

## **MODULE 2**

### **THE ENVIRONMENT AND SUSTAINABLE DEVELOPMENT**

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## 2.1 ORIGINS OF SUSTAINABLE DEVELOPMENT

Sustainable development as a term, is now a fashionable in environmental arenas throughout the world. The term was first coined in the 1980 World Conservation Strategy (IUCN/UNEP/WWF) but gained more attention in the 1987 World Commission on Environment and Development. The latter is more commonly known as the Brundtland Report, after the Commission's Chair, Gro Harlem Brundtland who at the time was the Prime Minister of Norway. Since 1987, sustainable development has been advanced by among others, the publication of *Caring for the Earth* (IUCN/UNEP/WWF 1991), and the various outcomes of Agenda 21 following the 1992 Earth Summit in Rio de Janeiro. The need to balance environment and development are central to most definitions of sustainable development (Pearce, Barbier and Markandya 1990).

As a concept, sustainable development has evolved over the past four decades. In the 1950s and 1960s, the focus of development thought was on economic growth and increases in output, based mainly on theories of efficiency (Munasinge 1993). The main tenet of this paradigm was that strong economic growth would impart trickle down effects to lesser-developed regions. In the early 1970s however, this approach was increasingly being questioned and shifted towards equitable growth with an emphasis on social development. Income distribution was a central feature. At around the same time, a number of authors began to point out that human activities were inextricably linked to the global socio-economic system and natural environment. The limits of the natural environment to supply raw materials for production and act as a sink for waste products were raised with growing alarm<sup>1</sup>. Over the next decade, the emerging environmental concerns with development led to the 1980 World Conservation Strategy.

It is generally acknowledged that environmental degradation is an impediment to social and economic development, particularly in developing countries. This module will outline the economy-environment interface, provide an economic dimension to definitions, outline principles of sustainable development, and examine sustainable development in a global context.

## 2.2 THE GLOBAL CONTEXT OF SUSTAINABLE DEVELOPMENT

The 1992 Earth Summit (1992 United Nations Conference on Environment and Development - UNCED) represented a turning point in global environmental policy development. More than 20,000 individuals from 171 countries attended. Official delegates to UNCED approved three seminal documents<sup>2</sup>:

- The Rio Declaration on Environment and Development, a set of 27 principles outlining rights and responsibilities of countries towards the environment. The declaration is non-binding;
- A non-binding statement of 15 principles for the sustainable management of forests; and
- Agenda 21, a comprehensive plan to guide national and global action towards sustainable development. The massive document (40 chapters) covers a wide range of environment and development issues, defines problems and objectives, outlines actions and provides resource requirements for implementation.

Outside of Agenda 21, two major multi-lateral environmental agreements (MEAs) were signed: the UN Framework Convention on Climate Change (FCCC), and the UN Convention on Biological Diversity (CBD). Both of these conventions have been ratified by many countries throughout the eastern and southern African region and are presently being implemented at various stages. The FCCC addresses the concerns over growing concentrations of so-called “greenhouse gases” in the atmosphere and the potential global impacts of increased average atmospheric temperature. The CBD addresses issues surrounding conservation of biodiversity, sustainable use of biological resources, and equitable sharing of benefits.

A number of other relevant MEAs, some predating UNCED in 1992 are:

- Ramsar (1971) – conservation of wetlands
- World Heritage (1972) – preserving unique biophysical habitats

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<sup>1</sup> Some good examples come from Odum (1973), Odum (1975).

<sup>2</sup> Much of the material in this section is derived from WRI 1994.

- Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES 1973) – addressing trade in endangered plants and animals
- Montreal Protocol (1985-1987) dealing with ozone depletion and CFC control
- Basel Convention (1989) – managing movement of hazardous waste
- Convention to Combat Desertification (CCD – 1994) – land degradation

Countries signing and ratifying these agreements take on responsibilities to undertake specific action, often with financial assistance from the global community. Experience has shown that signing and ratifying MEAs is easy for politicians; dealing with the tough issues surrounding implementation is more difficult. As an example, Zimbabwe signed the CBD in 1992 but only began to develop a biodiversity strategy in 1997, with financial and technical assistance from UNDP.

With all of these MEAs, developing countries experience difficulties in mobilising adequate financial resources to effectively meet conditions for implementation. In recognition of this constraint, the Global Environment Facility (GEF) was established in 1994 to help developing countries address these financial constraints. The World Bank, UNDP and UNEP jointly manage the GEF. It provides resources in four categories climate change, biological diversity, international waters, and ozone depletion. For approved projects, the GEF will provide financial resources to meet the incremental costs of improving the environment above normal activity levels.

