Topic 1

FOUNDATIONS OF ENVIRONMENTAL SYSTEMS AND SOCIETIES

1.01 Environmental value systems

LEARNING OBJECTIVES

After reading this chapter you should be able to:

- define what is meant by 'environmental value system (EVS)'
- outline the main factors that define different environmental philosophies
- describe the key historical influences on the development of the modern environmental movement
- describe how these philosophies influence decision-making on environmental issues
- justify your own view on environmental issues.

KEY QUESTIONS

How do historical events affect the development of environmental value systems (EVSs)?

What other influences are important to the development of environmental movements and EVSs?

What are the viewpoints of different EVSs?

1.01.01 Historical influences on the modern environmental movement

An **environmental value system (EVS)** is a particular worldview or set of paradigms that shapes the way individuals or societies perceive and evaluate environmental issues.

There are many different **environmental value systems (EVSs)**. Some of them consider humans to be more important than ecology and nature, while others prioritise the rights of living things and urge humans to behave more responsibly. Three examples of EVSs are described in this chapter. Any EVS is influenced by cultural (including religious), economic and sociopolitical contexts, for example whether individuals are from a less economically developed country (LEDC) or a more economically developed country (MEDC), or a democratic or an authoritarian society. Historical events also affect the development of EVSs and environmental movements in different societies.

Many of our current concerns for the environment have their origins in the reaction that some people had to the growth of cities and industries from the mid-1800s onwards. Industrialisation brought with it worsening air quality and pollution. During the 20th century, technology advanced and human influence on the environment became more widespread as the world population and industry grew. With improvements in communication, such as newspapers, television, the internet and social networking, people have become more aware of environmental issues more quickly. A number of significant milestones have punctuated the development of the modern environmental movement, and the idea of human 'stewardship' of the natural world has developed.

One of the first pollution disasters that became well publicised was in1956 at Minamata Bay in Japan. People living in the area were poisoned by mercury that was discharged into the bay by a local factory. You can read more details about this in Topic 2, page 72. There have been other significant events over the last 60 years which have also influenced the development of people's awareness of the environment. Some of these are described here, but there are many others. Events like these have led not only to the formation of environmental movements and political parties but also to the establishment of EVSs that define what people believe are the best ways for us to live in harmony with our environment.

The environmental accidents and incidents that have occurred since the middle of the last century have motivated politicians and members of the general population to become more involved in environmental and conservation issues – that is, to develop their own EVSs.

1962 – *Silent Spring*

Rachel Carson (1907–1964) was a US writer and ecologist who became concerned about the overuse of synthetic chemical pesticides in agriculture. Her book *Silent Spring*, published in 1962, challenged modern agricultural practices and called for a change in the way the natural world is viewed. She was one of the earliest writers to highlight the effects of bioaccumulation of pesticides on populations of predatory birds (see Topic 2). Some dismissed her work as alarmist but she continued to speak out. *Silent Spring* brought environmental concerns to public attention, led to significant changes in policies towards pesticides, and later led to the ban on DDT (dichlorodiphenyltrichloroethane). The book was a major influence and is credited with inspiring American environmental movements which eventually resulted in the formation of the Environmental Protection Agency.

1975 – Save the Whales

Greenpeace, founded in 1971, is an organisation that campaigns for the environment and conservation of natural resources.

In 1975, Greenpeace launched the world's first anti-whaling campaign by taking direct action against Soviet whaling ships in the Pacific Ocean. The voyage of its ship *Rainbow Warrior* sparked an international outcry after pictures and videos taken by the Greenpeace crew shocked the world. The campaign 'Save the Whales' was taken up in many countries. After nearly a decade of intense lobbying the International Whaling Commission finally declared a moratorium on commercial whaling in 1986.

Greenpeace followed this success with several campaigns against nuclear testing in the 1980s, and the organisation is now recognised as a major player in the environmental movement.

1984 – Bhopal disaster

In 1984, a serious gas leak occurred at the Union Carbide pesticide factory in the Indian city of Bhopal. Even today, it is often cited as the world's worst industrial disaster. It is estimated that more than 500 000 people were exposed to methyl isocyanate and other chemicals from the plant. Of these, nearly 4000 died within weeks and a further 8000 died soon afterwards. Many thousands were partially or severely disabled, and since the tragedy as many as 25 000 deaths have been attributed to exposure to the gas (see Image 1.01).

Since the Bhopal incident, the chemical industry has been put under pressure to develop and implement strict safety and environmental standards to ensure that such an accident never happens again. In Bhopal, 3 December, the day of the incident, is still an official day of mourning.

