

## 8 Why Should We Be Concerned?

**I have** been describing the likely changes in climate which may occur as a result of human activities, and the impact these may have in different parts of the world. But large and potentially devastating changes are likely to be a generation or more away. So why should we be concerned? What responsibility, if any, do we have for the planet as a whole and the great variety of other forms of life which inhabit it? And does our scientific knowledge in any way match up with other insights, for instance ethical and religious ones, regarding our relationship with our environment? In this chapter I want to digress from the detailed consideration of global warming (to which I shall return) in order briefly to explore these fundamental questions and to present something of my personal viewpoint on them.

### **Earth in the Balance**

Al Gore, the Vice-President of the United States, entitled his book on the environment *Earth in the Balance*<sup>1</sup>, implying that there are balances in the environment which need to be maintained. A small area of a tropical forest possesses an ecosystem which contains some thousands of plant and animal species, each thriving in its own ecological niche in close balance with the others. Balances are also important for larger regions and for the Earth as a whole. These balances can be highly precarious, especially where humans are concerned.

One of the first to point this out was Rachel Carson in her book *Silent Spring*<sup>2</sup>, first published in 1962, which described the damaging effects of pesticides on the environment. Humans are an important part of the global ecosystem; as the size and scale of human activities continue to escalate, so can the seriousness of the disturbances caused to the overall balances of nature. Some examples of this were given in the last chapter.

It is important that we recognize these balances, in particular the careful relationship between humans and the world around us. It needs to be a balanced and harmonious relationship in which each generation of humans should leave the Earth in a better state, or at least in as good a state as they found it. The word that is often used for this is sustainability – politicians talk of sustainable development (see box in Chapter 9 p. 163). This principle, and its link with the harmonious relationship between humans and nature, was given prominent place by the United Nations Conference on Environment and Development held at Rio de Janeiro in Brazil in June 1992. The first principle in a list of 27 at the Rio Declaration adopted by the Conference is 'Human beings are at

the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature.'

However, despite such statements of principle from a body such as the United Nations, many of the attitudes which we commonly have to the Earth are neither balanced, harmonious nor sustainable. Some of these are briefly outlined in the following paragraphs.

### **Exploitation**

Humankind has over many centuries been exploiting the Earth and its resources. It was at the beginning of the Industrial Revolution some two hundred years ago that the potential of the Earth's minerals began to be realized. Coal, the result of the decay of primeval forests and laid down over many millions of years, was the main source of energy for the new industrial developments. Iron ore to make steel was mined in vastly increased quantities. The search for other metals such as zinc, copper and lead was intensified until today many millions of tons are mined each year. Around 1960, oil took over from coal as the dominant world source of energy; oil and gas between them now supply over twice the energy supplied by coal.

We have not only been exploiting the Earth's mineral resources. The Earth's biological resources have also been attacked. Forests have been cut down on a large scale to make room for agriculture and for human habitation. Tropical forests are a particularly valuable resource, important for the maintenance of the climate of tropical regions. They have also been estimated to contain perhaps half of all the Earth's biological species. Yet only about half of the mature tropical forests which existed a few hundred years ago still stand<sup>3</sup>. At the present rate of destruction virtually all will be gone in less than fifty years.

Much of this exploitation has been carried out with little or no thought as to whether this use of natural resources is a responsible one. Early in the Industrial Revolution it seemed that resources were essentially limitless. Later on, as one source ran out others became available to more than take its place. Even now, for most minerals new sources are being found faster than present sources are being used. But the growth of use is such that this situation cannot continue. In many cases known reserves or even likely reserves will begin to run out during the next hundred or few hundred years. These resources have been laid down over many millions if not billions of years. Nature took about a million years to lay down the amount of fossil fuel that we now burn worldwide every year – and in doing so it seems that we are causing rapid change of the Earth's climate. Such a level of exploitation is clearly not in balance, not harmonious and not sustainable.

### **'Back to nature'**

Almost the reverse of this attitude is the suggestion that we all adopt a much more primitive lifestyle and give up a large part of industry and intensive farming – that we effectively put the clock back two or three hundred years to before the Industrial Revolution. That sounds very seductive and some individuals can clearly begin to live that way. But there are two main problems.

The first is that it is just not practical. The world population is now some six times what it was two hundred years ago and about three times that of fifty years ago. The world cannot be adequately fed without farming on a reasonably intensive scale and without modern methods of food distribution. Further, most people that have them would not be prepared to be without the technical aids – electricity, central heating, refrigerator, washing machine, television and so on – which give the freedom, the interest and the entertainment which is so much taken for granted. Moreover, increasing numbers of people in the developing world are also taking advantage of and enjoy these aids to a life of less drudgery and more freedom.

The second problem is that it fails to take account of human creativity. Human scientific and technical development cannot be frozen at a given point in history, insisting that no further ideas can be developed. A proper balance between humans and the environment must leave room for humans to exercise their creative skills.

