7.2 Impact of industry on the environment

7.2.1 Important definitions

In Chapter 1, the term 'environment' was defined as the surroundings within which humans exist. These are made up of the land, water and atmosphere of the earth; micro-organisms, plant and animal life, or any part or combination of this; the interrelationship among and between them; and the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence health and well-being.[1] Before we can look at the impact that industry has on the environment, we first need to define the term 'industry'.

Industry includes commercial activities, commercial agricultural activities, mining activities and the operation of power stations.[2] According to Statistics SA,[3] the economic sectors in South Africa that can be classified under industry are: forestry and fishing; mining; manufacturing; electricity, gas and water supply; construction; trade; transport, storage and communication; real estate; and community, social and personal services.

In order to understand the impact of industry and agriculture on the environment, the terms 'ecosystem' and 'agroecosystem' also need to be defined.

An ecosystem is defined as any self-sustaining and self-regulated community of organisms and the interaction between such organisms with one another and with their environment.[4] The National Environmental Management Act 107 of 1998 (NEMA) defines an ecosystem as a dynamic system of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit. This phrase was first used by Roy Clapham in an attempt to define the physical and biological components of an environment in relation to each other as a unit. When looking at the definition of an ecosystem, it is notable that it is made up of living organisms – plants, animals and micro-organisms. The definition also includes their environment – soil, rock, water sources, and the atmosphere of this system. Finally, the definition of an ecosystem looks at the interaction of these living organisms with the physical environment and vice versa.

A natural ecosystem provides the environment with oxygen, produced by trees, and with clean water, filtered by wetlands.

An agroecosystem, in contrast, is an ecosystem that has been changed for agricultural activity. It is usually a farm or field and its boundaries have been set for the purpose of agricultural activity. Agriculture is defined as the science, art, or practice of cultivating the soil, producing crops, raising livestock, and preparing and marketing the resulting product.[5]

Biodiversity is the variety of life on earth. It includes all organisms, species, and populations; the genetic diversity among these and their complex assemblages of communities and ecosystems.[6] If we look at this definition more closely, it

1 NEMA, 1998.
2 Waste Act, 2008.
3 Statistics SA (2013).
4 Environment Conservation Act, 1989.
5 OECD (2001) 50.
6 UNEP (2010) 2.

highlights three levels of biodiversity: genetic diversity, species diversity and ecosystem diversity. Different genes in all living things, different species within a natural environment and different environments making up the earth are vital to the survival of everything on earth. Biodiversity is important for the sustainable production of crops needed for food and for industry components. Biodiversity is also important for the ecological services provided by a natural ecosystem and the biological support it provides to the production of crops. Finally, biodiversity protects against ecosystem instability. The loss of biodiversity is caused by habitat loss, changes in ecosystem structures, the invasion of alien species, unacceptable agricultural practices, over-exploitation of natural resources, pollution and degradation, deforestation, desertification, illegal trade in species, and finally by climate change. Illegal trade in species is the second biggest threat to wildlife, after habitat loss.[7]

7.2.2 Impact of industry on the environment: overview

The impact that these activities have on the natural environment and on resources depends on the number of people who have access to these resources and who make use of it; it also depends on the rate of consumption. Population growth is at a record high and it is therefore understandable that resource consumption will be very high as well. For many years there were no practices in place to ensure that resources were consumed at a sustainable rate. The greatest impact on natural resources is usually seen in urban areas where there are larger quantities of people in a small space, consuming immense quantities of resources and producing vast quantities of waste with little regard for the environmental impact of their actions. The more advanced a civilisation is, the more waste it produces.

Any economic activity relies on natural resources in direct or indirect ways and all economic activity impacts on natural resources in direct and indirect ways. These economic activities cannot just be stopped since they contribute to job opportunities and income for South Africans. Unfortunately the benefits are only calculated in terms of monetary value and the damage to the natural environment is not calculated. If natural resources are over-used and depleted it will have a cost on the future wealth of the country, but this is not reflected in calculations that are done today.

Some industries have commercialised the direct use of natural resources. These industries include agriculture, fishing and forestry, and other natural product industries. Other sectors rely on natural sources at a subsistence level for the most basic needs of food, shelter, fuel and medicine. Even these basic survival activities can cause unsustainability and degradation.

7 WWF (2015).

Ecological processes are responsible for the direct transformation of natural systems. These ecological processes include the generation of soil, pollination of crops, pest control, and water purification processes. Many industries rely on these processes, but at the same time they are over-exploiting these processes or inadvertently destroying the components that make these processes possible.

Pollution is not the only damage that occurs in the process of over-exploitation. Any changes in the physical landscape can cause long-lasting damage by causing land degradation. As explained earlier in this chapter, industry and other human-related activities impact on the environment. The impact of these activities on biodiversity can be summarised in three broad categories: habitat loss and fragmentation; over-exploitation of species; and the introduction of invasive alien species. Habitat loss is caused by the expansion of human activity, specifically in food production activities to meet the increasing demands of an increasing population. Research has shown that about 85% of species are under serious threat as a direct result of habitat loss.[8]

7.2.3 Impact of industry on the environment: fisheries and forestry

Fisheries and forestry industries cause damage to the environment and biodiversity by removing indigenous vegetation and replacing it with species that grow faster and are more commercially viable since their yield is greater. Sometimes indigenous species do not have to be removed; simply introducing alien species overwhelms and destroys indigenous species. Fishing gear and destructive fishing practices cause damage to the physical environment. These destructive practices include bottom trawling, cyanide fishing, and dynamite fishing. Endangered species are accidentally caught up in commercial fishing activities aimed at the harvesting of other species.

Most fishing activities are unsustainable and threaten the future of many species. Oceans do not receive sufficient protection and it is very difficult to police those areas since they cover such a vast area of the planet. Fish farms, often cited as a solution to unsustainable fishing activities, also contribute to the damage of the natural environment. Farmed fish threaten local species by invading their habitat and introducing parasites that are increasingly resistant.[9] The fisheries industry is characterised by the waste of fish. Not everything that is caught will be sold and eaten and these practices have placed many marine species, such as dolphins, sharks and coral reefs, under threat.

The impact of the fisheries industry is worsened by pirate fishing vessels who have no respect for laws and treaties, as well as the harvesting and sale of juvenile fish species, that have not yet had the chance to reproduce.[10]

8 WWF (2015).
9 WWF (2015).
10 WWF (2015).

7.2.4 Impact of industry on the environment: mining

Mining is one of the major industries in South Africa; mining activities have a large impact on the natural environment, rivalled only by local and regional municipalities in this regard (this is discussed in further detail below). Once an area has been mined, it will never return to the same state again. Mining companies can only try to return the environment to some state of functionality after their operations have ceased. The impact of mining activities on the natural environment has resulted in regulations and legislation specifically for the governance of this industry. Mining activities cause great disturbance to the land and physical habitat; they make use of great amounts of water that need to be removed from somewhere else. Chemicals and run-off from mining operations can poison whole water systems, including underground water. Any processed material has the potential to become a leaching hazard given the right circumstances. One example is rainfall which falls on these material dumps, causing them to leach into the groundwater. This occurs when facilities are not built according to regulations and these facilities are not lined or the membrane is damaged.

However, even strict regulations and legislation do not prevent business practices that damage the environment. Many companies deem it too expensive to treat waste by-products as per regulation and they simply store these dangerous materials in big reservoirs that pose a danger to the environment in numerous ways. One of these hazardous elements is Chromium(VI) (CR+6), which has been classified as a carcinogen. Carcinogens are cancer-causing agents. Chromium(VI) is used in many industrial and metallurgical processes and water contaminated with Chromium(VI) and its by-products are very dangerous to the health of people and animals consuming such water.[11]

Steel and gold mining has resulted in serious incidents of pollution. Goldfields have been responsible for the contamination of groundwater around the Witwatersrand basin in southern Gauteng. Past mining activities have led to the pollution of three basins to such an extent that they now need to be treated. Their levels are rising to environmentally critical levels and risk the contamination of natural groundwater resources and the rest of the area with water that contains high levels of acidic sulphur, as well as high levels of various heavy metals. Any of these components will have seriously adverse effects on both the environment and human health. The Department of Water Affairs has built new water treatment plants in response to this. These plants are said to be the biggest of their kind in the world. At this stage, the cost of treating water in these facilities to acceptable levels so that it can return to rivers runs in the area of R210 million rand, excluding the capital costs that have been incurred.[12]

Coal mines have also caused serious damage to the environment. In 2012, the water in the Boesmanspruit Dam, which supplies water to the town of Carolina, was contaminated by acid mine drainage from the nearby mining enterprises. It took

11 EPA (2013).
12 Seath & Van Niekerk (2011).

over seven months to get the problem resolved and further investigation revealed that nearby wetlands had been heavily contaminated as well. The contamination was allegedly caused by a rain storm, which caused an overflow of the holding ponds at the coal mine.[13]

7.2.5 *Impact of industry on the environment: energy and water supply*

Electricity, gas and water supply activities require a lot of infrastructure. In order to supply water, it first needs to be gathered or purchased. The construction of dams and the infrastructure required to transfer water impacts in the same way as other construction activities impact on the natural environment. However, there are additional impacts on the natural environment further downstream from where a dam has been constructed. Most of the time there will be a drastic reduction in the amount of water that moves through these environments in comparison to before dam construction. However, in times of heavy rain when the dams are filled and threaten infrastructure, floodgates will be opened, flooding the environment down-river.[14]

Power generation contributes to global warming and is a great contributor to pollution. Electricity is generated by burning fossil fuels. Coal, oil and natural gas (fossil fuels) are the main source of CO_2 pollution; these emissions contribute directly to the climate change crisis faced today. The ash produced by the burning of coal also gives off very high pH levels that contaminate both the air and soil.

