

# 2

## Reflections on poverty, environment, and development

This chapter addresses the ways in which nature and environments relate to poverty and development. The first section gives an historical and global overview of environmentalisms. Section 2.2 outlines theories that are useful for developing an understanding of environmental change and the relationship between people and environments, both local and global. History and theory underlie many of the actions and policies of development agencies, governments, and environmental organisations, but they are not always sufficiently understood and articulated. Section 2.3 discusses situations where human vulnerability is exposed by natural and human-made hazards, war, and displacement. Section 2.4 addresses the issue of sustainable development and wider questions of sustainability, and poses the question *What needs to be sustained?*. To be credible, answers must deal with various forms of valuing nature and the environment, and also social relationships, people's institutions, or other social and human capital. At the end of section 2.4, some 'environmental myths' are discussed.

### 2.1 A short history of environment and environmentalism

This section discusses the multiple historical and cultural roots of the interest in environmental issues, and highlights modern forms of global environmentalism.

#### 2.1.1 Traditions of thought and the roots of environmentalism

Powerful expressions of environmental values and thought can be found in the huge wealth of spiritual and scientific systems that have developed over thousands of years. Modern science is dominated by Western thought, but there is much scientific thinking that predates this or has developed in parallel

to it: ideas that find expression in opposition and alternatives to mainstream thought and politics. It is impossible to do justice to the diversity and depth of this thinking, but the following offers a brief introduction to it.

Very important for modern thinking and spiritual life among Hindus and many others is *The Bhagavadgita*. This book attributes the following words to Krishna, a human manifestation of the divine:

*Earth, water, fire, air, ether, mind, intellect, and egoism – these make up Nature. This is the lower Nature, but different from this is the higher Nature – the principle of life which sustains the worlds.*<sup>1</sup>

Mahatma Gandhi interpreted this work in 1926. His focus was on the non-violent message in the *Gita*, even though it is a part of an epic story about wars. His translation refers to 'My lower aspect' instead of 'lower Nature' in the same stanza,<sup>2</sup> demonstrating that people and their environments, the force of life, and the outward manifestation of it are seen as part of the same whole, whether called God or Nature.

Present-day ecological grassroots movements are still inspired by Gandhi's promotion of village life, simplicity, and self-sufficiency, and by his methods of non-violent protest against foreign domination. Examples are the 'Chipko movement', campaigning for access to and protection of forests, and the protests against a huge dam-building programme that affects the Narmada river, its watershed, and people. Gandhi argued against the rapid industrialisation that other political leaders promoted – indeed pursued – after India's Independence. There is evidence that Gandhi was aware that resources were simply not available for India to pursue the wasteful and exploitative growth model of its colonial masters. Gandhi and several of his associates promoted the use of organic fertilisers, recycling, measures against soil erosion, and improved (community-based) water management. However, Gandhi should not be portrayed as an environmentalist *avant la lettre* who foresaw the current ecological crises that affect India, or who had all the answers to present-day environmental problems.<sup>3</sup>

Buddhism expresses ideas about the relationship between human beings and the essence of life and nature in the doctrine of 'karma', which is a natural law pertaining to human behaviour. According to this law, the person who intentionally kills a spider out of cruelty incurs a distinctly different result (karma) than one who accidentally and unconsciously tramples on it – even though the spider dies in both cases. Buddhism holds that 'all sentient beings are intimately interrelated', and because it sees the struggle for liberation from rebirth as one that involves improving karma by cultivating compassion and wisdom, 'Buddhism endorses a spirit of toleration and co-operation with the natural world'.<sup>4</sup>

The major Chinese religions all seem to have in common an emphasis on practical benefits for human development and society, promoting modesty, work, honesty, and other moral values. When human desires predominate, the original harmony in nature that is expressed by balance between *yin* and *yang*<sup>5</sup> and the 'five elements' (metal, wood, water, fire, and earth) will be disturbed. Disharmony between these elements in individuals, society, and other parts of the world (i.e. what Westerners would call nature or 'the environment') will degenerate into chaos.<sup>6</sup>

For Muslims, natural phenomena should be seen as awe-inspiring signs of God's presence; similarly, scientific discovery of natural laws can be celebrated as revelations of God's wisdom and greatness. According to Islamic sources, God created animals in order to serve human beings, but Islam equally prescribes that animals should be treated well. Manuals of Islamic law also prescribe the nurture of land and water, and acknowledge the rights of private ownership – contingent upon good use of those resources.<sup>7</sup>

Many traditional belief systems can be characterised as the worship of nature. Their followers have a close relationship with nature and are often perceived as living in a balanced way with natural phenomena. They usually do not make a sharp distinction between society and nature, and they often worship particular natural forces and phenomena, such as thunder, rain, sun, moon, and earth. These systems of belief and their related social institutions rarely recognise the private ownership of land, but negotiate different uses of land by different peoples, and, for example, sanction the co-existence of herders and sedentary agriculturists in parts of Africa.

The domination of indigenous people by larger and more powerful groups has brought their different values into sharp focus, for example through the declaration of Chief Seattle, writing to the President of the United States of America in the nineteenth century:

*Our dead never forget this beautiful earth, for it is the mother of the red man. We are part of the earth, and it is part of us. The perfumed flowers are our sisters; the deer, the horse, the great eagle: these are our brothers. The rocky crests, the juices of the meadow, the body heat of the pony, and man – all belong to the same family. The rivers are our brothers, they quench our thirst. The rivers carry our canoes, and feed our children. If we sell you our land, you must remember and teach your children that the rivers are our brothers, and yours, and you must henceforth give the rivers the kindness you would give any brother.*<sup>8</sup>

Such words still inspire native Americans and some of their fellow citizens, as an implicit expression of an alternative to the mainstream paradigm of economic growth and human domination over nature.

Mainstream Western behaviour and views *vis à vis* nature can be traced back to ancient Greek and Roman thought, Judaism, and early Christianity. Of course there were and still are diversity and divergence from the mainstream, but if the dominant views in these traditions can be summed up with one phrase, it is 'man's superiority over nature'. According to the Christian Bible, which has absorbed Jewish texts, God created nature, man, and later woman, and nominated Adam, Noah, and their sons as caretakers, indeed masters and users of the earth and all plants and creatures on it. Equally, the ancient texts and ideas can be seen as endorsing the domination of 'man' over 'woman'. In this tradition God created nature for the use of people, and people are seen as separate from nature. Human interference with nature was (and sometimes still is) perceived as 'improving' upon nature, almost irrespective of what is done, and as conquering nature: nature is a resource for human use and also a threat, imbued with destructive forces.<sup>9</sup>

This mainstream view is of course not representative of all Christians and cannot explain all behaviour. Already in seventeenth- and eighteenth-century European philosophy, differences between thinkers such as Descartes and Kant were emerging. They differed over the perceived dualism between mind and body, spirit and matter, and the degree to which nature can be understood as the sum of its parts. The science of ecology developed, shaped by Linnaeus in the eighteenth century, Darwin in the nineteenth, and Frederic Clements in the twentieth. John Muir (1838-1914), an American 'nature lover', founded the National Park system in the USA. Indeed, in the late nineteenth and early twentieth centuries, romantic ideas about the beauty of nature started to emerge, contrasting with earlier mainstream notions of the harshness of nature and wilderness. In the USA in 1962, Rachel Carson published the best-seller *Silent Spring*, warning about the effects of chemicals like DDT on wildlife and people.

Thomas Malthus (1766-1834) argued the existence of a natural law dictating that population grows exponentially and that agricultural production, growing much more slowly, is based on limited natural resources. He thought that the limitations in growth of agricultural production would therefore act as a natural check on excessive population increase. Malthusian thinking is still debated, although in 1965 Ester Boserup challenged it very effectively. She showed that population growth affects agricultural development: when population increases, fallow periods decrease, which prompts the application and invention of new methods of cultivation and enhanced productivity. On the other hand, in a neo-Malthusian tradition, Garret Hardin argued in *The Tragedy of the Commons* that if people have the freedom to manage common natural resources, they will over-exploit and thus destroy these resources.

### **2.1.2 Global environmentalism: the past thirty years**

Appendix 1 shows that from the early twentieth century a plethora of international environmental treaties and conventions has been agreed. They range from treaties to regulate the use of international rivers and access to Antarctica, through conventions regarding whaling, plant protection, nuclear accidents, and sea pollution, to protocols that regulate atmospheric pollution.

In 1972 at the United Nations Conference on the Human Environment (UNCHE, or 'the Stockholm Conference'), Indira Gandhi, then India's Prime Minister, set the tone for some of the differences of opinion and confrontations between industrialised countries and poorer States when she asked, '*Will the growing awareness of "one earth" and "one environment" guide us to the concept of "one humanity"? Will there be a more equitable sharing of environmental costs and a greater international interest in the accelerated progress of the less-developed world?*'<sup>10</sup>

The conference agreed to set up the United Nations Environment Programme (UNEP), which was established in the same year in Nairobi, Kenya. Also in 1972 the so-called 'Club of Rome' published its report *Limits to Growth*.<sup>11</sup> This predicted global disaster for a world that could no longer sustain life at the current rates of growth, consumption, and pollution. In 1984 the UN set up the World Commission on Environment and Development (WCED), also known as the Brundtland Commission, which investigated environmental and developmental issues and proposed future management strategies. The commission produced the report *Our Common Future* (1987) and famously defined sustainable development (see section 2.2.4 of this book).<sup>12</sup> It recommended holding a world conference on environment and development,<sup>13</sup> the United Nations Conference on Environment and Development (UNCED), or Earth Summit, in Rio de Janeiro, Brazil in 1992. UNCED agreed the terms of Agenda 21, a programme for promoting sustainable development from 1992 through the twenty-first century.

Various further treaties were discussed at UNCED, and initiatives for global environmental management were taken. For example, the Framework Convention on Climate Change was produced, and the Convention on Biological Diversity was agreed in December 1993 as a legally binding treaty to halt the destruction of biological diversity. In Rio the Global Environment Facility (GEF) was reinforced, in order to provide funds for developing countries for environmental programmes. UNCED also initiated negotiations towards the ratification of the UN Convention to Combat Desertification, with particular relevance for Africa. This entered into force in December 1996. The Commission on Sustainable Development (CSD) was formed to ensure and monitor progress on Agenda 21.

The Earth Summit itself failed to raise the estimated US\$600 billion needed to implement Agenda 21, and was perceived by a number of countries not to have fully addressed the environmental problems of developing countries.<sup>14</sup> An important sequel to the Earth Summit came in a Special Session of the United Nations General Assembly (UNGASS) in 1997 ('Earth Summit II'), to be taken further in 2002 ('Earth Summit III'). At the 1997 meeting, it was agreed that Agenda 21 had achieved only limited success. That meeting itself, and other initiatives such as the CSD, are not regarded as very effective or influential, even though they take place at ministerial level.

The organisers of UNCED made specific efforts to involve non-government organisation (NGOs), setting up the Global Forum with and for NGOs in parallel to the conference. However, authors like Finger (1993) have criticised the Global Forum as a public-relations exercise on the part of the UNCED organisers, and an instrument to co-opt the NGOs into endorsing a non-radical agenda promoted by governments and multilateral institutions. Preceding the Earth Summit II was 'Rio+5', a forum held in Rio de Janeiro by the Earth Council of NGOs, but it is widely agreed that Rio+5 did not make a significant impact on Earth Summit II.<sup>15</sup>

The main environmental issues of global significance that are currently being addressed, or urgently need to be addressed at the CSD and in other international forums, include the following:

- global warming and climate change;
- depletion of the atmospheric ozone layer;
- cross-boundary pollution, including 'acid rain', nuclear waste, and waste disposal in international seas;
- international co-operation on transport (to combat risks of pollution from oil tankers and to address the fact that airline fuel, being untaxed, fails to generate funds to mitigate the pollution caused by air transport);
- management and exploitation of international rivers;
- forest conservation policy (including 'Forest Principles');
- biodiversity issues, including the adoption of a Biosafety Protocol under the Convention on Biodiversity;
- rights to genetic resources, plant-breeders' rights, farmers' rights to save seeds, and the patenting of life forms, in particular in the context of international trade rules;
- over-fishing;
- extractive industries, including mining of the ocean floor, and particularly in areas where indigenous peoples' traditional land rights are violated;
- the environmental impacts of tourism.

Particularly important in all those discussions are the growing inequalities, between and within countries, in terms of access to resources, which can be offset only by a combination of reduced resource consumption by the better-off (people and nations), and rapid development and transfer of environmentally beneficial technologies to developing nations. The relationship between environmental resources and the human economy prompts the need to incorporate measures of pollution and resource consumption ('externalities') in economic indicators such as the gross national product (GNP), and the need to find other ways to resolve the failures in measuring development or human progress.