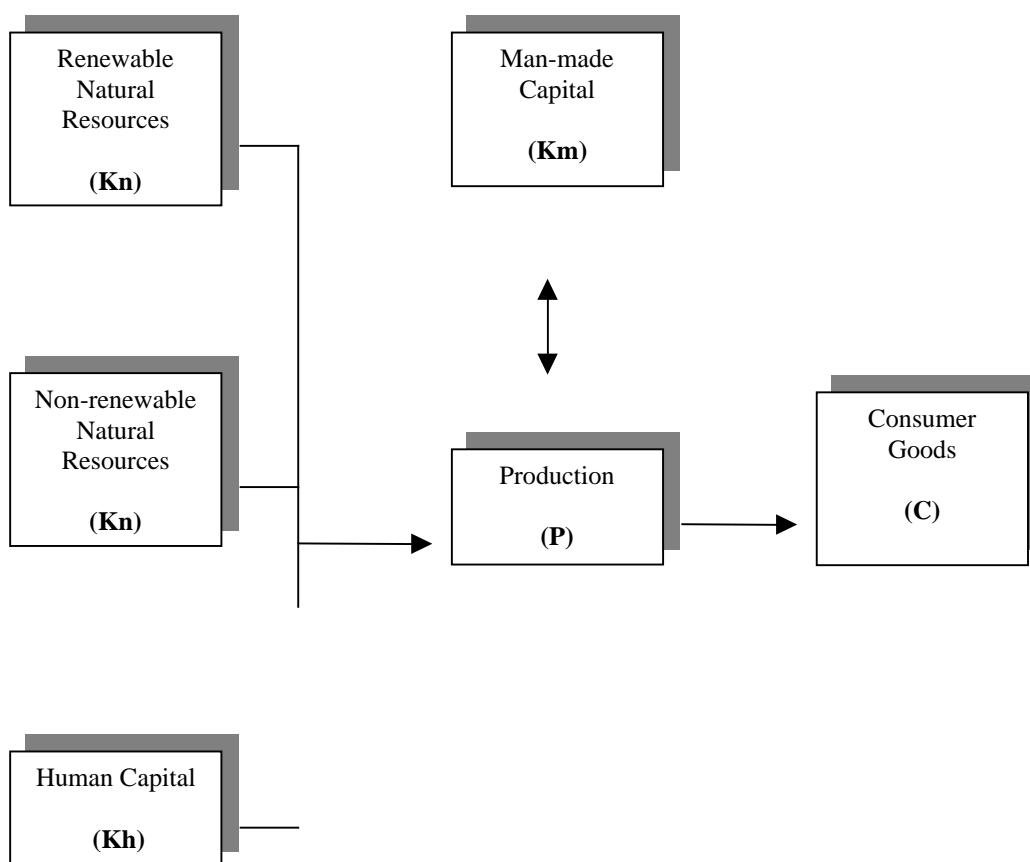
The GEF has been praised in some circles as a step forward for future multi-lateral co-operation on environmental issues. Others criticise the GEF for not targeting the key environmental issues facing developing countries, for simply re-directing existing multi-lateral funding under a new label, and not having enough resource to adequately meet the environmental challenges of the 1990s.

The environment is clearly accepted as a global concern, yet corrective actions must largely occur at the national and even community levels. The MEAs outlined in this section provide a platform for improved global co-operation to address key environmental issues common to most

countries, and in particular, developing countries. Both the process leading up to UNCED and the resulting agreements signify an awareness of the international community to acknowledge the importance of sustainable development as a global imperative.

### **2.3 THE ECONOMY-ENVIRONMENT INTERFACE**

In a simplified linear model of the economy (Figure 2.1), production (P) results in both consumer goods (C) and manufactured or “man-made” capital (Km) as outputs (from Pearce and Turner 1990). The production process itself relies on human capital (Kh), man-made capital (Km) and natural capital (Kn). The latter consists of the natural inputs into the production process such as minerals, water, wood, etc. Natural resources can also be further divided into renewable resources such as forests, and non-renewable resources such as minerals.