Oil and gas refineries and the transportation of these valuable resources are a grave threat to the natural environment as it not only involves the mining of natural resources, but also carries with it the constant threat of pollution.[15]

The energy problems experienced in South Africa are often reported in the news. The cost of fuel and electricity continues to increase at a rate that is unprecedented. South Africans experience black-outs, or load shedding, on a regular basis, as well as fuel shortages at times. Although government is funding numerous research projects on alternative energy production, and new developments are focusing on constructing green buildings, a definitive solution to the ever-growing energy problems in South Africa is still a long way off. South Africa is on the right track though; this was proved by the launching of South Africa's first solar power plant in 2015.

The public sector, which supplies energy and water to the population, is one of the worst polluters. All services that are provided by various municipalities create waste and carry the risk of pollution. It is just as important that government institutions be held accountable for their environmental impact as it is for businesses and individuals to be held accountable. Local, regional and national governmental institutions waste precious resources by duplicating services and ignoring the importance of environmental management. These institutions determine

13 McCarthy & Humphries (2013).
14 Kraljevic et al (2013).
15 WWF (2015).

development and population planning and in the past numerous projects have been undertaken with little regard for the environmental impact of their choices.

Besides the provision of electricity, gas and water supply, domestic households also require waste removal and a range of other economic services, all contributing to the impact humans have on the natural environment.

7.2.6 *Impact of industry on the environment: construction*

The construction of housing and other infrastructure can only be achieved by clearing land. This means the removal of natural species through deforestation and the removal of layers of natural soil. Natural resources are required in the process of construction; the construction industry can easily over-exploit these natural resources, contributing to habitat fragmentation. Once construction has been completed, alien species may be introduced, deliberately or inadvertently, in the gardens of these newly constructed areas.

The construction industry needs space in which to develop new houses, industries, etc. This is sometimes achieved by drying wetlands. Wetlands act as nature's filter and play an important role in purifying water. If wetlands are destroyed, there is a loss of habitat for indigenous species and also a loss of clean water. Pollution increases in these areas due to increased human activity.[16]

Providing housing and other infrastructure for people disrupt natural ecosystems, which, in turn, have an adverse effect on the future existence of numerous species.

7.2.7 *Impact of industry on the environment: trade and tourism*

As with most other economic activities, trade and tourism require the construction of infrastructure. Tourists visit areas renowned for their natural beauty and take their vehicles off-road in order to get to these areas. They cause disturbances to the natural environment and pollute these areas. Tourists pay exorbitant amounts of money for sports such as recreational fishing in order to obtain species that they deem collectable. Although tourism does have its advantages when it comes to environmental education and the creation of awareness regarding environmental issues, there needs to be a balance.

7.2.8 *Impact of industry on the environment: transport*

So many industries and individuals make use of transport that it can be classified as an industry. In the process of making transport possible, roads and railways need to be constructed. As with all construction processes, a lot of damage is done by reshaping the land and removing indigenous species. Additional traffic through natural areas contributes to pollution and threatens the biodiversity of these affected areas. Roads causes habitat fragmentation by changing the landscape. If roads are built through a natural area, the affected species can no longer reach the

16 WWF (2015).

other side of the road, for example in search of water, without extensive risk. These are all factors that affect the biodiversity of an area, but which are seldom taken into account when there is profit to be made.

7.3 Impact of agriculture on the environment

In the process of human activity, people have set boundaries that would not have occurred naturally. These boundaries are devised for the purpose of producing agricultural products effectively. The set boundaries usually have no correlation to the boundaries that a natural ecosystem would have.

The characteristics of a natural ecosystem are:

- relatively stable over time
- without input or management
- nutrients are recycled
- structured trophic system
- nutrients are harvested by a variety of plants
- soil organisms enable decomposition to occur – providing nutrients and organic matter.

The characteristics of agroecosystems are:

- management and human control
- human intervention
- disturbance
- regulation of the system
- habitat fragmentation
- variability.

7.3.1 Differences between an agroecosystem and a natural ecosystem

Diversity and complexity

Agroecosystems are very simplistic when compared to natural ecosystems. There is very little diversity in terms of the species involved and in the way these species are arranged within a physical space. The species that are involved in an agroecosystem may be genetically modified; even if they are not, there is very little genetic variety since the same crops remain in the same physical space. In an agroecosystem, maize, wheat, rice and potatoes make up most of the food that is consumed on a global scale.

Biomass

Biomass is defined as the amount of living matter in a unit area or volume of habitat or the biological material derived from living organisms.[17]

The biomass of livestock in South African agriculture is much greater than the biomass usually present in a natural ecosystem, for example a greater number of cattle per hectare will be found in an agroecosystem than could be supported in a natural ecosystem. This happens because the goal of agricultural activities is to gain the most economic profit possible, even if it means that extensive human interference and management will be required. The implication of this increase in biomass is an increase in resources required to sustain the agroecosystem, an increase in the pollution and waste produced, and a substantial decrease in the natural nutrients available in the agroecosystem.

Disruption

Natural disasters such as floods, fire, droughts, etc are part of the natural ecosystem. When these disruptions occur, it actually boosts the growth and survival of the organisms in these ecosystems. A good example is the veld fires that run rampant in the northern parts of South Africa during the winter months. The veld ends up blackened with seemingly nothing left alive, but when the first rains come the grass grows back stronger and healthier than before. There are even certain Protea species that only germinate after they have been exposed to veld fires.

However, these natural disasters wreak havoc with agroecosystems, completely devastating the delicate balance that exists in these man-made systems. Agroecosystems have no natural built-in protection, since many of the species are not native to the region.

Erosion is also notably higher in agroecosystems than in natural ecosystems since humans remove most of the built-in protection provided by forests and other natural habits when an agroecosystem is prepared for agricultural activity.

Pollution

Agroecosystems make use of pesticides and fertilisers, both of which do not exist in a natural ecosystem. This not only affects the agroecosystem in which these pollutants are being used, but the run-off from these high amounts of phosphor and potassium from agricultural activities also infects surrounding ecosystems, sometimes poisoning water for human consumption. Agroecosystems also produce more waste than is found in natural ecosystems; this waste sometimes contaminates the wild ecosystems surrounding these man-made agroecosystems.

Pesticides and herbicides have been proven to cause mutations and fertility problems in animals. It is postulated that they can cause serious health problems in humans as well.[18]

17 Biomass Energy Centre (2011).

18 WWF (2004).

Management and control

Almost everything about an agroecosystem is controlled and managed by humans. This includes the types of plants and animals that will be cultivated or raised, resources to be invested in the area, the pesticides to be used and the reproduction of the animals and plants. In a natural ecosystem, there is a self-regulating process in which nutrients from the soil are used by plants; these plants are eaten by animals and insects and, in so doing, the animals and insects ingest the nutrients. Nutrients are returned to the soil when animals and plants die and decompose. This natural system requires very little management and interference, while agroecosystems require careful management to ensure that the soil is not just stripped bare, but that enough nutrients are returned to the soil to ensure successful crops in the future.

Boundaries

As explained in the definition of agroecosystems, the boundaries of these systems are man-made and are determined by economic need. Natural ecosystems have borders that are blended together very well. Usually one would not see clear lines separating boundaries in natural ecosystems. Living organisms have greater freedom of movement between these different systems. The impact of these man-made boundaries is called habitat fragmentation.

Energy sources and cycles

In light of the factors discussed above, it is clear that there will be differences in the energy cycles of agroecosystems compared to natural ecosystems. There is no complexity in the structure of an agroecosystem; all incoming energy is diverted to one purpose – producing economically viable produce. Very little nutrition is transferred back into the soil and surrounding areas and the cycle of life is very limited in these agroecosystems. The energy from dead and decaying organic matter is much lower in man-made ecosystems than in natural ecosystems. Even solar energy is channelled differently since agroecosystems are designed to minimise competition and maximise the effectiveness of the system, in order to produce the maximum amount of the desired crop.