### **2.1.3 Modern environmentalisms**

The different historical roots of human relationships with nature in the South, East, and West, and various theories of environmental change (elaborated in section 2.2) resulted in the diversity of present-day *environmentalisms*. An environmentalism can be seen as a set of ideas favoured by a particular group. Different forms are developed in different contexts. They are articulated in academic circles, among development professionals, and in the sphere of politics, be it by grassroots movements, international protest alliances, national party politics, or official international forums. Environmentalisms are often a reaction against mainstream views and are often borrowed from traditions of thought that are outside the mainstream.

'First World environmentalism' can be characterised by the irony of the widespread love-affair with the car 'which, more than anything else, opens up a new world, of the wild, which is refreshingly different from the worlds of the city and the factory'.<sup>16</sup> Many better-off urban people, mostly based in industrialised countries and with a world-view rooted in Western culture, have come to romanticise and admire nature and wilderness as something of which they are no longer part, something external to them and to be found in often remote areas. This sort of view can be traced back to the likes of John Muir and the dualism in Western and Judaeo-Christian mainstream thought.

More recently, Arne Naess, a Norwegian philosopher, introduced the idea of *deep ecology*, which was developed into an environmentalism in the USA and Europe.<sup>17</sup> The US variety has been described as having four characteristics:<sup>18</sup> (a) it takes a strongly bio-centric view (as opposed to anthropocentric 'shallow ecology'), which means that nature is awarded an intrinsic value, independent of its value to people; (b) it has a focus on pristine and unspoilt wilderness and is strongly preservationist, to the extent that it believes that people should be expelled from large areas of the earth; (c) it invokes Eastern traditions and belief systems to support its bio-centric views; and (d) it believes that it is at the forefront of the environmental

movement. These characteristics of 'deep ecology' can be found to some degree in many forms of environmentalism and environmental organisations, mostly in developed countries.<sup>19</sup> Extreme views on the need to conserve nature, and also less radical views, are all based on the idea that there must be 'limits to economic growth'. People have started to articulate the down-sides of development in their own lives, and radicals and moderates have built temporary alliances, for example in local protests against road construction.

Many are sympathetic to deep ecology or similar forms of environmentalism, but criticise conservationism as harmful when applied to the Third World. For example, the separation of people from wilderness harms what are perceived as balanced relationships between rural people and nature. The expulsion of human communities from national parks has led to benefits for the rich at the expense of the poor. (For example, the Maasai people in Tanzania are no longer allowed to herd their cattle in what has become the Serengeti wildlife park, even though they have used it for hundreds of years. The park now serves tourists who enjoy the sight of wildebeest migrations and roaming elephants.) Western 'deep ecologists' are also accused of reading the main Eastern traditions selectively, to 'prove' that these are essentially bio-centric, instead of anthropocentric. Equating environmental protection with wilderness preservation is a very American-European idea, and in some cases nature preservation in developing countries is perceived as an imperialist act, rather like the export of Coca-Cola and some forms of Christianity.

However, the debate is more complex and subtle than this. Many European and US environmentalists explain environmental devastation primarily in its social and historical context, in terms of social inequality, and argue for a reduction in the resource consumption of the global elites. These ideas would find a 'strong resonance in countries such as India, where a history of Western colonialism and industrial development has benefited only a tiny elite, while exacting tremendous social and environmental costs'.<sup>20</sup> In fact, Naess also argues the need for lifestyle changes combined with political changes.<sup>21</sup>

In parts of Africa, nature parks were created in the colonial era and are still maintained by national elites, foreign aid, and tourism. They still exclude local people and deny their historical rights to pastures, for example. Nevertheless, in some cases the interest of tourists and the presence of wildlife have been turned into an advantage for local people, who are increasingly recognised as the main wildlife managers, for example in the Zimbabwean Campfire programme. Conservationism also appeals to popular movements such as the ones led by Gandhi and his followers, and in the past few decades there have been some strong reactions against dominance by external forces (international companies and co-opted national governments) over both nature and peoples.

An example of the conflict between popular interests on the one hand and dominant business and State interests on the other is that of the plight of the rubber tappers in Brazil. Chico Mendes, a leader of a Brazilian rubber-collectors' union, 'discovered that he was also an ecologist only a couple of years before his death'.<sup>22</sup> His assassination in 1988 at the hands of a local landowner sent reverberations well beyond Brazil's borders, as by then he and the cause of his rural trade union were well known. His campaign against deforestation and expansion of ranching was not motivated merely by the urge to defend nature or to protect the environment for its own sake, but it was a protest against the ruthless intrusion of capital and global markets into the livelihoods of rubber tappers and indigenous people – livelihoods based on extracting resources from forests and streams, like nuts, rubber, and fish. Campaigning by Mendes and his union, with the support of national and international NGOs, has led the governments of various Brazilian States to map out 'extractive reserves', which are more or less protected from the expansion of (large-scale) ranching and deforestation.<sup>23</sup>

Ken Saro-Wiwa was killed by the Nigerian military regime in 1995. Saro-Wiwa, a writer and businessman turned politician, led protests of his Ogoni people against the failure of the Nigerian State and the Anglo-Dutch oil company Shell to channel benefits from oil drilling to local people. Very few schools, services, or jobs were generated to off-set the destruction of the local environment that was caused by drilling, oil spillage, air pollution from flaring gas, and the depletion of wildlife. This made agriculture and fishing virtually impossible for the people of Ogoniland – a small and very densely populated part of the Niger delta. In Saro-Wiwa's words:

*The Ogoni people were being killed all right, but in an unconventional way ... The Ogoni country has been completely destroyed by the search for oil ... Oil blowouts, spillages, oil-slicks, and general pollution accompany the search for oil ... Oil companies have flared gas in Nigeria for the past thirty years, causing acid rain ... What used to be the bread basket of the delta has now become totally infertile. All one sees and feels around is death. [Petrolic] degradation has been a lethal weapon in the war against the indigenous Ogoni people.*<sup>24</sup>

In the perception of the Ogoni people, the connectedness between humans and nature was being violated: 'petroleum was, in the local vernacular, being pumped from the veins of the Ogoni people'.<sup>25</sup> Saro-Wiwa saw MOSOP, the Movement for the Survival of the Ogoni People, as a movement that had political, economic, and environmental aims and set out to achieve an alternative, autonomous development path for the Ogoni people that integrated these aims. This should be seen as an attempt to bring the multiple, historic concerns and interests of different groups together – modernisation, but on the terms of the Ogoni people themselves.

Such protests challenge industrial, modern society, its insatiable demands for resources, and its devastating effects on the (mostly local) environment. However the issue is clearly much wider: it is about inequality, social oppression, and access to economic development as much as the more narrowly defined environmental changes. Furthermore, protests are just part of the story, because many activists also engage in the search for alternatives: ways of organising production, trade, and consumption that are more people-friendly and in tune with the natural environment than those that operate in mainstream, market-based regimes. The alternatives are usually about limiting resource consumption, about nurturing (local) environments, whether rural or urban, about stimulating local employment and local trade. They tend to be rooted in people's own initiatives and a high degree of voluntarism, led by enthusiastic activists, and supported by local governments or outsiders such as development agencies. Many alternative technologies, social arrangements, and livelihoods have potential for widespread adoption.<sup>26</sup>

Across the world, smallholder farmers are developing and adopting forms of sustainable agriculture which enable them to increase their productivity, reduce their dependency on external inputs such as chemical pesticides and fertilisers, improve the sustainability of their environments, and protect or even improve their own health and that of the consumers of their products.<sup>27</sup> Experience shows that participatory approaches to technology development and genuine partnerships between scientists and farmers are capable of providing alternatives, in sharp contrast to the failures of the Green Revolution of the 1970s and the claims of transnational companies that their genetically modified crops are the solution to world hunger.<sup>28</sup> Oxfam and other international agencies have long supported Philippine NGOs, scientists, and community groups in their campaign against destructive industrial fishing and their efforts to develop techniques that help to regenerate coral and fishing grounds.<sup>29</sup>

In urban areas, creative alternatives and solutions are sought by governments, citizens' groups, and NGOs alike. A much-quoted success story is the transport system in the Brazilian town of Curitiba, which has good infrastructure, based on privately supplied public transport, and green spaces for cyclists in the low-lying areas, doubling as flood canals in emergencies. Another positive example is the collection and recycling of urban waste by the Zabbaleen in Cairo.<sup>30</sup> Grassroots groups and NGOs such as PREDES near Lima in Peru take action against recurrent floods and mud slides that threaten the lives of city dwellers,<sup>31</sup> and initiate improvements to sewerage, transport, and housing systems, for example in the Orangi Pilot Project in Karachi.<sup>32</sup> Local Exchange and Trade Systems (LETS) are developing in the USA, UK, and other industrialised countries as ways to share resources, skills, and services among local people, and create new forms of community.

## **2.2 Theories of people–environment relations**

This section discusses some theories of environmental change and the relationship between people and local and global environments. Different disciplines look very differently at the relationships between people and environmental change.

### **2.2.1 Eco-logical systems**

Since the 1970s, the meaning of ‘ecology’ has been questioned. Scientists began to abandon earlier models based on systems theory, which describes ecosystems in terms of notions such as stability and carrying capacity. They now think in terms of uncertainty, disequilibria, and chaos, as in the fluctuations of populations of people, plants, and animals.<sup>33</sup> This shift first occurred in the study of local ecosystems, but is reflected in global approaches too. (See also section 2.4.4.)

Environmental theory and environmentalism are based on empirical data, in particular from the biological sciences, geography, soil science, hydrology, and climate studies. Data are compiled by UN agencies, private organisations, and various government services and universities.<sup>34</sup> In *The Gaia Atlas of Planet Management*, Myers (1994) and the many other contributors make good use of globally available data. The title refers to the concept of Gaia, as developed by James Lovelock in the 1970s. Gaia is the ancient Greek Goddess of the Earth, and Lovelock (1979) developed the Gaia-hypothesis to explore the idea of the Earth as a super-organism that comprises ‘all life on Earth and its environment’, with the atmosphere, oceans, the biosphere, and soil all part of the complex system. Disturbance of one part produces feedback to other sub-systems and can cause ‘sustained oscillation between two or more undesirable states’,<sup>35</sup> which means that the present relatively small differences between hot and cold years or dry and wet years could suddenly become far bigger.

Lovelock studied the impact of human activity on the global environment, and in particular on the atmosphere and biosphere, for example in its effects on the Earth’s water and carbon cycles. His ideas, rooted in scientific analysis, lead to the conclusion that humanity needs to take great care, because of all the unknown factors that influence the Earth’s sub-systems: the systems are too complex for the full results of any action to be predicted. Lovelock argues that it is not permissible to affect the Earth-system in any major way, because ‘undesirable states’ are likely to be harmful to people as much as to anything else. Nature must be given an intrinsic value that cannot be substituted for something else (such as financial capital or human activity). One of the most important sub-systems of ‘planet Earth’ is the atmosphere, and global

warming is just one piece of evidence that humanity may have already gone too far in influencing it (see section 5.3).

This environmental theory, with its focus on the physical (eco)systems, has one important flaw: it does not describe *why* people change environments, and how that happens or can be stopped. Furthermore, it does not tell us how environmental changes have differing impacts on the poor and rich, women and men, the powerless and powerful.

### **2.2.2 Political ecology**

Political ecology is an attempt to develop a theory of environmental change in its social, economic, and political context. It has been developed from research and experience in diverse settings in the rural, developing world. It is rooted in social-political science and geography, and its ideas are echoed in the analysis and policies of development organisations and social movements.

Blaikie and Brookfield (1987) are responsible for an important publication on political ecology. The main concern of their book is to try to understand why land degradation occurs, and why in some cases regeneration does not happen. This is for them a largely social question. They argue that '[land] degradation is ... a reduction in the capability of land to satisfy a particular use',<sup>36</sup> and they explain that different users of land will appreciate its capabilities differently. Land may be perceived as degraded from one perspective but as benefiting from increased capability from another. For example, hunters and gatherers may not value land that is converted from forest to cropland, and farmers may not share the satisfaction felt by industrialists when a factory is built on agricultural land.

These authors assert that degradation of land results from a combination of natural and human degrading forces, and it is off-set by natural improvement of land and 'restorative management': land degradation is not simply caused *either* by humans *or* by natural forces, and improvement is possible. Central to their concept of political ecology is the role of the *land manager*, i.e. the farmer, forest department, or herder who directly interacts with the land: 'fundamentally, the land manager's job is to manage natural processes by limiting their degrading consequences'.<sup>37</sup> Investments of capital and labour that improve the capability of the land are called *landesque capital*: for example, terracing or other erosion-prevention measures. Such an investment thus increases what others have called *natural capital*, and what happens is a substitution of *financial, human, and social capital* for *natural capital* (compare section 3.2). This takes them beyond Marx, who held that of the three production factors – labour, land, and capital – labour is the only source of a product's real value. Marx discussed the injustices of unequal ownership and control of capital and land, but saw land as an essentially free

source: the owner can use it at will, and there is (theoretically) a virtually limitless supply. However, land can be mined and degraded in order to obtain a product, and the damage needs to be minimised or repaired if productive capacity is to be maintained over longer periods of time.