Again, therefore, a 'back to nature' viewpoint is neither balanced nor sustainable.

### **The technical fix**

A third common attitude to the Earth is to invoke the 'technical fix'. As a senior environmental official from the United States said to me some years ago, 'We cannot change our lifestyle because of the possibility of climate change, we just need to fix the biosphere.' It was not clear just what he supposed the technical fixes would turn out to be. The point that he was making is that, in the past, humans have been so effective at developing new technology to meet the problems as they arise, can it not be assumed that this will continue? Concern about the future then turns into finding the 'fixes' as they are required.

On the surface the 'technical fix' route may sound a good way to proceed; it demands little effort and no foresight. It implies that damage can be corrected when it has been created rather than avoided in the first place. But damage already done to the environment by human activities is causing problems now. It is as if in looking after my home I decided not to carry out any routine maintenance but 'fixed' the failures as they occurred. For my home that would be a high risk route to follow: failure to rewire when necessary could easily lead to a disastrous fire. A similar attitude to the Earth is both arrogant and irresponsible. It fails to recognize the vulnerability of nature to the large changes which human activities are now able to generate.

Science and technology possess enormous potential to assist in caring for the Earth, but they must be employed in a careful, balanced and responsible way. The 'technical fix' approach is neither balanced nor sustainable.

### **Future generations**

Having described attitudes which are not balanced or harmonious in their relationship to the Earth and which fail to contribute to sustainability, I now turn to

describe attitudes to the environment which are more acceptable in terms of the criteria I have set.

Firstly, there is our responsibility to future generations. It is a basic instinct that we wish to see our children and our grandchildren well set up in the world and wish to pass on to them some of our most treasured possessions. A similar desire would be that they inherit from us an Earth which has been well looked after and which does not pose to them more difficult problems than those we have had to face. But such an attitude is not universally held. I remember well, after a presentation I made on global warming to the British Cabinet at number 10, Downing Street in London, a senior politician commented that the problem would not become serious in his lifetime and could be left for its solution to the next generation. I do not think he had appreciated that the longer we delay in taking action, the larger the problem becomes and the more difficult to solve. There is a need to face up to the problem now for the sake of the next and subsequent generations. We have no right to act as if there is no tomorrow. We also have a responsibility to give to those who follow us a pattern for their future based on the principle of sustainable development.

### **The unity of the Earth**

A second point of view sees us as having some responsibility, not just for all generations of humanity, but also for the larger world of all living things. We are, after all, part of that larger world. There is good scientific justification for this. We are becoming increasingly aware of our dependence on the rest of nature and of the interdependencies which exist between different forms of life, between living systems and the physical and chemical environment which surrounds life on the Earth – and indeed between ourselves and the rest of the universe.

The scientific theory named Gaia after the Greek Earth goddess and publicized particularly by James Lovelock emphasizes these interdependencies. Lovelock<sup>4</sup> points out that the chemical composition of the Earth's atmosphere is very different from that of our nearest planetary neighbours, Mars and Venus. Their atmospheres, apart from some water vapour, are almost pure carbon dioxide. The Earth's atmosphere, by contrast, is 78 per cent nitrogen, 21 per cent oxygen and only 0.03 per cent carbon dioxide. So far as the major constituents are concerned, this composition has remained substantially unchanged over many millions of years – a fact that is very surprising when it is realized that it is a composition that is very far from chemical equilibrium.

This very different atmosphere on the Earth has come about because of the emergence of life. Early in the history of life, plants appeared which photosynthesize, taking in carbon dioxide and giving out oxygen. There followed other living systems which 'breathe', taking in oxygen and giving out carbon dioxide. The presence of life therefore influences and effectively controls the environment to which living systems in turn adapt. It is the close match of the environment to the needs of life and its development which seems so remarkable and which Lovelock has emphasized. He gives many examples; I will quote one concerned with oxygen in the atmosphere. There is a critical connec-

tion between the oxygen concentration and the frequency of forest fires<sup>5</sup>. Below an oxygen concentration of 15 per cent, fires cannot be started even in dry twigs. At concentrations above 25 per cent fires burn extremely fiercely even in the damp wood of a tropical rain forest. Some species are dependent on fires for their survival; for instance, some conifers require the heat of fire to release their seeds from the seed pods. Above 25 per cent concentration of oxygen there would be no forests; below 15 per cent, the regeneration that fires provide in the world's forests would be absent. The oxygen concentration of 21 per cent is ideal.

It is this sort of connection that has driven Lovelock to propose that there is tight coupling between the organisms that make up the world of living systems and their environment. He has suggested a simple model of an imaginary world called Daisyworld (see box) which illustrates the type of feedback mechanisms which can lead to tight coupling and exert control. This model is similar to the one he has proposed for the biological and chemical history of the Earth during the first 1,000 million years after primitive life first appeared on the Earth some 3,500 million years ago.