Human-introduced crops require much more water than would naturally be consumed by the natural environment. Despite the amounts of water needed to irrigate crops, trillions of litres of water are wasted in these processes. These losses occur due to unprofessional and unsustainable agricultural practices and irrigation systems that leak water.[19]

Alien plants

The impact of invasive alien plants, introduced for agricultural purposes, may be irreversible in some cases. Invasive alien species are usually introduced as a result of

19 De Nooy (2003).

human activity. The search for better food resources that can feed more people with less energy input leads to the introduction of foreign species for cultivation and hunting. Invasive species threaten the habitat of native species and can cause their extinction. Invasive alien species also cause irreversible damage to ecosystems.[20]

7.3.2 Implications of environmental impact by human activity

There are some serious consequences for the damage that people have done to the environment. Acid rain and ozone depletion are just the tip of the iceberg. Climate change has caused unpredictable weather patterns; many regions that were previously tropical, now receive little or no rain and vice versa. This has led to increased incidents of water scarcity, extreme floods, and extreme droughts, leading to a situation where consumers simply have to pay more for even the most basic resources.

7.4 Climate change

Climate change and global warming have been contested subjects for many years, with some scientists and politicians becoming a driving force behind reformation and the need to make environmentally responsible decisions, while other scientists and politicians still believe that it has not yet been proven that any threat to our current way of life exists. Some of the arguments that attempt to disprove the existence of global warming appear to be rooted in personal agendas. Other arguments are due to a misunderstanding of the science behind global warming. The purpose of this chapter is not to convey the science of climate change and global warming in detail, but to provide a brief overview of the current state of affairs and how it impacts on business decisions.

7.4.1 What is climate change?

The Intergovernmental Panel on Climate Change[21] defines climate change as observable changes in the climate system. These changes can be measured and compared to historical data in the form of ice core samples extracted from the polar regions of the earth. This means that major changes in the observable weather, and the origin of these observable changes, can be traced back to changes in ocean levels, average rainfall patterns, increases in the average global temperature, and more regular and prolonged occurrence of extreme weather events. The United Nations Framework Convention on Climate Change (UNFCCC) makes use of a different definition for climate change. According to the UNFCCC,[22] climate change is defined as the changes in climate as a result of human activities that are changing the composition of the atmosphere, resulting in changes in weather

20 IUCN (2011); WWF (2015).
21 IPCC (2007) 6.
22 UNFCCC (2014).

systems and sea-levels. These changes are in addition to the natural changes in the climate system.[23]

Although weather changes daily and seasonally, when weather patterns are compared to available historical data, it is clear that the earth's overall climate has changed drastically in the last 30 years. This is worrying, as such changes in climate usually happen over thousands of years. Any major changes in temperature and rainfall patterns impact on whole ecosystems. In recent years a lot has been written about the melting ice caps. Not only does this cause a rise in sea levels, it also results in a smaller physical environment for cold climate creatures to live in. The real danger of climate change is that it is happening at such a rapid rate that the species inhabiting the earth do not have the time to adapt to these changing conditions.[24]

How the normal system works

If scientists are able to discern a difference in climate which is significant enough to give them cause for worry, it makes sense that a 'normal' system exists as a base for comparison. However, it is not that simple since the climate system is very complex.

The most important aspect that influences the earth's climate is known as the great ocean conveyor belt. This conveyor belt acts as a weather buffer for temperatures across the globe. It is responsible for the gradual changes in seasons, which balance heat and cold around the world. Without this conveyer belt, the earth would look quite different. This great ocean conveyor belt includes deep ocean currents and surface ocean currents that circulate the earth in a 1 000 year cycle. This circulation cycle results in the following two processes: warm surface currents carry less dense water away from the Equator, towards the poles, while cold, deep ocean currents carry colder, denser water away from the poles towards the Equator. This circulation cycle is vital for the distribution of heat energy, the regulation of weather and the cycling of gases and nutrients.[25]

The worrying thing about climate change is that it leads to an increase in the surface temperature of oceans, which in turn leads to the evaporation of seawater. Climate change also increases the temperature of the earth's surface which leads to the melting of glaciers and sea ice. Melting glaciers cause an influx of warm freshwater into the ocean, disrupting the conveyer belt system by blocking the formation of sea ice.

23 IPCC (2007) 6.
24 UNEP (2010) 2.
25 NGE (2015).

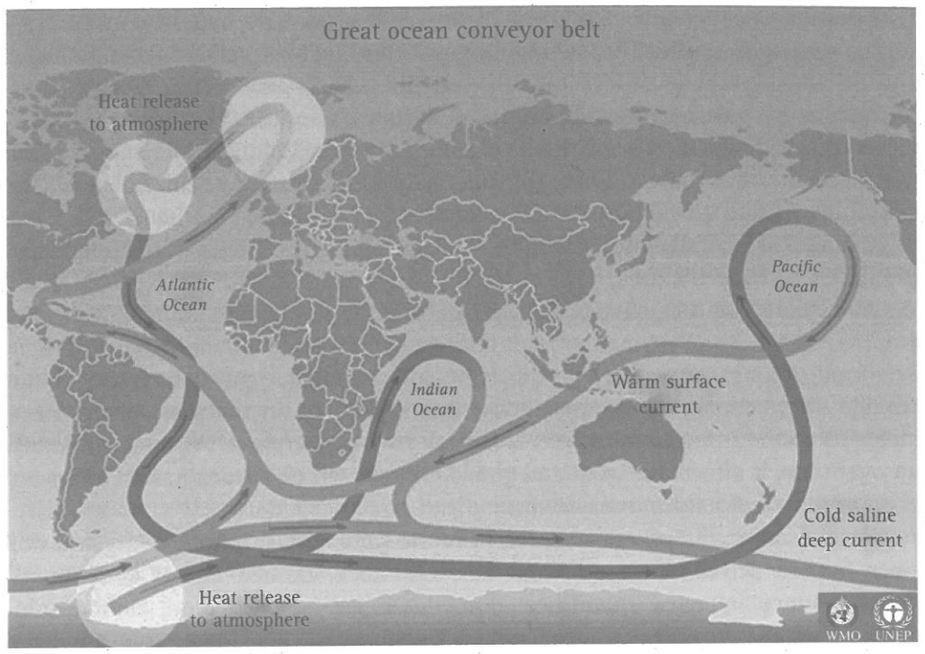

Figure 7.1: The great ocean conveyor belt[26]

Figure 7.1 illustrates the flow of the ocean currents described in this section. It is important to note that climate change should not be confused with El Niño and La Niña cycles. These cycles are the two opposite phases of the El Niño-Southern Oscillation (ENSO) cycle. The ENSO cycle is a scientific term that describes the variations in temperature between the ocean and the atmosphere. The La Niña phase is sometimes referred to as the cold phase of ENSO, while El Niño is referred to as the warm phase of ENSO. These deviations from normal surface temperatures have a global impact, not only on ocean processes, but also on global weather and climate. The difference between ENSO-cycle climate change and the climate change we should be worrying about lies in the fact that ENSO cycles follow a predictable pattern of occurrence. El Niño and La Niña episodes last from nine to twelve months and occur every three to five years.[27]

Causes of climate change

Climate change does not have a single cause, but is the product of various different environmental impacts that act synergistically. Causes can be natural or human induced. The factors that induce climate change include temperature changes, changes in rainfall patterns and humidity, and changes in wind and pressure.

26 NOAA (2015).
27 NOAA (2015).

Temperature changes are caused by carbon emissions that trap heat under the earth's atmosphere. These heat-trapping gases trap the heat emitted from sunlight and do not allow it to reflect back through the atmosphere. These carbon gases are emitted by power-generation activities, various factories, and motor vehicles.[28] Power-generation activities are responsible for 24% of emissions, while industry and transport each contribute to 14% of greenhouse gas emissions. Agricultural activities contribute 14% to greenhouse gases, as much as is contributed by industry.[29]

Changes in rainfall patterns include changes in both the intensity and frequency of rainfall in a specific area.

As explained earlier, climate change can be natural or human induced. Volcanic eruptions are a good example of natural elements causing climate change. When a volcano erupts, it spews large quantities of greenhouse gases such as carbon dioxide and methane. These greenhouse gases build up in the atmosphere. Heat builds up in the sunshine; this heat is not released by the gases. As the heat builds up over time, it affects the local and global climate, which in turn has an effect on plant growth and natural ecosystems.

