4. ECONOMIC THEORIES ON SUSTAINABLE DEVELOPMENT

4.1 INTRODUCTION

In Chapter 2 the concepts of substance and process economics were introduced. It was further argued in Chapter 3 that the various theories on economy-environment interactions could be categorised according to the substantivist capital-theory approaches and more processional evolutionary approaches, with a strong emphasis on the former in economic policy-making approaches, including climate change. The first question therefore is whether economic theory on sustainable development would provide an adequate framework for economic policy making towards sustainable development that includes both substantivist and processional aspects of reality.

It has been pointed out in section 3.4.1 that economic policy-making approaches, as based on particular economic theories, are constrained in the different normative principles of value determination. It is also generally accepted that the theory of sustainable development encompasses economic efficiency, ecological sustainability and social equity (Munasinghe 1993). These components of sustainable development often involve trade-offs. The second question is whether the theory of sustainable development would provide an adequate framework wherein such trade-offs can be included, given the complications different fundamental principles of value determination would pose.

The objective of this chapter is first, to evaluate economic theory on sustainable development with regard to:

- the alignment with both substantivist and processional aspects of reality
- the ability to have trade-offs between the different components of sustainable development

The second objective is to discuss the need for alternative approaches if economic theory on sustainable development does not provide an adequate framework for approaching economic policy towards sustainable development.

The structure of the chapter is as follows: In section 4.2 the concept sustainable development is introduced and defined, in section 4.3 the criteria for and degrees of sustainable development are outlined, and in section 4.4 the analyses of the different economic theories on sustainable development, as introduced in chapter 3, are outlined. In section 4.5 the need for alternative economic policy-making approaches towards sustainable development is discussed and in section 4.6 a few conclusions are made.

4.2 WHAT IS SUSTAINABLE DEVELOPMENT?

The term sustainable development was popularised by the Bruntland Commission (WCED 1987), and further positioned on the environmental policy agenda through the Earth Summit in 1992. Numerous publications on sustainable development reflect the confusion and open interpretation of the definition (Pezzey 1992; Frazier 1997). Pezzey (1992) listed 61 definitions of the term sustainable development. Since development is a value-laden word, implying a desirable change, there is no consensus on the meaning of development (Pearce *et al.* 1988:3).

The definition of sustainable development most used is the definition given by the Bruntland Commission (WCED 1987:43): *Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.*

In operationalising this definition it is also generally accepted that sustainable development consists of at least three elements: economic, ecological and socio-cultural sustainability (Munasinghe 1993; Munasinghe & Cruz 1995).

The **economic approach** to sustainability is based on the Hicksian income-rule[21]. There is an underlying concept of optimality and economic efficiency applied to the use of scarce resources. Defining and interpreting the various kinds of capital and their substitutability as well as the value of non-marketable environmental amenities is central to this approach. The issues of uncertainty, irreversibility and ecological collapse pose additional difficulties.

The **ecological approach** to sustainability focuses on the stability of biological and physical systems. There are limits to the development of ecosystems that are critical to the global stability of the overall ecosystem. DD&PW reduce the stability and resilience of ecosystems.

The **socio-cultural approach** to sustainability is people-orientated and seeks to maintain the stability of social and cultural systems, including the reduction of destructive conflicts and greater intra- and inter-generational equity. Key issues that should be pursued are cultural diversity and the better use of knowledge concerning sustainable practices. Modern society would need to encourage and harness pluralism and grass-roots participation into a more effective decision-making framework for socially sustainable development.