The real world is, of course, enormously more complex than Daisyworld, which is why the Gaia hypothesis has led to so much debate. Lovelock's first statement in 1972 of the hypothesis<sup>6</sup> was that 'Life, or the biosphere, regulates or maintains the climate and the atmospheric composition at an optimum for itself.' In his later writings he has introduced the analogy between the Earth and a living organism, introducing a new science which he calls geophysiology<sup>7</sup> – a more recent book is entitled *Gaia, the Practical Science of Planetary Medicine*<sup>8</sup>.

An advanced organism such as a human being has many built-in mechanisms for controlling the interactions between different parts of the organism and for self-regulation. In a similar way, Lovelock argues, the ecosystems on the Earth are so tightly coupled to their physical and chemical environments that the ecosystems and their environment could be considered as one organism with an integrated 'physiology'. In this sense he believes that the Earth is 'alive'.

That elaborate feedback mechanisms exist in nature for control and for adaptation to the environment is not in dispute. But many scientists feel that Lovelock has gone too far in suggesting that ecosystems and their environment can be considered as a single organism. Although Gaia has stimulated much scientific comment it remains a hypothesis<sup>9</sup>. What the debate has done, however, is to emphasize the interdependencies which connect all living systems to their environment – the biosphere is a system in which is incorporated a large measure of self-control.

There is the hint of a suggestion in the Gaia hypothesis that the Earth's feedbacks and self-regulation are so strong that we humans need not be concerned about the pollution we produce – Gaia has enough control to take care of anything we might do. Such a view fails to recognize the effect on the Earth's system of substantial disturbances, in particular the vulnerability of the environment with respect to its suitability for humans. To quote Lovelock<sup>10</sup>, 'Gaia, as I see her, is no doting mother tolerant of misdemeanours, nor is she some fragile and delicate damsel in danger from brutal mankind. She is stern and

### Daisyworld and life on the early Earth

Daisyworld is an imaginary planet spinning on its axis and orbiting a sun rather like our own. Only daisies live in Daisyworld; they are of two hues, black and white. The daisies are sensitive to temperature. They grow best at 20 °C, below 5 °C they will not grow and above 40 °C they wilt and die. The daisies influence their own temperature by the way they absorb and emit radiation; black ones absorb more sunlight and therefore keep warmer than white ones.

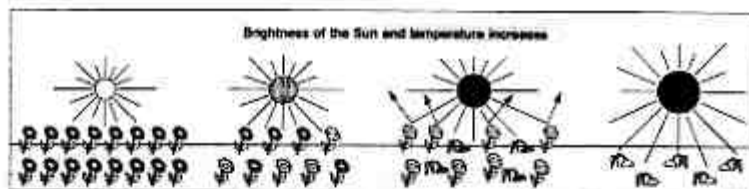
In the early period of Daisyworld's history (Fig. 8.1), the sun is relatively cool and the black daisies are favoured because, by absorbing sunlight, they can keep their temperature closest to 20 °C. Most of their white cousins die because they reflect sunlight and fail to keep above the critical 5 °C. However, later in the planet's history, the sun becomes hotter. Now the white daisies can also flourish; both sorts of daisies are present in abundance. Later still as the sun becomes even hotter the white daisies become dominant as conditions become too warm for the black ones. Eventually, if the sun continues to increase its temperature even the white ones cannot keep below the critical 40 °C and all the daisies die.

Daisyworld is a simple model employed by Lovelock<sup>11</sup> to illustrate the sort of feedbacks and self-regulation which occur in very much

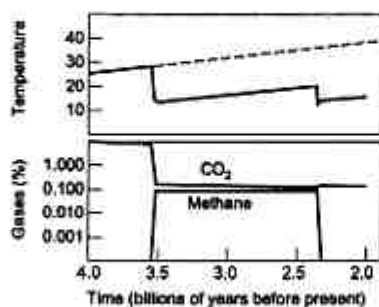
more complex forms within the living systems on the Earth.

Lovelock proposes a similar simple model as a possible description of the early history of life on the Earth (Fig. 8.2). The dashed line shows the temperature which would be expected on a planet possessing no life but with an atmosphere consisting, like our present atmosphere, mostly of nitrogen with about 10 per cent carbon dioxide. The rise in temperature occurs because the sun gradually became hotter during this period. About 3,500 million years ago primitive life appeared. Lovelock, in this model, assumes just two forms of life, bacteria which are anaerobic photosynthesizers – using carbon dioxide to build up their bodies but not giving out oxygen – and bacteria which are decomposers, converting organic matter back to carbon dioxide and methane. As life appears the temperature decreases as the concentration of the greenhouse gas, carbon dioxide, decreases. At the end of the period about 2,300 million years ago, more complicated life appears: there is an excess of free oxygen and the methane abundance fails to low values, leading to another fall in temperature, methane also being a greenhouse gas. The overall influence of these biological processes has been to maintain a stable and favourable temperature for life on the Earth.