The phrase 'political ecology' is obviously drawn from political economy, and thus it is concerned with issues of class and power in society, and how they interact with land management and land degradation. Blaikie and Brookfield (1987) talk of *regional* political ecology, to express the fact that the theory takes account of the complex relationships between people and land-based resources over a fairly extensive and varied area. It incorporates processes and relationships on different scales and in different hierarchies, from individuals, families, and farms, to communities and local commons, nations and the world. Its language employs terms such as *resilience* and *sensitivity*, to express how land-based systems can withstand human interference, and ideas about *marginality* of resources and of people. With these concepts they relate closely to the study of, prevention of, and response to disasters, which, especially in semi-arid areas, often strike after a gradual process of social, ecological, and economic decline.<sup>38</sup>

An important theme in the book is the idea of single-factor explanations for degradation or improvement of natural resources, and in particular the population question. Blaikie and Brookfield reject the simplistic theories of Malthus and neo-Malthusians like the Club of Rome, mainly because the notion that land has a fixed carrying capacity (to maintain people's food production and supply) denies the potential of technological development. Technology is never equally accessible to all people, so the analysis must include socio-political differences. As we have already seen (in section 2.1), Boserup challenged Malthus by developing the hypothesis that population increases actually prompt the development of technology; but Blaikie and Brookfield (1987) qualify this claim by arguing that it is too simplistic to say that *crisis prompts people to innovate and survive*. Pressure on resources from increasing populations may equally result in a downward spiral. Which way the development goes depends on complex relationships, access to other resources, labour availability, market prices for produce, social organisation, and the role of the State.

Blaikie and Brookfield admit that there are severe limitations to scientific methods that attempt to quantify land degradation and to estimate the economic costs involved in degradation and restoration. They promote the improvement of quantitative and numerical methods of measurement and analysis, but argue also for a qualitative approach. By focusing on 'the land manager', they recommend the study of perceptions of degradation, which are different for different land managers; they support the need for case

studies of degradation in different contexts, and for an analytical approach 'which allows for complexity, uncertainty and great variety'.<sup>39</sup>

Their conclusions reflect very much what development organisations, and NGOs in particular, preach and practise.

- First, they stress repeatedly that in analysis the land manager must be central and that the complexity of the land manager's reality must be respected. Local knowledge is important, and a 'bottom-up' approach, with a willingness to listen, is called for.
- Secondly, the analysis must reduce uncertainty about the causes of land degradation and find ways to avert it by making ever-better (quantitative) estimates of actual degradation, costs, and benefits.
- Pressure on resources can arise in different ways and for different reasons, which can include increasing population, but the pressure is usually enhanced or even caused by some 'surplus-extracting relationship' between the land manager and others, be they money lenders, local traders, or State bureaucracies that set low farm-gate prices. Thus relationships between land users and powerful groups in society must be studied, in order to understand the behaviour of the former.
- Analysis must also examine links with the State and the world economy. Blaikie and Brookfield stress the importance of assessing the land manager's access to, for example, land, capital, and State assistance. The role of the State is particularly important for strengthening local institutions, improving access to land and other resources for all, and ensuring pricing policies that enable surpluses to become investments in land. The State may also have to step in where local institutions are incapable of protecting or restoring marginal lands, in particular because soil conservation in marginal areas does not usually yield economic returns that can compete with alternative investments of capital (for example in 'high potential areas' or urban centres).

Not surprisingly, the work of Blaikie and Brookfield has been criticised, but political ecology has received much attention and is being developed further as a theoretical framework for the analysis of environmental change, for example by Peet and Watts (1996). They observe a number of shortcomings in the conceptualisation of political ecology, including (1) that not only poverty but also affluence can be a cause of environmental degradation; (2) that there is a bias towards rural and Third World agrarian situations; (3) that land is not the only (important) environmental resource; (4) that the concepts and language used sometimes obscure complexity, in particular of relationships between the land manager, (micro) environmental changes,

and the external context; (5) that it still lacks theoretical underpinning and does not necessarily clarify causal links; and (6) that little attention is paid to politics and political processes, and the means by which groups and individuals actually access resources.

Research continues in these weaker areas, focusing for example on environmental movements, civil society, and environmental rights. Hayward (1994) takes political ecology beyond the rural and looks at more than just land-related environmental change processes. He calls for theoretical improvements in the science of political economy, which is strongly based on Marx's theories (i.e. what is known as Marx's critique of the political economy of his day). Hayward (1994) comments that Marx used the following concepts in his theory: the three factors of production (labour, capital, land); the forces of production (between humans and nature); and relations of production (property rights, labour; relations between people that regulate the relationship with nature). He observes that Marxist and neo-Marxist theories fail to accommodate reproductive activities, i.e. the responsibility for maintaining health and family, which mostly falls on women. In the same way, these existing theories fail to appreciate the reproduction (of the productive capacity) of nature, land, or environmental resources. He writes: 'where political economy reveals the source of value to be labour, political ecology reveals the source of labour, and hence ultimately of value itself, to be nature'. It is social mediation that turns nature into value, and a theory of political ecology should 'extend [Marx's] critique to the exploitation of non-waged labour and the "labour" of nature itself'.<sup>40</sup>

### **2.2.3 Gender, environment, and development**

The term 'ecofeminism' was coined by the French feminist Françoise d'Eaubonne in 1974 and promoted by Susan Griffin, Carolyn Merchant, Vandana Shiva, among others. Ecofeminists argue that women are closer to nature than men, and men are closer to culture (which is often seen as superior), and that there is a connection between male domination of nature and male domination of women. There are differing views on whether the 'special relationship' of women with nature is rooted in their biological role in reproduction, or whether it is purely ideologically constructed in order to maintain gender-based power differences.

Critics of mainstream development models that are promoted by Western-dominated institutions have argued that paternalistic, colonial, and neo-colonial values and forces have marginalised women's scientific knowledge. In more general terms they have introduced the dualism that so characterises Western thought, between nature and culture, nature and people, body and

mind. These critics argue that indigenous people's knowledge – and in particular women's knowledge – of the natural world should be valued much more highly, and that their knowledge and experience are superior in promoting egalitarian societies and harmony with nature. Vandana Shiva claims that the values thus articulated as ecofeminist are also central to popular movements, such as the Chipko movement against deforestation in Garhwal in north-west India, in which local women played an important role through hugging trees in attempts to prevent loggers from felling them. Several analysts have, however, argued that movements like Chipko are based on a much broader coalition of people, ideas, and concerns.<sup>41</sup>

Critics of ecofeminism such as Bina Agarwal (1998) allege that ecofeminists (a) have failed to differentiate women by class, ethnicity, and caste; (b) have focused on ideological arguments and failed to address power and economic differences as important sources of dominance; (c) have failed to show how ideological differences are constructed (in social processes, by institutions, through history); (d) have failed to recognise that concepts of nature, culture, and gender vary across different cultures; and (e) have not really addressed the actual material relationship that women may have with nature. Further objections are that ecofeminism concerns rural people and environments only, and that the idea of harmonious, ecological, traditional societies should not be generalised.

Agarwal not only criticised ecofeminism, but also suggested an alternative concept, which she labelled 'feminist environmentalism'. This concept accepts ideological construction of terms like 'gender' and 'nature' and the relationship between them, but insists that the link between women and the environment should also be seen as 'structured by a given gender and class (/caste/race) organisation of production, reproduction and distribution'.<sup>42</sup> She sees feminist environmentalism as a struggle to transform notions about gender and nature, as well as the actual division of work and access to resources. Agarwal speaks of class–gender effects of environmental change, and in describing those for the rural Indian situation she highlights some of the core aspects of this relation: (a) the importance of shifts in land-control patterns (from common access to State control and privatisation); (b) land degradation; (c) population growth; and (d) technological choices in agriculture associated with the erosion of local knowledge systems. She describes poor households, and women and female children in particular, primarily (but not only) as victims of environmental change because of gender-related divisions in labour and unequal access to resources. The class–gender effects of environmental change are manifested as pressures on women's time, their income, their nutrition and health, their social support networks, and their (indigenous) knowledge. These manifestations and

some of the underlying causes are echoed by experience from development practice, ranging from women's disproportionate suffering during floods in Bangladesh, the increased work burden and health risks for urban women in Senegal following economic crisis, and health risks in the workplace of women workers in plantations and micro-electronic assembly plants; all as a result of gender-related unequal rights and access to environmental resources and other resources.<sup>43</sup>

Agarwal's approach is similar to what Dianne Rocheleau (1995) has called 'feminist political ecology', and both have also been grouped under the concept of 'gender, environment, and development' (GED). All have in common an 'emphasis on material relations and on their structuring by gender relationships'.<sup>44</sup> This relationship finds particular expression in gendered knowledges of environments, sciences, and technologies. This knowledge should be seen as cumulative and dynamic, because it builds on the experience of the past, while adapting to the technological and socio-economic changes of the present. Appleton (1995) has shown that there are many examples of specific knowledges and technologies, held and developed by women within their specific gendered context.

Further to this, GED pays attention to issues like (a) the gendered division of labour and responsibility which influences women's particular relation to environmental change; (b) gendered property rights, as a mediator in gender-environment relationships; (c) gendered positioning in households, communities, and other institutions; (d) the influence on gender relationships and gender-environment relations of the wider political economy; and (e) ecological characteristics that determine the processes of gender and environmental change.<sup>45</sup> This is a brief list of what needs to be studied and analysed in any particular situation.

However, GED and ecofeminism remain strongly rooted in *rural* livelihoods, gender relations, and people-environment relations. Another criticism is that little attention has been paid to internalising the economic costs to environments of social and economic processes.

#### **2.2.4 Environmental economics**

In *Small is Beautiful: A Study of Economics as if People Mattered*, Schumacher (1973) argued that, in the 'modern' economic approach, labour and work are seen by employers as a cost factor that is to be minimised, and by workers as a sacrifice for which they need to be compensated. He contrasts that with Buddhist ideas about work, where it is ascribed three important functions: developing and utilising people's faculties; enabling people to overcome self-centredness by working with others on a common task; and producing goods and services for human existence. The former attitude

leads to the replacement of labour by capital-intensive machines and extreme specialisation of people in mechanical tasks, for example in manufacturing industry. The latter, more idealistic view, would lead to the use of tools in creative and social production processes, employing 'intermediate' technology that is small in scale, manageable, and people-friendly. This Buddhist economics is not averse to increasing material well-being: 'the ownership and the consumption of goods is a means to an end, and Buddhist economics is the systematic study of how to attain given ends with the minimum means. Modern economics, however, considers consumption to be the sole end and purpose of all economic activity, taking the factors of production – land, labour and capital – as the means.'<sup>46</sup> Schumacher addressed problems that were taken up later by environmental economists.

*Sustainable development* was defined by the Brundtland Commission as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'.<sup>47</sup> The concept originally emerged from a document of the International Union for the Conservation of Nature (IUCN, 1980), as an attempt to bring together concerns over the conservation of nature and development. Pearce *et al.* (1989) explain the term 'sustainable development' as made up of three core aspects: when compared with more classical approaches to economics, (a) it pays more attention to the value of the environment, (b) it extends the time horizon to include next generations, and (c) it addresses questions of equity among people now and also questions of intergenerational equity. The implications of this for how economics is seen and operationalised are vast.

Pearce *et al.* (1989) address the problem in classical and neo-classical economics that certain social and environmental costs remain external to actual prices as determined in markets. Gupta and Asher (1998) write that 'an externality occurs when action by an economic agent ... unintentionally affects the welfare of other economic agent(s) without being incorporated in the market price'.<sup>48</sup> This happens often to environmental resources, either when pollution occurs or when resources are mined. Besides capital wealth, locked up in infrastructure and productive goods, environmental economics looks at *natural capital*, for example stocks of water and forest, and then confronts the problem of valuing these environmental stocks. Such stocks are difficult to value until prices of environmental services from those stocks (such as logging or fishing) are revealed in the market place through buying and selling.

However, many doubt that markets can determine true values of environmental resources, for example because future values and generations of people are not represented in today's markets. There is no guarantee that

an environmental good will not be damaged or depleted before demand is high enough to push up prices and limit consumption. Another complication discussed by Pearce *et al.* (1989) is risk and uncertainty, i.e. the risk of (environmental) damage, unrecognised in the present, that future generations must deal with. The authors conclude that 'anticipatory environmental policy' is to be preferred over 'reactive environmental policy', i.e. polluting and consuming at will, until the problems have grown so great that dealing with them can no longer be avoided. The latter approach is commonly associated with 'technological optimism', that is, the task of dealing with the problem is postponed in the hope that future generations will invent and mobilise technologies that can solve the problems caused in the past and present.

