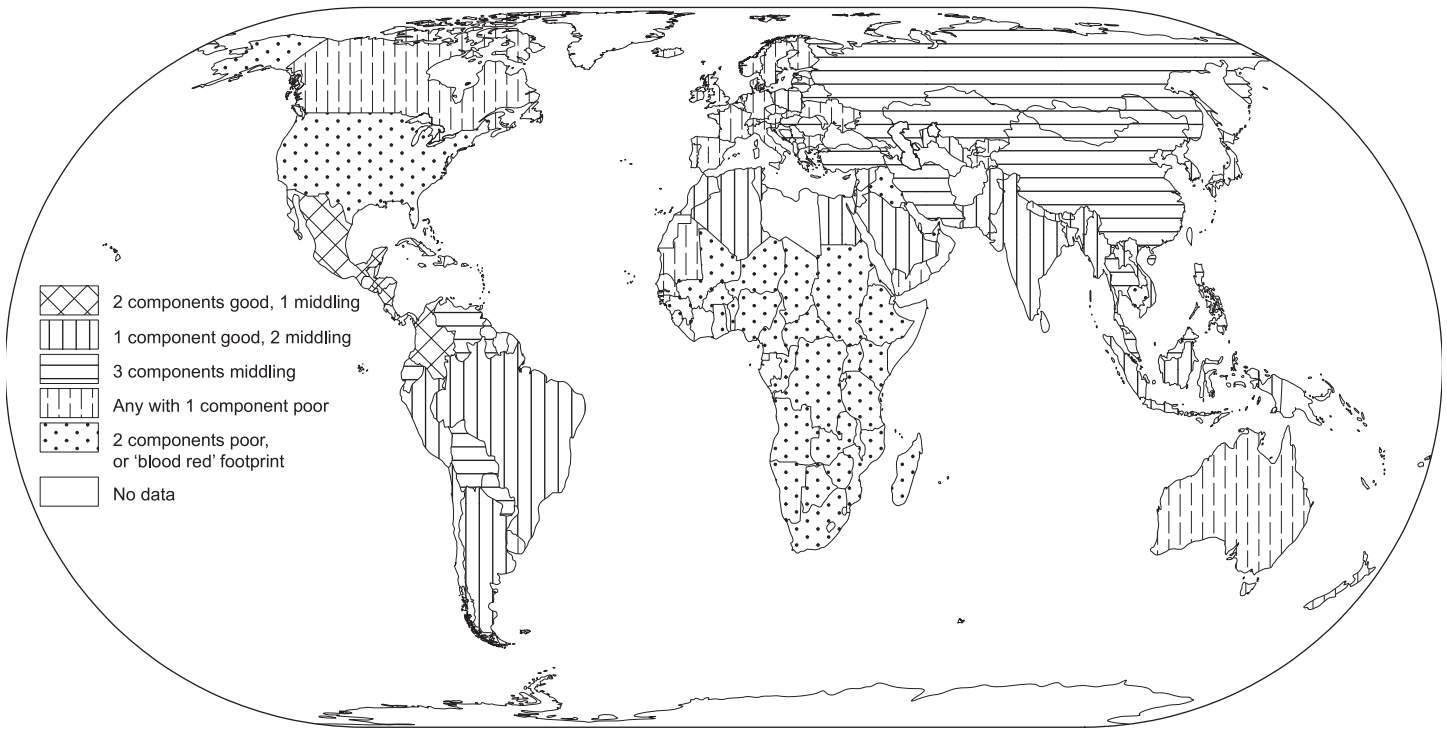

Figure 6.4 Evaluation of Happy Planet Index components, 2008

Source: based on data from Happy Planet Index (2010)

widespread agreement that countries of the Global South will be disproportionately affected. For example, food security will be threatened due to more irregular rainfall, as well as possible increases in crop destruction due to pests. More extreme weather events, such as tropical storms and hurricanes, could lead to crop destruction, as well as loss of life and infrastructure damage (Adger *et al.* 2003). Duncan McGregor (2008) outlines the impact of droughts and hurricanes on Jamaican agriculture, suggesting possible future food security issues that may be faced by many Southern countries.