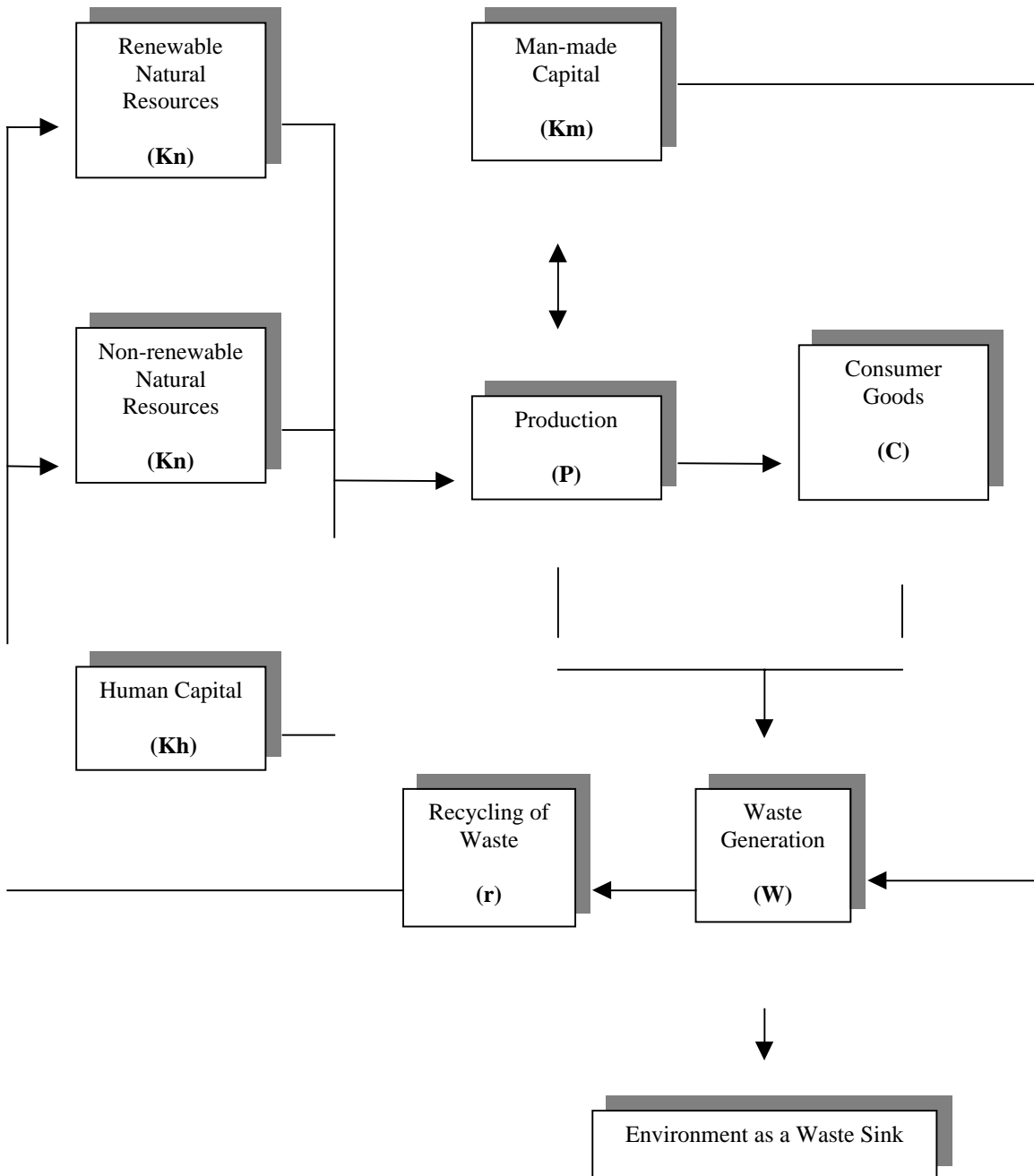
**Figure 2.1: Linear model of the economy**

In this linear model, no allowance is made for waste products (W), which will be generated from all phases of the production process and consumption of consumer goods. A circular economy-environment model (though simplified) is more appropriate (Figure 2.2). The amount of waste products will generally equal the amount of natural resources used. The primary reason is the First Law of Thermodynamics, which states that matter can neither be created nor destroyed. Whatever is used up in the production process will eventually end up in the environment. The efficiency of the production process will influence the rate of consumption of natural resources (Kn) per unit of output. Inefficient production processes will waste natural resource inputs.

The natural environment is a sink for waste products. The major concern with economic production is that the environment has a limit for absorbing or “assimilating” waste products.

Recycling waste ( $r$ ) can help and is beneficial in two ways. First, it can augment natural resources used in production and thus reduce the raw natural resources required for the same level of output. As an example, waste paper can be recycled back to pulp and used to manufacture newsprint. There are limits however, to recycling many products. With the paper example, repeated recycling weakens the fibres resulting in low paper strength and a need to add new “virgin” pulp. A similar pattern exists with glass bottles recycled for soft drinks or beer. Second, recycling results in reductions in waste volumes. Given the limit to which many products can be technically and economically recycled, the environment will continue to act as a waste sink.

**Figure 2.2: Circular economy and waste**



## 2.4 DEFINING SUSTAINABLE DEVELOPMENT

### 2.4.1 Background

Many definitions have been crafted for sustainable development since the 1980 World Conservation Strategy. Two that stand out are from the 1987 Brundtland Report and the 1991 report, Caring for the Earth (Box 2.1):

#### Box 2.1: Definitions of Sustainable Development

*Development that meets the needs of the present without compromising the ability of future generations to meet their own needs* (World Commission on Environment and Development 1987).

*Improving the quality of life while living within the carrying capacity of supporting ecosystems* (IUCN/UNDP/WWF 1991).

While these general definitions can be helpful, they can also be misunderstood and misused to suit vested interests (Munro 1995). A more thorough assessment of the meaning of sustainable development is required to assist policy makers in charting a way forward.