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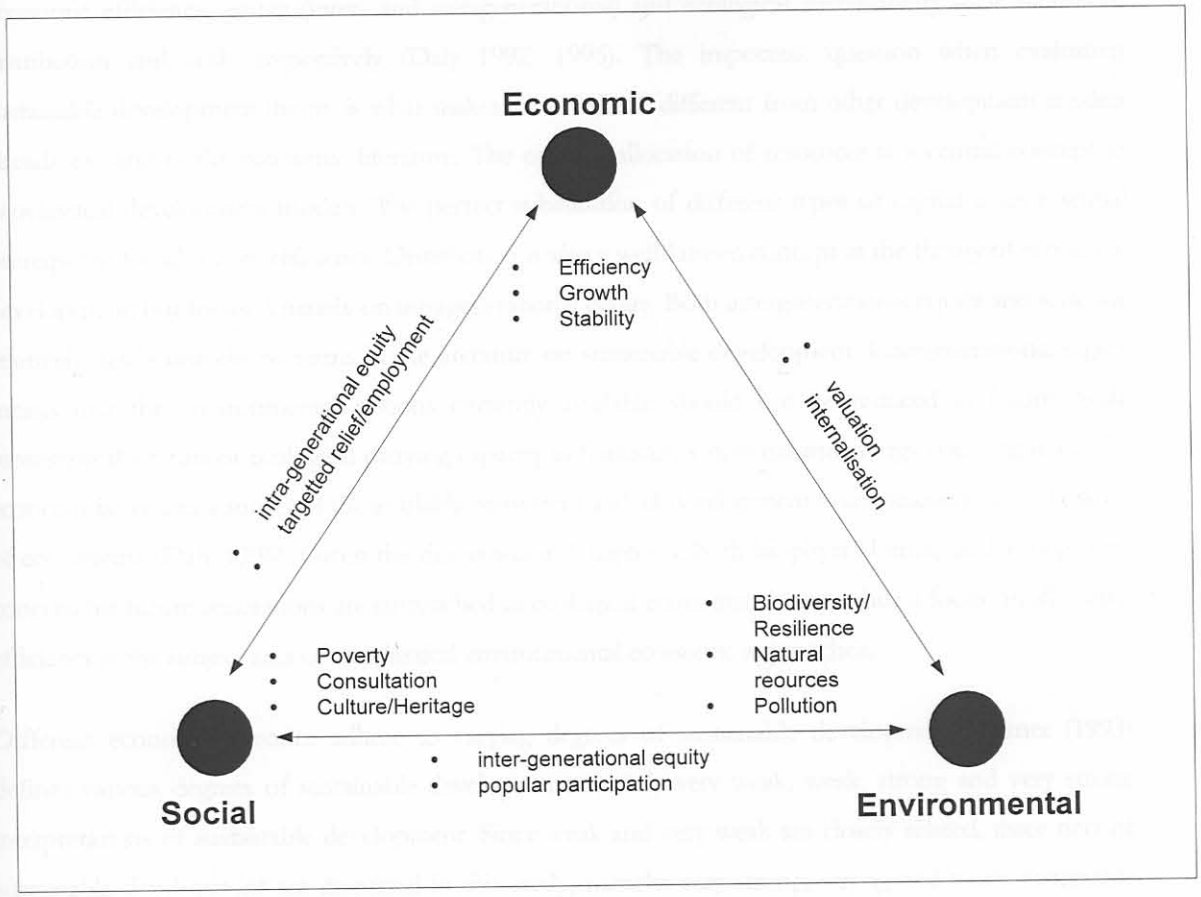
[21] As specified in the Hicksian definition of true or sustainable income, saving contributes to more future income. The essence of the Hicksian income concept is as follows: *The purpose of income calculations in practical affairs is to give people an indication of the amount which they can consume without impoverishing themselves. Following from this idea, it would seem that we ought to define a man's income as the maximum value which he can consume during a week, and still expect to be as well off at the end of the week as he was at the beginning. Thus, when a person saves, he plans to be better off in the future; when he lives beyond his income he plans to be worse off. Remembering that the practical purpose of income is to serve as a guide for prudent conduct, I think it is fairly clear that this is what the central meaning must be* (Hicks1946:172).

This approach, popularised under the term **the triangle**, gained momentum by work done in the World Bank amongst others (Serageldin 1996; Munasinghe 1993). The triangle of sustainable development is illustrated in Figure 4.1. It is clear from this figure that an understanding of sustainable development will fail if the viewpoints of the three represented disciplines are not integrated (Serageldin & Steer 1995:2).

Figure 4.1 The triangle of sustainable development



Source: Munasinghe (1993)

4.3 COMPONENTS, CRITERIA AND DEGREES OF SUSTAINABLE DEVELOPMENT

The discussion will focus on the key components of sustainable development as captured in the relationship between the various sub-components in **the triangle**. The focus is on the interface between economic and social sustainability, between social and environmental sustainability and between economic and environmental/ecological sustainability as summarised in Table 4.1.