Human-induced carbon emissions have the same effect, but on a larger scale, since human activities are so numerous. Livestock, farmed on an agricultural scale, produce immense quantities of methane gas – a lot more than would occur naturally. In order to meet human consumption demands, large numbers of livestock, for example cows, are bred for milk and meat. These unsustainable agricultural activities contribute to methane gas production on a large scale, which in turn contributes to global warming.

There are many other examples of human activities impacting on greenhouse gas emissions on earth. If these emissions are not drastically reduced, the earth could face devastation.

Impact of climate change

Climate change forces wildlife to adapt to life on a warmer earth, due to changing weather patterns.[30] Normally, these changes would occur over thousands of years but species are now forced to adapt very quickly or become extinct.

Climate change contributes to deforestation; deforestation contributes to greenhouse gas emissions and climate change. Forests act as air filters in a certain sense and are responsible for changing human-produced carbon dioxide into oxygen.

Rising temperature and changing rainfall and snowfall patterns force trees and vegetation to move towards the colder polar regions and up mountain slopes. These shifts undermine much of the work that the conservation community has accomplished over the years. Traditionally, the natural environment was protected by using conservancy preserves, local land trusts and national parks. If the face

28 The Nature Conservancy (2015).
29 Stern (2006) 254.
30 WWF (2015).

of vegetation changes, animals will try to migrate, but will come up against man-made borders. Some species will be left without viable habitats, putting much of our treasured wildlife at risk. Polar bears are the most famous example of this.

Higher temperatures also increase the amount of moisture that evaporates from land and water, leading to droughts in areas that never previously had a problem with lack of water. Land affected by droughts is more vulnerable to flooding. These floods will increase as global temperatures continue to increase. Agricultural activities will be forced to change since such practices will no longer be viable in the affected areas. This has already happened in certain areas in Africa and Asia; the effects can be seen in the changes in water supply, human health and human activities. These warmer and drier conditions increase the risk of both veld fires and forest fires. In the western parts of the USA, conifer forests are drying out, due to decreased snowfall and increased summer temperatures. In South Africa, fynbos fires in the southern parts of the country have been worsened by longer hotter summers and a decrease in the traditional winter rainfall.

The effects of climate change on businesses and economies can be felt around the world. If climate change is threatening the most basic elements of human life, it is definitely the responsibility of the business environment, as well as of international governments, to address the issue.

The projected cost of climate change on annual GDP averages 5–10%. However, if governments acted immediately to reduce the effects of climate change, it would only cost 1% of annual GDP.

Many industries are unable to continue with business as usual due to the impacts of climate change. The fisheries industry struggles with species, whose numbers are threatened by the stresses of heat and growing parasites in oceans, due to rising temperatures. Rising sea temperatures are also threatening the survival of coral reefs. These reefs generate billions of dollars' worth of goods and services. Ski resorts are often unable to open during ski seasons because of a decline in snowfall. These businesses cannot even obtain loans to get them through periods of decreased income, as banks have realised that these businesses may never return to normal.

Lowering lake and dam levels cause irreparable damage to shoreline infrastructure and force the relocation of harbours at a cost of millions. Hurricanes and rainfall are becoming more intense, causing damage to infrastructure and property that amounts to billions of dollars.

Furthermore, it is the poorest who suffer the most. The impacts of climate change pose a grave threat to the poorest countries. These developing countries, which depend on agricultural activities for survival, are already at a geographical disadvantage as a result of warmer climates and shortages of water. These countries are also plagued by poor healthcare systems and poor public service systems and are therefore struggling to cope with the additional current climate challenges they face.[31]

31 Stern (2006) iv.

Although traditionally colder countries will initially see benefits in climate change through increased crop yields, reduction in heating requirements and reduced winter mortalities, the long-term damage to infrastructure, the economy and biodiversity will be irreversible.[32]

Despite the bleak outlook on the future of the world when taking the impact of climate change into account, the economic world powers do not have to choose between the promotion of economic growth and limiting the impact of climate change. With improvement in power generation and transport technologies, the future looks less bleak.

Legislation on climate change

The National Environmental Management Act 107 of 1998 (NEMA) forms the basis of all environmental legislation. With specific reference to carbon emissions, the *White Paper on Renewable Energy* focuses on climate change as one of the major threats facing the environment and introduces the concept of carbon emissions tax in South Africa.

Carbon emissions tax has been charged since 2015. South Africa is the 11th biggest polluter in the world; this is very concerning since the South African economy only makes up 1% of the world's economy. According to *Business Day*, however, South Africa is the 13th most active country when it comes to its attempts to reduce carbon emissions.[33]

The Kyoto Protocol was adopted by the United Nations Framework Convention on Climate Change (UNFCC) in 1997. This protocol was introduced to do more than merely suggest that industrialised countries should reduce their greenhouse gas emissions. The protocol commits industrialised countries to reduce greenhouse gas emissions and has been ratified by 195 countries. The Kyoto Protocol also makes use of other mechanisms to reduce greenhouse gas emissions by industrialised countries and has given rise to the phenomenon of emissions training, also known as the carbon market, which encourages joint efforts between participating countries to address the issue.[34]

The countries in the southern part of Africa belong to the Southern African Development Community (SADC), established in 1992. The SADC member countries are: Angola, Botswana, the Democratic Republic of Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe. The goal of this alliance is to increase economic growth, improve the living conditions of people in the region and support sustainable development and democratic principles. SADC countries have poor access to water and many people living in the region suffer from malnutrition.[35] As explained earlier, it is the poorer countries who suffer the most when it comes to climate change since they are already battling harsher climates. The SADC region

32 Stern (2006) iv.
33 Lester (2013).
34 UNFCC (2014).
35 Chishakwe (2010).

is one such example. Not only do the people living in this region struggle with the HIV/Aids pandemic and child-run households, but they face daily challenges of water insecurity and malnutrition.

SADC countries have a number of agreements and protocols, as well as numerous intergovernmental programmes, in place to monitor, mitigate and support countries with regard to climate change. These programmes include a Drought Monitoring Centre (DMC) to monitor drought and act as an early warning system; the Programme for Biomass Energy Conservation (ProBEC), a regional programme for biomass energy conservation; and the Common Market for Eastern and Southern Africa's (COMESA's) climate change initiative aimed at addressing climate change in order to reduce the impact it has on a social and economic level. These are just a few of the intergovernmental projects running at the moment. In addition, there are numerous civil society projects to assess climate change impacts, drive alternative energy production, mitigate disasters and support conservation.[36]

7.5 Business strategies to minimise industry impact

Simply speaking, the best solution for minimising the impact of human activity on the environment will be to start thinking before acting. Every business and every individual will need to determine what the threats are over which they have influence and then take action to put policies, procedures and habits in place to limit these threats.

For businesses, the first step is to gather as much information as possible from impact assessments and ecological assessments. Awareness of base-line data and how measurements change over time is vital. Every organisation needs indicators to measure their impact on the environment, for example, in the Florida Everglades, the population of alligators is used as an indicator for the entire ecosystem. If the alligator population thrives and numbers increase, it is safe to assume that the rest of the ecosystem is doing well.

In a business context, awareness and education programmes are the best ways to educate and inform employees and stakeholders.

7.5.1 Pollution prevention

In every step of a product's life cycle there are opportunities for pollution prevention. The same can be said for the daily activities of any business organisation, for example a business can conduct a pollution prevention audit that will produce a tailor-made report on all the areas where waste can be reduced or eliminated.[37] Pollution prevention is the responsibility of everybody in an organisation. All employees need to be encouraged and their behaviour controlled and rewarded in order to ensure that they behave appropriately and that this modified behaviour

36 Chishakwe (2010).
37 Crognale (1999) 14.

continues. Pollution prevention needs to become part of their daily habit and be taken into account in all future strategic planning. Pollution prevention should not just be implemented in the manufacturing processes, but also in administrative processes and office functions. It is relatively easy to determine the specific actions that will contribute to pollution prevention; however, the real challenge will be to ensure consistent pollution prevention by employees.[38]

7.5.2 Design for the environment

Designing for the environment (DfE) was prompted by stricter regulations. These regulations forced businesses to take environmental issues more seriously and be more innovative in all aspects of the manufacturing process. DfE requires organisations to look upstream in their manufacturing processes and completely rethink their processes, with the conservation of energy resources and raw materials in mind. Consuming fewer resources in order to generate less waste is at the heart of this philosophy. In the process of manufacturing responsibly, businesses also need to focus on producing goods that are reusable or can be successfully recycled.

Designing for the environment can be divided into the following steps:

1. Evaluate the product life cycle.
2. Determine the goals for the DfE process.
3. Agree on the principles the organisation would like to implement.
4. Implement a life-cycle management system.
5. Develop the DfE process.