1986 – Chernobyl disaster

The nuclear disaster at Chernobyl began during a routine test on a reactor at the plant. An emergency shutdown failed and a sequence of events followed which resulted in explosions that sent clouds of highly radioactive smoke into the atmosphere and destroyed one of the reactors (see Image 1.02). The smoke was carried over the nearby city of Prypiat and extensive areas of the western Soviet Union and Europe, which received high levels of radioactive fallout. More than 350 000 people had to be evacuated and resettled from the most severely contaminated parts of Belarus, Russia and Ukraine.

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Russian data has suggested that over 900 000 premature cancer deaths have occurred as a result of radioactive contamination from Chernobyl. The accident raised concerns about the safety of nuclear power all over the world, and the expansion of nuclear power plants in many countries was halted or slowed.

Image 1.01 At the Bhopal factory, important safety systems were not working on the night that toxic gases leaked affecting the lungs and eyes of thousands of people who lived nearby.

Image 1.02 Explosions destroyed one of the reactors at the Chernobyl power station. Eventually the plant was enclosed in a concrete 'sarcophagus' that kept dangerous radioactive material inside.

Image 1.03 Oil gushed from the *Deepwater Horizon* oil well into the sea from 20 April 2010 until the well was finally capped on 15 July 2010.

2006 – *An Inconvenient Truth*

Promoted by former US Vice President Al Gore, the film *An Inconvenient Truth* put the issues of climate change (see Topic 7) at the front of the agenda for a wide audience. Publicity by a well-known politician and the accessible format of the film, produced by Davis Guggenheim, brought information about global warming to many and raised awareness of environmental issues worldwide. The film was supplied to schools and colleges, which also received additional material to help teachers explain the ideas to young people.

2010 – *Deepwater Horizon* oil spill

In 2010, oil poured out of a ruptured drilling rig deep below the sea in the Gulf of Mexico for almost three months. It was the largest marine oil spill in the history of the petrochemical industry (see Image 1.03). The oil

caused extensive damage to marine and wildlife ecosystems, as well as to fishing and tourism in the area. Attempts to contain and disperse the oil had limited success.

A report into the accident concluded that reforms were needed in both industry practices and government policy to prevent a similar event ever happening again. Images of the sea covered by an oily floating mass and of seabirds with oil-covered feathers spread rapidly via the internet and news media, and many environmentalists questioned the need to drill for oil in insecure or dangerous locations.

2011 – Fukushima nuclear accident

The damage to the Fukushima nuclear power station in Japan caused the largest nuclear disaster since Chernobyl. The power station was hit by waves of seawater almost 15 m high from a tsunami that followed a severe undersea earthquake near the island of Honshu. The plant was designed to withstand waves of 5.7 m but was overwhelmed by the ferocity of the tsunami. Japan was well prepared with evacuation procedures, and nuclear fallout was limited by prompt action. By the end of 2011, Japanese authorities were able to declare the plant to be stable, although it may take decades to decontaminate the surrounding areas and to decommission the power station.

As the disaster unfolded, it was watched on 24-hour news bulletins by millions of people all over the world, which is a further example of the influence of media coverage on public awareness of environmental issues.

1.01.02 An outline of the range of environmental philosophies

EVSs are divided into three general categories which form a continuous spectrum (see Figure 1.01):

- **ecocentric** (nature centred)
- **anthropocentric** (people centred).
- **technocentric** (based on technology).

Ecocentrists are likely to distrust modern technology and large-scale production and prefer to maintain natural environmental systems on a small scale. Ecocentrists view themselves as being under nature's control rather than controlling it. They foresee a limit to the Earth's resources. Deep ecologists are extreme ecocentrists and include people who believe that nature has more value than humanity.

Technocentrists believe that the brain power and resourcefulness of humans will enable us to control the environment. Such people have an optimistic worldview. They consider that natural processes must be understood to be controlled and that scientific research is important in policy making.

Anthropocentrists tend to include both viewpoints in their value system.

An **ecocentric** system is a nature-centred value system that views people as being under nature's control rather than in control of it.

An **anthropocentric** system is a human-centred value system that places humans as the central species and assesses the environment from an exclusively human perspective.

A **technocentric** system is a technologically-based value system that believes the brain power of humans will enable us to control the environment.