Sea level rise also represents a threat, with estimates ranging from 18 to 59 cm by the end of the twenty-first century (Huq *et al.* 2007). Thus areas currently at risk from coastal flooding would increase, as would the areas at risk during storm surges. The survival of some countries, most notably low-lying island states in the Indian and Pacific Oceans, such as the Maldives and Kiribati, is under threat even from moderate sea level rise, while large sections of the population in many countries are found in the low elevation coastal zone (LECZ), which is less than 10 m above sea level (Table 6.1).

Responses to climate change have been classified as mitigation, which is attempting to limit future climate change through measures to reduce greenhouse gas emissions, or adaptation, is adjusting to current expected climate change (Ayers and Dodman 2010).

Table 6.1 ***Population in the Low Elevation Coastal Zone, 2000***

	Top ten by total population in LECZ			*Top ten by share of population in LECZ*	
	Number (000s)	*% of total population*		*Number (000s)*	*% of total population*
China	143,880	11	Bahamas	267	88
India	63,188	6	Surinam	318	76
Bangladesh	62,524	46	Netherlands	11,717	74
Vietnam	43,051	55	Vietnam	43,051	55
Indonesia	41,610	20	Guyana	415	55
Japan	30,477	24	Bangladesh	62,524	46
Egypt	25,655	38	Djibouti	289	41
USA	22,859	8	Belize	91	40
Thailand	16,478	26	Egypt	25,655	38
Philippines	13,329	18	The Gambia	494	38

Source: adapted from McGranahan *et al.* (2007: Table 3)

In both cases, the people most affected by climate change are the least able to do anything about it. While mitigation has tended to focus on international negotiations (see next section on global governance), it does also include measures to adopt clean technologies, such as solar power (see Box 6.3). Adaptation measures include early warning systems, the use of drought and pest-resistant seeds and the strengthening of coastal defences. However, as Jessica Ayers and David Dodman (2010) argue, these tend to be technocratic solutions that do not take into account the social, political and economic causes of vulnerability, which mean that certain groups are more likely to be affected than others (Wisner *et al.* 2003).

Global governance and environmental protection

Climate change is an obvious example of an environmental problem that is not restricted to within national borders. Similarly, the source of water and air pollution can be in one country, but the effects can be experienced elsewhere. Because of the global nature of many environmental problems, attempts have been made to organize responses on a global scale. The idea of 'global governance' has been used to describe political decision-making at a global level. This is not global 'government' in the sense of an elected body that represents the citizens of the world, but rather the way in which political power is exercised at this scale. Organizations such as the UN can be described as 'global governance organizations', consisting of nation-state representatives (see Chapter 7 for further discussion).

In terms of global governance and environmental protection, the 1972 UN Conference on the Human Environment in Stockholm is often held up as a key moment and in the following year the UN Environment Program (UNEP) was established (Barrow 1995). Since then there have been numerous attempts to produce global agreements on issues around pollution, whaling and biodiversity among others. The *Brundtland Report*, the 1992 Rio Conference and the 2002 Rio + 10 Conference in Johannesburg, South Africa brought these issues to even greater public attention and also highlighted the potential conflicts between North and South regarding the environmental agenda. For many Southern nations, the concept of controls on economic growth because of environmental concerns was interpreted as a way of limiting development progress in the South by denying access to methods that were used by Northern countries in their industrialization processes.

When the global distribution of greenhouse gas emissions is examined, it is clear that emissions are disproportionately concentrated in the industrialized nations of Western Europe and North America (Table 6.2). For example, while the USA makes up about 4.6 per cent of the world's population, it contributes 22 per cent of global carbon dioxide emissions.