They also challenge earlier ideas that economic growth, usually measured as GNP growth, would necessarily suffer from an anticipatory environmental policy. They accept some trade-offs, but argue that economic growth can improve through the improved health of the workforce, jobs in environment-related tourism, and jobs in pollution control and clean-up campaigns. With many others, they criticise the use of the gross national product (GNP) as an indicator of wealth creation and economic growth. They argue that increased GNP suggests improved standards of living, even though it may be caused by an increase in pollution-related expenditure on health care, while a decrease in (i.e. depreciation of) environmental capital is not incorporated.

Pearce *et al.* (1989) argue that economic development (as distinct from economic growth) usually involves three sets of societal changes: (a) improved utility or well-being, made up in particular of income and environmental quality; (b) advances in skills, knowledge, capability, and choice; and (c) increased self-esteem and independence.<sup>49</sup> This echoes Schumacher's (1973) ideas about the function of work and employment in Buddhist economics. Pearce *et al.* (1989) equate sustainable development, however, with sustainable utility, meaning that 'well being of a defined population should be at least constant over time and preferably increasing'.<sup>50</sup>

They offer a choice between what others have called *weak and strong sustainability*: the former is about the next generation inheriting a total stock of wealth (natural and human-made assets) that is equal to or better than the current one; the latter is about the next generation inheriting an equal or better stock of natural assets. The central issue in choosing between these extremes is that natural and human-made assets need to be substitutable. For example, the loss of a species, of topsoil, or of a forest would be substituted for, say, a better habitat for people, high and sustained food production with

non-natural inputs, and alternative livelihoods for forest dwellers. It is obvious that trying to compare the value of the existence of an animal species (that may or may not be used by people) or forest-dependent traditional livelihoods, with (say) the convenience and economic value of a motorway is an almost surreal endeavour, but that is what economists do, and must do for practical reasons. Spiritual values that people may attach to natural resources (for example ancestral domains, or certain animals) usually do not feature at all in economic assessment, other than indirectly through market prices and government regulation (governments can protect certain areas or restrict commercial use of natural assets on the basis of political preferences, which go beyond economics).

According to most thinkers in this field, including those who hold a 'weak sustainability' position, inheriting an equal or better stock of total wealth can happen only if, for example, the proceeds of logging natural forests are used to build up other assets, and not for direct consumption. It is also generally agreed that there are other – sometimes unknown – functions of the natural forest, besides the supply of timber, and there is the problem that some environmental changes – such as the extinction of an animal species – are irreversible, whatever the technology of future generations. If sustainable development is taken to mean no reduction in environmental or natural capital (i.e. the 'strong sustainability' view), one accepts the irreversibility and non-substitutability of some assets, the uncertainties and risks involved in environmental change, and the fact that technological development cannot be fully predicted nor be expected to solve all problems. Maintaining natural capital is particularly important for people who live on the edge of survival, and who depend for their livelihoods on resources in their immediate environments. Pearce *et al.* see this as an issue of intragenerational equity. However, poor people have little capacity to forgo consumption and substitute natural capital for other assets; in other words, they cannot easily aim to pass on similar natural wealth to the next generation and thus hand over an equal standard of consumption and survival potential.

Going further on the topic of sustainability, Pearce *et al.* borrow from agro-ecosystems analysis, seeing the sustainability of economic systems as their ability to maintain productivity under stress: the conservation of natural capital leads to increased resilience of economic systems, because it provides a flow of services to the economic system. They have come close to a 'strong sustainability' position as far as some environmental resources are concerned, which they have called 'critical capital'. They would like to see those resources conserved through (a) government regulation (for example standards for maximum pollution; exploitation permits); and (b) market-based instruments like taxation, subsidisation, and tradable permits for

resource use and harmful emissions. However, they promote substitutability even for exhaustible resources. A third set of instruments of authorities is (c) those based on awareness and voluntary behaviour. Pearce *et al.* argue that practical economics cannot be conducted if a natural resource or 'the environment' is given an infinite price, which would mean that 'environmental assets somehow lie outside the realm of money values. ... [This] poses as many problems as it is supposed to solve since, quite clearly, people do have preferences for environmental services and do express them in money terms'.<sup>51</sup> We can conclude, then, that it should be possible to find environmentalists and economists who choose a more radical path to conserving environments and environmental capital.

So, as some criticism of environmental economics implies, what is the use of all this for developing countries and poor people? Are the latter not simply concerned with survival, and are developing countries not perfectly right in claiming that they need to substitute natural, environmental capital for consumption – in other words, is environmental economics an unaffordable luxury? Even the 'weak sustainability' argument leads to the conclusion that it is equally important for industrialised and developing countries to ensure that depletion of natural capital results in sustained economic activity, and that it is not merely consumed, unless survival is at stake. It is important to ensure that valuation of environmental resources happens in developing countries, because they too confront the future, and will want to avoid medical, infrastructural, and clean-up costs that may set them back after initial economic progress. Economic development is more important than unbridled economic growth.

Gupta and Asher (1998) argue that degradation of water, land, and air reduces the productivity of people and natural resources, with a potentially adverse effect on food security and the provision of other basic necessities – and that could lead to inflation. Ecological and economic linkages are multiple and complex, and many of the environmental change-processes are external to the market system, but not external to the economy, which is possibly even more true in developing countries than in the industrialised world. Governments of developing countries have an immediate interest in guaranteeing at least the survival of their populations and indeed of optimising the environment–economy links. In urban areas, human health is central to this, and therefore measures to reduce pollution and ensure good water supply, sanitation, and protection from mudslides should be seen as a basic right as well as a national economic necessity. In rural areas, maintaining the quality of natural resources on which primary producers depend for their livelihoods is vital, but unfortunately authorities do not always appreciate their value.

## **2.3 Questions of vulnerability**

Before discussing sustainability (in section 2.4), we need to explore the role of nature and environments in the more extreme of situations – those where very little is or can be sustained. The first sub-section asks how natural or environmental disasters actually are caused. The environment can be the object of struggle and war, and the means of survival, as subsection 2.3.2 shows. The effects on the environment of disasters that involve large displacements of people are discussed in section 2.3.3.

In the situations discussed in this section, theories of environmental economics are less relevant in an operational sense, although it is obviously critical that economists should help to assess the human and material costs of failures to mitigate disasters. Political ecology has contributed to our understanding of some of the processes that lead to complex crisis, with a mix of environmental degradation, economic decline, and political violence. Ideas from the field of gender, environment, and development (GED) also remain important, both in order to understand the differing impacts of disasters on women, men, various castes, and social classes, and to assist in the targeting of mitigating responses. The physical causes and effects of environmental disasters are obviously the terrain of the natural sciences.

### **2.3.1 More or less natural disasters**

Many have tried to define what makes a certain event, a catastrophe or natural disaster, into a human disaster. Most stress that a disaster needs to be seen as a socio-economic phenomenon that may be extreme but is not necessarily abnormal, and in which 'community structures and processes temporarily fail'.<sup>52</sup> Human disasters happen when some hazard or shock strikes and when the vulnerability of individuals and groups is so great that they cannot cope with it. They cannot withstand the shock (that is, they have limited *resistance*), and cannot easily recover from it (that is, they have limited *resilience*).<sup>53</sup> This explanation does not define disasters in a precise way and does not clarify exactly when some human crisis can be called a disaster, but it obviously relates to the more extreme of cases, when lives are at risk and indeed lost, and when the scale and extent are very significant.

#### ***Types of disaster***

Section 5.3 considers the phenomenon of global climatic change and increasing concerns about the impact of human actions, in particular the use of fossil fuels. The increase in the frequency and severity of disasters is associated with people-induced climate change, in particular floods, cyclones,<sup>54</sup> and droughts. The severity and occurrence of other 'natural'

hazards, in particular river floods, can also be influenced by people. Such floods are enhanced by deforestation and urbanisation of the upper reaches of river basins and also by canalisation, which reduces the natural flood plain and thus the water-storage capacity of rivers. Some disasters are entirely created by people, and others are not at all related to human activity, or in other words they are disasters that could be seen as totally natural.

A useful typology or overview of disasters should take a social perspective into account and must distinguish between different vulnerabilities of different groups of people. It also needs to be practical and embrace the possible range of mitigating responses, and not simply list the types of hazard that contribute to human disasters. Table 2.1 is an attempt to construct such a typology. It is evident from this exercise that nature or environment plays a central role in both enhancing vulnerabilities and generating actual hazards or shocks. The five main categories of disaster are distinguished mainly by the cause of the hazard: (a) natural disasters; (b) less natural disasters; (c) industrial disasters; (d) human displacement following war; and (e) slow-onset disasters. The box does not present the range of socio-political mediations that can increase vulnerability and translate a hazard or risk into an actual human disaster, a subject that is discussed in chapters 3, 4, and 5.

**Table 2.1: A typology of disasters**

<b>Hazard: cause and symptoms</b>	<b>Vulnerability: who and why?</b>	<b>Response and immediate mitigation potential</b>	<b>Environmental impact and livelihood recovery</b>
<b>Natural disasters</b> volcanic eruptions, earthquakes, and related tsunamis (flood waves)	<ul style="list-style-type: none"><li>• People living on/near to slopes of volcanoes</li><li>• Poorer urban people in crowded and built-up inner cities</li><li>• Fisher people and others living near the coast, especially poorer people outside sea-defence structures</li></ul>	<ul style="list-style-type: none"><li>• They strike unexpectedly but in known geographical regions.</li><li>• Life-saving is always a first priority, and very few choices can be made or measures taken that reduce the immediate impact on livelihoods and environment.</li><li>• Protection and preparedness are possible but costly.</li></ul>	<ul style="list-style-type: none"><li>• Impact on nature and environment is rarely irreversible (e.g. in terms of extinction of species or topsoil erosion).</li><li>• Chemical installations may be damaged and cause long-term pollution.</li><li>• Physical infrastructure can be rebuilt, depending on human and financial resources.</li><li>• Market-based livelihoods may take a long time to recover.</li><li>• Agricultural subsistence can recover comparatively easily.</li></ul>

**Table 2.1:** A typology of disasters (continued)

<b>Hazard: cause and symptoms</b>	<b>Vulnerability: who and why?</b>	<b>Response and immediate mitigation potential</b>	<b>Environmental impact and livelihood recovery</b>
<b>Less natural disasters, enhanced by anthropogenic causes:</b> floods, cyclones, droughts, forest fires	<ul style="list-style-type: none"> <li>• People in coastal areas and valleys</li> <li>• People in poorly constructed houses and huts</li> <li>• People who are dependent on the informal economy</li> <li>• All those without insurance</li> <li>• People involved in subsistence agriculture and small-scale fishing</li> </ul>	<ul style="list-style-type: none"> <li>• They strike unexpectedly but in particular geographical regions, possibly more frequently in 'El Niño years', so that tentative warning is possible.</li> <li>• Life-saving is always the first priority, and some choices can be made and measures taken that reduce the immediate impact on livelihoods and environment.</li> <li>• Protection and preparedness are possible, and not all measures are costly.</li> </ul>	<ul style="list-style-type: none"> <li>• Impact on nature and environment can be irreversible, for example in terms of topsoil erosion.</li> <li>• Positive impacts of floods can occur (e.g. improved soil fertility<sup>55</sup>), and negative impacts on flora and fauna may be slow to become apparent.</li> <li>• Chemical installations may be damaged and cause long-term pollution.<sup>56</sup></li> <li>• Physical infrastructure can be rebuilt, which depends on human and financial resources.</li> <li>• Market-based livelihoods may take a long time to recover.</li> <li>• Recovery of agricultural subsistence and market-oriented production may require very substantial support.</li> </ul>
<b>Industrial disasters:</b> oil spills, nuclear-plant failure, chemical-plant failure, pollution from mining, etc.	<ul style="list-style-type: none"> <li>• People in poor housing, living near industries, mines, and power plants</li> <li>• People with little political influence and financial insurance</li> <li>• Farmers and subsistence producers, e.g. those living along oil pipelines<sup>57</sup></li> </ul>	<ul style="list-style-type: none"> <li>• They strike unexpectedly, but places and risks are known.</li> <li>• Life-saving may be a first priority, but in many cases measures to limit the environmental impact come first.</li> <li>• Protection and preparedness should happen and are normally enshrined in law; these costs should be internalised in industrial production.</li> </ul>	<ul style="list-style-type: none"> <li>• Much of the environmental impact is toxic pollution and either irreversible or extremely difficult, costly, and slow to repair.</li> <li>• Physical infrastructure can be rebuilt, which depends on human and financial resources.</li> <li>• Health impacts will limit people's ability to recover their livelihoods, urban and rural.</li> <li>• Agriculture and fisheries may have been made impossible, and relocation or alternative livelihood opportunities are needed.</li> </ul>