**Fig. 8.1**  
Daisyworld.



**Fig. 8.2.**  
Model of the Earth's  
early history, as  
proposed by  
Lovelock<sup>12</sup>.



tough, always keeping the world warm and comfortable for those who obey the rules, but ruthless in her destruction of those who transgress. Her unconscious goal is a planet fit for life. If humans stand in the way of this, we shall be eliminated with as little pity as would be shown by the micro-brain of an intercontinental ballistic nuclear missile in full flight to its target.'

The Gaia scientific hypothesis can help to bring us back to recognize two things, firstly the inherent value of all parts of nature and secondly our dependence, as human beings, on the Earth and on our environment. Gaia is a scientific theory. But some have been quick to see it as a religious idea, supporting ancient religious beliefs. Many of the world's religions have drawn attention to the close relationship between humans and the Earth.

The Native American tribes of North America lived close to the Earth. One of their chiefs when asked to sell his land expressed his dismay at the idea and said<sup>13</sup>, 'The Earth does not belong to man, man belongs to the Earth. All things are connected like the blood that unites us all.' An ancient Hindu saying<sup>14</sup>, 'The Earth is our mother, and we are all her children' also emphasizes a feeling of closeness to the Earth. Those who have worked closely with indigenous peoples have given many examples of the care with which, in a balanced way, they look after the trees, plants and animals in their local ecosystem<sup>15</sup>.

The Islamic religion teaches the value of the whole environment, for instance in a saying of the prophet Mohammed: 'He who revives a dead land will be rewarded accordingly, and that which is eaten by birds, insects and animals out of that land will be charity provided by God' – so emphasizing both our duty to care for the natural environment and our obligation to allow all living creatures their rightful place within it<sup>16</sup>.

Judaism and Christianity share the stories of creation in the early chapters of the Bible which emphasize the responsibility of humans to care for the Earth – we shall refer to these stories again later on in the chapter. Further on in the Old Testament are passages which give detailed instructions regarding care for the land and the environment<sup>17</sup>. Christianity has been described by William Temple, Archbishop of Canterbury sixty years ago, as 'the most materialistic of the great religions'. Because of its central belief that God became human in Jesus (an event Christians call the incarnation), Temple goes on to say 'by the very nature of its central doctrine Christianity is committed to a belief...in the reality of matter and its place in the divine scheme'<sup>18</sup>. For the Christian, the twin doctrines of creation and incarnation demonstrate God's interest in and concern for the Earth and the life it contains.

In looking for themes which emphasize the unity between humans and their environment, we need not confine ourselves to the Earth. There is a very much larger sphere in which a similar perspective of unity is becoming apparent. Some astronomers and cosmologists, overwhelmed by the size, scale, complexity, intricacy and precision of the universe, have begun to realize that their quest for an understanding of the evolution of the universe right from the 'Big Bang' some fifteen thousand million years ago is not just a scientific project but a search for meaning<sup>19</sup>. Why else has Stephen Hawking's book *A Brief History of Time*<sup>20</sup>, in selling over six million copies, become one of the bestsellers of our time?

In this new search for meaning, the perspective has arisen that the universe was made with humans in mind – an idea expressed in some formulations of

the 'anthropic principle'<sup>21</sup>. Two particular pointers emphasize this. Firstly, we have already seen that the Earth itself is fitted in a remarkable way for advanced forms of life. Cosmology is telling us that, in order for life on our planet to be possible, the universe itself at the time of the Big Bang and in its early history needed to be 'fine-tuned' to an incredible degree<sup>22</sup>. Secondly, there is the remarkable fact that human minds, themselves dependent on the whole universe for their existence, are able to appreciate and understand to some extent the fundamental mathematical structure of the universe's design<sup>23</sup>. As Albert Einstein commented, 'The most incomprehensible thing about the universe is that it is comprehensible.' In the theory of Gaia, the Earth itself is central and humans are just one part of life on Earth; the insights of cosmology suggest that humans have a particular place in the whole scheme of things.

This section has recognized the intrinsic unity and interdependencies which exist not only on our Earth but also within the whole universe, and the particular place that we humans have in the universe. Being aware of these has large implications for our attitude to our environment.

### **Environmental values**

What do we value in the environment and how do we decide what we need to preserve, to foster or improve? At the basis of our discussion so far have been several assumptions regarding the value or importance of different fundamental attitudes or actions, some of which I have associated with ideas which come from the underlying environmental science. Is it legitimate, however, to make connections of this kind between science and values? It is often argued that science itself is value free. But science is not an activity in isolation. As Polanyi<sup>24</sup> has pointed out, the facts of science cannot sensibly be considered apart from the participation and the commitment of those who discover those facts or incorporate them into wider knowledge.