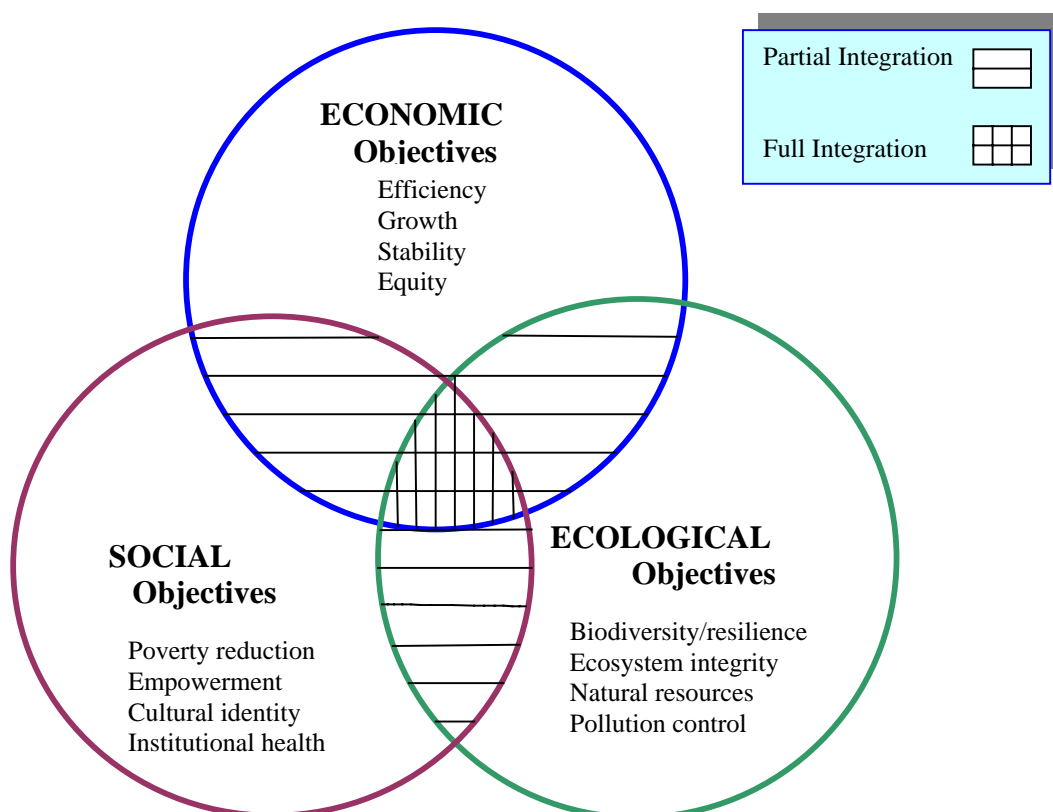
### 2.4.2 The Components of Sustainable Development

As indicated previously in this section, early concepts of development focused on desirable economic and social objectives. Examples of these could include (Pearce, Barbier and Markandya 1990):

- Increases in real income per capita;
- Improvements in health and nutrition;
- Educational achievement;
- Access to resources;
- More equitable distribution of income; and
- Increases in basic public freedoms.

For development to be sustainable, it must continue to meet these and other objectives defined by society over an indefinite period of time. As shown in Section 2.2, the ability of the environment to provide natural resource inputs and absorb waste products is limited. In addition, the environment provides the basis for basic ecological cycles that are critical for life on earth, for example the water and energy cycles. Therefore, environmental or ecological objectives must be considered. In summary, sustainable development will address three circles of sustainability: economic, social and ecological, each with key issues and objectives (Figure 2.3).

The figure illustrates that each of the circles of sustainability has independent objectives, yet there are areas where overlap occurs, or partial integration between two spheres. Full integration of all three spheres is the ultimate goal.

**Figure 2.3: Three circles of sustainable development**

Sources: Munasinge 1993, Dalal-Clayton *et al* 1995, Serageldin 1993).

#### a) Economic sustainability

The economic circle of sustainability is founded on the concept of maximising the flow of income from a stock of assets (or capital) while maintaining the stock yielding this income. The concept encompasses traditional theory on economic growth and determining the optimal growth path with a given stock of capital. Economic policy is often driven toward achieving stability, for example in prices, employment, etc. Linkages with social development centre on intra-generational equity. Economic efficiency and optimal use of scarce resource inputs are also underlying principles. Capital consists of man-made, human and natural categories. Difficulties arise with economic sustainability in terms of identifying the types of capital to be maintained, and substitutability. Linkages with environmental development focus on valuation of natural

resource capital and the degree to which environmental degradation is internalised in to economic decisions.

### **b) Social sustainability**

The social circle of sustainability addresses issues such as poverty, health, education, local empowerment and maintaining culture and heritage. Although social norms change over time, sustaining social and cultural systems is important. Social sustainability has obvious linkages with economic activity in terms of addressing poverty and local input into economic decision-making. The links with the environment focus on the allocation and distribution of natural resources to future generations as well as local empowerment over natural resource management.

### **c) Ecological sustainability**

The ecological circle of sustainability is concerned with maintaining the biophysical environment to preserve resilience and the ability of natural systems to adapt to change. Ecological processes and cycles that are fundamental to life on earth must be protected from degradation. A key linkage with the economy is through the supply of raw material for production and the environment being used as a waste sink. One linkage with social sustainability is through the level of local participation in natural resource management. The concept of carrying capacity is critical, both in terms of human population that can be supported and the ability of the environment to assimilate waste products.