China's role as a major carbon dioxide emitter from the Global South needs to be recognized; it also contributes nearly 20 per cent of the global figure, but with a significantly larger population, meaning that China and the USA have very different per capita emission figures; 3.9 metric tons p.c. in China and 19.7 metric tons p.c. in the USA (World Bank 2010e: 362). Attempts to control future emissions are challenging, not least because of these distribution patterns and demands from countries in the Global South to be able to develop and achieve economic growth as Global North countries did. Such

Table 6.2 ***Energy consumption and carbon dioxide emissions by region***

	Electricity consumption Kilowatt-hours p.c.		*Carbon dioxide emissions*		
			Metric tons p.c.		*Share of world total %*
	1980	*2004*	*1980*	*2004*	*2004*
Developing countries	316	1,221	1.3	2.4	42.5
Least developed countries	59	119	0.1	0.2	0.5
Arab States	489	1,841	2.8	4.5	4.7
East Asia and Pacific	253	1,599	1.4	3.5	23.1
Latin America and Caribbean	845	2,043	2.4	2.6	4.9
South Asia	132	628	0.6	1.3	6.7
Sub-Saharan Africa	463	478	1.0	1.0	2.3
Central and Eastern Europe and CIS	–	4,539	–	7.9	10.9
OECD	4,916	8,795	11.0	11.5	46.0
High-income OECD	5,932	10,360	12.6	13.2	41.9
High income	5,873	10,210	12.6	13.3	44.8
Middle income	583	2,039	2.3	4.0	42.0
Low income	106	449	0.4	0.9	7.2
World	**1,444**	**2,701**	**4.3**	**4.5**	**100.0**

Source: adapted from UNDP (2003, Table 19, pp. 300–3) and UNDP (2007, Table 22, pp. 302–5; Table 24, pp. 310–13)

tensions were very evident at the UN Climate Conference in Copenhagen in December 2009 (see Box 6.4). However, as highlighted above, the need to address the negative effects of global environmental change is particularly acute in parts of the Global South where sea level rise, land degradation and the spread of disease threatens international attempts at poverty reduction.

The limited outcomes of the Copenhagen Conference should not, however, hide the fact that international agreements on environmental protection can be successfully implemented. For example, the 1987 Montreal Protocol led to reductions in the manufacture and use of chlorofluorocarbons (CFCs), which were implicated in the development of holes in the ozone layer that protects the Earth's surface from particular forms of ultra-violet radiation (Barrow 1995).

Pricing the earth

Despite the overall acceptance that the natural environment needs to be considered as part of development policies, the section on sustainable development shows us that there are very different ways in which sustainable development is conceived. This is reflected in the range of policy suggestions. Given the problems with implementing radical 'ecocentric' approaches, it is not surprising that governments throughout the world have focused on technocratic solutions to perceived environmental problems (Barrow 2006).

Within a free market system, environmental controls may be regarded as limits to free trade, or providing too great a brake on potential economic growth. This does not mean that controls or restrictions are not applied as in the case of CFCs and the Montreal Protocol. For example, there are international agreements on the trade in hardwoods and endangered species because of the recognition that allowing free trade in these goods would result in reduced biodiversity and other potentially damaging environmental impacts. In practice, while these restrictions work to some extent, there are still significant examples of these rules being flouted. In some cases, the rule-breakers are individuals who operate without the knowledge of the law enforcement authorities, but in others, rule breaking may be ignored by the authorities, who see the need for foreign currency as being much more important than the environmental protection agenda.

Box 6.4

The United Nations Climate Change Conference, Copenhagen 2009

The UN Climate Change Conference held in Copenhagen, Denmark in December 2009, was billed as the 'last chance' for international leaders to make an agreement regarding climate change. The two-week summit involved 115 world leaders and their negotiating teams, as well as representatives of thousands of civil society organizations, some of whom were able to act as observers.

An existing international document, the Kyoto Protocol, had been agreed in 1997 by 113 countries, but a number of key countries refused to ratify it, including the USA and Australia. In both cases, national governments argued that the emissions targets that the Kyoto Protocol involved would hamper domestic economic growth and would be unpopular with the electorate. This led to widespread criticisms, particularly from Global South countries, that the Global North was failing to respond to a global crisis that they had largely created, but that would affect the Global South most seriously.

With the Kyoto experience as a backdrop, tension between North and South was likely at Copenhagen. Kyoto was based on different expectations for 'developed' and 'developing' countries. Attempts to get rid of this distinction at Copenhagen to consider emission targets more generally, was blocked by Southern nations. However, the role of the BRIC economies, particularly China, as major greenhouse gas emitters also needs to be acknowledged.