In the methodology and the practice of science are many assumptions of value. For instance, that there is an objective world of value out there to discover, that there is value in the qualities of elegance and economy in scientific theory, that complete honesty and cooperation between scientists are essential to the scientific enterprise.

Values can also be suggested from the perspective of the underlying science as we have shown earlier in the chapter. For instance, we have described the Earth in terms of balance, interdependency and unity. Since all of these are critical to the Earth as we know it, we can argue that they are of fundamental value and worth preserving. We have also provided some scientific evidence that humans have a particular place in the overall scheme of the natural world, that they possess special knowledge – which suggests that they also possess special responsibility.

Moving away from science, we have already referred to values related to the environment which come from our basic experiences as human beings. These are often called 'shared values' because they are common to different members of a human community – which may be a local community, a nation or ultimately the global community taking in the whole human race. An outstanding

example is the conservation of the Earth and its resources, not just for our generation but for future generations. Other examples may involve how resources are used now for the benefit of the present generation of humans and how they are shared between different communities or nations. When shared values are applied to real situations, however, conflicts often arise. For instance, how much should we forego now in order to make provision for future generations, or how should resources be shared between different countries, for instance between those in the relatively rich 'North' and those in the relatively poor 'South'? Discussion within and between human communities can assist in the definition and application of such shared values.

Many of these shared values have their origins in the cultural and religious backgrounds of human communities. Discussions about values need therefore to recognize fully the cultural and religious traditions, beliefs and assumptions which underly many of our attitudes and reasoning about ethical concerns.

An obstacle to the recognition of religious assumptions in the attempt to establish environmental values is the view that religious belief is not consistent with a scientific outlook. Some scientists maintain that only science can provide real explanations based on provable evidence whereas the assertions of religion cannot be tested in an objective way<sup>25</sup>. Other scientists, however, have suggested that the seeming inconsistency between science and religion arises because of misunderstandings about the questions being addressed by the two disciplines and that there is more in common between the methodologies of science and religion than is commonly thought<sup>26</sup>.

Scientists are looking for descriptions of the world which fit in to an overall scientific picture. They are working towards making this picture as complete as possible. For instance, scientists are looking for mechanisms to describe the 'fine-tuning' of the universe (these are known as 'Theories of Everything') mentioned earlier. They are also looking for mechanisms to describe the interdependencies between living systems and the environment.

But the scientific picture can only depict part of what concerns us as human beings. Science deals with questions of 'how' not questions of 'why'. Most questions about values are 'why' questions. Nevertheless, scientists do not always draw clear distinctions between the two. Their motivations have often been associated with the 'why' questions. That was certainly true of the early scientists in the sixteenth and seventeenth centuries many of whom were deeply religious and whose main driving force in pursuit of the new science was that they might 'explore the works of God'<sup>27</sup>.

That science and religion should be seen as complementary ways of looking at truth is a point made strongly by Al Gore in *Earth in the Balance*<sup>28</sup> which lucidly discusses current environmental issues such as global warming. He blames much of our lack of understanding of the environment on the modern approach which tends to separate scientific study from religious and ethical issues. Science and technology are often pursued with a clinical detachment and without thinking about the ethical consequences. 'The new power derived from scientific knowledge could be used to dominate nature with moral impunity<sup>29</sup>,' he writes. He goes on to describe the modern technocrat as 'this barren spirit, precinct of the disembodied intellect, which knows the way things work but not the way they are'<sup>30</sup>. However, he also points out<sup>31</sup> that

'there is now a powerful impulse in some parts of the scientific community to heal the breach' between science and religion. In particular, as we pursue an understanding of the Earth's environment, it is essential that scientific studies and technological inventions are not divorced from their ethical and religious context.

## Stewards of the Earth

The relationship between humans and the Earth which I have been advocating is often described as one of stewardship. We are on the Earth as its stewards. The word implies that we are carrying out our duty as stewards on behalf of someone else – but whom? Some environmentalists see no need to answer the question specifically, others might say we are stewards on behalf of future generations or on behalf of a generalized humanity. A religious person would want to be more specific and say that we are stewards on behalf of God. The religious person would also argue that to associate the relationship of humans to God with the relationship of humans to the environment is to place the latter relationship in a wider more integrated context – providing additional insights and a more complete basis for environmental stewardship<sup>32</sup>.

In the Judaeo-Christian tradition in the story of creation in the early chapters of the Bible is a helpful 'model' of stewardship – that of humans being 'gardeners' of the Earth. It is not only appropriate for those from those particular traditions – it is a model which can be widely applied. That story tells that humans were created to care for the rest of creation – the idea of human stewardship of creation is a very old one – and were placed in a garden, the Garden of Eden, 'to work it and take care of it'<sup>33</sup>. The animals, birds and other living creatures were brought to Adam in the garden for him to name them<sup>34</sup>. We are left with a picture of the first humans as 'gardeners' of the Earth – what does our work as 'gardeners' imply? I want to suggest four things.