Balancing these three circles of sustainability and their underlying objectives is a primary challenge facing decision-makers. There is no “right” or “wrong” level of sustainability. Trade-offs have to be made and it is here than economics can help in putting monetary values on various policy options related to the economic, social and environmental development.

A fourth aspect is intra and intergenerational equity. The first refers to the distribution of wealth (including environmental assets) within the current generation, the second the transfer of wealth to future generations. Key questions arise. What kind of environment should be passed on to future generations and what will this cost the present generation? If sacrifices are to be made, how are these to be shared among the present generation? How do we balance the welfare of

current and future generations? Much of the tension surrounding policies for implementing sustainable development relates to the equity aspect.

### **2.4.3 Models of Sustainability**

Examining alternative models of sustainable development can help understand the nature of the trade-offs that must be made in addressing economic, social and environmental goals. Four alternative models are shown in Table 2.1. The opposing ends of the four models (very weak and very strong) sustainability represent extremes and probably are not realistic approaches for sustainable development. The outcomes are simply not politically acceptable nor justified by economics.

The middle two models probably offer a more reasonable and politically acceptable approach to sustainable development. Most country environment strategies and policies take into account many of the points. An important feature of all four models is the degree of substitutability between the different forms of capital: man-made ( $K_m$ ), human ( $K_h$ ) and natural ( $K_n$ ). The very weak sustainability model, with its emphasis on economic growth, assumes perfect substitution between  $K_m$  and  $K_n$ . The very strong sustainability model assumes that little substitution can occur between  $K_n$  and  $K_m$ .

**Table 2.1 Models of sustainability**

Label and Criteria	Very Weak Sustainability	Weak Sustainability	Strong Sustainability	Very Strong Sustainability
Green Label	Resource exploitative, strong growth orientated position	Resource conservationist and managerial position	Resource preservationist position	Extreme preservationist position
Type of Economy	Anti-green economy with unfettered free markets	Green economy and green markets guided by economic incentives such as pollution charges	Deep green, steady state economy, regulated by macro-environmental standards plus economic incentives	Very deep green economy, heavily regulated by government to minimise the extraction of natural resources
Management Strategies	Primary goal is to maximise growth of national income (GNP)	Modified economic growth using adjusted GNP (green accounts) to reflect changes in natural resource stocks	Zero economic growth and zero population growth	Reduced scale of economic activity and population
Substitutability	Free markets and technological progress ensure infinite substitution possibilities, capable of mitigating all scarcity/limits constraints and environmental damage as a waste sink	Substitution and technological progress occurs to address resource constraints but with some limits.	The health of the whole ecosystem is important. Very limited substitution occurs to address resource constraints. No increase in scale of economic activity	Very little recognition of substitution to address resource constraints. Real reduction in scale of economic activity
Sustainability Rules And Conditions	$K_m + K_n + K_h$ constant Perfect Substitution of all $K_n$ and $K_m$ Rents from non-renewable resources re-invested in other capital assets <b>Growth economy</b>	$K_m + K_n + K_h$ constant Technical change > population growth Natural capital stocks above lower limits Depreciation of $K_n \leq 0$ Upper bound on assimilative capacity of environment Lower bound on $K_n$ necessary to support development	$K_m + K_n + K_h$ constant Depreciation of $K_n \leq 0$ Depreciation of cultural capital ( $K_c$ ) is $\leq 0$ Protect $K_n$ based on precautionary principle	$K_m + K_n + K_h$ constant Depreciation of $K_n \leq 0$ Depreciation of cultural capital is $\leq 0$ Depreciation of ethical capital is $\leq 0$ Natural capital stocks above lower limits Zero population and economic growth <b>Steady-state economy</b>
Ethics	Support for rights and interests of individuals	Caring for others ethics, intra and inter-generational equity is important value in nature	Interests of the collective take precedence over those of the individual; primary value of ecosystems and secondary value of component functions and services	Acceptance of bioethics with rights conferred on all non-human species; nature has intrinsic value and is valuable in its own right

Sources: Turner (1993) and Pearce (1994).

One important element of sustainable development theory is the re-investment of income from non-renewable resource extraction into other productive assets such as renewable resources, human and man-made capital. Governments owning non-renewable natural resources usually receive income from extraction through royalties or “rent”. Investing this income into productive assets is a way of maintaining total capital stocks (Hicks 1946, El Serafy 1989). If, on the other hand, governments invest this income in current consumption, then capital stocks

are not being maintained. Tracking how resource rents captured by governments are re-invested is difficult if the rent accrues to the general Treasury. If government expenditure increases on productive capital such as infrastructure, and human capital such as health and education, then a loose assumption may be that resource rents are being re-invested properly. In Namibia, the government appears to be capturing resource rents from mining. At the same time, government expenditure on human capital accounts for about 40 percent of total expenditures (Lange and Motinga 1997). In South Africa the situation is reversed with very little rent captured and re-invested (Blignaut and Hassan 2002).

Another approach is for governments to establish a trust fund for resource rents, which can then be directed to investments in other forms of capital. One example of how a government has applied this method is from Canada (Box 2.2).