Table 4.1 Components of sustainable development

Interface on the triangle	Component of sustainable development
Socio-cultural and ecological	Intergenerational equity, grassroots participation
Economic and socio-cultural	Intragenerational equity
Economic and ecological	Capital substitutability

Source: Adapted from Serageldin & Steer (1995) and Munasinghe (1993).

Based on these components of sustainable development, the following criteria can be identified: economic efficiency, equity (inter- and intragenerational) and ecological sustainability – or allocation, distribution and scale respectively (Daly 1992; 1996). The important question when evaluating sustainable development theory is what makes these criteria different from other development models already existing in the economic literature. The optimal allocation of resources is a central concept in neoclassical development models. The perfect substitution of different types of capital is an essential prerequisite for allocative efficiency. Distribution is also a well-known concept in the theory of economic development, but focused mainly on intragenerational equity. Both intergenerational equity and scale are relatively newly introduced terms in the literature on sustainable development. Intergenerational equity means that the environmental options currently available should not be reduced in future. Scale represents the limits of ecological carrying capacity in humanity's material and energy consumption. The economy is seen as a subset of the available ecosystem and all development is constrained by the realities of ecosystems (Daly 1996). Given the discussion in Chapter 3, both biophysical limits and a long-term concern for future generations are entrenched in ecological economic theory, while a focus on allocative efficiency is the subject area of neoclassical environmental economic approaches.

Different economic theories adhere to varying degrees of sustainable development. Turner (1993) defines various degrees of sustainable development, namely very weak, weak, strong and very strong interpretations of sustainable development. Since weak and very weak are closely related, three tiers of sustainable development are discussed in this study, namely: very strong, strong and weak sustainable development. Extremely weak sustainable development is not considered to be a category since it reflects an inherent contradiction in terms (Blignaut & Heymann 1998:244-246). These three degrees and theories can be distinguished as follows (Blignaut & de Wit 1999):

- Very strong environmental sustainability places the earth and all its inert substances as well as living species on the same level. In essence it means that no natural resource should ever be depleted. Very strong environmental sustainability could be linked to the views held by the so-called deep ecologists. Gray, Owen and Adams (1996:60) describe deep ecologists as those who believe that human beings do not have any greater rights to existence than any other form of life. Not one of the discussed economic theories falls clearly within this framework. Economic theory, by nature, places human rights in the centre of analysis. Ecological and institutional

economists emphasise that some natural life-support systems are not to be traded off against other economic motives. However, this cautiousness is more a concern for mankind's welfare than a concern for the rights of non-human forms of life (see Costanza *et al.* (1997b) for a valuation of the earth's ecosystems, using the benefit for mankind as a starting point). The real identification with nature as advocated by deep ecologists does not convincingly feature in any economic theory (Turner & Pearce 1990:8)[22].

- Strong environmental sustainability allows for the exploitation of resources (even non-renewable), but stresses that the receipts (or income) from such exploitation must be specifically invested in research or other activities that eventually will (or should) ensure that alternative renewable resources will be available for future generations. Ecological economics falls in this category (Turner 1993). Ecological economics has even been called the science and management of sustainability (Costanza 1991). It has been suggested that sustainable development requires the preservation of natural capital at the present level. This implies the non-substitutability of critical natural resources for other forms of capital. Economic development can take place but the stock of natural capital and ecosystem services should remain constant over time (Ayres 1998).

- Weak environmental sustainability allows for the exploitation of all resources, provided that the receipts or profits of such exploitation should ideally be applied to the general benefit of mankind (Gray, Owen & Adams 1996:58). Environmental economics, an applied field of neoclassical welfare theory, falls in this category. An economy is sustainable when the total capital stock remains constant. In this paradigm natural and environmental resources are degraded on the condition that investments are made in other forms of capital. The demand for environmental quality is imputed to make the trade-off with investments in other forms of capital more explicit. An implicit assumption is that natural and environmental resources can be substituted for other forms of capital. Pearce and Atkinson (1993, 1992) argue that for an economy to be sustainable, the savings rate should be higher than the combined depreciation rate of natural and man-made capital. Turner (1993) states that sustainable development according to this definition is more or less just about **getting the prices right**. Weak sustainability is the most widely accepted degree of sustainable development, since it does not produce an outright conflict with conventional market-orientated economic theory.