Overall, the Conference did not deliver the agreement that was anticipated. While it was agreed that there is a need to keep global temperature rises at 2ºC or less, there were no commitments to reducing emissions. Many countries that are likely to be most affected by climate change, not least the low-lying island states and Sub-Saharan African countries, had wanted the figure to be 1.5ºC or less, but this was not accepted. Targets for emission levels by 2020 were included (based on previously-agreed levels), but targets for 2050 were not, despite the importance of this longer-term perspective. It has been argued that China was determined that the 2050 targets would not be included, as they would be required to participate.

The Copenhagen Accord did include commitments to providing poor countries with US$30 billion per year from 2010–12 and US$100 billion per year after that until 2020. This money is to be used for adaptation activities. There was also an agreement on forest protection, which involves paying governments to protect forests.

Source: adapted from Elliott (2006); Lynas (2009); Vidal *et al.* (2009); J. Watts (2009)

Another approach to environmental protection within a free market model is the attempt to put a price on nature, or on environmental destruction, so creating a market for these goods. Under this approach, price reflects the cost in market terms, rather than a less tangible idea of value, for example in spiritual terms. The introduction of market price mechanisms into environmental protection has been part of what James McCarthy and Scott Prudham have termed 'neoliberalizing nature' (2004).

The pricing of ecosystem services has expanded greatly with market-focused 'solutions' to environmental problems. Rather than seeing aspects of the natural environment purely in terms of the commodities, for example wood, water, animal products and the prices that could be obtained for them, the concept of ecosystem services recognizes the wider benefits of the environment, for example as carbon sinks in the case of forests, or biodiversity in relation to animal and plant species. The price that is charged for protecting the environment should therefore include these broader services that nature provides.

Plate 6.5 Sign against charcoal production, Mulanje, Malawi.
Credit: Katie Willis

Payment for ecosystem services (PES) (also called payment for environmental services) has been introduced as a way of promoting environmental protection while also providing local communities with a source of income (Pagiola *et al.* 2005). For example, PES has been widely adopted in Mexico in relation to forest protection (Kosoy *et al.* 2008). However, for successful adoption it is vital that the process whereby community members are able to participate is relatively straightforward. Nicolas Kosoy, Esteve Corbera and Kate Brown (2008) found that farmers in the Lacandan rainforest in southern Mexico were confused by the process, or applied to participate although they were not eligible. PES schemes also need well-resourced verification processes.

Poverty and environment

The relationship between poverty and the environment is a complex one, but it is clear that there are some connections. Poor people are often forced to live in environmentally-fragile or degraded areas. In cities, these locations may include unstable hillsides, areas prone to flooding and pollution, as well as lacking basic infrastructure such as drinking water (Plate 6.6). These poor environmental conditions may

Plate 6.6 Squatter housing, Melaka, Malaysia.
Credit: Katie Willis

lead to health problems, such as respiratory diseases or water-borne infections, which in turn can affect individuals' ability to earn a living, so exacerbating their economic and social vulnerability. In addition, people living in poverty can often not afford to improve their local environment and in many cases may be forced to contribute to environmental degradation through, for example, using local forest resources for building materials and fuel (McGranahan 1993) (Box 6.5).

These inter-connections demonstrate that environmental protection measures are about more than just the natural environment; rather, attempts at sustainable development need to be placed within the much wider context of poverty alleviation, meaningful community participation in decision-making and a recognition of the importance of social and cultural contexts (Elliott 2006; WCED 1987). These complex relationships were clearly highlighted by

Box 6.5

Household environmental conditions in Lagos, Nigeria

Lagos is one of the largest cities in Africa, with a population of about 9.6 million. Due to the rapid growth of the city and the inability and unwillingness of successive city governments from the period of British colonialism, through independence in 1960 to the present day, the majority of residents live in poor conditions. Modern urban infrastructural services are concentrated in the commercial district and the wealthier residential areas.

In Greater Lagos only 9 per cent of the population has access to piped water. The remaining 91 per cent of the population rely on purchasing water at high cost. Over two-thirds of cases of childhood illness have been attributed to the lack of access to safe drinking water. Given its coastal location and its expansion on a series of islands, many parts of the city are vulnerable to flooding, including low-income houses that are built on stilts on the Lagos lagoon. The lack of an adequate drainage system means that during heavy rain over 50 per cent of houses are flooded.