**Table 2.1: A typology of disasters (continued)**

<b>Hazard: cause and symptoms</b>	<b>Vulnerability: who and why?</b>	<b>Response and immediate mitigation potential</b>	<b>Environmental impact and livelihood recovery</b>
<p><b>Human displacement</b> caused by war, and possibly compounded by environmental hazards</p>	<ul style="list-style-type: none"> <li>• Particular ethnic or political groupings</li> <li>• Especially the poorest; women, children, and the elderly</li> </ul>	<ul style="list-style-type: none"> <li>• Do not usually happen unexpectedly, although the scale may be a surprise.</li> <li>• Life-saving is often the first priority and is intrinsically linked to environmental health factors, which are in turn strongly influenced by site planning for refugee camps.</li> <li>• Protection and preparedness can be difficult and should involve host populations and authorities.</li> </ul>	<ul style="list-style-type: none"> <li>• Most environmental impact will be on renewable natural resources, in particular trees and forests. Minor irreversible environmental impacts are possible, such as depletion of confined groundwater aquifers or displacement into conservation areas.</li> <li>• It is vital to minimise environmental health risks: good water supply, sanitation, and waste disposal are priorities.</li> <li>• Livelihoods are usually limited to some local trade and employment and rarely subsistence production; people's basic needs need to be supplemented heavily over longer periods of time.</li> </ul>
<p><b>Slow-onset disasters</b> that are triggered by minor hazards but caused by gradual degradation in resources and socio-political processes</p>	<ul style="list-style-type: none"> <li>• The lower classes or castes, or otherwise excluded people</li> <li>• Subsistence producers, often women-headed households and elderly people</li> </ul>	<ul style="list-style-type: none"> <li>• Slow build-up of crisis can be monitored and full crisis predicted.</li> <li>• Life-saving may become first priority once the full crisis is triggered, but before that a wide range of mitigation measures is possible, including those that limit degradation of local productive resources.</li> <li>• Protection and preparedness should be linked with efforts to reverse the gradual degradation and can be comparatively straightforward and affordable.</li> </ul>	<ul style="list-style-type: none"> <li>• Environmental degradation can be irreversible, including topsoil loss and chemical pollution.</li> <li>• People will normally explore a wide range of survival strategies, including going hungry, eating wild foods, petty trade, selling livestock and other productive assets, and (temporary) migration; these can be supported in many different ways, including employment programmes such as infrastructure development through food-for-work or cash-for-work schemes.</li> </ul>

Development agencies in general and NGOs in particular respond in varying ways to human disasters, as suggested in Table 2.1. The actual response depends of course on the scale of the disaster, and on various contextual realities. For example, where local activists and NGOs are well established, it is possible to campaign for more safety and better adherence to environmental standards to prevent industrial and mining hazards, and in case of an industrial disaster to campaign for better compensation for victims. An example is the chemical disaster at the Union Carbide plant in Bhopal in India in 1984.<sup>58</sup> In the case of slow-onset disasters, development agencies tend to support forms of sustainable agriculture, community-level mediation and social development efforts, and/or employment programmes that support the poorest people and the local economy. These initiatives may be implemented by and through local agencies or by international development agencies themselves. Response to large-scale acute disasters usually comes from emergency specialists employed by governments and also by private companies and NGOs, from anywhere in the world. The United Nations has a special unit – the Joint UNEP/OCHA Environment Unit, based in Geneva – that aims to help to improve international response to environmental disasters, acts as a clearing house for information, and can mobilise some support. In the world of NGOs, Green Cross International, also based in Geneva, and its national affiliates have response to environmental disasters at the core of their mandate.<sup>59</sup>

***The incidence of disaster: looking into the future***

As population numbers increase, especially in hazard-prone areas, the impact of environmental disaster is also increasing, and, with deepening poverty and inequality in some parts of the world, the ground is becoming more fertile for slow-onset disasters involving large numbers of people. There is also a legacy from earlier days with a potentially lethal impact, in particular the threats to health and the natural environment that stem from very highly polluting industry, nuclear, chemical, and biological weapons manufacturing in the former Soviet Union, and also frequent oil spills.<sup>60</sup> The risks in that region are particularly enhanced by economic and political crises that make it almost impossible to address such problems effectively. Economic growth in other parts of the world involves externalities that are often ignored, including those related to pollution and to risks associated with mining and dam building.

Internal and international tensions (sometimes leading to war) that are linked to conflicts over environmental resources are impossible to predict; it depends on extremely complex socio-political mediation whether scarcity results in violent conflict or not. Nevertheless, the future will bring more population, scarcer resources, more inequality, and therefore more potential

for conflicts. Conflicts of interests between North and South, as illustrated by greenhouse-gas emissions, and so-called solutions such as carbon trading, are unlikely to be settled through violent conflict, unlike the struggle for control over oil supplies, which was a key reason why the USA and its allies fought the Gulf War against Iraq. Regional conflicts over resources such as river water are more likely, although they will in many cases be settled through negotiation over long periods of time.<sup>61</sup> The biggest potential exists for internal conflicts over local and national resources such as land, minerals, water, forests, and fisheries – but these conflicts will be complex, with a range of causes. (Some examples are discussed in section 5.2.)

The coasts of poor countries in the Caribbean and Central America, of Bangladesh, India, Vietnam, and many others will continue to be hit by tropical cyclones, and possibly more frequently in future. The Andean region, Central America, and various countries in South-East Asia and elsewhere will continue to experience earthquakes and volcanic eruptions, and more and more people will be obliged to live in the critical zones. Drought and floods may worsen in parts of Africa, Indonesia, Brazil, the Andean Region, and elsewhere. Urbanisation and economic growth will increase the risks of industrial disaster all over the developing world.

The vulnerability of large groups of people depends on non-natural and non-environmental factors, although physical structures offer essential protection and means of escape in many instances. Income, general economic development, and reasonable levels of social equality and political influence are far more decisive in this respect. When compared with the situation 30 years ago, Bangladeshis are now far better informed of the risk of severe river floods or tidal waves associated with cyclones in the Bay of Bengal, and escape routes and structures are gradually improving. Over the next three decades, many millions of people will be affected by the power of extreme floods, and tens of thousands, if not more, are likely to perish. Even though the situation is improving in Bangladesh, the levels of suffering there for generations to come will remain out of all proportion to the problems experienced in rich-country (and also highly populated) flood plains and deltas such as The Netherlands. Alert systems to give warnings of tsunamis and earthquakes in Japan and hurricane warnings in the USA are far more effective than (for example) the preventative measures and early warning systems of which the governments of Central America and most Caribbean States are capable. Furthermore, the people in the latter States have generally no insurance cover to help with the cost of rebuilding infrastructure and homes.

Besides measures for mitigation, preparedness, and prevention, there are situations in which the impact of a hazard appears to differ according to the livelihood and land-use strategies that were in place before the disaster. There

are livelihood strategies that reduce vulnerability, in particular in an environmental sense. Holt (1999), for example, reports that initial assessments in Honduras and Nicaragua following the devastation caused by Hurricane Mitch in 1998 suggest that farmers who followed a sustainable agriculture strategy with water-conservation measures and agro-forestry practices may have achieved higher agro-ecological resistance. However, in the most severely affected areas, the levels of destruction experienced by farmers who took part in the *campesino a campesino* (farmer to farmer) extension programme were not detectably less than those encountered by farmers not included in the scheme: beyond a certain threshold, differences in agricultural practices no longer matter in terms of the devastation caused by a cyclone.

*Early warning* refers to a range of systems for data collection, analysis, and communication. This range goes from elementary, community-based systems of observation and communication to highly sophisticated systems involving satellite observation and communication, computer simulation, and scores of specialists. They are particularly geared towards the advent of famine, tropical cyclones, and floods. Famine is not primarily a natural disaster, or even a less-natural disaster, but created by a complex web of factors that reduce the entitlements to food of particular groups of people.<sup>62</sup> Some of those factors are related to climate and agriculture, but the all-important political, market, and social factors make early warning by observation from satellites a perilous undertaking. Nevertheless, early warning of natural or less-natural hazards enables governments and aid agencies to act in a timely way, and tools are also available to spot signals from market behaviour and trends in nutritional status. The range of tools for obtaining early warning of famine includes systems put in place by NGOs and some governments to collect quantitative and qualitative information, with semi-participatory monitoring techniques (known as risk mapping, livelihood monitoring, or the livelihood-economy approach) to survey nutrition, markets, and agricultural production. Governments and international organisations such as the FAO and WFP also analyse satellite images and monitor rainfall to predict crop yields, and recently have begun work on drought prediction in relation to the so-called El Niño phenomenon (see also chapter 5). It is generally agreed that the latter is extremely useful, if complemented by detailed local information on nutrition and markets. Indicators of increasing vulnerability and the severity of hazards must be relevant for the authorities, the people directly affected, and the communications media alike.<sup>63</sup> Above all, the nature of disaster-risks needs to be understood in its local manifestation for any risk-management strategy to be effective.<sup>64</sup> These risks are clearly greater for the poorer, for the less powerful, often for women, and generally for excluded and deprived people.

### **2.3.2 Conflicts and natural resources**

Links between violent conflict and environmental resources are several. War destroys people, livelihoods, and environmental resources, besides targeting the opponent's means of waging war. Struggle over scarce natural resources, such as land, diamond deposits, or water can lead to conflict. Natural resources can equally play a role in sustaining warring parties, and also in supplying the means of survival for victims. An important and immediate effect of war is often the displacement of people, with natural resources being degraded as an effect of the huge and sudden pressures, but at least supplying some means of sustenance in the form of fuelwood, building materials, and sometimes food.<sup>65</sup>

#### ***The environmental impacts of war***

War can degrade the environment, besides killing and wounding people. Damage to infrastructure is an obvious effect, for example the destruction of bridges, airports, and factories. Destruction of chemical industries or, worse, nuclear installations or stores of biological and chemical weapons can also lead to unexpected and long-term health problems, as does the use of weapons containing depleted uranium. Several reports claim that such practices explain the high numbers of deformed babies born in Iraq following the Gulf War. Furthermore, smoke and carbon dioxide from burning oil wells during that war were emitted on a huge scale, with globally significant impact. Before this, in the 1960s and early 1970s, the USA used defoliants in the war against the Vietnamese: Agent Orange destroyed hundreds of thousands of hectares of forest. The forest cover in Vietnam has still not fully recovered, and the dioxins in the environment still cause deformities in newly born babies.<sup>66</sup> In the NATO war against Serbian domination and ethnic cleansing of Kosovo in 1999, petrochemical plants were bombed, and the resulting toxic pollution is expected to cause birth defects and cancer among people living in the vicinity of those plants for years to come.<sup>67</sup>

#### ***One cause of conflict among many***

Environmental resources are often the objects of struggle and war, and competition for resources is seen as an (increasingly) important cause of war. Environmental causes are, however, always part of a far more complex set of factors, and of a historical process. New theories of war-related and drought-related famine and population movement look at the driving forces and internal rationale of the situation, employing the terminology of 'complex emergencies' and 'slow-onset emergencies' (or disasters). This analysis makes use of ideas from political economy and resembles political ecology (see section 2.2.2). The idea is that economic and environmental decline, increased competition for resources such as land, together with other factors (slowly) erode the resilience of certain groups of people. A relatively minor drought,

ethnic or political confrontation, or other reason may then trigger violent conflict, displacement and/or famine. Such emergency situations are called complex because there is no single factor that is the cause of the crisis; causes include longer-term factors such as the breakdown of the State and a crisis in agriculture (deteriorating quality and availability of resources). What sustains a conflict and even a famine has been labelled the 'political economy of internal war'. It is essential when planning any kind of support for the losers to understand the interests of the winners, who institutionalise a political economy of war, and also to understand the wider economic and political forces that prevail. For example, the winners gain financially through (illegal) trade and accumulation of resources. People's survival strategies will include migration and the sale of assets (including land), so that the local situation changes drastically and permanently through the crisis, to someone's benefit.<sup>68</sup>

It is obvious that conflicts and their causes are complex and that contention over environmental resources or environmental degradation is a contributor to this complexity. The following is a suggested taxonomy of four aspects that are central to understanding causal links between environment and conflict:

- *trigger mechanisms* (as above), which include natural disasters, cumulative (environmental) change, accidents, and warfare;
- *political-geographical factors*, which show who and which levels of power and authority are affected by environmental change;
- *categories of environmental change*, including those affecting climate, land, water, fisheries, and forest;
- the *historical dimension* of society-induced environmental transformation.