Each step in a product's life cycle, from the acquisition of raw materials to the disposal of the product at the end of its life cycle, needs to be considered.

The ideal goal of DfE is to attain a balance between environmental concerns, monetary goals and other stakeholder issues, such as compliance, social issues and legal responsibilities.[39]

7.5.3 Benchmarking and strategic design

The ideal way to minimise the impact of business activities on the environment is to incorporate it in company strategy from the get-go. By analysing the long-term goals of a business, top management can integrate environmentally responsible goals into its existing organisational goals. In this process of reflection, a business can also investigate whether its existing environmental management system is effective and reflective of its chosen environmental strategy. Once the processes have been re-evaluated and implemented, the business can use both its historical performance and its ideal world model, against which to benchmark its performance.

38 Crognale (1999) 15.

39 Crognale (1999) 39.

Another part of a business that can make a vital contribution in terms of environmental responsibility is its human resources department. Incorporating principles such as work ethic and environmentally responsible decision making in personnel training will be greatly beneficial to the business in achieving its environmental strategies. These employees can also be trained in the International Organization for Standardization's family of standards, ISO 9000 (quality management) and ISO 14000 (environmental management) to allow them the opportunity to gain awareness of environmental and quality issues and where the business stands in terms of its long-term goals and strategies.[40]

Once the organisational strategy has been determined and the long-term goals set in place, it is important to get the business to pull together and commit to attaining its set goals. Gaining a commitment to addressing environmental issues is vital. Both the highest levels of management and the lower-level employees need to be committed and to actively demonstrate this commitment. A letter signed by the CEO or an annual environmental report can motivate employees towards attaining the organisation's environmental goals. Compiling annual reports is mostly a voluntary gesture, but over the years it has begun to carry more weight with stakeholders to enable them to see how a business is achieving its environmental goals. The information contained in an annual report can be used as the benchmark, against which an organisation will evaluate each consecutive year's performance.

Other stakeholders, such as customers and suppliers, also attach value to these annual reports and to the fact that an organisation is working to make a difference to the environment. Improving product packaging and advertising to reflect the environmental principles of an organisation could target a whole new customer base, as well as improve customer retention. Since marketing and sales managers are more interested in sales figures than in the environment, an environmental report should also include some of the harder issues such as product sales and packaging in an effort to win such managers over to more environmentally friendly business practices.[41]

7.5.4 Regulatory requirements

It is important to keep up to date with the latest industry-related regulatory requirements. There are numerous ways of getting hold of these regulatory requirements, including subscriptions to regulatory boards, attendance of workshops and conferences and membership of professional bodies. Information on regulatory requirements is contained in laws and in documents and books on regulations. Government departments and international organisations such as the United Nations are a treasure trove of information on anything environmental and compliance related. Some publishers provide a loose-leaf service, whereby one can purchase legislation and regulations and, for an annual subscription fee, receive any updates. In South Africa, the two biggest providers of this service are

40 ISO (2009).

41 Crognale (1999) 156.

the publishers LexisNexis and Juta & Co. Newsletter subscriptions will provide up-to-date information and inform subscribers of pending and possible changes in regulations and legislation.

Voluntary compliance to non-compulsory regulations shows even more commitment towards environmental issues and provides business with the opportunity to stay ahead of regulatory requirements. Instead of businesses being taken by surprise by new requirements, and spending a lot of money on meeting these requirements, organisations can anticipate these regulations and implement them in a timely fashion. It is also important to aim at exceeding expectations, instead of just meeting the set minimum requirements to the letter. This principle needs to be applied to all business units in an organisation. The focus should not simply be on compliance or on quality, but also on the people within the organisation doing things correctly and understanding why it needs to be done that way.[42]

7.5.5 Root causes approach

A thorough audit of a business's EMS will reveal some of the root causes of the problems the organisation faces. These audits provide organisations with the information they require to make the changes necessary for their environmental goals to succeed. The root cause approach is aimed at fixing the core issue and not simply fixing the symptoms. For example, if waste is not properly stored and disposed of, the process that produces the waste needs to be investigated and the employees involved should be trained to manage hazardous materials more responsibly. Simply fixing messes after they have been made will not solve the problem in the long run. Being able to address root causes will be well worth the money a business needs to spend on conducting an environmental audit.

7.5.6 Training and development and awareness

Training and development is vital to an organisation's success in addressing environmental issues, as is awareness. Employees need to be aware of the proper usage, storage and disposal procedures for each hazardous substance they work with. But environmental training requires more than simply awareness and training in hazardous substances. All employees need to be aware of emergency procedures and how to take the correct preventative measures, so that these emergency procedures will not be necessary. Employees should receive training in both hard skills, such as training associated with dealing with hazardous materials, as well as training in soft skills, such as environmentally responsible decision making. If an organisation has a philosophy of simply complying with the minimum requirements, this attitude will be reflected in its employees. However, if an organisation has an attitude of exceeding minimum compliance regulations and behaving in a manner that is environmentally responsible, this attitude will also be conveyed by its employees.

42 Crognale (1999) 388.

7.5.7 PDCA

The PDCA-cycle, also known as the Deming cycle, has already been discussed in previous chapters. The Plan-Do-Check-Act cycle is a common problem-solving technique that was developed in the 1930s. The PDCA-cycle is also applied in ISO 14001. This cycle provides a business with a systematic system on which to base its decision making, thereby structuring that organisation's information gathering, implementation and decision making to maximum efficiency.[43] Consult Chapter 5 for details on this vital part of environmental management.

7.5.8 Reducing greenhouse gas emissions

There are four ways to reduce greenhouse gas emissions:[44]

1. Reduce the demand for emissions-intensive products and services.
2. Increase the efficiency of manufacturing processes that are financially efficient and that reduce emissions.
3. Reduce deforestation and other human activities that indirectly impact on greenhouse gas emissions.
4. Focus on technologies that are more environmentally friendly and emit fewer greenhouse gases. These low-carbon technologies can be implemented at any stage of the manufacturing and supply chain process.

Initially, the cost of reducing greenhouse gas emissions may be exorbitant, but this is outweighed by the long-term benefits of taking global warming and climate change seriously.

7.6 Conclusion

South Africa is currently experiencing a situation of increased demand for decreasing resources. Population growth and technology has led to a situation in which the rate of consumption and the resulting pollution is increasing at an alarming rate. More people need more food and more space; the more advanced a society is, the more advanced their needs are. This in turn threatens the natural order of things. Natural resources such as air, water, soil, fossil fuels, minerals, and living organisms are threatened. This cycle needs to be broken in order to make growth more sustainable. Minimising the impact of industry and agriculture on the environment starts with one person – you. Everybody can make a difference by making better choices and living with greater environmental awareness.

At the level of policy establishment, world economic powers need to focus on reducing emissions by taxing carbon emissions, introducing policies that support the development of clean technologies and making these behavioural changes as easy as possible.

43 Crognale (1999) 136.

44 Stern (2006) ii.

All business strategies to minimise industry impacts require a champion inside the organisation to drive these new ways of thinking and of doing business. Anybody with a passion for the environment can be that champion and help to change the world.

Review questions

1. Explain the concept of biodiversity and its importance.
2. List the elements of the environment that are impacted by industry.
3. List the differences between natural ecosystems and agroecosystems.
4. Sketch the great ocean conveyor belt and explain its importance in the climate system.
5. Explain the concept of greenhouse gas emissions.
6. Discuss any two business strategies to minimise industrial impact on the environment and explain how you would implement these strategies in your organisation.

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Chapter Eight

Integrating environmental management with the business environment

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Learning Outcomes

After studying this chapter, you should be able to:

- briefly explain and depict the business environmental model
- describe the components of a micro business environment
- explain the impact of environmental issues on the micro business environment
- discuss the management of the impact of environmental management issues
- describe the components of a market business environment
- motivate turning environmental management challenges into business opportunities
- describe components of a macro environment
- briefly discuss global environmental management disasters as long-term consequences of globalisation policies.

Overview of this chapter

This chapter provides an overview of the integration of environmental management with the business environment. A discussion of the business environment provides insight into the impact of environmental management policy on the micro business environment, market business environment and macro business environment respectively.

8.1 Introduction

The goal of this book is to teach students environmentally sound management principles. The term environmentally sound management was first used in the National Environmental Management: Waste Act 59 of 2008, with specific focus on the management of waste. Here the term is applied to all management activities. Environmentally sound management is the taking of all practicable steps to ensure that business activities are managed in a manner that will protect people's health and the environment. In order to manage a business in an environmentally sound manner, the business environment should first be understood.

8.2 The business environment model

The business environment can be divided into three general environments, namely: the micro business environment, the market business environment and the macro business environment. This chapter focuses on these three environments and their importance from an environmental management perspective.