About 99 per cent of the population do not have access to a closed sewer system, which means that human waste is disposed of in water courses and on waste ground. Of the approximately 4 million tonnes of solid waste generated every year, only about 50 per cent is collected and disposed of in landfill sites or incineration. A small amount is recycled. Because of the poor waste collection services, households often dump their waste in the street, resulting in pollution and impacts on health.

Source: adapted from Gandy (2006); Kofoworola (2007); UN-Habitat (2008)

David Drakakis-Smith in his discussions of sustainable urban development (1995, 1996, 1997). He claimed that for sustainable urban development to be achieved five areas of urban life need to be addressed: as well as the environmental aspects, demographic, social, economic and political dimensions need to be considered.

Gordon McGranahan *et al.* (1999) stress, however, that when considering the relationships between poverty and environmental destruction, it is important to recognize the scale of the environmental issue concerned. Global warming is a problem at a global scale, although of course certain locations and populations will be more directly affected than others. In contrast, poor quality water and sanitation problems are problems throughout the world, but their impacts are felt locally. In relation to debates about urban environmental problems and sustainable cities, the general patterns are:

> The urban environmental hazards causing the most ill health are those found in poor homes, neighbourhoods and workplaces, principally located in the South.
>
> The most extreme examples of city-level environmental distress are found in and around middle-income mega-cities and the industrial cities of the formerly planned economies.
>
> The largest contributors to global environmental problems are the affluent, living preponderantly in the urban areas of the North.
>
> (McGranahan *et al.* 1999: 109)

Because of this, approaches to sustainable development will differ depending on the nature of national and local economies and societies, and political priorities.

Ecotourism

Tourism represents one of the fastest growing economic sectors in the world and can provide significant income for many Southern nations (WTTC 2010). However, tourism is also associated with severe environmental destruction as unregulated infrastructure development takes place and an area's population increases much faster than the services, such as sewage systems and local water supplies, can cope with (Simon 1997). In addition, large numbers of visitors in environmentally-sensitive areas such as mountain regions can lead to soil degradation, pollution and the disruption of local ecosystems (Sharpley and Telfer 2008).

The sustainable development agenda has led to attempts to make tourism development more environmentally friendly and this has led to the phenomenon of 'ecotourism'. Sustainable tourism in its broadest sense encompasses more than environmental protection (see discussion of indigenous tourism in Chapter 5) (Hall and Lew 1998). As with 'sustainable development', 'ecotourism' can cover a multitude of activities. It may be used to refer to tourism to areas of outstanding natural beauty or interest. In other words, the 'eco' refers not to the way in which the tourism is being organized, but the purpose of the visit such as wildlife-watching. However, even within 'ecotourist' projects that are set up to reduce the environmental impact of the activities, there are wide variations. Requiring little adaptation to the 'traditional' form of mass tourism, hotels increasingly give guests the opportunity to reduce water and energy use and pollution from detergents by using towels for more than one day. As Richard Butler (1998) argues, while this does have a small environmental impact, it also helps public relations, but it does nothing to deal with larger sustainability issues.

'Ecotourism' projects which really get to grips with the concept of minimizing the environmental impacts of tourism need to look at