In summary, there is no common integrated economic theory of sustainable development. Various approaches exist, each with a particular focus on allocation, distribution or scale. The trade-offs between these components of sustainable development would depend largely on that part of reality most extensively discussed in the various theories. The different economic theories of sustainable

[22] For a discussion on utilitarian approaches, including economics, to the environment, see Allison (1991).

development have to be discussed in more detail to answer the question whether these would provide an adequate framework for approaching economic policy towards sustainable development.

4.4 ECONOMIC THEORIES AND SUSTAINABLE DEVELOPMENT

In the next three sections an attempt is made to spell out the different economic approaches to sustainable development. In section 4.4.1 the capital theory approach (including environmental economic, ecological economic and neo-institutional approaches) and in section 4.4.2 the evolutionary approach to sustainable development is discussed. As discussed in Chapter 3, the CTA is a manifestation of the substantivist approach to problem solving, while the evolutionary approach links more readily to the processional aspects of reality. The focus is on both the theories and available tools for the analysis of sustainable development in these two broad approaches.

4.4.1 Capital theory approach

Theories

In general, environmental economics is a weak approach to sustainable development while ecological economics is a strong approach to sustainable development. Neo-institutional economics could be either weak or strong depending on the type of property rights structure. Neither classical nor neoclassical economic theories have dealt with the issue of sustainable development in an explicit way. Malthus and Ricardo are probably the best-known classical economists who have brought forward the notion of limits. They have laid the roots for a strong sustainability viewpoint in modern economic theory (Christenensen 1989). Neoclassical economists have long recognised the concept of sustainability. The interpretation of sustainability is based on the **Golden Rule** of neoclassical growth theory: that configuration of the economy that yields the highest level of consumption per capita and which can be maintained indefinitely (Hicks 1946; Phelps 1961; Robinson 1962). However, neoclassical economists have not dealt with the broader issue of sustainable development by not including aspects of scale and intergenerational equity, and do not believe that a negative change in the quality of natural and environmental resources is a serious long-term problem (Simon & Kahn 1984).

Neoclassical environmental economists build on the Solow (1992b) definition of *intergenerational equity* which states that *sustainable development requires that future generations be able to be at least as well off as current generations.* DD&PW may happen, but should be offset by an increase in productive capital sufficient to enable future generations to obtain at least the same standard of living as those alive today. In this approach, net present value (NPV) calculations, based on discounted future costs and benefits, underlie the decisions that are made on behalf of future generations. The subject of discount rates is currently debated with emphasis on the use of market rates versus social discount rates (Harris 1996:156; Krutilla & Fischer 1985:60-65).

Many scholars, sympathising with the ecological economic approach, have argued that discounting the future is not compatible with sustainable development (Daly 1977; Georgescu-Roegen 1971; Howarth & Norgaard 1995; Hueting, Bosch & de Boer 1992; Pearce & Turner 1991). Hueting, Bosch and de Boer (1992:56) summarise the argument well: *The NPV (net present value) formula is meaningless for environmental measures when long-term effects are involved...Exceptions are those cases in which the preferences for environmental functions involved can be fully derived from (market) behaviour. Long-term environmental costs and benefits are, from an economic point of view, completely different from costs and benefits of commercial investments.*

Howarth and Norgaard (1995) propose an ethical intergenerational allocation model, advocating for additional compensating mechanisms for future generations (see also Hediger 1997). This approach emphasises the importance of an environmental ethic underlying sustainable development (Daly 1996; Söderbaum 1987:163). This concerns an ethical judgement on the quantity and quality of natural resources left behind for future generations (Dietz & Van Straaten 1992:44). The neoclassical response of optimising the use of natural resources over time is perceived to be senseless without knowing precisely where its limits are located in order not to fall into irreversible processes (Dietz & Van Straaten 1992:34). This leads to a principle that *irreversible effects on nature are not allowed* (Dietz & Van Straaten 1992:44). According to this line of thinking, a broad substitutability between types of capital will not present future generations with the same options when presented with a degraded stock of natural capital exchanged for an increased stock of man-made or social capital.