1.01 Environmental value systems

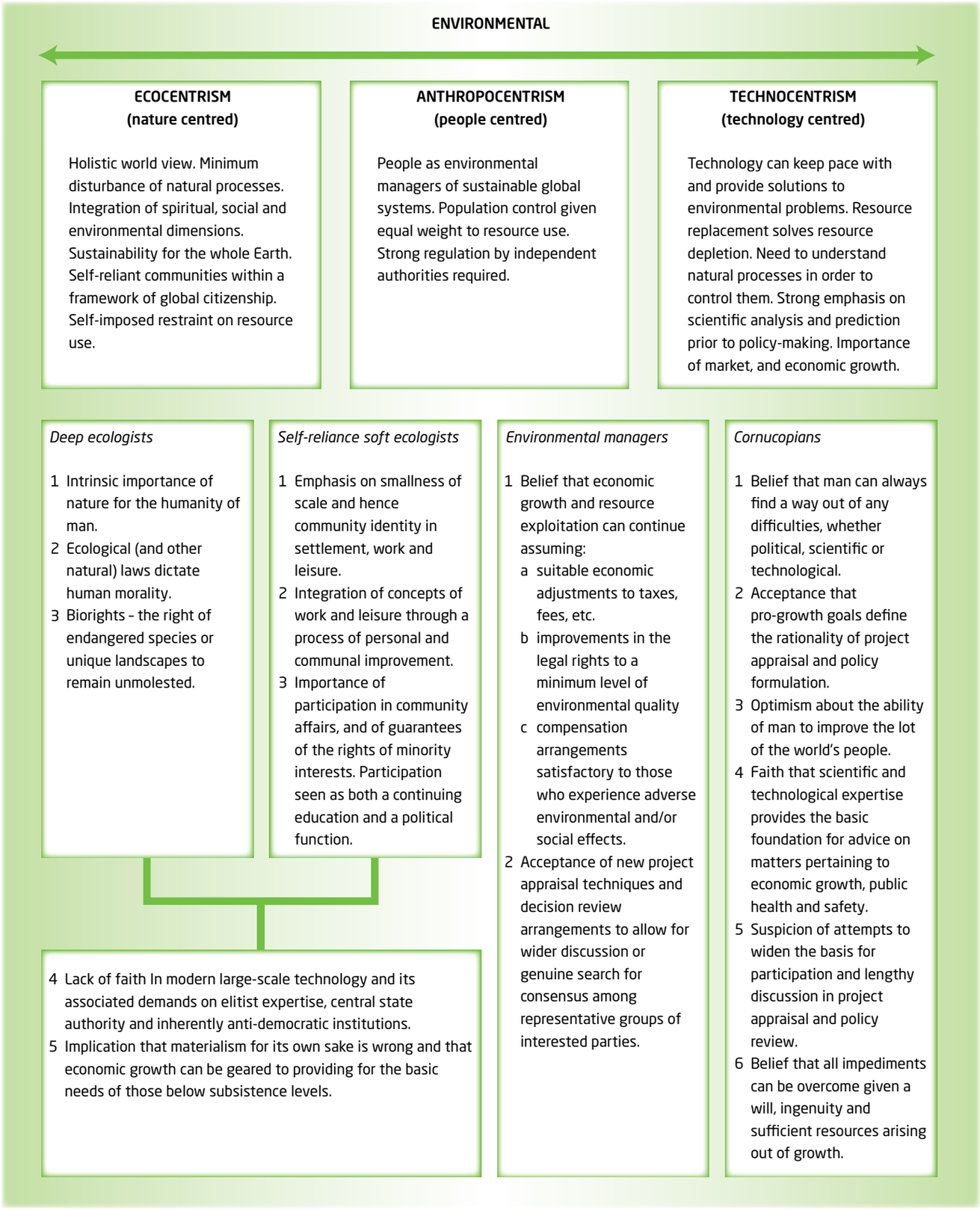

Figure 1.01 Categories of Environmental Value Systems showing the range of beliefs held by different groups.

Ecocentrism

Ecocentrism takes a nature-centred, holistic view of the world. It proposes that we know very little about living things and their complex relationships, so we cannot have the ability to manage the environment in the way that technocentrists suggest. Biocentric or life-centred philosophers consider that all life is inherently valuable and is not simply for use by humans. They consider that people should not harm any species, whether it is useful or not, and that we should preserve ecosystems so that life will thrive. Humans are just one species which is no more important than any other. Some ecocentrists stress the holistic nature of our ethical obligation to the Earth, highlighting the need to limit our use of its resources.

One group of ecocentrists are the self-reliant or soft technologists, who believe small-scale, local and individual actions, such as recycling, can make a difference. At the other end of the spectrum are deep ecologists who value nature over humanity and believe that all species and ecosystems have values and rights that humans should not interfere with. They believe that the human population should decrease so that humans consume less of the Earth's resources (see Theory of knowledge 1.01.02).

Technocentrism

Technocentrism proposes that humans and technology will always be able to provide a solution to difficulties, whether they are scientific or political. In ecological systems, technocentrists believe that technology will always be able to solve environmental problems, even when humans push resources to the limit.