- A garden provides food and water and other materials to sustain life and human industry. Part of the garden in the Genesis story contained mineral resources – 'the gold of that land is good; aromatic resin and onyx are also there'<sup>35</sup>. The Earth provides resources of many kinds for humans to use as they are needed.
- A garden is to be maintained as a place of beauty. The trees in the Garden of Eden were 'pleasing to the eye'<sup>36</sup>. Humans are to live in harmony with the rest of creation and to appreciate the value of all parts of creation. Indeed, a garden is a place where care is taken to preserve the multiplicity of species, in particular those that are most vulnerable. Millions of people each year visit gardens which have been especially designed to show off the incredible variety and beauty of nature. Gardens are meant to be enjoyed.
- A garden is a place where humans, created as described in the Genesis story in the image of God<sup>37</sup>, can themselves be creative. Its resources provide for great potential. The variety of species and landscape can be employed to increase the garden's beauty and its productivity. Humans have learnt to generate new plant varieties in abundance and to use their scientific and

technological knowledge coupled with the enormous variety of the Earth's resources to create new possibilities for life and its enjoyment. However, the potential of this creativity is such that increasingly we need to be aware of where it can take us; it has potential for evil as well as for good. Further, good gardeners intervene in natural processes with a good deal of restraint.

- A garden is to be kept so as to be of benefit to future generations. In this context, I shall always remember Gordon Dobson, a distinguished scientist, who in the 1920s developed new means for the measurement of ozone in the atmosphere. His home outside Oxford in England possessed a large garden with many fruit trees. When he was 85, a year or so before he died, I remember finding him hard at work in his garden replacing a number of apple trees; in doing so he clearly had future generations in mind.

How well do we humans match up to the description of ourselves as gardeners caring for the Earth? Not very well, it must be said; we are more often exploiters and spoilers than cultivators. Some blame science and technology for the problems, although the fault must lie with the craftsman rather than with the tools! Others have tried to place part of the blame on attitudes<sup>38</sup> which they believe originate in the early chapters of Genesis, which talk of human beings having rule over creation and subduing it<sup>39</sup>. Those words, however, should not be taken out of context – they are not a mandate for unrestrained exploitation. The Genesis chapters also insist that human rule over creation is to be exercised under God, the ultimate ruler of creation, and with the sort of care exemplified by the picture of humans as 'gardeners'. Why, therefore do humans so often fail to get their act together?

### The will to act

Many of the principles I have been enunciating are included at least implicitly in the declarations, conventions and resolutions which came out of the United Nations Conference on Environment and Development held in Rio de Janeiro in June 1992; indeed, they form the background of many statements emanating from the United Nations or from official national sources. We are not short of statements of ideals. What tend to be lacking are the capability and resolve to carry them out. Sir Crispin Tickell, a British diplomat who has lectured widely on the policy implications of climate change, has commented 'Mostly we know what to do but we lack the will to do it'<sup>40</sup>.

Many recognize this lack of will to act as a 'spiritual' problem (using the word spiritual in a general sense), meaning that we are too obsessed with the 'material' and the immediate and fail to act according to generally accepted values and ideals particularly if it means some cost to ourselves or if it is concerned with the future rather than with the present. We are only too aware of the strong temptations we experience at both the personal and the national levels to use the world's resources to gratify our selfishness and greed. Because of this, it has been proposed that at the basis of stewardship should be a principle extending what has traditionally been considered wrong – or in religious parlance as sin – to include unwarranted pollution of the environment or lack of care for it<sup>41</sup>.

Those with religious belief tend to emphasize the importance of coupling together the relationship of humans to the environment to the relationship of humans to God<sup>42</sup>. It is here, religious believers would argue, that a solution for the problem of 'lack of will' can be found. That religious belief can provide an important driving force for action is often also recognized by those who look elsewhere than religion for a solution.

One of the main messages of this chapter is that action addressing environmental problems depends not only on knowledge about them but on the value we place on the environment and our attitudes towards it. In the chapter I have suggested that assessments of environmental value and appropriate attitudes can be developed from the following:

- the perspectives of balance, interdependence and unity in the natural world generated by the underlying science;
- a recognition – some would argue suggested by the science – that humans have a special place in the universe, which in turn implies that humans have special responsibilities with respect to the natural world;
- a recognition that to damage the environment or to fail to care for it is to do wrong;
- an interpretation of human responsibility in terms of stewardship of the Earth, based on an understanding of wide obligations towards all life on Earth based on 'shared' values generally recognized by different human communities.
- a recognition of the importance of the cultural and religious basis for the principles of stewardship – humans as 'gardeners' of the Earth is a possible 'model' of such stewardship;
- a recognition that, just as the totality of damage to the environment is the sum of the damage done by a large number of individuals, the totality of action to address environmental problems is the sum of a large number of individual actions. To quote from Edmund Burke, a nineteenth century British politician: 'nobody made a greater mistake than he who did nothing because he could only do a little.'