The neoclassical environmental economic approach implicitly assumes that substitutes exist or could be found for all resources. Neoclassical economists view the **substitutability** of man-made for natural capital as a means to safeguard the benefits of future generations. In this view, future generations can be better off in a state of increased knowledge and increased man-made welfare even at an increased cost of DD&PW.

It has been argued in the ecological economic literature that natural capital is not always substitutable for other forms of productive capital. The economic system is perceived as a sub-system of the ecological system (Daly 1996). Economic extraction might produce an outcome that threatens the continuation of ecosystem services. Natural resources are many times multi-functional, implying that substitution does not only occur for the use of natural resources, but for the whole of the particular resources' services. The trade-off between various forms of capital is not neutral. The increased exploitation of environmental resources leads to ecological feedbacks, threatening critical natural capital and subsequent life support potential. Some natural capital is not substitutable over time. Daly (1996) argued that to protect the range of options for future generations has to be a social decision on a macro level. Individual decision makers do not have the incentives to protect the full range of options for the future.

The debate on **intragenerational equity** was initiated in development economics in the early 1960s. While neoclassical approaches advocated the trickle-down approach, other stronger approaches advocated more targeted policies such as compensation and redistribution schemes (Thirlwall 1994; Todaro 1989). For instance, distributional weighting schemes to correct for an unequal distribution have been proposed in cost-benefit analysis, but these have up to now not often been used in practice (Squire & van der Tak 1975; Dinwiddy & Teal 1996). Compensation payments (e.g. targeted relief) outside the economic analysis, is a theoretically strong sustainable option more often referred to. Various indicator sets have been developed to measure and operationalise the concept of intragenerational equity, for example the human development index (HDI).

Grassroots participation has not received attention in the environmental economic and ecological economic CTAs to sustainable development (Redclift & Sage 1994). However, neo-institutional economics approaches, and especially those focusing on property rights, have made meaningful contributions to the management of natural and environmental resources at the local level. Redclift and Sage (1994:23) observe: *Both sustainable development and environmental management have become buzz-words in development policy circles, but the discussion surrounding these terms pay scant attention to the way in which people in developing countries participate in the management of their resource base and, through their participation, help to transform the practice of environmental management.* Redclift and Sage (1994:47) highlight the way in which the power relations between different groups in their control over resources are understood, and the way in which these power relations change over time. Neo-institutional economic theories have a lot to contribute in understanding grassroots participation and power relations (Ostrom 1990; Hardin 1968; Bromley 1992; Berkes 1996; Eggertsson 1990). Various analysts have called for clearly established local responsibilities resting with the local people in the management of local resources (see various contributions in Ghai & Vivian 1995). This call has been echoed in the neo-institutional economic literature on entitlements. Open access resources are perceived to be at high risk to DD&PW due to the problem of free riding on the natural and environmental resources (Berkes 1996).

Nevertheless, to simply call for greater participation by local people will not guarantee success. Like any other ownership structure, it can only function when a supportive institutional framework is in place. Local Agenda 21 initiatives toward sustainable development will only have a chance to succeed if they receive support that only a higher level of government can provide (Reid 1995). Some authority has to define **the rules of the game** beforehand (for an application of neo-institutional economics to common property resource management, see Ostrom 1990).

Policy tools

In the CTAs several tools are available to measure progress towards sustainable development. These tools reflect the underlying environmental and ecological economic theories on sustainable development. The most popular approach, driven by powerful institutions such as the International