All these aspects overlap, and a study of one can complement the study of others.<sup>69</sup> Nevertheless, workable hypotheses in the research of conflict-causation will have to focus on specifics in one or two of those groups. Research that follows does not need to make the case *that* environmental resources play a role in conflict (which is often evident); rather it needs to establish what their *relative importance* is. Furthermore, in the study of conflict one needs to take into account that parties involved are unlikely to understand the conflict fully themselves, and (false) images, 'conventional wisdom', and indeed fiction dominate. Such images can turn into unchallenged assumptions and may define the starting point of research into the causes of a conflict. For example, the idea of persistent drought in the Sahel in the 1980s was the unchallenged starting point in analysis of the border conflict between Senegal and Mauritania that broke out in 1989. This almost inevitably led to the conclusion that it was an environmental conflict. However, the story of that conflict can equally be told as an ethnic struggle, or one of struggle for Senegalese State power.

The causes of the extreme violence in Rwanda in the mid-1990s between extremist Hutus (who were guilty of genocide) and Tutsis and moderate Hutus (who retaliated against the crimes) included population pressure and competition for limited land among the predominantly rural population, according to many authors.<sup>70</sup> The land problem related (and possibly still relates) to the diminishing size of average family holdings, the fragmentation of plots, and the centralised control of land, combined with the effective existence of local land markets. Ethnicity is also an important factor in the history of Rwanda, and so are power struggles over control of the State and military. Control over the latter has for more than 100 years been in the hands of small, elite groups dominated by one or other of the two 'ethnic' groups (perceived as distinct, although Hutus and Tutsis share a common language, have intermarried a great deal, but were formally distinguished by colonial interests in the twentieth century). Nevertheless, the struggle for land and the lack of economic development are important causal factors too.

***Sustaining conflict, guaranteeing survival***

Natural resources are often important during conflict, sustaining warring parties and even fuelling the tension. An example of this is the mining of gemstones and logging of trees in Cambodia, and the trade in these resources that was conducted through Thailand, thus sustaining the Khmer Rouge guerrillas for many years. Natural resources can equally be the means of survival for those caught in the middle: environmental resources can thus offer alternative livelihood strategies (see the sustainable livelihoods framework presented in section 3.2). The following examples illustrate these roles of environmental resources in conflicts.<sup>71</sup>

The **civil war in Sierra Leone** in the early 1990s is a case where population growth and environmental degradation were *not* among the causes of war, but exploration and competition for natural resources like diamonds have contributed to social tensions and the recession of the State. Importantly, the ability to survive in rainforest (where much of the war took place) made an essential difference in the war. The rebel violence in Sierra Leone has been described as 'a mobilisation of youth on behalf of a small group of people angry at their exclusion from an opaque patrimonial system serving mineral extraction interests'.<sup>72</sup> Analysts assert that the key lesson to be drawn from this is that even during such a war, civil society must be supported and islands of peace must be built.

Also in West Africa, in Sinoe County in **Liberia**, an Oxfam project found in 1995 that insecurity and lack of production had forced people to eat palm cabbage, the tip of the growing tree. This constituted about 40 per cent of their diet, and this source was running out fast. Harvesting the palm cabbage means that the tree dies, and thus what is a key cash crop in normal years is

lost. Palm oil and palm nuts are important foods and cash crops in this area. Such a bio-diverse environment thus helps survival, but people's survival strategies can have a negative impact on long-term livelihood opportunities.<sup>73</sup> In situations such as this, alternative food sources or food aid must be supplied, to safeguard long-term interests.

In the **Horn of Africa**, people adopt a wide range of livelihood and survival strategies that intricately link them to their environments in situations of human insecurity.<sup>74</sup> People have an intimate knowledge of their natural environment, which serves their needs for construction, tools, medicines, spices, herbs, food supplements, and forage. They need bio-diverse environments in times of food crisis and war, which has been a reality for decades, especially in Sudan. Livelihood and survival strategies also include migration for purposes of work, trade, and the grazing of cattle. Relief agencies tend to have very limited understanding of these local and resource-related survival strategies, do not tap into them, and do not strategise to support them. People's survival strategies are disturbed by gradual changes in markets and other institutions as well as natural environments, and by shocks that may occur in the form of livestock epidemics, political upheavals, or drought. These may be the triggers that turn a violent but localised conflict into a large-scale disaster. Wild foods often form an important means of survival, but in the north-east of Sudan the mesquite tree (*Prosopis juliflora*), introduced by a forestry programme, invaded local environments and severely reduced biodiversity. War and political changes that restrict the movement of pastoralists, or government policies that promote forms of modern agriculture, are particular causes for reducing the resilience (i.e. increasing the vulnerability) of local people.<sup>75</sup> Development efforts must thus promote communication and mobility, and also land-tenure reform, sustainable agricultural techniques, and education in order to enable herders to develop alternative means of livelihood.

These examples and the associated recommendations suggest that supporting the (local) management of environmental resources, more or less equal access to and control over them, and support to improve the conditions for their sustainable use are of central importance, as they are also in situations of violent conflict. This should happen in particular through local people's participation, supporting their strategies and creating islands of peace through support for the elements of civil society that can deliver them. Education and support for the environmentally sustainable management of natural resources are also important, in order to improve prospects for both short-term survival and long-term livelihoods. These are not impossible dreams for outsiders to achieve, although it will be difficult: what is required first and foremost is a change in the mindset of relief agencies and a better understanding of local people's survival strategies.

### **2.3.3 Displaced people and environments**

Crises that affect large numbers of people, in particular those associated with violent conflict, tend to cause displacement of populations, which can have significant effects on their own environment and that of their hosts. In such cases, survival mechanisms that exploit local natural resources may degrade the environment in various ways as a result. Agencies and governments responding to the needs of displaced people can make various choices that affect the quality of local environmental resources, and enable displaced people to achieve a minimum level of sustenance, as is explained in the rest of this section.

Civil war has raged in **Sudan** almost continuously since 1955. This has caused people to flee as refugees to neighbouring countries or to remain in the country as internally displaced people (IDPs). Many of the latter have migrated to the capital, Khartoum, making up about a quarter of its population of almost four million. The military government that came into power in 1989 has responded to the massive presence of IDPs with forced evictions and relocation of hundreds of thousands of people to new sites on the desert fringes of the city. In those sites no water supply and sanitation services exist, there are no employment opportunities, and traditional livelihoods (agriculture, livestock keeping) are virtually impossible. The scarce natural resources such as fuelwood that were available have long been depleted. The weakest people remain dependent on feeding programmes, food aid, and health services supplied by the international community, just as in refugee camps, and their plight has turned into a long-term reality. The international development agencies have to work in a very adverse political climate if they are to achieve anything at all.<sup>76</sup>

Refugees fled in extremely large numbers from Rwanda to Kagera in **Tanzania** and Kivu in the **Democratic Republic of Congo** (former Zaire) from April 1994 onwards. Refugee camps holding several hundreds of thousands of inhabitants were created overnight, and large numbers of people died in the first weeks after crossing the international borders. The international community and also local authorities responded with food distributions, the installation of water supply and sanitation systems, and the provision of various other supplies, including fuelwood. Several camps were located in places of water scarcity, and some were close to an internationally renowned World Heritage Site, the Virunga rainforest. There were camps on volcanic rock in North Kivu, rendering the digging of graves and pit latrines almost impossible, which caused major environmental health problems. There were also large numbers of refugees camped in local schools, parks, and churches. Thus, to save lives, the immediate environment of the refugees and also some of the host population was the concern of highest priority.

More generally, the environmental impact of this enormous flux of people was significant, and it was negative: deforestation, water depletion, soil erosion, and urban destruction were among the impacts. However, only in some cases could the changes be seen as irreversible or very difficult to restore, such as some soil erosion in South Kivu and damage to a research centre where particular genetic crop materials were held, and the depletion of confined aquifers of groundwater in Tanzania. All the other impacts were on renewable resources, forests in particular, and renewal started happening on a modest scale even before the refugees returned home. Some time after the exodus from Rwanda, it was possible to move the refugees to other areas, where more resources and better conditions were available and the environmental impact would be limited, but this proved to be extremely difficult and costly. Pressures to move refugees out of towns were very strong, however, in particular because their presence was highly resented by the host populations. The environmental destruction in the wake of the refugees' arrival played an important role in this. A few agencies did mitigate the impact by distributing fuelwood from other places, promoting the use of efficient wood stoves, and carrying out some 'beautification' in, for example, Bukavu town (in South Kivu) after refugees had been relocated. Most refugees have now returned to Rwanda, but there, in the DR Congo, and in Burundi, low-level conflict continues, preventing the repair of damage and regeneration of the local production base on any significant scale, and producing a very serious threat to one of the world's most famous gorilla populations. In Tanzania more environmental regeneration has been undertaken, through (for example) reforestation initiatives, compared with the other affected countries.<sup>77</sup>

Extensive analysis of the relationships between environmental change, refugee migration, and sustainable development in a number of cases confirms that environmental impacts are localised, and that dispersal of refugees should be an important strategy in limiting environmental degradation. This is in part because in the case of huge camps 'the environment' can provide so little that the whole burden of providing for refugees tends to fall on donor governments and NGOs. Resentment by host populations is common, because they are often equally poor and vulnerable, and their environments are rapidly deteriorating, but they are not assisted by aid agencies. More generally, refugee camps need to be considered as small or even large towns, with similar environmental problems. Their economic and also environmental sustainability depends strongly on its economic base – something that is rarely given a chance to develop.<sup>78</sup>

Furthermore, it can be argued that humanitarian emergencies are *not* fundamentally different from other development situations, and that therefore

similar policy options, shaped by best practice in sustainable development and natural-resource management, should be applied.<sup>79</sup> However, this happens rarely in situations of forced migration, and initiatives of the UNHCR rarely refer to the notion of sustainable development. The explanation for this can be found in operational realities, which focus on logistics and outputs. The idea of encouraging participation by a range of actors in responses to disasters is often absent, because there is no economic incentive to do it, because local communities often lack social and political coherence, and because it challenges the professional status of agency staff. Analysis of the historical context of particular groups of people and geographical areas tends to be lacking for a range of reasons, and few development professionals acquire detailed environmental knowledge that would allow them to leave aside the blueprints that are often applied as standard responses (plant trees/promote improved stoves, etc.). Refugees rarely gain rights to employment or to use natural resources such as land in their host communities, which may be seen as a chance missed for the local economy and for local resource management. Despite the policies and efforts of governments and development agencies, whatever they are, local hosts and refugees are in fact doing the lion's share of natural-resource management. It is also important to note that in most cases the main burden of this management falls on women, with their central role in providing food, fuel, and water. This should be recognised by policy makers, who should respond in a supportive manner.

However, it cannot be expected that real participation and improved rights to environmental resources will automatically lead to good environmental management and social equity. Furthermore, ideas of 'strong sustainability' (see section 2.2.4) that put environmental resources and nature before human welfare and livelihoods should be rejected in circumstances of extreme human suffering, on ethical grounds, among other reasons.<sup>80</sup> Radical environmentalism stresses the interests of future generations of people and the 'non-use' values of nature, such as the mere existence of a community of monkeys in a remote forest. These are long-term concerns that cannot all be taken into account when short-term needs become so pressing (see also section 2.4.2).

## **2.4 Questions of sustainability**

This section questions further the concept of sustainable development, which has become strongly associated with notions of 'environment' and 'environmentalism'. Both parts of the term, *sustainable* and *development*, as well as the meaning of the two combined, are problematic, and there are differing views in North and South on its practical translations into processes of human progress.

The book *Our Common Future* (WCED, 1987) defined sustainable development (as quoted in section 2.2) and explored the concept in some detail:

*The concept of sustainable development does imply limits – not absolute limits but limitations imposed by the present state of technology and social organisation on environmental resources and by the ability of the biosphere to absorb the effects of human activities. But technology and social organisation can be both managed and improved to make way for a new era of economic growth. The Commission believes that widespread poverty is no longer inevitable. Poverty is not only an evil in itself, but sustainable development requires meeting the basic needs of all and extending to all the opportunity to fulfil their aspirations for a better life. A world in which poverty is endemic will always be prone to ecological and other catastrophes.<sup>81</sup>*

This means that the concept of sustainable development expresses an overall aim and position, for example regarding the fulfilment of basic needs of the poor; that it must recognise limitations in technology, social organisation, and environmental resources; and that endemic poverty and ecological catastrophes are linked, in some way. There are fundamental questions to be answered, including (1) how poverty and environmental degradation are linked, (2) what needs to be sustained in order to reduce people's vulnerability, and (3) how patterns of consumption and technology development should help to achieve that. These questions are discussed in the following subsections.