At one extreme of the range, some technocentrists, known as the cornucopians, view the world as a place with infinite resources to benefit humans. They believe that growth will provide wealth to improve the lives of everyone. They propose that a free-market economy can achieve this.

At the other extreme, another group – the environmental managers – see the world in terms analogous to a garden that needs care and attention, or 'stewardship'. They hold that legislation is needed to protect the environment and that, if an environment is damaged, those who suffer should receive compensation. They believe that, if humans take care of the Earth, it will take care of them.

Anthropocentrism

Anthropocentrism is the people-centred view of the world that includes viewpoints from both ecocentrism and techocentrism. People living in MEDCs are more likely to have this world view. Humans are viewed as a dominant species which manages the environment for its own requirements. Anthropocentrists' views include some of those of self-reliant soft ecologists and some of those of environmental managers.

It is important to remember that an EVS is individual and it is impossible to say that any EVS is wrong. Every individual and each **society** will have its own EVS.

Society is defined as an arbitrary group of individuals who share some common characteristics such as location, cultural background, religion or value system.

1.01.03 EVSs and the systems approach

The EVS of an individual or society can be considered as a system because, like all other systems, it has inputs such as education, experience, media influences and religious doctrines, and outputs such as courses of action and decisions, which are determined by processing of the inputs.

Information flows to individuals in societies are processed into changes in perceptions of the environment and changes in decisions about how to react to environmental issues. Some inputs will have no obvious immediate effect on an individual or group, while others will lead to direct actions (see Case study 1.01.01) in response to concerns about the environment. Information comes from ideas in films, books, newspapers and so on. Some people liken those who originate

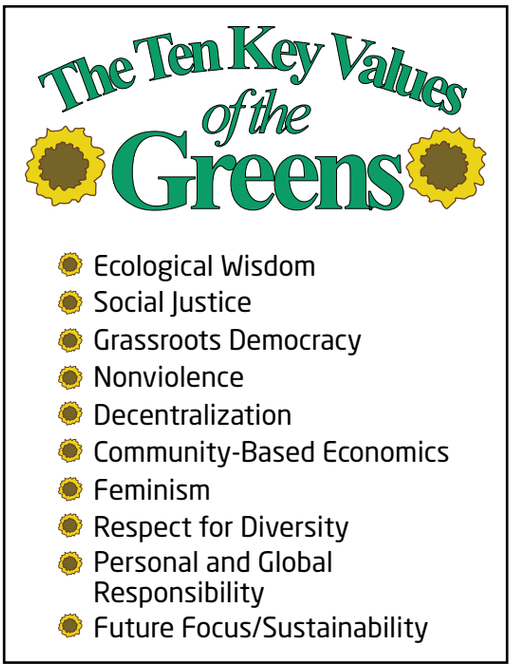

Image 1.04 The key values of green politics are shared throughout the world.

this information to the 'producers' in an ecosystem. Other members of society then become the 'consumers' of the new ideas.

Ecological issues are rarely confined to local areas. Ecosystems often cross international boundaries, so that differences in EVSs can lead to conflict. Whaling is an example of such a conflict. Nations with different EVSs have very different perspectives on the exploitation and conservation of whales (see Case study 1.01.02). Similarly, the importance of fishing and conservation of fish stocks is viewed differently in societies in different parts of the world (see Chapter 4.04).

1.01.04 Politics and EVSs – the green revolution

One way in which people can express their own EVS is through political parties and discussion. The green movement is one EVS that encourages people to influence decisions made about the environment. Green movements have been set up in many parts of the world. Green politics is an ecocentric ideology, and its aim is for an ecologically sustainable society that protects the environment.

Green politics began in the 1970s. Among the first active green parties was one in Australia that contested elections in 1972. In Europe, the Popular Movement for the Environment was founded in 1972 in Switzerland, and the Green Party in the UK began to develop in 1973. There are now green politicians who share similar values (see Image 1.04) in many countries throughout the world.

One important focus of green politics is to reduce deforestation, particularly in the rainforest, and to support efforts to plant more trees. The Green Party in New Zealand called for a reduction in the destruction of rainforest and drew attention to the loss of species in biodiversity hotspots. It highlighted loss of homes and livelihoods of people who live in rainforests, and the impact of deforestation on greenhouse emissions and climate change. The party called on the government to stop the import of illegal and unsustainable timber products, and to ensure that all biofuel used in the country was from sustainable sources.

In the UK, green campaigners have called for international agreement to stop global deforestation in consultation with the local and indigenous communities so that traditional land rights are recognised. It has also demanded a global moratorium on logging and burning of old forests and ecological restoration of degraded ancient forests.