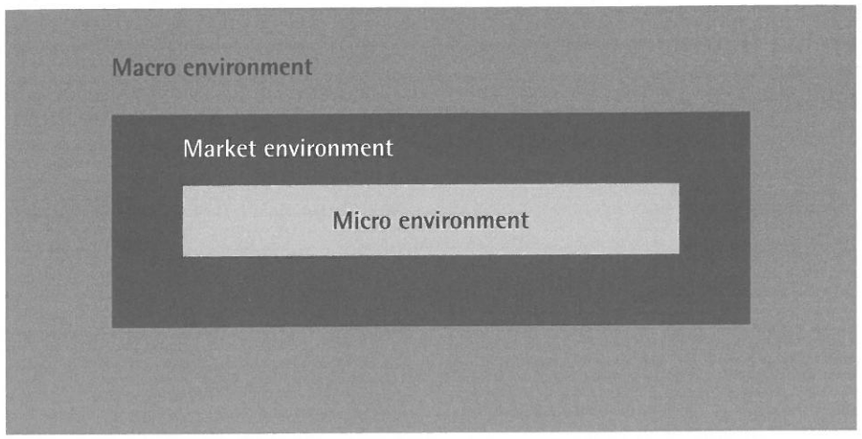

Figure 8.1: The business environment model

As illustrated in Figure 8.1, the macro environment encompasses both the market and micro business environments. The components of the macro business environment are those that a business has no control over, although these factors have a direct impact on the business.[1] These components include the technological environment, economic environment, politico-legal environment, demographics and cultural environment, international environment and the ecosystem.[2] The market environment consists of a business's customers, competitors, intermediaries, supplies and labour force.[3] This environment impacts on the business; the business in turn impacts on the market business environment.

The micro environment is the smallest of the three business environments. Both the macro and market business environments impact on the micro business environment. The micro business environment consists of everything over which a business has control. This includes the vision and mission of the business, the individual business functions and the resources that a business has.

Just as the business environment can be divided, environmental issues can also be divided into local, regional and global issues. The different levels of environmental issues need to be addressed at different levels of the business environment.

1 Erasmus et al (2013).
2 Botha & Musengi (2012).
3 Botha & Musengi (2012).

In responses to environmental impacts on a global scale, countries have signed conventions and protocols. On a local and regional scale, the response to environmental threats takes the form of legislation and financial incentives. Legislation translates the protocols that were signed at an international level into measurable and enforceable rules, aimed at protecting the environment. Even before these protocols have been translated into law, businesses can comply by adhering to the environmental standards compiled by the International Organization for Standardization (ISO).

Financial incentives for businesses are achieved in the form of tax cuts. Businesses which achieve certain environmental standards and make use of sustainable, environmentally friendly technology will not be liable for additional emissions taxes. Individuals have received tax breaks when they purchase greener cars since the implementation of emissions taxes on new car purchases.

8.2.1 Business and the environment

Most businesses in South Africa are registered as closed corporations under the Close Corporations Act 69 of 1984, or as private companies, under the Companies Act 71 of 2008. Before businesses were regulated by legislation, they started out as sole proprietors who traded the goods they produced for other goods or, later on, for money. As the population grew, so did the size of businesses required to provide the necessary goods and services. Businesses, driven by population growth, grew into the global economic systems we know today. The industrial revolution brought with it a mechanisation of production systems, replacing animal and human labour with machinery. Processes that were driven by wind and water energy, such as milling plants, were also replaced with machinery. Machinery was first driven by coal and fire and later on developed into electricity-dependent processes.

Businesses exist because shareholders perceive value in such enterprises. The goal of any business is to provide products or services in exchange for profit. When businesses prosper, all stakeholders are supposed to gain from their prosperity. Stakeholders include shareholders, employees, clients, suppliers and the surrounding community. Clients share in the prosperity of a successful business when prices are more competitive and products are of a higher quality. Shareholders gain a profit, not only for today but also the foreseeable future. Suppliers gain the continued business from such a profitable business venture and communities surrounding the business will see an improvement in their standard of living.

However, we are currently facing a situation in which business development has not been managed sustainably; this situation has been exacerbated by globalisation. While Friedman postulated in 1970 that the concern of business was not with social or political issues, but only with the goal of maximising profits, this has since been proven to be untrue.[4] Although many businesses still continue as though this statement is absolute, the truth is that everybody is responsible

4 Friedman (2013).

for implementing sustainable business practices. This is proven by the growing recognition of the King reports and the stricter legislation that follows in their wake. All major organisations now include corporate social responsibility as part of their annual reports.

8.3 Environmental management and the micro business environment

As explained in the introduction, the micro business environment is the part of a business environment over which an individual business has the most influence or control. The micro environment influences the market and macro environments to a limited extent, but is greatly influenced by factors in the market and macro environments. In short, the micro business environment consists of the business functions of an individual business, as well as the resources within that business's control.

8.3.1 Components of the micro business environment

According to Van Zyl et al,[5] a micro business environment consists of the following business functions:

- *General management.* General management activities include all activities that are conducted to oversee and direct all the other business functions that will be discussed in this chapter. Traditionally these activities include planning, organising, leading and controlling activities. From an environmental management perspective, such activities are divided according to the Deming Wheel: Plan-Do-Check-Act. The principle behind both these thought schools is similar, as are the eventual goals that these activities aim to achieve. Environmental management systems use the terminology as it appears in the Deming Wheel so it will be beneficial for managers to understand this cycle in order to better implement changes in the organisation. Leadership and management skills form an integral part of general management functions.
- *Operations management.* Operations management focuses on activities that allow a business to supply customers with products and services. Operations management involves activities such as the design of products and services, the delivery of such services, the manufacturing of products, planning for demand, and designing production systems.
- *Administrative management.* The main goal of administrative management lies in the administration of information. Information is recorded, analysed and reported. Office management also falls under the responsibilities of this management function.

5 Van Zyl et al (2012).

- *Marketing management.* Marketing management can be summarised as providing the right products at the right price to the right people. The main focus of marketing management is the achievement of customer satisfaction by balancing customer orientation, profit orientation, systems orientation and social responsibility.
- *Human resources management.* Human resources management is responsible for everything that has to do with personnel. Appointments, training, payment and retention of personnel all fall under this management function. Human resources management is responsible for placing the right people in the right positions.
- *Financial management.* The financial management function is responsible for all financial activities within a business. Financial management determines the best price to ask for a product in relation to the costs involved in production, marketing and selling these products. This function manages cash flow and asset acquisition. It provides management with projected earnings as well as projected costs.
- *Purchasing and supply chain management.* All businesses require resources in order to deliver their products and services. The purchasing function focuses on determining the resources needed, the acquisition of such resources, and negotiating with suppliers of such resources. These purchases range from regular perishables to larger, more expensive purchases. Any management functions that are contracted out to external suppliers also fall under the responsibility of purchasing management.
- *Public relations management.* Public relations management is a vital function relating to the public view of a business. All communications to the public should be either written or reviewed by the public relations manager. The public relations manager builds relationships with many of the community stakeholders, making it easier to communicate information about the business to the public.

The next section discusses each of these business functions in terms of how they relate to current environmental issues.

8.3.2 Impact of environmental issues on the micro business environment

Environmental management issues that have come about due to unsustainable business practices have forced businesses to change their policies and practices. These environmental issues include the scarcity and pollution of fresh water, food shortages, soil erosion and soil pollution, desertification, climate change, and the decline of wetlands, coral reefs and natural ecosystems. Socio-economic issues, such as overpopulation, unemployment, lack of access to safe water, food and sanitation services, and unpredictable power supply have also led to unsustainable business practices.

- *General management.* As stated earlier, leadership and management skills form an integral part of general management functions. This means that the capacity to lead employees and other stakeholders to more responsible business practices lies within this management function. Managerial skills, such as technical, interpersonal, conceptual, diagnostic, communication, decision making and time management skills will all help to transform the way that business is conducted.[6]
- *Operations management.* Environmentally responsible business practices will increase awareness, reduce safety and environmental hazards and thereby lead to a significant decrease in operational risk faced by operations managers.[7] Since operations management is responsible for so much of the manufacturing and service delivery processes, this management function exerts a lot of control over more responsible business practices.
- *Administrative management.* Administrative management is responsible for the administration of information. Information can be administered in ways that are paperless and more environmentally friendly. In service businesses, office management could be the one function that will have the greatest impact.
- *Marketing management.* In terms of environmental management, marketing management is responsible for marketing socially acceptable products.[8] The main focus of a business cannot simply be on the maximisation of profits. A business organisation forms part of a larger community, and has a responsibility to the community. This responsibility extends to all stakeholders, as well as to the environment. Socially responsible marketing means that a business will not engage in business practices that are harmful to the environment.