Monetary Fund (IMF) and the World Bank, is natural resource accounting (NRA) (or environmental accounting or green accounting) (United Nations 1993). The purpose of NRA is to ascribe a monetary value to the use and the change in stock of natural resources in a systematic way that corresponds to the Systems of National Accounts (SNA) used to compile, among others, the Gross Domestic Product (GDP). The data intensity of environmental accounting suggests other short-cut economic approaches to sustainable development, namely, the concepts of genuine savings and national wealth. Genuine savings is perceived to be the true rate of saving of a country after the degradation and depletion of natural resources are taken into consideration (Pearce & Atkinson 1993, 1992). Genuine savings are a flow measure, building on the income rules of neoclassical growth theories. Should a negative rate of savings persist, a decline in national well-being is inevitable (World Bank 1997:8). Not only the flow of income, but also stock estimates yield valuable insights where various forms of capital are factored into the analysis (World Bank 1997:2). This measure of wealth is a response to the interpretation that sustainable development concentrates and enhances the opportunities for future generations (World Bank 1997:19; Serageldin & Steer 1995:30). It is a shift away from flow measures in the economy, such as GDP, to a measurement of the stocks of capital. The World Bank (1997:19) states: *Stocks of wealth underpin the opportunities people face, and the process of sustainable development is fundamentally the process of creating, maintaining, and managing wealth.* These policy approaches can all be included in the weak interpretation of sustainable development (Stern 1997).

The ecological economic approach, or strong approach to sustainable development, argues for separate biophysical indicators, thereby electing not to subject ecological changes to the neoclassical environmental economists' interpretation of sustainable development. These indicators are meant to serve as early warning signals for a change in the critical levels of natural capital, such as ecosystem services necessary for life support (Costanza & Daly 1992). This **strong sustainable development** approach suggests that specific aggregates of capital stocks should be maintained, i.e. every class of capital needs its own set of indicators. The proponents of strong sustainable development argue for the precautionary principle, a safe-minimum standard (SMS), or absolute standards approach to natural capital, a concept not unknown in earlier economic literature (Ciriacy-Wantrup 1968; Bishop 1978).

The discussion on the CTAs is summarised in Table 4.2 with specific reference to the weak and strong interpretations of sustainable development. It can be concluded that the different CTAs differ considerably in the kind of trade-offs that should be allowed between allocation, distribution and ecological scale issues, both between present generations and between the present and future generations. Such differences accentuate the debate on individual freedom and state intervention and will be further elaborated on in Chapter 6. At this stage it is important to conclude that an integrative CTA framework for sustainable development would have to take account of the strong differences between weak and strong approaches to sustainable development.

Table 4.2 Sustainable development and the capital theory approach

Key principle(s) for sustainable development	Weak sustainability		Strong sustainability	
	Theory	*Policy tools*	*Theory*	*Policy Tools*
Intergenerational equity, grassroots participation	Inter-temporal valuation through discounting the future; Little recognition of local level	Natural resource accounts; genuine savings; national wealth all subject to capital depreciation rules	Inter-temporal allocation; more recognition on local level	Policy intervention through intergenerational compensation
Intragenerational equity	Trickle-down growth theory	Economic growth policies	Equity compensation	Policy intervention through redistribution
Capital substitutability	Substitution between all types of capital	Natural Resource Accounts; Genuine savings measures; National wealth estimates to guide investment in various types of capital	No substitutability between types of capital	Biophysical indicators; Precautionary principle: Policy intervention to set safe minimum standards or absolute standards

Source: Own analysis.

4.4.2 Evolutionary approach

Theory

The evolutionary economics approach, as defined in Chapter 3, comments in various ways on the concept of sustainable development. Especially institutional economists working in the tradition of the old institutional approach and co-evolutionary economists have commented on the subject-field of sustainable development. They reject both the environmental economic or weak and ecological economic or strong approaches to sustainable development. It is argued that these approaches, whether or not emphasising substitutability or complementarity between natural capital and other forms of capital, both depend on particular interpretations of environment-economy interactions and the working of the environment and the economy individually (Stern 1997:166). Both rely on the value of aggregated stocks of natural capital – a condition argued to be only possible in certain technical conditions. Institutional economists, working in the evolutionary tradition, argue that it is not meaningful to define