Many individuals and organisations support green issues, and publicity, petitions to governments and political movements have helped raise awareness and educate more and more people. Green parties encourage individual actions such as buying ethically produced goods. In the last 40 years, most have tended to grow from small-scale, local beginnings. With more support, they have gradually gained influence and now participate fully in the national politics of many countries. Green movements are now firmly established in Europe, Australia and New Zealand, as well as in the USA, Brazil and Colombia.

SELF-ASSESSMENT QUESTIONS 1.01.01

1 How important is green politics in rainforest conservation?
2 Have green politicians overemphasised the threat to rainforest ecosystems?
3 **Discussion point:** Can you think of any examples of issues where green politics influenced the EVS of people in your area?

CASE STUDY 1.01.01

Greenpeace – can direct action bring results?

Greenpeace is an ecocentric non-governmental organisation (NGO) founded by a small group of activists in 1971, which now has a presence in more than 40 countries. Greenpeace campaigns for positive change through action to protect the environment. This action takes many forms, from publicising environmental issues and lobbying governments, to promoting environmentally responsible solutions and taking non-violent direct action. Greenpeace is funded by supporters who donate money and sometimes take part in direct action themselves.

In 2011, Greenpeace began a campaign to prevent drilling for oil and gas in the Arctic, to protect the environment and its wildlife. As climate change melts the Arctic ice, oil companies are investigating the possibility of extracting fossil fuels from beneath the ice. Greenland is considering opening up an untouched area of its north-eastern waters to oil companies.

Greenpeace maintains that above the Arctic Circle, freezing temperatures, a narrow drilling window and a remote location mean that an oil spill would be almost impossible to deal with and would leave the habitat and its wildlife under threat. Greenpeace took direct action to subvert a meeting of oil industry leaders which was being held to discuss the issue. Activists greeted the oil industry leaders with a red carpet drenched in oil, and huge floating banners, one of which that read 'Protect the Arctic: No License to Drill' (see Image 1.05). Activists also gave delegates at the meeting their own alternative presentation about drilling in the Arctic, in the same building as the conference.

The campaign to prevent drilling in the Arctic continues. Another ecocentric organisation, World Wide Fund for Nature (WWF), has added its support to Greenpeace and, although it does not favour direct action, it has asked governments to handle Arctic development responsibly by:

- improving safety through the use of risk-lowering technology and higher standards for spill prevention and cleanup
- moving to renewable energy wherever possible
- protecting valuable species and areas of biological, economic and cultural importance.

Nevertheless, oil companies are pressing for drilling permits and started drilling at test sites in summer 2015.

Questions

1. This example of peaceful direct action allowed Greenpeace to lobby industry leaders directly. Do you think that the method used is an acceptable way to communicate an EVS?
2. Environmental campaigns by Greenpeace and other organisations have not always been trouble-free. In 1985, Greenpeace was involved in a campaign against nuclear testing in the Pacific Ocean. A Greenpeace vessel, *Rainbow Warrior*, was bombed while in harbour in New Zealand. Can protests that involve damage to property or that interrupt the lives of ordinary citizens ever be justified?
3. Research other environmental campaigns that have featured either direct action, such as the Greenpeace campaign, or lobbying, like the WWF approach.

Image 1.05 Greenpeace activists campaigning in 2011.

CASE STUDY 1.01.02

Whale hunting

Different nations and cultures have different views on the hunting of whales, even though many whale species are now endangered. Like all EVSs, these views depend on history and tradition. Nations that support whaling are likely to hold an anthropocentric viewpoint, whereas organisations that oppose it hold an ecocentric viewpoint. Greenpeace has run its campaign 'Save the Whales' since the 1970s to protect whales.

You can read more about the 'Save the Whales' campaign on the Greenpeace website: www.greenpeace.org/international/en/campaigns/oceans/fit-for-the-future/whaling

Historical background

By the 1930s more than 50 000 whales were being killed each year. The International Whaling Commission was set up to protect the whales, and in 1986 commercial whaling was banned in an effort to increase whale numbers. Today, there are only three nations remaining with whaling industries: Norway, Iceland, and Japan, whose industry is the largest, claiming up to 1000 whales annually (see Image 1.06). In the mid-1990s the International Whaling Commission considered easing its ban on commercial whaling to allow Japan to hunt whales off its coast, if Japan promised to kill fewer whales in the Antarctic. International reaction to that proposal was summed up by Captain Paul Watson of the Sea Shepherd Conservation Society, quoted in the *Los Angeles Times* on 27 January 2009: 'It's sort of like saying to bank robbers that you can't rob a bank in the city, but we'll let you do it in the country.'