#### **2.4.1 Poverty and environmental degradation**

Work on political ecology 'has affirmed the centrality of *poverty* as a major cause of ecological deterioration ... [although] ... at best only a *proximate* cause of environmental deterioration'.<sup>82</sup> Political ecology looks at the complexity of interactions between people and environmental resources and rejects single explanations, for example that the growth of (poor) populations would either cause severe environmental degradation to the point of self-destruction (cf. Malthus; see section 2.1.1) or would be the automatic engine for technology development and innovation (cf. Boserup).

Many argue that wealth is a greater threat to the environment than poverty, but that there are ways in which poverty causes local environmental degradation too. For example, when poor people cannot afford fossil fuels, they will use dung and trees, and are thus forfeiting the opportunity to improve soil quality and are causing land degradation, in particular in arid regions. However, this degradation mainly affects the poor themselves, and contributes less to global environmental change than the alternative, which is the use of fossil fuels. Comparatively poor people with the means to cut

significant numbers of trees, who fish with dynamite that destroys coral, or who process leather (and pollute locally) may be blamed for local or regional degradation too. Large-scale deforestation, mining, and fishing are usually in the hands of big enterprises, controlled by the rich and often the more powerful from industrialised nations, but they can also involve large numbers of relatively poor entrepreneurs. This environmental decline does, however, happen in order to serve high-consumers who are reached through (international) markets.

Analysis of the causes of global warming and climate change and other global, international, or large-scale environmental degradation suggests that consumption by affluent peoples, in industrialised nations and increasingly in the developing world, is the main driving force behind environmental degradation. Air pollution and acid rain, ozone-layer depletion, climate change and sea-level rise, increased river flooding and the depletion of fish stocks, all such are caused by the very large 'ecological footprint' of high-consumption elites. Those consumers use the biggest share of the Earth's fossil fuels, consume much of its fish and forest resources, and most of the meat from livestock that is fed on high-quality fodder. All these resources usually come from far beyond the geographical boundaries of the countries where the consumers live. Better-off people and nations can afford not to be affected by environmental degradation. Pollution is transported to faraway areas, for example through good sanitation systems, and citizens of rich nations can afford to visit protected nature reserves. Their ecological footprint can be expressed graphically, for example as the forested surface areas that would be required to reproduce the fossil-energy that they consume or to operate as a sink to absorb the carbon dioxide that they produce by driving cars and running manufacturing industry: such notional surface areas are often many times bigger than the size of the countries or regions where the high-consumers live.<sup>83</sup>

As argued in section 2.3, the causes of environmental disasters are only in some cases entirely natural, and the potential impact of disasters has increased dramatically, because more and more people are obliged to live in volatile areas, ranging from flood plains to zones prone to earthquakes, on slopes of volcanoes and near to chemical factories and nuclear-power plants. Tokyo, Mexico City, Managua, and San Francisco are prone to earthquakes, yet they are all increasing in size. The people of Bangladesh are infinitely more vulnerable than those behind the dykes of The Netherlands. People in Florida can flee before hurricanes strike, insurance companies cover most material costs, and the US government can rebuild bridges. The impact of a similar hurricane in Central America is obviously different. Many more lives are lost, livelihoods devastated, and large-scale rebuilding funded by insurance money and government investment is not an option –

as was demonstrated by Hurricane Mitch, which hit Honduras and Nicaragua in 1998. Vulnerability to natural and other disasters thus depends strongly on levels of income.

In making generalisations about the poor and their relation to environmental change, it needs to be stressed that at all levels people are different, and have differing capabilities and access to resources. Bina Agarwal and other analysts (see also section 2.2) have argued the importance of differentiating relationships between people and environmental resources according to gender, class, caste, and age. This is important when considering whether poor people are victims or culprits of environmental degradation. Work on gender and environment and political ecology has also highlighted the need to uncover relationships between poor *urban* people and their environments. Unlike in rural areas, urban people depend less on their immediate environmental resources for their livelihoods, and they are less likely to degrade environments in attempts to survive in the face of severe stresses. In fact, poor people in large human settlements are often the ones who re-use and recycle, and thus limit the negative environmental impacts of cities as a whole.<sup>84</sup> However, their health is strongly influenced by pollution and bad living conditions, and their vulnerability to hazards such as earthquakes can be very high: in human settlements the notion of *environmental risk* must be central in analysis and policy.

#### **2.4.2 Reducing vulnerability and sustaining environments**

Vulnerability and its opposite – security – are concepts that are often invoked when ‘sustainability’ and ‘resilience’ do not seem to express the relative precariousness of livelihoods and environmental resources on which very poor people depend. When immediate survival has become more important than future prospects, sustainability may be dismissed as an irrelevant dream. Chambers sees vulnerability as one aspect of deprivation, associated with income-poverty, powerlessness, and isolation. Vulnerable people are those who ‘are more exposed to risks, shocks and stresses; and with the loss of physical assets and fewer and weaker social supports, they have fewer means to cope without damaging loss’.<sup>85</sup> Ecological diversity gives security and offers survival possibilities, and high diversity of environmental resources enables multiple livelihood strategies. For example, in a drought certain foods may not be produced by a family nor be available on the local market, but a comparatively diverse set of wild plants in a local forest can be substituted and thus help people to survive. In normal times, the bio-diverse forest may offer many ‘non-timber forest products’ that can be processed and traded, or used as medicine.

UNDP, in the *Human Development Report 1994*, articulated *human security* as follows. 'It means, first, safety from such chronic threats as hunger, disease, and repression. It also means protection from sudden and hurtful disruptions in the patterns of daily life – whether in homes, in jobs or in communities'. Threats to human security are categorised as related to economic security, food security, health security, environmental security, personal security, community security, and political security.<sup>86</sup> UNDP has also outlined the concept of *sustainable human development*, which is a broader concept. It is compatible with most interpretations of sustainable development, for example in the fact that it addresses issues of intragenerational and intergenerational equity. It is supported in a practical way by indicators and data that provide the human development index (HDI), with offshoots, i.e. indexes that provide comparisons between countries in terms of the relative vulnerability and poverty of their peoples.<sup>87</sup>

If environmental resources and disasters are so important to livelihoods and human security, and sustainable development should capture that, then we must ask *what needs to be sustained?* Economists want utility to be sustained; health professionals want human health to be improved; social scientists want institutions to be reproduced and sustained; ecologists want species and ecosystems to be conserved. Critics like Sachs (1992) have argued that the concept of sustainable development is an attempt to incorporate environment in the otherwise unchanged goal of GNP growth: despite new rhetoric, it is mere growth that is being sustained. This required a process of 'blaming the victim': 'the poor were quickly identified as agents of destruction', and 'the environment could only be protected through a new era of growth'.<sup>88</sup> Worster (1993) finds it deeply problematic that the sustainable development concept does not provide a clear timeframe: *to sustain something until when?* Ten years from now, a thousand years, a million years? Furthermore, what needs to be sustained also depends on the level of aggregation: should the country sustain its total forest-stand, or should every village do so? In a constructive contribution to this debate, environmental economists write that sustainable development should imply 'that future generations should be compensated for reductions in the endowments of resources brought about by actions of present generations'<sup>89</sup> – this would be based on constant capital that can guarantee constant (or improving) welfare.

Most would agree that it is necessary to sustain health, utility (i.e. welfare), environmental resources, and more. Besides environmental sustainability, which implies sustaining some form of natural capital, it is possible to distinguish economic sustainability, and for example social sustainability, for which social capital would need to be sustained. *Social capital* has emerged as an important analytical concept in the past decade, and can be seen as

something like the strength (or capital) that is made up of trust, norms, and more generally social cohesion, through the existence and functioning of social networks and civic participation in politics – high social capital brings benefits to all concerned. In this way it may be seen as essential for the management, reproduction, and evolution of a society.

Dobson (1998) analysed different interpretations of the need to sustain environments and nature. He developed a typology of three broad types of *environmental* sustainability, of which in fact only the first one is entirely anthropocentric, that is, primarily concerned with human welfare and therefore fully consistent with most notions of sustainable development. In summary, Dobson's three types of environmental sustainability are the following:

- **Type A:** This is the '**critical natural capital**' type of environmental sustainability, concerned with sustaining natural resources (capital) that are 'critical to the production and reproduction of human life'. Critical capital can be either renewable or non-renewable; if it is non-renewable, it can still be substituted, such as fossil fuels that can be substituted with energy sources from already existing technology. Critical capital can also be non-substitutable and non-renewable, in which case protection remains the only option for sustaining it.
- **Type B:** This is the '**irreversible nature**' type of environmental sustainability. Degradation of some parts of nature cannot be reversed, and adherents of this type hold that those parts cannot be substituted, even though they may not necessarily be critical for human beings. Compensation for this irreversible loss is impossible, and protection is an important strategy. Human welfare is central, but parts of nature are accorded an intrinsic value that goes beyond human utility. Attempts to price nature could still be acceptable, in other words: work by environmental economists is still seen as important.
- **Type C:** This is the '**natural value**' type, which values the non-human natural world in its own right; its objective is to sustain 'natural value'. It operates outside the realm of economics: there is no talk of capital, and thus no possibility of substituting for other capitals. Compensation for the loss of some natural aspect by another is not seen as possible either. Renewal of nature is possible only as far as it is renewal through the dynamics of ecosystems. This can be seen as 'absurdly strong sustainability' and is motivated by a sense of 'obligations to nature', mainly for protection. In this group we find many supporters of deep ecology (see section 2.1).

Chapter 3 on sustainable livelihoods discusses the use of five capitals in practical analysis: social capital, human capital, technological capital, physical capital, and natural capital. In this wider set of capitals, the question of substitution between them is discussed, because the main challenge is to sustain a good level of total capital.

### **2.4.3 Consumption and technology**

So how can all these capitals be sustained, and poor people's vulnerability be reduced? Harrison (1992) proposes a model for assessing *environmental impact* as a result of changes in population, consumption, and technology, which are the main forces that affect environmental change and human vulnerability. Consumption is, in his view, extremely difficult to curb and must be minimised through changes in values and culture. He explains that population is very difficult to influence in a direct way too, and he argues that positive effects can be expected from guaranteeing women's rights, provision of good health care and family-planning facilities, poverty alleviation, more equal distribution of assets, and economic growth. He follows Boserup in seeing population growth as a driving force for technology development, particularly in times of (environmental) crisis (see also section 2.1). Environmental impact can and must thus be minimised, mainly through technological developments that reduce environmental stress.

However, from the analysis of Ekins (1993) it becomes clear that it is highly unlikely that technology development alone could solve current and future environmental problems. In line with proponents of the 'ecological footprints' approach, he has shown that the assumptions made in the Brundtland Report and subsequent discussions about the potential of technology development as a panacea for enabling the poor to consume at similar levels to the better-off are merely utopian unless the rich radically reduce their excessive consumption levels. His analysis is strongly based on the consumption of and pollution from fossil fuels.<sup>90</sup> That technology development would enable poorer populations to consume what industrial nations now consume is equally rejected by Ullrich (1992), but there are technological optimists, politicians and scientists alike, who are hoping for miracle technologies that could solve the problems of energy consumption and its polluting effects by means far less risky than nuclear energy.

Policies of governments and the international community to reduce the impact of consumption, develop ecologically less destructive technology, and make it more possible for poorer people to take part in more consumption can be categorised in three groups: (a) regulation, including tough (internationally agreed) standards for energy consumption and pollution; (b) market-based policies, including fiscal policies that provide

incentives for reduced resource-consumption instead of taxing labour, and subsidisation to encourage the transfer of clean technologies from industrialised nations to developing countries.<sup>91</sup> Finally, (c) government policies can help to raise awareness and persuade industry and consumers to change their behaviour, including that related to environmental impact. However, such policies and the solutions that are implied by them do not necessarily help all poor people and all environments, nor help to recover the wider, social-cultural values of technology.

Technologies are 'bodies of skills, knowledge and procedures for making, using and doing useful things ... technologies are cultural traditions developed in human communities for dealing with the physical and biological environment, including human and biological organisms'.<sup>92</sup> In this sense technology is very much part of human creation and activity, but in modern industrial society a huge gap has appeared between the creator-inventors and the users of technology. Technology has often lost its (local) cultural value and has internationalised with the economy: it has been reduced to a matter of production and consumption only, and can be seen as the main driving force in modern economic development. The strongest expression of this is, of course, in manufacturing industry. That this is also very dependent on fossil fuel has provoked the comment that 'the essential lie of the industrial system [is] the pretence that the material prosperity ... was "created" by industrial production, by science and technology'.<sup>93</sup> Fossil fuels are the main engine for almost all material prosperity, including food production. They were created over hundreds of millions of years and are being depleted in no more than a few centuries. They are also the main source of waste generation (plastics), atmospheric pollution, and climate change.