## **2.5 SUSTAINABLE DEVELOPMENT PRINCIPLES**

The preceding section outlined various models for sustainable development. Moving from a theoretical discourse with various assumptions, to a practical approach that governments can follow is difficult. To assist this process, the 1991 report, *Caring for the Earth* (IUCN/UNEP/WWF) identified nine principles as a basis of a strategy for sustainable development.

### **1. Respect and care for the community of life**

An ethic based on respect and care for each other and the Earth is the foundation for sustainable living. Development ought not to be at the expense of other groups or later generations, not threaten the survival of other species.

The benefits and costs of resource use and environmental conservation should be shared fairly among different communities, among people who are poor and those who are affluent and between our generation and those who will come after us.

## **2. Improve the quality of life**

The aim of development is to improve the quality of human life. It should enable people to realise their potential and lead lives of dignity and fulfilment. Economic growth is part of development, but it cannot be a goal in itself; it cannot go on indefinitely. Although people differ in the goals they would set for development, some are virtually universal. These include a long and healthy life, education, access to resources needed for a decent standard of living, political freedom, guaranteed human rights and freedom from violence. Development is real only if it makes our lives better in all these respects.

## **3. Conserve the earth's vitality and diversity**

Development must be conservation-based; it must protect the structure, functions and diversity of the world's natural systems, on which our species depends. To this end it is needed to:

- Conserve life-support systems. These are the ecological processes that keep the planet fit for life. They shape climate, cleanse air and water, regulate water flow, recycle essential elements, and create and regenerate soil and enable ecosystems to renew themselves;
- Conserve biodiversity. This includes all species of plants, animals and other organisms; the range of genetic stocks within each species, and the variety of ecosystems;
- Ensure that the use of renewable resources is sustainable. These resources include soil, wild and domesticated organisms, forests, rangelands, cultivated land, and the marine and freshwater ecosystems that support fisheries. A use is sustainable if it is within the resource's capacity for regeneration.

## **4. Minimise the depletion of non-renewable resources**

The depletion of non-renewable resources like minerals, oil, gas and coal must be minimised. While these cannot be used sustainably, their life can be extended, for example by recycling, by using less of a resource to make a particular product, or by switching to renewable substitutes where possible. These practices are essential if the earth is to sustain billions more people in the future and give everyone a life of decent quality.

**Box 2.2: The Alberta Heritage Savings Trust Fund****Background**

Alberta is a province located in western Canada, on the eastern edge of the Rocky Mountains, and extending east to the prairies. The province is blessed with an abundance of natural resources and is Canada's largest producer of oil and gas. Although oil and gas were discovered shortly after World War II, it was not until the Middle-East oil shocks of the 1970s that exploration and production took off.

The Alberta Heritage Savings Trust Fund was established in 1976 when the Alberta economy was booming. The government of the day decided a portion of Alberta's oil and gas revenues should be set aside for future generations.

The fund was created with three basic objectives:

- to save for the future;
- to strengthen and diversify Alberta's economy ; and
- to improve the quality of life for Albertans.

**Growth and Decline**

From 1976 to 1983, 30% of the province's oil and gas revenue went into the Heritage Fund. Between 1984 and 1987, 15% of the revenue went into the Fund. From 1987 on the government stopped putting resource revenue into the Fund. Until 1982, the fund kept all its investment income, which helped it grow. Since then, all income (including income from capital gains) has been transferred to the General Revenue Fund to help pay for government programs and services. The Fund reached its peak in 1987 at 8.6 billion US\$. It began to decline in 1987 because of spending on Capital Projects such as irrigation works, hospitals, research and parks. Spending on capital projects stopped in 1995.

The Heritage Fund enabled the government to meet the needs of a rapidly growing population and to diversify the economy through investments in forestry, petrochemicals, agribusiness, high technology and tourism. The capital projects have been paid for and their benefits will remain for all Albertans. New Directions In 1995, the government invited all Albertans to voice their opinion on the future of the Fund. The response was overwhelmingly in favour of keeping the Fund, with some changes. The Fund will no longer be used to invest in specific projects. The new focus is on providing greater long-term financial returns while providing a steady stream of interest income to help pay for government services. The Heritage Fund has recovered to a capital base of over 8.2 billion US\$, earning interest of 635 million US\$ in 1998/99.

Source: Treasury Department, Government of Alberta (1999).

**5. Keep within the earth's carrying capacity**

There are finite limits to the "carrying capacity" of the earth's ecosystems to the impacts that they and the biosphere can withstand without dangerous deterioration. The limits vary from

region to region and the impacts depend on how many people there are, and how much food, water, energy and raw materials each person uses and wastes. Policies that bring human numbers and life styles into balance with the earth's carrying capacity must be complemented by technologies that enhance that capacity by careful management.

#### **6. Change personal attitudes and practices**

To adopt the ethic for living sustainably, people must re-examine their values and alter their behaviour. Society must promote values that support the ethic and discourage those that are incompatible with a sustainable way of life. Information must be disseminated through formal and informal education so that needed actions are widely understood.