The situation today

The following article was published by *The Guardian* on 18 November 2014.

Japan cuts Antarctic whale quota after UN court ruling

'Japan has reduced the quota of whales it plans to catch by two-thirds after UN court called the controversial "research whaling"', programme a commercial hunt masquerading as science.

The country now has a plan to kill 333 minke whales in the Southern Ocean next year as part of its push to resume whaling following a legal setback instigated by Australia. The whales will be hunted in a vast sweep of Antarctic waters, including ocean claimed by Australia.

This figure is a sharp reduction in the previous quota Japan awarded itself last year, when it aimed to take 855 minke whales, 50 humpback whales and 10 fin whales. Japan ended up taking fewer than this due to the disruptive tactics of anti-whaling activists Sea Shepherd.

Japan suspended its 2014 whale hunt after the ruling at the UN international court of justice. The case brought by Australia and supported by New Zealand successfully argued that Japan's program was not scientific and was simply a façade for commercial whaling. Japan has indicated that it is committed to starting a new whaling programme in the Southern Ocean at the end of 2015.'

Questions

1. What do the newspaper articles tell you about the EVS of whaling nations and Australia?
2. How are the EVSs of the different societies formed?
3. How important is international legislation in upholding EVSs of the majority of nations?
4. Discuss how important you think education and cultural influences are in forming a view on whaling.

Image 1.06 Most species of whale are listed on the WWF endangered list, but hunting still continues in some parts of the world.

Theory of knowledge 1.01.01

The importance of religion

Religion has been a significant influence on ethics and how they are applied to the environment. The concepts of 'dominion' and 'stewardship' are important in both Muslim and Christian belief systems. In both faiths, humans are called on to act as stewards of nature in a way that emphasises human moral superiority over non-human (biotic and abiotic) factors. The value of other species and objects is defined by the pleasure and profit they bring to humans. This anthropocentric view is based on the external and instrumental value of such factors for humans, and is known as the ethic of 'instrumentalism'.

An alternative interpretation of the anthropocentric worldview is one that emphasises environmental conservation for the benefit of humans and is based on our moral responsibility to ensure that future generations inherit all possible natural resources. It has been suggested that this 'conservation ethic' was the dominant viewpoint held by delegates to the United Nations (UN) Conference on Environment and Development (the World Summit) in Rio in 1992. The key aim of the conference was to preserve world biodiversity, and the meeting influenced all subsequent UN conferences, which have examined the relationship between human rights, population, social development, women and human settlements – and the need for environmentally sustainable development.

1 To what extent do you think that a personal EVS is dependent on a person's religious faith or other strongly held view?
2 How important are events like the World Summit in informing and influencing a person's EVS?

Theory of knowledge 1.01.02

Deep ecologists

The founder of deep ecology was the Norwegian philosopher Arne Næss (1912–2009). Næss believed that, if you do not know how the outcomes of your actions will affect other beings, you should not act. People who adhere to the precautionary principle hold a similar view.

Deep ecologists are at one extreme of the range of the EVSs continuum. They believe that the world does not exist as a resource to be freely exploited by humans. The ethics of deep ecology hold that a whole system is superior to any of its parts. Deep ecologists summarise their values with eight key points.

- The well-being of human and non-human life on Earth has value in itself which is independent of the usefulness of the non-human world to humans.
- The richness and diversity of life contribute to these values.
- Humans have no right to reduce this richness and diversity except to satisfy vital human needs.
- For human life to flourish a substantial reduction in the human population is needed, and for non-human life to thrive such a decrease is required.
- Human interference with the non-human world is excessive, and the situation is becoming worse.
- A substantial change in policy towards economics, technology and ideology is needed to change the direction of human progress.
- Humans should appreciate the quality of life rather than always seeking higher standards of living. People should understand the difference between 'big' and 'great'.
- People who hold ecocentric views should do all they can to help make the changes necessary to improve the well-being of the Earth.

1 Think about your personal viewpoint. How many of the values listed above do you share with deep ecologists?
2 Can the actions of individuals lead to substantial changes in the policies of governments?

1.01.05 Decision-making and the influence of environmental philosophy

All decisions that are made about environmental issues are influenced by the philosophical standpoint of those taking the decisions. It is important to evaluate the implications of different viewpoints. Important environmental issues that are addressed in this course include acid rain, use of water resources, fossil fuels, climate change and ecological footprints. You can read more about all these issues in later topics of this book. All of them can be considered from different viewpoints. Here we compare how people with an ecocentric view and people with a technocentric view apply their different EVSs to aspects of the biosphere.