and measure the absolute sustainability of a society at any point in time, but rather assess the relative sustainability of society or economic activities (Norgaard 1994:22; Folke & Kåberger 1991:289; Stern 1997:161). Sustainability is not a problem that can be reduced to a single number indicator (Common 1993). The management focus should be on institutional structures that threaten the principles of social value, such as the continuity of human life (Stern 1997:159). (See section 3.4.1.) Some institutional economists do, however, accept biophysical limits on the degradation of natural and environmental resources (Dietz & Van Straaten 1992; Söderbaum 1990, 1987). It can be concluded that these evolutionary economists adhere to the principle of strong sustainability, although differing from the emphasis on capital definitions advocated by the ecological economic approach. This is not necessarily true for other evolutionary economists as many emphasise technological progress, innovation and invention with no inherent biophysical limits to economic activities. Those adhering to the old institutional approach share the emphasis on an environmental ethic with the strong interpretation of sustainable development from the CTA. This ethic, however, is judged according to the principles of social value, and not necessarily a focus on natural capital stocks alone.

The concept of capital substitutability does not feature prominently in the evolutionary, including the old institutional, approach to sustainable development. Production is seen as a process and not an optimisation of capital inputs.

The co-evolutionary approach suggests an integrated approach to sustainable development. A discussion of the key principles for sustainable development in a seamless way will not be possible. This differing approach to sustainable development is suggested in the co-evolutionary economic literature (Norgaard 1988). Co-evolutionary economics suggests that economic, socio-cultural and environmental dimensions of sustainable development are not only interdependent, but that they evolved together and will continue to evolve in tandem into the future (Norgaard 1994b; Gowdy 1994; van Jaarsveld 1996, van Jaarsveld *et al.* 1996). None of the dimensions of sustainable development can therefore be addressed in isolation. Any attempt to rectify environmental or economic problems cannot ignore that this approach will require new social constructs which provide the framework for change (van Jaarsveld 1996:18).

Policy tools

The evolutionary approach to sustainable development has very different operational tools than those found in the CTAs. Bergstrom (1993) made a distinction between the perceptions of sustainable development as a marginal or a structural problem. The CTA with its emphasis on changing economic, social and environmental indicators is an example of the marginal approach to sustainable development. Values, whether individual or social, are derived in a given context. The evolutionary economic viewpoint that sustainable development involves some structural questions does not assume any given context for analysis. Sustainable development, when approached as a structural problem, is an analysis at

the deeper level of changes in structures and institutions, value systems, rules of the game and power systems (Bergstrom 1993:7-9).

Institutional and co-evolutionary economists reject the single number dimension of the CTA as indicative for sustainable development. Norgaard (1994a:20) argues that an operational definition of sustainable development is impossible, but an inquiry into the difficulties of organising sustainable development is in order. A number of possible approaches are suggested to articulate sustainability concerns (Stern 1997:161):

- disaggregated sustainability indicators
- economy-environment simulation models
- historical assessment of sustainability performance

The capital theory approaches lead to the development of highly aggregated indices (such as natural resource accounts, genuine savings and stocks of national wealth), which have significant political advantages in communicating with the public, but do not provide an ideal or adequate framework within which political action could be prioritised (van Jaarsveld 1996:17). An in-depth analysis of **disaggregated data** is needed to capture the **complexity** at a lower level of analysis. These indicators do not indicate whether a system is sustainable in an absolute sense, but they might help to describe whether the system is moving away from or toward sustainable development. This is also a stimulation to grassroots participation on the community's or society's future options (see Leach, Mearns & Scoones 1997 for a discussion).

Simulation models of the complex economy-environment-socio-cultural interactions are more transparent than calculating the supposed level of sustainable income or net capital accumulation (Stern 1997:162). Forecasts are always subjected to sensitivity analysis or the construction of confidence intervals.

A **historical approach** would assess what effects past activities had on sustainable development until the present. Stern (1995) conducted a study on the impact of changes in mining income in some developing countries with large mining sectors on GNP per capita over a twenty-five year horizon. The sample mean showed no improvement in long term GNP despite the fact that most economies had met the weak CTAs Hartwick-rule of reinvestment of resource rents in alternative forms of capital as evaluated at market prices. The next step in such an analysis would be to answer the question why some other economies were more sustainable and apply the conclusions to the lagging performance of the other economies.