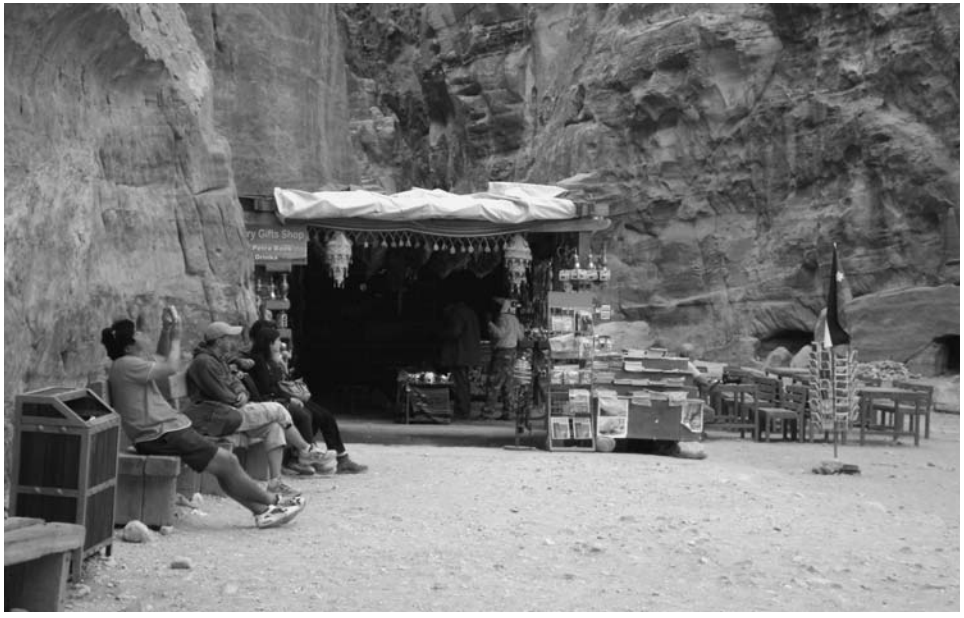

Plate 6.7 Tourist facilities, Petra, Jordan.

Credit: Katie Willis

limiting numbers to control pressure on resources, what form of accommodation is provided and where it is located, and the sourcing of building materials, food and other inputs. Making the tourism experience more expensive can be a way of limiting the number of visitors and can also create a fund which can be used for local environmental projects. However, such schemes do not always result in the desired outcomes in environmental terms (Box 6.6). Once

Box 6.6

Ecotourism in Nepal

Every year thousands of tourists travel to Nepal attracted by the potential for mountain trekking. In an attempt to protect the natural environment, while also allowing for an important source of income for economic and social development, the Annapurna Conservation Area Project (ACAP) was set up in 1986.

In environmental terms, trekking groups contribute to deforestation through their use of wood for fuel. The National Trust for Nature Conservation (NTNC) estimates that the average trekker uses twice as much fuelwood as a local resident. Wood is also used to construct lodges and teahouses for tourists. In addition, an average trekking group of 15 people generates about 15 kg of non-biodegradable and non-burnable rubbish during a ten-day trek.

The ACAP charges entrance fees to tourists trekking in the area. As of mid-2010, the entrance fee of 2,000 Nepalese rupees was worth about US$27. These fees are then used to benefit local residents and promote environmentally-sustainable activities. There are 57 Village Development Committees in the ACA and each one has a Conservation Area Management Committee (CAMC). This committee structure is aimed at promoting local participation in decision-making with the aim of making the CAMCs the main decision-making bodies in conservation matters from 2012 onwards.

In addition to entrance fees, expenditure during visits contributes to the Nepalese economy. There are clear differences between those trekkers who travel independently and those who are part of an organized group. Group participants spend more overall, but often this is spent outside the ACAP area by the agencies that are coordinating the trek. Spending on food, accommodation and equipment by independent travellers is more likely to stay in the local area.

In social terms, the ways in which local people, particularly porters, are treated by trekking groups has caused concern, with accidents and illness being much more common among the porters than the trekkers. This is a reflection of the weight they have to carry and also the conditions in which they work.

Sources: adapted from Baral and Stern (2009); NTNC (2010); Pobocik and Butalla (1998); Tourism Concern (2010)

projects grow beyond a very small scale, it is almost impossible to prevent environmental impacts. The question is how much environmental damage is allowable in the quest for tourist income?

Local production for local markets

An alternative approach to sustainable development is to focus much more on local-level activities. Rather than expending energy on transporting large amounts of goods, in particular agricultural products, around the world, for some theorists, a more locally-based self-sufficiency approach is advocated as being much more environmentally friendly and socially sustainable (Gibson-Graham 2006). This approach clearly goes against ideas of comparative advantage and the need for specialism in production and trade to allow for greater efficiency in production. The comparative advantage arguments do not, however, consider other factors such as environmental destruction.

For many producers in the Global South, the drive is to break out of the limitations of local markets to sell products on a national or international stage. Patterns in some parts of the North, however, have moved towards more local consumption. This may not be purely to reduce the environmental impacts of transportation, but they are an important part.