Development agencies often work *with* deprived and marginalised people (i.e. they pursue participation) in order to develop and adapt technologies that are relevant for them. They do not, however, always appreciate the importance and the implications of technological development: the 'impact [of NGOs] on the development of technological capability can be contradictory'.<sup>94</sup> Nevertheless, there are increasing numbers of (grassroots) successes in the North, South, and East in the search for technologies and organisational structures that go halfway between a total absence of technological innovation and the adoption of alienating, wasteful, and unsustainable technologies.<sup>95</sup> Increasing productivity in a people-friendly and environment-friendly way is, however, often criticised, in particular by political leaders in developing countries, as an attempt to allow industrialised countries to continue with high levels of consumption, dominate markets as producers, and deprive Third World populations of the chance to modernise and 'catch up'.

#### **2.4.4 Environmental myths**

The existence of historical overviews and theoretical frameworks, and the wealth of experience in addressing human vulnerability and attempting to improve the sustainability of development, as summarised in the previous sections, does not mean that all those lessons have been learned by everybody. A number of environmental myths persist among development professionals and others, including the following.

##### ***Myth 1: Poverty and population growth cause environmental degradation***

In fact, a minority of high-consumers are mainly responsible for global environmental degradation and, through markets, also for much local environmental degradation in areas where poor producers try to make a living (see also section 2.4.1 on ecological footprints). There is a large and growing body of evidence that some of the poorer people of the world, in particular in developing countries, actually restore degraded environments, and even create what was earlier perceived as purely natural capital. Increased densities of trees are associated with increased densities of people in parts of Kenya.<sup>96</sup> Comparatively poor people traditionally created patches of forest in the savannah of Guinée in West Africa, which challenges the orthodox view that the reverse would have been happening in the twentieth century, i.e. that the desert was entering the forests as a result of (poor) people's activities.<sup>97</sup> Moreover, the poorest may not be the ones to suffer environmental degradation, nor the ones from whom environmental regeneration should be expected. In a rural community in Vietnam, for example, 'the very poorest families, women and men, in Lung Vai commune did not take much part in the environmental change, whether negative or positive, and whether as culprit, victim or restorer of degraded environments'.<sup>98</sup> The relationship between numbers of people and degrees of environmental degradation is thus not at all as simple as Malthus would have had it (see also section 2.1.1): with more people, new and different ways of using and managing resources may be developed, and population growth does not need to be a problem at all.

##### ***Myth 2: Equity, participation, and environmental sustainability go hand in hand***

In 1992, in connection with the Earth Summit, some development agencies promoted the strategy of Primary Environmental Care (PEC). This consisted of three core aspects: (1) popular empowerment, (2) securing basic rights and needs, and (3) caring for the environment. PEC stressed also the 'vital role for women' and the need for 'a supportive national and international framework and the political will to tackle the obstacles to sustainable development'.<sup>99</sup> Unintentionally, the presentation of PEC came close to feeding the myth of

automatic synergy between more equity, more popular participation, and more environmental sustainability. Caring for the environment might result in strict forest conservation without any popular empowerment; basic needs can be met without empowerment and by means of environmental exploitation; and empowerment of some can lead to resource-exploitation, growing inequalities, and the deepening poverty of others.

Dobson (1998) asserts that 'systematic studies which show that poverty relief, rather than greater material equality is functional for environmental sustainability have not been made (nor, indeed, have studies which might show the opposite)', and 'despite sustainable developers' belief that distributive questions are key to sustainability, research to establish the precise nature of the functional relationship between such questions and environmental sustainability has not been carried out'.<sup>100</sup> We thus have little basis to argue that synergy does or does not exist between meeting basic needs (i.e. levels of equity) and environmental sustainability.

Participation and empowerment are discussed further in chapter 3, but it may be observed here that certain forms of empowerment *are* likely at least to help to improve local environmental quality. The Brundtland Report calls for securing property rights (in particular land rights) as a key issue on the road to sustainable development, which is possibly one of the least criticised recommendations that it made. The theories of political ecology and gender, environment, and development (GED) call for analysis of essentially complex situations, for participation of deprived and excluded people in political processes, and for continuous alertness to differences in impact on women and men, and people of different classes and castes (see section 2.2). The land manager of Blaikie and Brookfield can be expected to manage land better only if she is enabled by good policies and sees benefits now and in the future from doing things differently.

### ***Myth 3: Nature seeks balance***

The science of ecology, inspired by Linnaeus and Darwin, grew out of biology. In the twentieth century Frederick Clements and his successors developed the so-called 'climax' theory of vegetation (see also section 2.1). This theory proposes a process of succession of plant populations until harmony, balance, and a climax vegetation are reached. This will remain, in the absence of large shocks to the system from nature (for example volcanic eruptions, or climatic shocks) or interference of people beyond some critical point. An example of the latter was agricultural cultivation of the Great Plains in the USA without any measures to prevent soil erosion, which resulted in the Dust Bowl and economic devastation among the farming community in the 1930s.<sup>101</sup> The language of 'carrying capacity' and 'optimum yield' also fits in this context, i.e. the capacity of a particular ecosystem to sustain a certain extraction by people or livestock.

In recent decades the science of ecology has gone through major changes. Notions of balance, order, climax vegetation, and carrying capacity have been replaced with ideas of dynamism, chaos, and uncertainty (see also section 2.2.1). There is now also talk of ‘permissive ecology’, whereby ecologists do not just accept that ecosystems are affected by human use, but assume that shaping them by human interference is a right, if not a need – nature no longer sets the standard for what is good.<sup>102</sup> It has also led to a new way of looking at the interaction between pastoralists and their cattle and pastures in, for example, Africa. Pastoralists are no longer simply accused of irrationally degrading environments (i.e. causing desertification) by maximising herd sizes in times of water and vegetation availability. It is now accepted that pastoralists are acting rationally when they maximise herd sizes, respond to environmental changes in their herding patterns, and accept losses in times of crisis. Wide variations in vegetation-cover from year to year are actually more dependent on rainfall than on grazing. Indeed the whole idea of dryland degradation is being reassessed: it is not a clear-cut fact in, for example, non-equilibrium rangeland dynamics, where a high degree of variability requires flexibility and mobility of herders.<sup>103</sup> The upshot of ecological science based on dynamic, chaotic, and uncertainty principles is that it can no longer provide society with simple and clear answers to what would be the most sustainable use of trees, plants, fish, or wildlife. Equally, new insights have helped to explain the lack of success of pastoralist projects, since they were based on assumptions derived from equilibrium-based ecological analysis, which were wrong.

***Myth 4: High-input farming is the only way to avoid a global food crisis***

The so-called Green Revolution of the 1960s and 1970s (although it started earlier and lasted longer) is widely seen as having made a major contribution to increased food production, for example in Asian countries such as India and Indonesia. It promoted improved seed varieties (High Yielding Varieties, HYVs, which are normally hybrid seeds produced by in-breeding), widespread use of fertilisers and chemical pesticides, increased irrigation, and some mechanisation. The Green Revolution has however become almost more famous for its failures and shortcomings. The agricultural practices that were promoted were strongly based on external inputs; natural soil fertility and organic-matter content have been depleted; soil erosion enhanced; and health risks (indeed, incidences of death from poisoning) increased with the use of pesticides. The technological package that was promoted was mainly relevant for land of higher potential, which led to geographical inequality because such land tends to be in the hands of the better-off farmers. Dependency of farmers on external inputs (provided by the State or markets) sharply increased, and the medium to large farms benefited, while smallholders and subsistence farmers

either did not benefit at all or actually became worse off. Total, national production increased in several countries, but inequality sharply increased, and in some countries landlessness increased in its wake. Productivity per hectare increased, but the share of income from agriculture that went to (wage) labour decreased, which is in part attributed to mechanisation. The Green Revolution's main failure is that it has not managed to eliminate rural poverty and food insecurity; in fact, the FAO estimates that the total number of undernourished people has only very gradually declined over the past decades and was still 790 million people in 1999.<sup>104</sup>

Despite these lessons, and despite the fact that the world's food markets are currently well supplied, neo-Malthusian arguments are continuing to be used in order to promote rapid bio-technological progress and increased mechanisation and chemical inputs into agriculture (which are strongly based on the use of non-renewable fossil fuels and for that reason alone already environmentally unsustainable). In the late 1990s, those calls became substantially louder through the forceful business-led lobby for genetically modified (GM) crop varieties. Biotechnological developments could make crops more productive and more resistant to drought and pests, and they could increase the nutritional value of foods, which on the face of it could only be a good thing. However, the health and environmental risks of genetic modification are not yet well understood, and the companies that modify and patent the genetic materials spend much of their energy on developing herbicide-resistant or pesticide-resistant varieties, varieties that themselves produce pesticides (upsetting ecological diversity, as other pesticides do), and varieties that require high inputs of fertiliser and water. This seems a direction that is, once again, interesting for the better-off farmers in so-called high-potential areas, although they too will become ever more dependent on big business. As a result of new patenting legislation, seeds must be bought annually and cannot be saved legally by farmers (if they would viably germinate at all). GM seeds are developed to respond only to particular brands of pesticide or herbicide, produced by the same international companies. The environmental and social effects of the Green Revolution were nothing compared with the devastation that could follow from the spread to other plants of so-called terminator genes,<sup>105</sup> from pollution, soil deterioration, and, in particular, from the social inequalities that are associated with high levels of external inputs. In India, farmers have started protesting against the prospect of genetically engineered varieties by burning experimental fields, in Brazil activists and people's movements are in opposition, and governments in Europe are trying to accommodate public anxiety with the pressures for new international trade agreements that would allow international firms to bring genetically modified seeds and foods on to European markets.

Alternatives are available and spreading rapidly, and some believe that their spread is already so substantial that high-tech genetic engineering is not going to be as dominant as the Green Revolution technology was, whatever the attempts of big business. Sustainable agriculture<sup>106</sup> comprises a range of techniques and approaches that are being promoted by the FAO and others, both in the agriculture establishment and in progressive development organisations (see also section 5.2.2).

Food can be produced for the needs and wants of the (future) global population, and that does not have to entail the side-effects of social deprivation and environmental devastation imposed by the Green Revolution or its successor, the biotechnological revolution.<sup>107</sup> The successes of the alternatives are well documented and promising, but they need much better acceptance in the mainstream of agricultural development and food-policy making.<sup>108</sup>

***Myth 5: Urbanisation and urban consumption are the biggest environmental threat***

Earlier discussion concluded that 'strong sustainability' is impossible to achieve, locally or globally, without forgoing resource consumption by the better-off, i.e. the high-consumers (see sections 2.2.4 and 2.4.2). These people live in cities mainly, North and South, and contribute therefore to the notion that urban settlements are the most unsustainable part of civilisation. It is thus possible to argue that cities and urbanisation are an important – if not the main – environmental threat in the twenty-first century.

However, rural populations in industrialised countries are equally high consumers of petrol for their cars, or tropical hardwood for their garden furniture, and they have a very similar *per capita* impact on the global and local environments. It is estimated that 50 per cent of the poor of developing countries are living in cities at the start of the new millennium,<sup>109</sup> and indeed consumption and pollution are increasing, but urban population growth happens mainly among the low-consuming poor. They suffer from local environmental problems and are exposed to high environmental risks, but contribute hardly at all to global environmental degradation. This trend towards urbanisation is unstoppable and should be seen as an *opportunity*, according to many analysts, and not as a problem.

Rabinovitch (1998) acknowledges that, on the whole, urban settlements are deeply unsustainable because of their energy consumption, waste production, air and water pollution, and overcrowding, not to mention the problems of under-employment, social disruption, and poor housing and sanitation infrastructure. However, he also points to the fact that cities are the main engines for economic growth, all over the world, and that advantages of scale from having a large number of people in a small space are among the

factors that can explain that. Using the example of the Brazilian city of Curitiba, with almost 2.5 million inhabitants, he points to the enormous potential for limiting waste production, for recycling, and for the creation of cleaner and more habitable cities. Central to Curitiba's environmental and economic success is the city's (environmental) planning processes, particularly in relation to roads and public transport, and also land-use legislation that dictates population densities. Curitiba has a cheap and highly efficient public-transport system that is largely run by the private sector, it has green areas and cycle paths in areas that should remain open for drainage of flood water, and it has a garbage-collection system based on the sorting of recyclable materials by households (70 per cent of which participate). Planners and politicians consult NGOs and neighbourhood groups, the poorer and the better-off. Curitiba has developed an efficient and transparent information system, in particular regarding property, which is seen to have curbed commercial speculation.

The city as an environmental opportunity instead of a threat seems indeed a real prospect, and not a dream. Success does however depend strongly on the influence of people over their own environments, on power relations and policy processes, on capacities to manage environments, and on the ability to analyse and articulate what exactly is the most critical thing to do in a particular situation. These more practical aspects are addressed in chapters 3, 4, and 5.