Van Jaarsveld (1996) proposed a quantitative method based on the co-evolutionary approach to sustainable development. The method focuses on both broad trends and patterns of variance in a

multivariate data matrix. Thirty variables (12 social, 6 economic, 12 environmental) were chosen to explore the co-evolutionary relationships and broad patterns of covariance among social, economic and environmental variables. As stated by van Jaarsveld (1996:20), this model only provides a snapshot of a co-evolving sustainable development system at a particular scale. This model serves as a barometer for sustainable development that can be used to evaluate policy performance, inform public debate and serve as an early warning system for pending unsustainable situations. Once political action is prioritised on the basis of such a model, policy makers will need more detailed sustainability indicators for the targeted sources of unsustainability. However, the drawback of this particular study is that it is not fully developed for analysis and interpretation. It is a first-cut approach to bring the various components of sustainable development together, revealing the pattern of interaction, but it is less developed on the processes that lead to the problems of unsustainability (Fairbanks 1999).

4.5 THE NEED FOR AN ALTERNATIVE POLICY-MAKING FRAMEWORK TOWARDS SUSTAINABLE DEVELOPMENT

The different economic theories have various interpretations of what sustainable development means. Neoclassical environmental economists focus on the economically efficient trade-offs between mainly economic and ecological, but possibly also socio-cultural issues. Ecological economists highlight the biophysical, social and ethical (including intergenerational) limits while neo-institutional economists emphasise the institutional constraints within which these trade-offs occur. In the latter approach sustainable development can only be achieved when certain exclusive property rights regimes exists (Berkes 1996:89). Evolutionary economists do not frame sustainable development as an objective that has to be optimised subject to a set of constraints, but accentuate the most sustainable patterns of development over historical time. Co-evolutionary economists emphasise the co-evolution of the different components of sustainable development, that is one cannot really optimise one component at the cost of another.

In a world of scarcity (whether biophysical or financial), trade-offs have to be made. The economic theories on the environment, especially the CTAs, that inform such trade-offs and ultimately the parameters of sustainable development, differ considerably in approach. Where it would, for instance, be technically possible to optimally mine the environment to a point of depletion as long as investments are made in other types of capital under a weak sustainability rule, this would not be possible under a strong sustainability rule where safe minimum standards or absolute standards are implemented. Evolutionary approaches do not deny these trade-offs per definition, but instead focus on the flexibility and complexity of the structures wherein these trade-offs occur.

It is clear that there is not one integrated approach to sustainable development that will do justice to the various economic interpretations of environmental reality. The distinction between substance and

process economics is too large to build simple integrative frameworks. This is not surprising, seeing the long history of failed attempts to integrate both substance and process on a philosophical level, as discussed in Chapter 2.

Neither the CTAs nor the evolutionary approach to sustainable development in itself provides an exclusive framework for approaching policy for sustainable development. Sustainable development is a value-laden concept and the differences in the fundamental principles of value in the different theories on sustainable development only result in moving further away from an integrative framework for approaching policy making for sustainable development. While CTAs are useful on a macro-economic scale of decision making, (co)-evolutionary approaches recognise complexities at lower scales of analysis. Different approaches are useful in different cases, depending on the purpose of an analysis on policy for sustainable development. The challenge remains to find an approach for economic policy on sustainable development that has the ability to utilise the best approaches for the most appropriate context – an approach that includes both multiple contexts and elements of change. One approach that takes account of differences over spatio-temporal scales can broadly be defined as the systems approach. The applicability of this approach to designing economic policy for sustainable development will be discussed in the next chapter.

4.6 CONCLUSIONS

The economic theory of sustainable development is not the integrative concept that could provide the basis for integrated economic policy-making approaches to sustainable development. The different theories on the linkages between production, consumption and the environment, with their normative criteria of efficiency, sustainability and survival, have been further developed to include their own particular definition and operationalisation of the concept sustainable development. The concept sustainable development has not proved to be the unifying concept, but is just as fragmented as the particular theoretical framework wherein the analysis is carried out. The need still exists for an organisational framework with more clarity on which approach to use in which circumstances. Such an organisational framework should be able to include insights from both the substantivist and the processional approaches, state the choice of normative criteria explicitly and contribute to policy making for sustainable development. The systems approach includes both substantivist and processional aspects and its application to sustainable development will be discussed in the next chapter.