A good example of such an approach is the increase in farmers' markets in parts of Western Europe and North America. While local produce markets have been very important in some parts of Western Europe, in the UK for example, consumers have often been unable to buy locally-produced goods. Instead, they purchase foodstuffs from the local supermarket, which have often been imported from all over the world (Goodman and Watts 1997). Farmers' markets are set up to allow local producers to sell their produce directly to the public, rather than through large supermarket chains. Consumers may choose to purchase fruit, vegetables, meat, bread, cheese and other products from these markets for a range of reasons. They may want to support local producers, rather than the shareholders of large supermarket chains; they may feel that the quality of the food is better, particularly as they can ask questions about production processes. Finally, a local focus may be regarded as reducing harmful environmental impacts caused by what could be interpreted as unnecessary transportation of goods thousands of miles (Holloway and Kneafsey 2000).

While such reasons are clearly important and have a solid environmental grounding, this 'retreat' to more local production and consumption could have harmful effects on producers elsewhere in the world, particularly in poorer countries. If these poorer countries have adopted outward-oriented trade-focused development policies to increase economic wealth and contribute to improvements in standards of living, what would happen if their overseas markets shrank? Currently farmers' markets and similar locally-oriented forms of trade are limited and there are no signs that such approaches will have a serious impact on world trade patterns. However, this is a small-scale example of some of the complex debates around the scale of development. These will be considered further in the next chapter, which deals with how the processes that have been termed 'globalization' have affected the ways in which development has been conceived and policies adopted.

Summary

- **All development theories include reference to the natural environment.**
- **Many development approaches have used the natural environment as a source of wealth.**
- **There are limits to the natural environment, but these can vary spatially and temporally.**
- **Sustainable development has become a key element of many development policies, but meanings can vary widely.**
- **There is a relationship between poverty and environmental destruction, but the link is not always clear.**

Discussion questions

1 What were Malthus' arguments about the relationship between human populations and the natural environment and why have they been criticized?

2 Given the debate about the definitions of 'sustainable development', is it still worth using the term?

3 How can market-led approaches be used to protect the natural environment?

4 Why is local production regarded as a solution to many environmental problems?

5 Can global-level agreements about the environment ever work in practice?

Further reading

Barrow, C.J. (2006) *Environmental Management for Sustainable Development,* 2nd edition, London: Routledge. A clearly-written introduction to the role of different actors in managing the environment, with a particular focus on the Global South.

Elliott, J. (2006) *An Introduction to Sustainable Development*, 3rd edition, London: Routledge. An excellent introduction to sustainable development debates in the Global South.

Environment & Urbanization (2007) Special issue on 'Reducing risks to cities from disasters and climate change', 19 (1).

Peet, R. and M. Watts (eds) (2004) *Liberation Ecologies: Environment, Development and Social Movements*, 2nd edition, London: Routledge. A wide-ranging collection of chapters focusing on the relationships between capitalist development and environmental destruction and the grassroots responses to this destruction.

World Bank (2010) *World Development Report 2010*, Washington DC: World Bank. (Available at www.worldbank.org). The theme of this WDR is 'Development and climate change'. It provides an excellent insight into mainstream approaches to climate change, stressing international cooperation and technology transfer.

World Commission on Environment and Development (1987) *Our Common Future*, Oxford: Oxford University Press. The report of the Brundtland Commission that informed policy-making about sustainable development.

Useful websites

www.agra-alliance.org Alliance for a Green Revolution in Africa website.

www.happyplanetindex.org Happy Planet Index homepage.

www.irn.org International Rivers Network. Works with local communities around the world to campaign for sustainable water and energy supplies, as well as flood management. Much of their work deals with campaigning against the construction of large dams.

www.practicalaction.org Practical Action, previously known as the Intermediate Technology Development Group. Founded by E.M. Schumacher, the organization works with poor communities in the South to find appropriate technologies to meet their needs. The website includes many examples of small-scale technological approaches which have had an enormous benefit.

www.tourismconcern.org.uk Tourism Concern. British-based organization which campaigns for ethical, fair trade tourism. There is a strong environmental focus in their work.

www.unhabitat.org United Nations Habitat homepage. Provides information about UN programmes in relation to human settlements with a strong focus on sustainable cities.