#### **7. Enable communities to care for their own environments**

Communities and local groups provide the easiest channels for people to express their concerns and take action to create securely-based sustainable societies. However, such communities need the authority, power and knowledge to act. People who organise themselves to work for sustainability in their own communities can be an effective force whether their community is rich, poor, urban, suburban or rural.

#### **8. Provide a national framework for integrating development and conservation**

All societies need a foundation of information and knowledge, a framework of law and institutions, and consistent economic and social policies if they are to advance in a rational way. A national programme for achieving sustainability should involve all interests and seek to identify and prevent problems before they arise. It must be adaptive, continually re-directing its course in response to experience and to new needs.

#### **9. Create a global alliance**

Global sustainability will depend on a firm alliance among all countries. But levels of development in the world are unequal, and the lower-income countries must be helped to develop sustainably and to protect their environments. Global and shared resources, especially the atmosphere, oceans and shared ecosystems, can be managed only on the basis of common purpose and resolve. The ethic of care applies at the international as well as at the national and

individual levels. No nation is self-sufficient. All stand to gain from world-wide sustainability – and all are threatened if we fail to attain it.

The previous nine principles bear many similarities to the more theoretical aspects of sustainable development in Table 2.1. Conserving the earth's vitality and diversity, minimising the depletion of non-renewable natural resources, and keeping to within the earth's carrying capacity are principles shared by parts of the more moderate models in Table 2.1. The principles also tend to address the combined economic, social and ecological objectives in Figure 2.3.

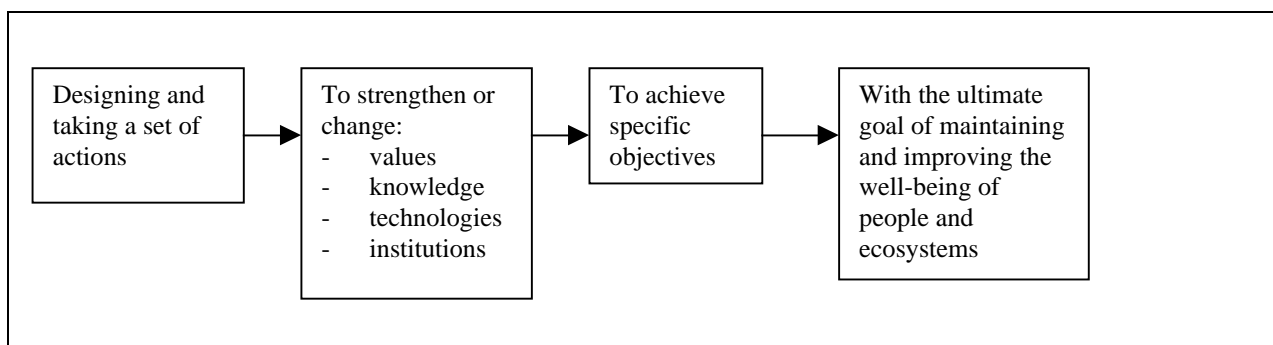
Moving from rhetoric to reality is not easy given that trade-offs have to be made in the policy arena. Talk is cheap and actions more difficult to implement when discussing how to achieve sustainable development. One paradox is that developing countries need to exploit their natural resources to generate real economic growth and provide income to address social objectives. However, if short-term economic growth is generated at the expense of the capacity of the environment to continue providing resources, then development is not sustainable. Methods are needed to evaluate alternative development paths in terms of the trade-offs<sup>3</sup>.

## **2.6 REGIONAL EXPERIENCE WITH SUSTAINABLE DEVELOPMENT**

Implementing sustainable development, or moving from rhetoric to reality can be facilitated through the use of national environment strategies. A strategy for sustainability is a process leading to the improvement of the quality of life (Box 2.3).

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<sup>3</sup> Refer to Module 6 for a discussion of analytical methods to link economic, social and environmental policy and help decision-makers assess trade-offs.

**Box 2.3: Environmental Strategy Process**

Source: Carew-Reid (1994).

Most countries in the region now have some type of environmental strategy from among the following:

- National conservation strategy (NCS - promoted by IUCN);
- National environmental action plans (NEAP - promoted by the World Bank; and
- National sustainable development strategies (NSDS - called for by Agenda 21).

All three approaches to a national environmental strategy recognise a number of important steps in the process (Margulis and Bernstein 1995).

**Identifying priority problems**

Because financial resources are scarce, governments must make choices about which environmental problems to deal with first in terms of the criteria such as importance of the issue and urgency to act. Therefore, environmental issues need to be identified and put in some order of priority, based preferably on a national consensus. A balance needs to be achieved between analysis and public participation. Both are needed to identify and set priorities that are based on sound scientific information and the input of society.

**Defining priority actions**

After environmental priorities are established, actions need to be identified to address the most important problems within available human, technical and financial resources. Understanding the causes of environmental degradation is important in the process of developing practical and

enduring solutions. Cost-effective solutions are then required, often requiring external financial assistance and local implementation.