The demand for water resources

An ecocentric view of water management involves conservation and recycling so that water can be used sustainably without harm to the environment (see Topic 4). An ecocentrist would encourage the use of meters and monitoring so that water use was kept to a minimum and used for essential purposes only. On the other hand, a technocentrist would seek to provide water for the future by using technology and seeking new or innovative methods. A technocentrist would use technology to limit water use in the home and in industry. Technological solutions such as seeding clouds to produce rain, desalination of seawater (see Image 1.07) and iceberg capture, or breeding and developing crops that can grow using less water, would all be options that technocentrists would favour. Technocentrists would also advocate greater use of purified wastewater and the extraction of water from sources deep beneath the Earth.

Image 1.07 Desalination plants like this one on Lake Mead are very efficient at producing drinking water from seawater.

Climate change

Technocentrists would favour plans such as the one devised by scientists at the National Center for Atmospheric Research in the USA. Scientists here propose using a fleet of unmanned, wind-powered ships to spray salt water up into low-lying clouds through 20 m high cylinders (see Image 1.08). Tiny particles of salt within each droplet act as centres of condensation, leading to a greater concentration of water droplets within each cloud, and thus a greater albedo. Clouds with increased albedo can cool the Earth by reflecting radiation back into space.

Ecocentrists would prefer to see a limit on the consumption of fossil fuels. They stress the need to modify farming methods and reduce human dependence on livestock such as cattle which increase the level of greenhouse gases in the atmosphere. They would favour replanting trees and increasing the level of phytoplankton in the sea as a means to increase carbon dioxide uptake by the environment.

Ecocentrists favour the use of renewable and carbon-neutral sources of energy, such as biomass, solar and wind power.

(For more about climate change, see Topic 7.)

Fossil fuels

Overuse of fossil fuels has caused environmental problems which include pollution and global warming.

A technocentric or more extreme cornucopian solution would call on science to refine and extend new technologies such as alternative energy sources using wind, waves and hydrogen fuel cells as a solution to the issue. Rather than changing lifestyles, technocentrists would change technology to reduce carbon dioxide emissions and use science to endeavour to remove carbon dioxide from the atmosphere rather than reducing industry.

Carbon sequestration could provide a useful technocentric solution (see Figure 1.02). Carbon sequestration involves the capture and storage of carbon dioxide that would otherwise be present in the atmosphere. Carbon dioxide can be removed from the atmosphere and retained by plants and the soil that supports the plants. Alternatively, carbon dioxide can be captured (either before or after fossil fuel is burnt) and then stored (sequestered) within the Earth.

An ecocentric view would focus on the reduction in carbon dioxide by limiting the emissions that industry is permitted to make, even if this did limit economic activity and growth. Schemes such as carbon trading, which would allow large companies, such as airlines, a limited number of carbon 'credits', would be favoured by ecocentrists. To exceed its allowance, a company would have to buy additional credits from other organisations that were low-emitters or used their credits more efficiently.

(Resource use is discussed in Topic 8.)

Image 1.08 Artist's impression of proposed salt-spraying vessel.

Ecological footprints

A society's ecological footprint is the hypothetical amount of land that it requires to satisfy all its need for resources and to assimilate all its wastes. Many societies now consume more than is sustainable, and we are beginning to realise that this cannot continue. An increase in reliance on fossil fuels and increasing use of technology all increase a society's ecological footprint, whereas actions such as recycling, limiting pollution and reducing the use of resources all reduce the footprint (see Chapter 1.04). It is these actions that help reduce consumption that are being encouraged today.

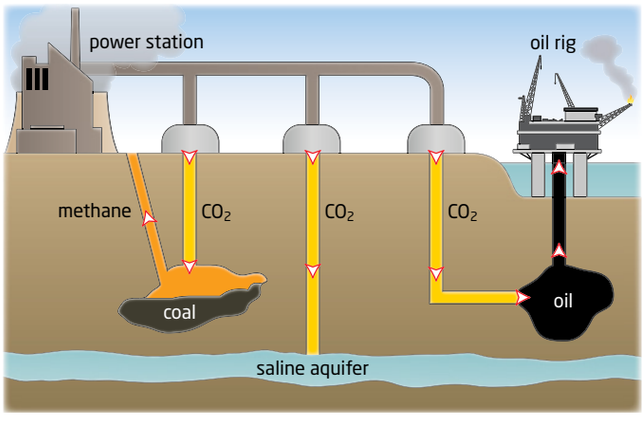

Figure 1.02 Carbon capture and storage involves capturing the carbon dioxide and preventing it entering the atmosphere by storing it deep underground.