Finally, let me recall some words of Thomas Huxley, an eminent biologist from last century, who emphasized the importance in the scientific enterprise of 'humility before the facts'. An attitude of humility is also one which lies at the heart of responsible stewardship of the Earth.

In the next chapter we shall reflect on the uncertainties associated with the science of global warming and consider how they can be taken into account in addressing the imperative for action. For instance, should action be taken now or should we wait until the uncertainties are less before deciding on the right action to take?

- Questions**    **1** There is a debate regarding the relationship of humans to the environment. Should humans be at the centre of the environment with everything else and other life related to the human centre – in other words an anthropocentric view? Or should higher prominence be given to the non-human part of nature

in our scheme of things and in our consideration of values – a more ecocentric view? If so, what form should this higher prominence take?

- 2 How far can science be involved in the the generation and application of environmental values?
- 3 How far do you think can environmental values be generated through debate and discussion in a human community without reference to the cultural or religious background of that community?
- 4 It has been suggested that religious belief (especially strongly held belief) is a hindrance in the debate about environmental values. Do you agree?
- 5 Should we strive for universally accepted values with respect to the environment? Or is it acceptable for different communities to possess different values?
- 6 An argument for religious belief which is sometimes put forward, irrespective of whether the belief is considered to have any foundation, is that such belief motivates people more strongly than other driving forces. Do you agree with this argument?
- 7 Explain how the cultural or religious traditions in which you have been brought up have influenced your view of environmental concern or action. How have these influences been modified because you now hold (or do not hold) definite religious beliefs?
- 8 Discuss the term 'stewardship' which is often used as a description of the relation of humans to the environment. Does it imply too anthropocentric a relationship?
- 9 Discuss the model of humans as 'gardeners' of the Earth. How adequate is the picture it presents of the relationship of humans to the environment?
- 10 Do you agree with Thomas Huxley when he spoke of the importance of humility before the scientific facts? How important do you think is humility in this context and in the wider context of the application of scientific knowledge to environmental concern?
- 11 Because of the formidability of the task of stewardship of the Earth, some have suggested that it is beyond the capability of the human race to tackle it adequately. Do you agree?

## Notes

- 1 Al Gore, *Earth in the Balance*, Houghton Mifflin Company, 1992.
- 2 Rachel Carson, *Silent Spring*, Houghton Mifflin Company, 1962.
- 3 For more information see G. Lean, D. Hinrichsen, A. Markham, *Atlas of the Environment*, Arrow Books, 1990.
- 4 J. E. Lovelock, *Gaia*, OUP, 1979 and *The Ages of Gaia*, OUP, 1988.
- 5 J. E. Lovelock, *The Ages of Gaia*, OUP, 1988, pp. 131–3.
- 6 J. E. Lovelock and L. Margulis, *Tellus*, 26, 1974, pp. 1–10.
- 7 J. E. Lovelock, 'Hands up for the Gaia hypothesis', *Nature*, 344, 1990, pp. 100–12.
- 8 J. E. Lovelock, *Gaia: the practical science of planetary medicine*, Gaia Books, 1991.
- 9 Colin Russell in *The Earth, Humanity and God*, UCL Press 1994, discusses Gaia as a scientific hypothesis and also its possible religious connections.
- 10 J. E. Lovelock, *The Ages of Gaia*, OUP, 1988, p. 212.
- 11 For more details see J. E. Lovelock, *The Ages of Gaia*, OUP, 1988.