### **Ensuring effective implementation**

Most environmental strategies “come off the rails” at this stage. Often, elaborate and well-crafted strategies fail to be effectively implemented. To avoid this problem, it is important that environmental strategies are integrated with broader development objectives. Key stakeholders must be involved, especially central government agencies such as Finance, Trade and Planning that hold the key to budget allocations. The reality is that environment agencies are usually viewed as lightweight organisations within governments (Greve 1995). Other key players include NGOs, donors, and communities. It is critical that actions be linked with specific agencies who will be responsible for implementation. Additionally, performance indicators are required to track implementation performance.

Institutional structures must be improved to provide a foundation for effective actions. A 1995 World Bank review of environmental strategies in Africa (Lampietti and Subramanian) found that of 14 countries completed a strategy, ten had identified new legislation and environmental standards as a priority action. Thus, effort is required to strengthen environmental policy, legislation, and regulations. The potential for using economic incentives as a tool to improve environmental quality should be explored. Moving towards a more sustainable development path may require major commitments of financial resources, not only to “undo” past damage, but to implement new initiatives. Donor funding is a fact of life in developing countries and donor support must be mobilised and co-ordinated to avoid duplication of effort. In many cases, small steps forward may not mean a large financial cost and these “win-win” solutions should be exploited. Finally, monitoring and evaluation must be an integral step in the whole process. This implies that an effective environmental information system can be established to provide quantitative measures of progress towards improved environmental performance.

## 2.7 SUMMARY

Sustainable development as a term, is now a fashionable in environmental arenas throughout the world. The need to balance environment and development are now central to most definitions of sustainable development. As a concept, sustainable development has evolved over the past four decades. In the 1950s and 1960s, the focus of development thought was on economic growth. In the early 1970s however, the approach shifted towards social development. Over the next decade, emerging environmental concerns rose to the forefront of development policy.

The environment clearly is a global concern. This is reflected in the various international environment agreements such as Agenda 21 and multi-lateral agreements such as the Convention on Biodiversity that most countries in the region have signed and ratified. While these types of agreements focus attention on specific environmental issues and provide mechanisms for resource mobilisation, corrective actions must largely occur at the national and even community levels.

Linear models of production tend not to account for waste generation from all phases of the production process and consumption of consumer goods. A circular economy-environment system is more appropriate where the natural environment is a sink for waste products. The major concern with economic production is that the environment has a limit for absorbing or “assimilating” waste products. Recycling waste can reduce the amount of natural resources used in production and resulting waste volumes. Many products however have technical and economic limits to recycling. Thus, the environment will continue to act as a waste sink.

Many definitions have been crafted for sustainable development since the 1980 World Conservation Strategy. Two that stand out are from the 1987 Brundtland Report and the 1991 report, Caring for the Earth. These general definitions can be helpful, but they can also be misunderstood and misused to suit vested interests. A more thorough assessment of the meaning of sustainable development is required to assist policy makers in charting a way forward.

For development to be sustainable, it must continue to meet a wide range of economic, social and ecological objectives defined by society over an indefinite period of time. Each broad area of sustainability may have independent objectives, yet there are areas where overlap occurs, or partial integration between two spheres. Full integration of all three spheres is the ultimate goal. Balancing these three circles of sustainability and their underlying objectives is a primary challenge facing decision-makers. Trade-offs (choices) have to be made.

Various models of sustainable development exist, ranging from those where economic growth and technology can overcome natural resource scarcity and waste assimilation, to others where environmental preservation takes supreme precedence. In between these extreme positions are models approaching what many governments are trying to achieve in practice: economic and social development that is environmentally sustainable. One important element of sustainable development theory is the re-investment of income from non-renewable resource extraction into other productive assets such as renewable resources, human and man-made capital. Governments owning non-renewable natural resources usually receive income from extraction through royalties or “rent”. Investing this income into productive assets is a way of maintaining total capital stocks. If, on the other hand, governments invest this income in current consumption, then capital stocks are not being maintained.

Moving from a theoretical discourse with various assumptions, to a practical approach that governments can follow is difficult. To assist this process, the 1991 report, ‘Caring for the Earth’ (IUCN/UNEP/WWF) identified nine principles as a basis of a strategy for sustainable development that draw from the more moderate theoretical models.

- Respect and care for the community of life;
- Improve the quality of life;
- Conserve the earth’s vitality and diversity;
- Minimise the depletion of non-renewable resources;
- Keep within the earth’s carrying capacity;
- Change personal attitudes and practices;
- Enable communities to care for their own environments;

- Provide a national framework for integrating development and conservation; and
- Create a global alliance.

Most countries in the region now have some type of environmental strategy, sharing a number of common steps and many of the previous principles. The main steps include:

- Identifying priority problems;
- Defining priority actions; and
- Ensuring effective implementation

**Implementation is the most problematic step because that is where hard political decisions must be made. Institutional structures must be improved to provide a foundation for effective actions and this means effort is required to strengthen environmental policy, legislation, and regulations. While donor funds are usually needed in developing countries to implement environmental strategies, small steps forward may not mean a large financial cost. As an example, economic incentives can often improve environmental quality at low cost. Monitoring and evaluation must be an integral step, thus implying a need to an effective environmental information system.**

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