1.01

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CONSIDER THIS

In 2010, data showed that the United Arab Emirates (UAE) had the world's largest ecological footprint. Its population of 6.25 million people had an average footprint of 10.68 global hectares per capita (gha). The lowest footprint was found in Puerto Rica, where the population of 3.94 million had an average of 0.04 gha.

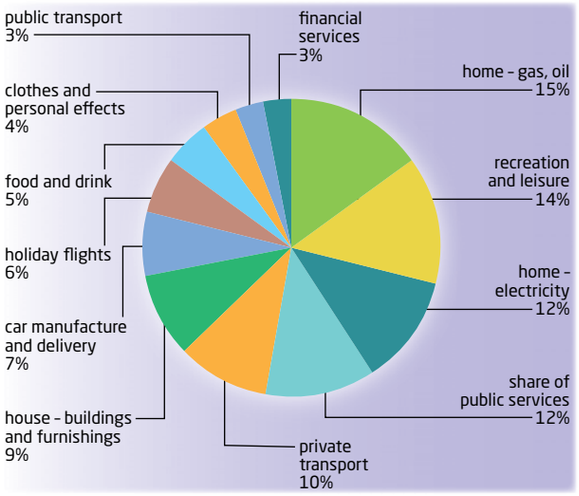

Figure 1.03 This pie chart shows the main elements of a typical individual's carbon footprint in an MEDC. A carbon footprint is one aspect of the ecological footprint. It is an estimate of the total greenhouse gas emission of this individual.

A **carbon footprint** is the total set of greenhouse gas emissions caused directly and indirectly by an individual, organisation, event or product (UK Carbon Trust, 2008).

The idea of 'ecological deficit' is linked to the availability of a biologically productive area in a country. When the ecological footprint of a society or country is greater than the biologically productive area, it has an ecological deficit. An ecocentrist would argue that, if ecological deficit happens, economic growth has caused the society to live unsustainably. Humans should therefore change their lifestyle and reduce their demands on the land. A technocentrist would counter that technology can solve the problems and, with economic growth, prosperity will help to redress the imbalances and ensure that deficits are removed.

A typical **carbon footprint** for an individual in an MEDC is shown in Figure 1.03. How do you think an ecocentrist would reduce this person's carbon footprint?

SELF-ASSESSMENT QUESTIONS 1.01.02

1 Define an 'environmental value system (EVS)'. How is this system similar to other systems?
2 How does a technocentric worldview differ from an ecocentric view?
3 **Discussion point:** How do environmental philosophies influence the decisions which are made about issues such as climate change and the use of fossil fuels?

1.01.06 Your personal viewpoint on environmental issues

Where do you stand on the continuum of environmental philosophies? Your personal value system, influenced by your background, education, culture and the society in which you live, will form your personal view of the world. You will have your own attitudes to the environment based on the influences you have had, the assumptions you have made and the conclusions you have come to. These factors will help form your own EVS. Personal value systems are principles that guide your behaviour and help you determine what is meaningful and important to you. A personal value system helps you express who you are and what you stand for. If you are unaware of your values, you may end up making choices out of impulse or for instant gratification rather than basing them on reason and responsible decision-making. This is why it is so important to know what you value and what is important to you.

Knowledge of the environment and the problems it faces will help you understand and become involved with environmental issues. You will probably also be influenced by those around you; so, for example, you may be more likely to join recycling schemes if your friends and neighbours do so and encourage you to do the same. The seriousness of an environmental problem and how close it is to you may also influence your behaviour. If the coastline near where you live is polluted by plastic waste (see Image 1.09), you are more likely to consider your own use of plastic shopping bags. Perhaps you are concerned about air pollution in your town; this may influence you to cycle or encourage your family to buy a hybrid car. Emotions also affect people's behaviour, so that anger or disgust at environmental damage such as burning forests or slaughtering whales can be a strong influence on your EVS.

As people become more knowledgeable about the environment, their awareness and sense of urgency of the need to deal with environmental problems also increases. More people realise that they can make a difference as individuals and that science can help to solve problems too.

Image 1.09 How does an image like this influence your view of the environment and human activity?

SELF-ASSESSMENT QUESTIONS 1.01.03

1 Which factors in your own community have an influence on your EVS?
2 How does an EVS affect the way people respond to environmental issues?
3 Which of these human activities is most likely to have a *negative* impact on the stability of global ecosystems?
   A Decreasing water pollution levels
   B Increasing recycling programmes
   C Decreasing habitat destruction
   D Increasing world population growth
4 **Discussion point:** The philosopher Socrates said, 'Not life, but good life, is to be chiefly valued.' Discuss what this statement might mean today.