  Green marketing is an excellent example of socially responsible marketing management.[9] The steps that a business takes in producing more environmentally friendly products can be used as part of their marketing campaign. This includes making use of recycled materials or supporting environmental rehabilitation projects. Eco-labelling forms part of green marketing and is discussed later in this chapter.
- *Human resources management.* Having the right people in the right positions is especially vital if a business aims at implementing more environmentally responsible business practices. Appointing managers and employees, whose ethical values do not align with environmentally sustainable business practices, is counterproductive. The down side of environmental awareness is the cost involved in retraining all employees and management to be more responsible and aware. Environmental policy changes need to be included in employee training in order to increase their awareness.

6 Van Zyl et al (2012).
7 World Bank Institute (2008).
8 Van Zyl et al (2012).
9 Van Zyl et al (2012).

- *Financial management.* The financial management function will be able to determine the long-term financial benefits of more sustainable business practices. This management function will also be able to estimate the losses that will occur in the event of non-compliance. Although a business may choose to simply continue with its existing business practices, it is important to first consult the financial manager in order to determine what the cost implications to both the business and other stakeholders are. This can then be compared with the projected savings that environmentally friendly business practices can incur, in order to substantiate the decision to conduct business in a more environmentally responsible manner. A business with a proven track record of environmentally responsible behaviour will have easier access to capital, since many financial institutions and even competitors prefer partnering with such businesses.
- *Purchasing and supply chain management.* Purchasing managers have a lot to do with the resources procured for use within an organisation, as well as with the suppliers of these resources. It is within the power of this management function to ensure that resources are procured in a sustainable manner from sustainable sources, as well as pressuring suppliers to be more environmentally responsible.
- *Public relations management.* It is the responsibility of the public relations manager to ensure that the organisation has a positive public image, that environmental achievements are communicated to all stakeholders and that they form part of the business's marketing campaign. It is also the responsibility of the public relations management function to deal with any fallout from environmental transgressions. This is not an easy issue to deal with and has caused the downfall of multinational companies. It is therefore advisable to avoid situations that expose businesses to negative environmental publicity.

8.3.3 *Managing the impact of environmental management issues on business activities*

The impact of environmental management issues on business activities is managed through management systems and integrated environmental management (IEM) practices. The Department of Environmental Affairs has published extensively on this topic; this information can be accessed from the DEA website.[10]

Businesses on the Dow Jones are rated according to their sustainable practices and these ratings are recorded on the Dow Jones Sustainability Indices. The Dow Jones Sustainability Indices, launched in 1999, analyses a collection of economic, environmental and social factors. Every year the companies listed on the Dow Jones Sustainability Indices are measured according to set standards and the list changes annually.[11] The United Nations has also added sustainable environmental

10 http://www.environment.gov.za.
11 RobecoSAM & S&P Dow Jones Indices (2014).

practices to its millennium development goals (MDGs), in addition to the alleviation of poverty.

Environmental indicators are another way of managing the impact of environmental management issues on business activities. Almost anything can be used as an indicator. In an office environment, it could be as simple as measuring paper consumption and endeavouring to reduce this aspect. The usage of paper can be compared on a weekly, monthly or annual basis and the endeavour to reduce paper consumption can be incentivised to encourage employees to work more sustainably. Other office-related measures could be recycling practices (distinguishing between paper, glass and foods), cartridge consumption, cartridge and consumables disposal, and reducing power usage. Other environmental indicators work on the same principle, although on a bigger scale. These environmental indicators include: carbon dioxide (CO_2) emissions, chlorofluorocarbon (CFC) consumption, sulphates and nitrates emissions, waste generation, municipal waste per capita, freshwater quality, water usage, fish production, energy supply per capita, and threatened species.[12]

Policies and audits

It is vital to create a social responsibility and environmental policy for a business. The process of writing such a policy will afford business owners and stakeholders the opportunity to take a closer look at current business practices and decide how this will change in the future, in order to make their business more sustainable and environmentally friendly.

Business organisations may also need to hire an auditing firm, which can analyse their business in terms of its applicable standards (such as ISO 14000) and assess what can be done to make that business more environmentally friendly.

In the end, these environmental management tools can be used by businesses on a micro environmental level to make their products and waste more recyclable, to prolong the life cycle of products produced, and to reduce the inputs, energy and harmful waste.

8.4 Environmental management and the market business environment

The market business environment is divided into four components: consumers, suppliers, intermediaries and competitors. The market environment influences the micro business environment to a great extent and is influenced by the micro business environment to a lesser extent. The macro business environment, however, influences the market environment to a greater extent. This means that environmentally related decisions and movements that occur in the market business environment will cause changes that will directly impact on the decisions that businesses need to make in order to survive.

12 OECD (2008).

8.4.1 Components of the market business environment

Consumers

The green consumption movement encompasses aspects such as environmental labelling, re-using shopping bags or finding other uses for them, eating fresh organic foods and supporting local businesses to minimise the impact of transporting goods. The green consumption movement aims to illustrate that consumers do have power and by making more environmentally friendly choices, they are exerting that power and slowly changing the impact human activity has on the environment. Green consumption should be more than just a passing trend; it should become a lifestyle of making choices that are good for the earth. Businesses, which advocate green consumption and practice the principles of sustainable environmentally friendly business practices, should market these aspects of their business to consumers since it may be one of their most sought-after assets.

Competitors

Competitors operate in the same market environment as a specific business, and provide the same or similar products and services. Competitors influence the quality of a product or service, as well as the price at which these can be sold. Businesses operating in the same environment compete in terms of the quality of their products and services, the price at which these are offered, the resources available to produce these products, the intermediaries selling their products and the consumer market, which has limited spending power.[13] The competitive environment directly influences a business's strategic planning. Businesses in the same market can also compete in terms of their environmentally responsible business practices.

Intermediaries

Intermediaries play a vital role in bridging the gap between manufacturers and consumers. Intermediaries include insurance brokers, bankers, wholesalers and retailers.[14] One of the greatest changes that has occurred in the intermediaries' environment is the prevalence of online shopping and to a certain extent, the monopoly that certain retailers have in this industry.

Suppliers

Suppliers provide a business with the resources required to deliver products and services to its consumers. These resources include raw materials, capital and labour. The quality of products and services provided by a business greatly depend on the quality of input received from suppliers.[15] This is why supplier relations are so important.

13 Erasmus et al (2013).
14 Erasmus et al (2013).
15 Erasmus et al (2013).

Environmental issues have forced businesses to manage their supplier relations differently. It is important for businesses to choose their suppliers wisely. It stands to reason that the greener the supplier of raw materials and products is, the greener the end product or service will be. It is important to ensure that suppliers have an environmental impact and sustainability policy in place, or at the very least, a social responsibility policy. Merely having such a policy, however, does not mean that these intentions are translated into practice. It is important for a business to ask questions and get to know a supplier if it is serious about managing the impact of environmental issues.

8.4.2 Impact of environmental management issues on the market business environment

Most business activities impact on the environment. In production activities, businesses consume raw materials, use natural resources, and contribute to pollution. Business operations impact on the quality of the environment's surrounding areas and on the quality of life of the surrounding communities.

Businesses tend to only comply with environmental issues as far as is essential for their survival. This has forced regulations and legislation to become stricter.

According to King III and the Companies Act of 2008, owners and directors of businesses can be held personally liable for environmental and social transgressions. These steps were introduced because of the nonchalance with which environmentally harmful business decisions were historically made.

8.4.3 Turning environmental management challenges into business opportunities

If businesses are able to implement a more holistic approach to their business practices, they will become the trendsetters of their industry. 'Cradle-to-grave' means that businesses look at a product's life cycle from the time of conception to the disposal of that product by the customer. Taking this one step further, the business can approach this from a 'cradle-to-cradle' point of view where the business takes responsibility for a product's sustainability from the time of conception, beyond the point of disposal, to recycling, reusing or upcycling. This holistic approach to business practices will increase a business's competitiveness and customer retention and encourage suppliers to follow the same approach to their business activities.

Facing environmental management challenges affords a business the unique opportunity to change their image within the community. Consumers, competitors, intermediaries and suppliers form part of this community. Many businesses claim that they are environmentally responsible and sustainable; however, a business which acts on these claims will attract more customers, increase its competiveness and therefore be more successful. Standards and regulations are not a punishment to force compliance. They should rather be viewed as an opportunity to increase competitiveness and market share by following marketable business practices.

When investigating the opportunities that environmental challenges present, a business should conduct an environmental self-assessment.[16]

Environmental self-assessment

1. Identify the environmental issues affecting your company.
2. Identify existing environmental activities (such as recycling programmes, energy-efficient practices, partnerships with suppliers, competitors, intermediaries and surrounding communities).
3. Identify environmental short-falls. Is there an environmental policy in place; is this policy being implemented via an awareness programme; is environmental awareness an integral part of daily business activities; and are environmental achievements documented and communicated/marketed?
4. Assess your organisation's capabilities.
5. Assess your organisation's resources.