- 12 J. E. Lovelock, *The Ages of Gaia*, OUP, 1988, p. 82.
- 13 Quoted by Al Gore, *Earth in the Balance*, Houghton Mifflin Company, 1992, p. 259.
- 14 Quoted by Al Gore, *Earth in the Balance*, Houghton Mifflin Company, 1992, p. 261.
- 15 Ghillelan Prance, Director of Kew Gardens in the UK, in his book *The Earth Under Threat* (Wild Goose Publications, Glasgow 1996), provides examples from his extensive work in countries of south America.
- 16 M. H. Khalil, 'Islam and the Ethic of Conservation', *Impact* (Newsletter of the Climate Network Africa), December 1993, p. 8.
- 17 A number of injunctions were given to the Jews in the Old Testament regarding care for plants and animals and care for the land, for example Leviticus 19:23–25, Leviticus 25:1–7, Deuteronomy 25:4.
- 18 W. Temple, *Nature, Man and God*, Macmillan, 1964 (1st edition 1934)
- 19 See for instance Paul Davies, *The Mind of God*, Simon and Schuster, 1992. I have also addressed this theme in J. T. Houghton, *The Search for God; can science help?* Lion Publishing, 1995.
- 20 Stephen Hawking, *A Brief History of Time*, Bantam Books, 1989.
- 21 See for instance Paul Davies, *The Mind of God*, Simon and Schuster, 1992; also J. Barrow and F. J. Tipler, *The Anthropic Cosmological Principle*, OUP, 1986.
- 22 J. Barrow and F. J. Tipler *The Anthropic Cosmological Principle*, OUP, 1986, and J. Gribbin and M. Rees, *Cosmic Coincidences*, Black Swan, 1991.
- 23 Paul Davies, *The Mind of God*, Simon and Schuster, 1992.
- 24 M. Polanyi, *Personal Knowledge*, London, Routledge and Kegan Paul, 1962.
- 25 See for instance R. Dawkins, *The Blind Watchmaker*, Longmans, 1986.
- 26 See for instance J. Polkinghorne, *One World*, SPCK, 1986, *Beyond Science*, CUP, 1996; J. T. Houghton, *The Search for God; can science help?*, Lion Publishing, 1995.
- 27 See, for instance Colin Russell *Cross-currents: Interactions between Science and Faith*, Intervarsity Press, 1985.
- 28 Al Gore, *Earth in the Balance*, Houghton Mifflin Company, 1992.
- 29 Al Gore, *Earth in the Balance*, Houghton Mifflin Company, 1992, p. 252.
- 30 Al Gore, *Earth in the Balance*, Houghton Mifflin Company, 1992, p. 265.
- 31 Al Gore, *Earth in the Balance*, Houghton Mifflin Company, 1992, p. 254.
- 32 For modern expositions of a Christian view of the Environment, see R. Elsdon, *Greenhouse Theology*, Monarch, 1992 and Colin Russell, *The Earth, Humanity and God*, UCL Press, London, 1994.
- 33 Genesis 2:15.
- 34 Genesis 2:19.
- 35 Genesis 2:12.
- 36 Genesis 2:9.
- 37 Genesis 1:27.
- 38 The best-known exposition of this position is L. White Jr in, for instance, 'The historical roots of our ecological crisis', *Science*, 155, 1987, pp. 1203–7; see Colin Russell, *The Earth, Humanity and God*, UCL Press, London, 1994, for a commentary on this thesis.
- 39 Genesis 1:26–28.
- 40 *The Doomsday Letters*, broadcast on BBC Radio 4, UK, 1996.
- 41 This was the first of the principles which came out of a symposium (called Patmos Principles since the climax of the symposium, held in celebration of the 1900th anniversary of the writing of the Book of Revelation, was on the island of Patmos) I attended in 1995 sponsored by the Ecumenical Patriarch Bartholomew I of the Greek Orthodox Church and Prince Philip in his capacity as President of the World

Wild Life Fund. An extremely eclectic group, scientists, politicians, environmentalists, theologians attended from a wide range of religious backgrounds and beliefs. John, the Metropolitan of Pergamon, who was chairman of the symposium's scientific committee kept emphasizing that we should consider pollution of the environment – or lack of care for the environment as a sin – not only against nature but a sin against God. His message struck a strong chord with the symposium. The principle goes on to explain that this new category of sin should include activities that lead to 'species extinction, reduction in genetic diversity, pollution of the water, land and air, habitat destruction and disruption of sustainable life styles'. The symposium's report is to be published under the title *Revelation and the Environment – AD95–1995*, (ed. Sarah Hobson and Jane Lubchenco), World Scientific Publishing, 1997.

- 42 In Judaeo-Christian teaching the coupling of these two relationships begins with the Creation stories in Genesis. These stories go on to describe how humans disobeyed God (chapter 3) and broke the partnership. But the Bible continually explains how God offers a way back to partnership. A few chapters on in Genesis (9:8–17), the basis of the relationship between God and Noah is a covenant agreement in which 'all life on the Earth' is included as well as humans. A relationship based on covenant is also the basis of the partnership between God and the Jewish nation in the Old Testament. But, after many times when that relationship was broken, the Old Testament prophets looked forward to a new covenant based not on law but on a real change of heart (Jeremiah 31:31–34).

The New Testament writers (for example Hebrews 8:10–11) see this new covenant being worked out through the life and particularly through the death and resurrection of Jesus, the Son of God. Jesus promised his followers the Holy Spirit (John 15, 16), whose influence would enable the partnership between them and God to work. Paul, in his letters, is constantly referring to the dependent relationship which forms the basis of his own partnership with God (Galatians 2:20, Philippians 4:13) and which has been the experience of millions of Christians down the centuries. Included in Paul's theology is the whole of creation (Romans 8:19–22).