After completing the environmental self-assessment and deciding on a course of action, it is important to make the suggested changes and to regularly report back to not just management, but to all stakeholders.

8.5 Environmental management and the macro business environment

The macro business environment exerts influence on both the market business environment, as well as on the micro business environment.

8.5.1 Components of the macro business environment

The macro business environment comprises the economic, technological, social, physical, institutional and international environments.

Political and institutional environment

In the political and institutional environment, environmental governance is achieved through command and control. Command and control tools include permits, licences, environmental standards and audits. The good thing about command and control tools is that there are consequences to non-compliance, which include restraining orders, prosecutions, penalties and fines, and criminal prosecution. Command and control as an environmental governance tool is based on the evaluation of actual performance against the standards set in laws and regulations. The disadvantage of command and control tools lies in its inflexible nature. Businesses may decide to continue their harmful manufacturing practices at the risk of a fine, since the fine is

16 World Bank Institute (2008).

much less than the loss of income they face if they change their business practices. This will continue to be true until the applicable legislation is updated to penalise violators with more realistic fines and penalties.

There are many laws in the political and institutional environment which are used as governance tools to enforce environmental governance. South Africa has been working to make environmental legislation as comprehensive as possible. The next challenge in the governance process lies in the enforcement of this legislation.

In the South African political environment, as with many other countries, politicians tend to make many promises in order to gain support and votes. Unfortunately, many of these promises of environmental reform do not come to pass after votes have been cast.

Economic environment

Environmental governance tools used in the economic environment consist mostly of market-based and fiscal instruments. These tools include pollution taxes, tradable permits, trade restrictions imposed on businesses and countries which do not comply, encouragement of green purchasing, adjustment of pricing policies, tax concessions, and carbon emissions taxes, to name but a few. These incentive and disincentive instruments allow for greater flexibility than can be gained with command and control tools. They also act as a source of income for the government and are more cost effective to implement.

Robbins et al[17] discuss macro environmental solutions to environmental management problems, describing green taxes as the most direct method of influencing the way business is conducted. Green taxes directly increase the price of goods and services, with the intent of forcing businesses and consumers alike to make more sustainable choices.

Social environment

The social environment includes many of the factors that play a role in consumers' consumption habits. These include demographics, education, urbanisation, awareness of consumer rights, the social responsibilities of a business, business ethics and culture.[18] Many of these factors have already been discussed; ethics will be discussed in more detail in the next chapter.

In the social environment, environmental governance tools are based on civil instruments. These civil instruments include:

- eco-labelling, where manufacturing information is included on the packaging of a product (eco-labels indicate whether a product was manufactured in an environmentally friendly manner, whether it is recyclable and if the packaging is biodegradable)
- public participation processes

17 Robbins et al (2010).

18 Erasmus et al (2013).

- civil legal action
- consumer education (there is a big movement to support products that are manufactured in an environmentally friendly manner, to consume foods that are organically produced and to encourage consumers to be more environmentally friendly)
- social impact assessment, either as a part of environmental impact assessments or as an assessment on its own.

Physical environment

The physical environment includes the following elements: population, health of this population, food and water, energy, climate and biodiversity. It is vital to take these elements into consideration when making environmentally responsible business decisions. The physical environmental factors present both opportunities and threats and these need to be assessed by businesses to help them survive.

International environment

The international environment provides an even larger arena of opportunities and threats that exert an influence on a business.[19] Environmentally aware businesses will find a foothold in international markets if they comply with and even exceed international standards.[20] An exemplary reputation will open doors to businesses in the international arena.

Technological environment

Conducting business in an environmentally responsible and sustainable manner contributes to innovation.[21] New technologies are needed to enhance business profitability while conducting business in a sustainable manner. Technological advancement has brought the world to where it is today. Improved healthcare, manufacturing processes and communication are all results of technology. The next wave of technological advancement should be focused on protecting the environment and on more sustainable business practices and living conditions.

8.5.2 Global environmental management incidents

All environmental disasters have an impact. This is even more so with global environmental disasters.

In 2010 an oil rig exploded, releasing millions of barrels of oil into the Gulf of Mexico. Although this explosion occurred in April, the oil well was only capped three months later. The BP oil spill resulted in extensive damage to kilometres of coastlines. BP budgeted $42 billion for the clean-up expenses, penalties and

19 Erasmus et al (2013).

20 World Bank Institute (2008).

21 World Bank Institute (2008).

damages. The court cases and damage determination has, to date, not been completed, but it would seem that the estimated $42 billion will not be nearly enough to cover class action payouts, penalties and civil trials.[22] This international incident received greater media coverage and harsher penalties because, although it was the largest disaster of its kind, it was not the first disaster of this kind and people nowadays are less tolerant of negligence that leads to environmental harm.

Lead pollution in Guangdong, China, killed 160 children in 2012. These emissions came from factories in the area that poisoned the air, water and food consumed by people. Heavy metal poisoning has the greatest harmful effect on children; even if they survive, they may be plagued by mental and physical disabilities. This incident was preceded by numerous incidents of non-lethal poisoning, calling for worldwide action against heavy metal emissions.[23]

These cases illustrate that environmental disasters occur on a global scale and these international events influence local legislation and regulation in many countries. These events also influence public opinion to a great extent and show that the public is becoming more informed and has a lot less patience with environmental disasters.

8.5.3 Globalisation and global environmental disasters

Globalisation is an economic phenomenon that has impacted greatly on the environment. Economic activities have gone global in order to cut costs and streamline processes. The world is a long way from the small communities who provided for themselves and only produced what was needed. Today, businesses are producing goods and services to export on a global scale. Unfortunately this has increased pressure on the environment on a global scale. The world's population has grown exponentially, increasing the waste generated on a global scale. This would be bad enough, but with the advancement of technology and civilisation, the waste that is produced has become less biodegradable and more toxic. More people need more space to live and they need more jobs, which in turn requires more resources.

Globalisation has caused a decline in fresh water through irresponsible agriculture, aimed at food security. Agricultural practices and waste production threaten the quality of water that is available.

In a global environment there is a greater demand for energy. The processes of producing more energy have greatly increased greenhouse gas emissions and pollution, which has contributed to the climate change crisis the world faces today. The global tragedies mentioned above can all be traced back to the phenomenon of globalisation in one way or another. If globalisation is causing global disasters, it should call for global solutions to environmental issues and global collaboration to implement these solutions.

22 Reuters (2014).

23 Reuters (2012).

8.6 Conclusion

Environmental management is an aspect of the global business environment that can no longer be ignored. The impact that environmental issues have on the micro business environment provides both challenges and opportunities. These challenges need to be planned for at all levels of business functions in order for businesses to survive in the long term and prove to be sustainable.

Review Questions

1. Define environmentally sound management.
2. Depict the business environmental model and its major components.
3. Depict the components of the micro business environment.
4. Discuss the impact of environmental management issues on each of the micro business environmental components.
5. Depict the components of the market business environment, including a summary of the most important aspects of each component.
6. Briefly explain the contribution of globalisation towards environmental disasters. Give an example.

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Chapter Nine

Ethics of environmental management

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Learning Outcomes

After studying this chapter, you should be able to:

- define ethics
- briefly explain the relationship between ethics, religion, etiquette and laws
- discuss the development of environmental management ethics
- differentiate between intrinsic values, instrumental values and prudential values
- discuss the concept of sustainable development
- define the concept of business ethics
- explain how environmental ethics should influence business policy
- link moral and cultural values to the application of ethics to lifestyle decisions.

Overview of this chapter

This chapter provides an overview of ethics in general, as well as a more focused view on environmental ethics and environmental management ethics. The chapter then discusses business ethics and the role of environmental ethics on business policies. Finally, there is an overview of moral and cultural values and the application of ethics to lifestyle decisions. The goal of this chapter is to provide students with the knowledge and tools to enable them to make ethical decisions in both their personal and business environments.

9.1 Introduction

Dealing with environmental problems is complex, diverse, uncertain, and multi-faceted. These problems affect multiple participants and role players. Interacting with these multiple role players demands transparent decision making that is flexible to changing circumstances. The decision making should embrace a diversity of knowledge and values.

As people become aware of their environment, participation in these decision-making processes is regarded as a democratic right. This right is enshrined in the United Nations Economic Commission for Europe's 1998 Arhus Convention. This democratic right is also instilled in the Constitution of the Republic of South Africa, 1996, in Chapter 2, s 24, which deals with the Bill of Rights. The following is an extract from the Bill of Rights: