# Chapter 2
# Sustainable Development – Background and Context

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**Abstract** The debate about sustainability can be traced back into the eighteenth century. It was revived following the publication of the Brundtland Report "Our Common Future" (1987) and the United Nations Conference on Environment and Development in Rio de Janeiro (1992). Since then, interest has been focused on developing new concepts between the seemingly opposing paradigms of strong and weak sustainable development as well as on their application in practice. Moreover, sustainable development entails normative implications that affect inter- and intragenerational justice.

**Keywords** Sustainable development • Brundtland Report • Strong and weak sustainability • Inter- and intragenerational justice

## 1 The Idea and Historical Overview

Sustainable development is a concept that, since the 1992 Earth Summit in Rio de Janeiro and the *Agenda 21* adopted in its wake right up to the present, has been used, misused, and sometimes abused. In the concept of sustainable development, a number of social visions based around the ideas of justice, the frugal life, freedom and autonomy, the welfare of humankind, and responsibility for the future can be found with varying degrees of importance. Governments, companies, and non-governmental organizations, as well as national and international conferences, have all emphasized the importance of sustainability. However, one result of sustainability being considered in such widely different contexts is that the concept has become plagued by inaccuracies, ambiguities, and contradictions.

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In his book *Sustainability: A Cultural History*, Ulrich Grober carefully investigates our understanding of sustainability, beginning with the following question (Grober 2012: 15 f.):

> But what is 'sustainable?' The Dictionary of the German Language published in 1809 by Joachim Heinrich Campe, Alexander von Humboldt's teacher, defines Nachhalt (the root of nachhaltig, the German word for 'sustainable') as 'that which one holds on to when nothing else holds any longer'. That sounds comforting. Like a message in a bottle from a distant past, for our precarious times. Another message in a bottle, this one from the famous 1972 report The Limits to Growth (Club of Rome) says: 'We are searching for a model that represents a world system that is: 1. sustainable without sudden and uncontrollable collapse; and 2. capable of satisfying the basic material requirements of all people.'
>
> In both cases, sustainability is an antonym to "collapse". It denotes that which stands fast, which bears up, which is long-term, and resilient. It is immune to ecological, economic or social breakdown. What is striking is that the two terms, from such different epochs, are remarkably congruent. They both locate "sustainability" in the basic human need for security.

The book offers a rewarding insight into how the discussion of sustainability has developed over the centuries and which aspects played a role.

## *1.1 Beginnings of the Discussion About Sustainability*

The origins of the concept of "sustainability" go back 300 years, when in 1713 the German mining director Carl von Carlowitz wrote a treatise on forestry, *Sylvicultura Oeconomica* (cf. Peters 1984; Schanz 1996; Di Giulio 2004). Carlowitz called for "continuous, steady and sustained use" of the forest. Sustainable forest management was to be based on the principle that only as many trees as would allow a continuous replenishment of an equivalent number of mature trees should be cut down in a single year, allowing the forest to be maintained and managed over the long term.

This principle of sustainability unites an economic criterion (e.g., maximum timber production securing the continuing existence of an individual business enterprise or livelihoods) and an ecological one (e.g., preserving a particular ecosystem). From an economic perspective, we can also derive the principle of living from the "interest" of capital (the annual growth in logged timber) and not from the capital itself (the forest). This principle was legally codified in German forestry at the end of the eighteenth century. Since then, sustainable forestry has, however, been reinterpreted a number of times.

At the beginning of the twentieth century, the concept of sustainability in the form of "maximum sustainable yield" was introduced to the fishing industry, and for similar reasons. Conditions were to be created that would allow maximum yields in relation to the size of the fish populations. For over 200 years then, the principle of sustainability, to the extent it was made use of at all, was limited to the timber and

fishing industries. It had very little influence on other sectors of the economy. The business principle of "allowance for depreciation" comes closest to the goal of conservation of living from the yield and not from capital.

By the mid-eighteenth century, the first economic analyses focused on nature as a factor of production (in the sense of resources or land) had already appeared. Some 50 years later, the works of important economists such as David Ricardo and Thomas Malthus, as well as of the philosopher John Stuart Mill in the mid-nineteenth century, were premised on the idea of the limited carrying capacity of nature. Malthus, living in a time of extreme population growth in England, diagnosed an imbalance between the resources in a habitat and the size of its population. He predicted starvation, epidemics, and wars would follow. Today, these works are often considered the first systematic studies of the ecological limits on growth in a finite world and are credited with being an early source of critical sustainability. This work was given little attention at the time, however, as environmental problems on a national scale, much less a global, were not part of the political or social discourse at the time.

From the emergence of industrialization at the end of the eighteenth century until the mid-twentieth century, for most people, development was largely about economic and social issues. Questions of survival and improving work conditions were more urgent than what we would today call environmental problems. In addition, new methods in agriculture and food industries improved food supplies and, in spite of greater opportunities for consumption, the population grew more slowly or even remained stable. Malthus' pessimistic thesis was given less attention or even considered out of date. As a result, for more than 150 years, neoclassical economic theory and practice largely ignored nature as a factor in the analysis of production processes. It was not until the 1960s that economists such as Boulding (1966), Ayres and Kneese (1969), Georgescu-Roegen (1971), Ayres (1978), Daly (1973, 1977), and others put nature and the environment, and so, at least indirectly, sustainability, back on the economic agenda. In the wake of a series of environmental catastrophes that could no longer be disregarded, environmental protection became an issue of growing public concern. Winter smog in London and New York, devastating mercury poisoning in Japan, a tanker oil spill are only a few examples. The book *Silent Spring* by Rachel Carson, published in 1962 in the United States, had a very strong impact on the discussion of the risks of chemical pesticides on the environment. In 1972, the Club of Rome commissioned the report *Limits to Growth* (Meadows et al. 1972) and thrust the question of resources into the heart of environmental debates in more-developed countries. The report was based on work done by scientists at the Massachusetts Institute of Technology (MIT), who used computer programs to simulate different scenarios of the Earth's future. The most alarming forecast, and so the most widely reported in the media, was that the Earth would not be able to sustain a continuation of resource-intensive growth policies. Most scenarios show an eventual and significant decline in population and in the standard of living (Meadows et al. 2005). In Fig. 2.1, expected advances in extraction technologies for nonrenewable resources that might be capable of postponing the onset of increasing extraction costs are shown. Also evident is the alarming rise of pollution levels (even

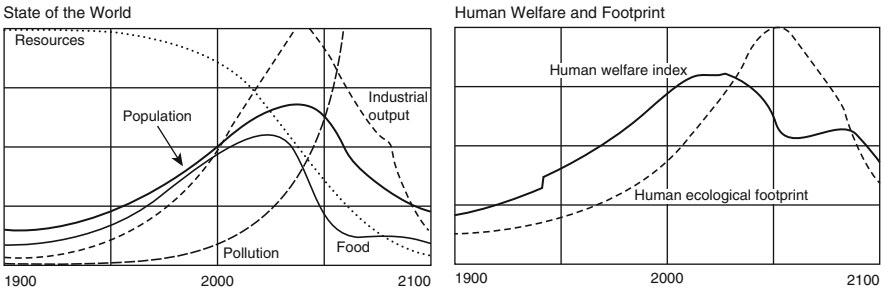


**Fig. 2.1** Scenario 2: more abundant nonrenewable resources – one of 10 different scenarios for the future, through the year 2100 that were generated by of the World3 computer model (cf. Meadows et al. 2005). For detailed explanation see text

exceeding the borders of the graph!), to be followed by depressing land yields and requiring huge investments in agricultural revitalization. As a fatal consequence, the population will decline as a result of food shortages and negative health effects from pollution. The report started a largely scientific and political discussion of the relationships between the social means of production and lifestyles, economic growth, and the availability or finiteness of resources. Following the publication of the *Limits to Growth*, Scandinavian countries and the United States started an initiative to have environmental protection taken up by the United Nations.

- ***Task:*** *Find two current examples of both overexploitation and sustainable management of natural resources and describe one positive and one negative example in detail.*
- ***Question:*** *List the most important milestones in sustainability discourse and outline their meaning.*

## *1.2 Initiatives of the United Nations and Other Organizations*

### 1.2.1 The Stockholm Conference and Its Consequences

In 1972, the first United Nations Conference on the Human Environment took place in Stockholm. The main political interest of the countries of the northern hemisphere was to head off an imminent environmental catastrophe by reaching an agreement on measures to limit industrial pollution and protect the environment. Contrastingly, on the priority list of the developing and undeveloped countries were items such as the eradication of poverty, the establishment of education and vocational training, access to clean water, and medical care – in short, social, and economic development. These were the first interest conflicts between the two goals of "environment" and "development" (Di Giulio 2004). The countries of the southern hemisphere – meaning the less-developed and undeveloped countries in the

world – wanted to overcome their "backwardness" through rapid industrialization. Environmental problems were, to the extent that they were recognized at all, accepted as inevitable and were to be dealt with at a later point in time.

Nevertheless, there was a first rapprochement at the Stockholm Conference. The more-developed countries were able to persuade the developing and undeveloped countries that drought, flooding, and inadequate hygienic conditions were also environmental problems and that there was no contradiction between environmental protection and development. It was in this discussion that the formula "poverty is the biggest polluter" emerged. This made it possible for developing and undeveloped countries to become engaged in environmental protection without having to make compromises regarding their development goals. Furthermore, it became clear that the environmental problems recognized in the 1972 Conference (e.g., the destruction of the rainforest or pollution of the oceans) could not be solved without taking social and economic perspectives into account.

The *Action Plan for the Human Environment* adopted by the UN General Assembly in 1972 included:

- Measures for the collection of environmental data, for environmental research, and for monitoring and exchanging information
- Agreements on environmental protection and the efficient use of resources
- Establishment of environmental administration and management agencies
- Programs for the education, training, and information of the public

To implement this action program, the United Nations Environmental Program (UNEP) was established with headquarters in Nairobi, Kenya.

### 1.2.2 Other Environmental and Development Initiatives

Following the Stockholm Conference, the UNEP created concepts for alternative environmentally and socially acceptable paths of development. Under the heading "eco-development," the economic and consumption patterns of more-developed countries were criticized as models for other nations.

The 1974 Cocoyoc Declaration, the final statement of one of the joint conferences organized by UNCTAD (the United Nations Conference on Trade and Development) and the UNEP and held in the Mexican city of Cocoyoc, together with the 1975 *What Now* report by the Dag Hammarskjöld Foundation, introduced the problematic state of "overdevelopment" alongside the problem of underdevelopment. The demand that basic human needs must be met as an answer to poverty-related overpopulation and environmental destruction was contrasted with the call for a reduction of the exploitation of environmental resources by wealthy countries. A stable ecological and social balance can only be achieved by taking both aspects into account. In this context, issues of power and the distribution of wealth on both the international and the national level were identified as problems.

The concept of "eco-development" was first intended as a developmental approach for the largely rural regions of developing and undeveloped countries. Its theoretical framework, however, allowed it to be expanded to redefine growth and prosperity. Essential elements of this approach were:

- Meeting basic needs using a country's own resources and without imitating the consumption patterns of industrial countries
- Developing a so-called satisfactory social ecosystem, which includes employment, social security, and respect for other cultures
- Anticipatory solidarity with future generations
- Measures for the efficient use of resources and environmental conservation
- Participation of all parties
- Accompanying and supportive educational programs

(Haborth 1991)

The Bariloche Report *Limits to Poverty* (Herrera et al. 1977), published by the Argentinian foundation of the same name, took a more radical position and clearly rejected the thesis of limits to growth. Briefly, it was not economic growth but consumption by more-developed countries that was approaching its limits. These countries should restrict their consumption and make the resulting resources available to developing and undeveloped countries. Economic growth does not necessarily lead to increased environmental pollution, as there are technological solutions to this problem. What is decisive is that there is a comprehensive transfer of technology from north to south so that both development and environmental problems could be solved. Due to the intensifying global environmental situation, the ecological dimension was given greater priority in the subsequent international debate.

The International Union for Conservation of Nature (IUCN) published, together with the UNEP and the UNESCO, the *World Conservation Strategy*. This was the first time the term "sustainable development" was used in a contemporary context. Its core thesis was that without preserving ecological functionality (above all, agricultural, forest, coastal, and freshwater ecosystems), there would be no economic development. Sustainable development was understood as a concept in which the protection and conservation of nature would ensure the preservation of natural resources. Ecological issues (efficient use of resources, protection of species diversity, preservation of ecosystem functions) were given priority. There was less said about the political and socioeconomic conditions that were some of the main causes of the dangers facing the ecosystems.

In the 1980s, the view of ecological problems shifted somewhat from a focus on resources to the sink problem, that is, the threatened capacity of the ecosystem to absorb and process wastes. In addition, it became more widely understood that the production methods and lifestyle of the more-developed countries could not be

transferred to the rest of the world – i.e., roughly 80 % of the world population. Linked to this insight, the more-developed countries were, due to their role in a majority of environmental and socioeconomic problems, given the main responsibility for finding a solution to these problems. The so-called Brandt Report (1980) and the subsequent *Palme Repo*rt (1983) – both the result of work done by the North–South Commission of the United Nations – were among the first international documents that dealt with this topic extensively. On the 10th anniversary of the Stockholm Conference in 1982, the United Nations Conference on the Human Environment met in Nairobi, Kenya, to develop a new and long-term strategy for the environment and development.

The concept "sustained livelihood" was introduced to the discourse of the environment and development by women's movements in developing and undeveloped countries (Wichterich 2002: 75). This approach focuses on "the local conditions of life, livelihood security and everyday experiences of women" (Wichterich 2002: 75). Livelihood is defined as the basis of existence, that is, "the capabilities, assets (including both material and social resources) and activities required for a means of living" (Scoones 1998 in Göhler 2003). The livelihood approach is about human beings, with all of their possibilities and strengths in their local situations. In the livelihood concept, the subsistence economy is of major importance.

- ***Task:*** *Contrast in a few words the different positions taken by developing and undeveloped compared to more-developed countries in sustainability discourse.*
- ***Question:*** *What role did the Stockholm Conference play in the north–south conflict? What activities followed this conference?*

### 1.2.3 The Brundtland Commission

In 1983, the United Nations appointed a World Commission on Environment and Development (WCED) chaired by the Norwegian Minister, President Gro Harlem Brundtland. The Brundtland Commission, as it came to be known, published its final report *Our Common Future* (WCED 1987), providing what came to be the best-known definition of the concept of sustainable development.

The WCED report built on the findings of the first environmental conference in Stockholm and the insight that the environment, the economy, and the society are mutually dependent and interrelated. Three basic principles were important for the Brundtland Commission in its problem analysis and recommendations for action: the global perspective, the linking of the environment and development, and the pursuit of justice. The report distinguished between two different perspectives on justice:

- The intergenerational perspective, in regard to responsibility for future generations

- The intragenerational perspective, in the sense of responsibility for different peoples living today, with a duty for wealthy countries to compensate poor countries

**Faces of Sustainability**
Gro Harlem Brundtland

- Born 1939
- Minister President of Norway (three terms)
- 1983–1987 Chair of the World Commission on Environment and Development (WCED)
- 1998–2003 Director General of the UN World Health Organization (WHO)
- Since 2007 a Special UN Envoy on Climate Change (Fig. 2.2)

**Fig. 2.2** Gro Harlem Brundtland (Nett 2008)

The Brundtland Commission's most cited definition of sustainable development was: "*To make development sustainable – to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs*" (WCED 1987: 8). Sustainable development is a process that aims at achieving a state of sustainability. The Brundtland Commission report called for the international community of nations to take urgent action. This demand was extensively discussed at the 1992 United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro and subsequently implemented in a number of documents (cf. UN 1992a), most importantly in the *Agenda 21* (UN 1992b).

- ***Task:*** *Research and discuss the importance of the activities following the Rio Conference on Environment and Development* (UNCED) 1992.
- ***Question:*** *How do you personally evaluate the compatibility of economic growth and the tenets of sustainable development?*

## 2 Sustainable Development: Theoretical Concepts

Specifying the concept of sustainability and developing strategies for its implementation is an enormous challenge. And there are a number of different approaches that can be found in the literature about the goals, strategies, and instruments of

sustainable development. The German Advisory Council on the Environment (SRU), an important commission set up by the German government, critically comments that the discussion on sustainable development is marked by an inflationary use of the term, which is partly due to the influence of interest groups, and that in general, there is a lack of precision concerning the concept and its definition (SRU 2002).

## *2.1 Ethical Implications*

The concept of sustainable development is not the result of scientific research; instead, it is an ethically grounded concept. The ethical norms upon which this concept is based, one of the most common being the principle of fairness or justice, are not subject to critical examination in most works on sustainability, nor are reasons given for it. The German Advisory Council did attempt to ground the concept ethically in its 1994 Annual Report (cf. SRU 1994). In an ethics of responsibility, which it defines as "the unity of wisdom and duty" (SRU 1994: 51), the Council distinguishes three ethical elements of sustainable development:

- The responsibility of humanity for its natural environment
- The responsibility of humanity for its social world
- The responsibility of humanity for itself

Against a background of continuing ecological crises, the Council underscores the growing urgency of addressing the issue of environmental ethics. In its own attempts to deal with this issue, the Council follows an anthropocentric approach based on the principle of personality, that is, "the moral autonomy of a human being, i.e., his or her dignity as an individual person." It is on the basis of a human being's individuality and rationality that the Council derives the responsibility of humankind for the natural world. The core of this comprehensive set of environmental ethics is the interrelatedness of all social systems with nature, for which they coined the concept of "retinity":

> If human beings would like to preserve their personal dignity as rational creatures, both regarding the self and others, they can only fulfil their implied responsibility for nature if they make the interrelatedness of all their civilizational activities and products with nature, the basis of life, the principle of their actions. (SRU 1994: 54)

This responsibility of human beings for nature refers on one hand to securing the existence of nature and understanding that nature has its own importance and on the other to securing the natural basis for human life.

In addition to environmental friendliness, the Council identifies social acceptance or social appropriateness as a further criterion for sustainable human activity. The responsibility for the social world extends both to one's own social group or society and to present and future generations. The most important ethical principle is, according to the Council, "the demand for universal solidarity as a condition for the creation of social justice" (SRU 1994: 56).

Furthermore, the Council refers to the responsibility of individual human beings for themselves and for the success of their own lives, which is their essential purpose as free human beings. This means that the state is obligated to secure the right of the individual citizen to autonomy and the free development of their personality, as well as a just and equitable coexistence and the preservation of the natural basis of human existence. The real ethical challenge is in developing an ethical stance that sees freedom as freedom *in* responsibility for our natural and social world. The Council points out that, for the development of such an ethical stance, it is necessary to have a nuanced awareness of values, ethical sensitivity, and the capacity for judgment. These must be learned in social processes that develop ethical capacities.

Action that can be ethically justified and that is oriented to the idea that sustainability can be grounded, according the Council, on the principles of personality and retinity, as well as its compatibility with the environment, the society, and the individual person. Sustainability thus does not describe a scientifically observed fact. Instead, it is an ethical concept that conveys an idea of "how the world should be" (UBA 2002c: 16; Renn et al. 1999). It is about how people would like to live today and tomorrow, as well as about what kind of future is desirable (Coenen and Grunwald 2003). This discourse is related to environmental ethics and the relationship between human beings and their natural and artificial world, which is largely influenced by the interests, values, and ethical attitudes of social actors.

The ethical component of sustainability development becomes especially apparent when issues of the national or global distribution of exploitation and pollution rights are at stake, whether those resources are natural or socioeconomic. It is hardly surprising that, given the variety of cultures, political systems, and interests in the world, there are at times strongly divergent ideas about what is a fair distribution of these rights. There are also different views in science, politics, and social interest groups within countries as to how the concept of sustainable development should be defined and implemented (cf. Fig. 2.3).

Sustainability is also interpreted as a "regulative" idea, a concept that originated with the German philosopher Immanuel Kant. Regulative ideas are not concepts that specify something we have experienced but instead are practical regulating principles. Similar to the concepts of freedom and justice, sustainability should be understood as an open-ended and positive concept that is only a provisional specification of something. This open-endedness is due to the fact that social understandings of sustainable development are dependent on time and situation, as well as on culture and knowledge (cf. Enquete-Kommission 1998).

At this point, it should be emphasized again that ethical questions cannot be decided scientifically. Questions with a normative content can only be decided in social decision-making processes (cf. Kopfmüller et al. 2001). Sustainability research must always remain aware that it is part of social perceptual and evaluation processes. A scientific discussion of the concept of sustainability can provide and critically reflect on knowledge that helps orient social decision-making, but it cannot make normative principles themselves. "Scientific statements thus have, theoretically speaking, the structure of if-then statements" (Kopfmüller et al. 2001: 348).

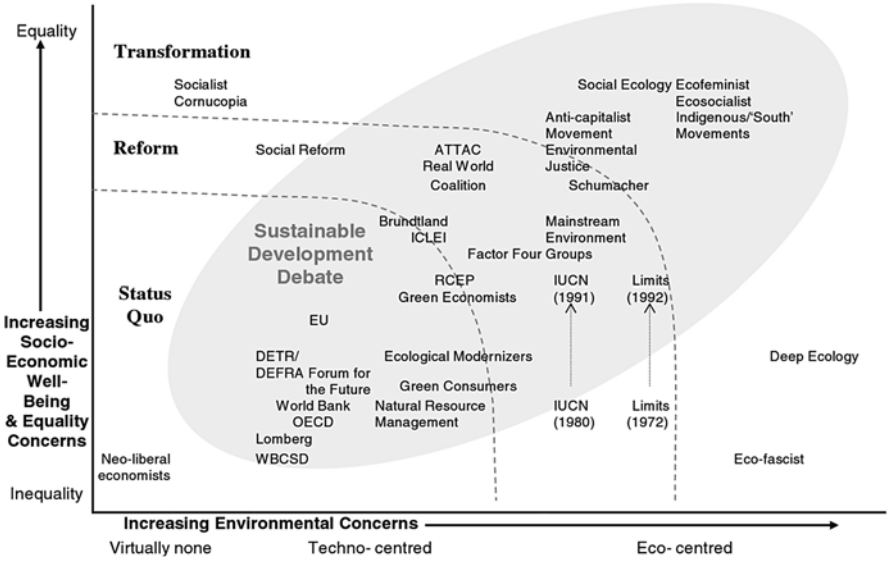


**Fig. 2.3** Mapping different views of sustainable development (Hopwood et al. 2005: 41). The linking of justice criteria and environmental concerns illustrates the wide range of approaches regarding their normative priorities and so provides a useful basis for the critical evaluation of different interpretations and constructs in sustainability discourse

- ***Task:*** *Discuss the challenges related to the ethical implications of the concept of sustainable development and its "translation" into political action.*
- ***Question:*** *What problems do you see with the demand for intergenerational justice and what solutions would you propose?*

## *2.2 Dimensions of Sustainability*

In the literature on the concept of sustainability, there is general agreement that sustainability can only be achieved by integrating the different dimensions of social development. However, there are different views as to the relative importance of these dimensions. Konrad Ott, a philosopher at the University of Kiel, Germany, points out that it is often assumed that the three dimensions, or pillars, of sustainability are equally important without the question of their equality ever being argued (Ott 2009). Some approaches give, for example, a primary role to the ecological dimension.

There are different ideas about the number and importance of the dimensions of sustainability, but in general, they can be divided into the "unidimensional" and "multidimensional" approaches (Tremmel 2003). In the unidimensional model, one dimension, for example, the ecological dimension is given a fundamental priority in case of a conflict between dimensions. Economic and social aspects are seen then as

the causes and effects of environmental degradation but are not considered equally important dimensions (Kopfmüller et al. 2001).

An example of the primacy of the ecological dimension is given by the UBA, the German federal environmental agency (UBA 2002a, b). In their sustainability studies, ecology provides the framework in which the development of the economy and society takes place: "the carrying capacity of the ecosystem must therefore be accepted as the final, insurmountable limit for all human activities" (UBA 2002b: 2). The German Advisory Council on the Environment (SRU) in its 2002 Report also proposes that the ecological approach be given primacy, in particular, in the integration of environmental concerns into other policy sectors: "*This thought* [*of sustainability*] *has a clear ecological focus and thus accounts for the fact that environmental protection has, in comparison to the achievement of economic and social goals, the farthest still to go"* (SRU 2002: 68).

Multidimensional models, on the other hand, emphasize the equal importance of, typically, two to eight dimensions; however, the most common is the model with the three dimensions of ecology, society, and the economy. This model was introduced to the German debate on sustainability by the Enquete Commission of the German Federal Parliament on the Protection of Humanity and the Environment. Sustainability policy should be understood as a social policy in which the three dimensions of ecology, society, and the economy are of equal importance (Deutscher Bundestag 1998): "The main goal of sustainability is the maintenance and improvement of ecological, economic and social capabilities. These are mutually interdependent and cannot be optimized separately without endangering development processes as a whole" (Deutscher Bundestag 1998: 33).

As a result, on the one hand, "economic development and social well-being are only possible to the extent that nature as the basis of life is not endangered" (ibid.). On the other hand, ecological objectives are hard to reach if socioeconomic problems predominate in society or for the individual: "An ecologically dominant sustainability policy will always lose out in social decision-making processes when other problems prove to be more immediate, more tangible or more virulent and so more urgent and attractive for political action. Even if they can be successful they will be ineffective, since in the end only a policy integrating the three dimensions will be able to overcome the conceptual weakness of a discussion of the environment separated from economic and social issues" (Deutscher Bundestag 1998: 31 f.).

Two levels of argumentation are advanced in favor of the three-dimensional approach. First of all, together with natural resources, economic, social, and cultural values are seen as resources that, in their totality, provide the basis for satisfying human needs. Secondly, society can be endangered by ecological as well as economic or social risks. The carrying capacity of natural as well as social systems thus limits the scope for action of sustainable development. The environment, society, and the economy should be understood as independent but interrelated subsystems "whose functionality and resistance to breakdown should be preserved in the interests of future generations" (Kopfmüller et al. 2001: 49).

| Economic dimension | Ecological dimension |
|---|---|
| caring economy; recycling economy; material flow management; environmental management system; environmentally friendly, innovative technologies; eco-design (operating life, disposability, aesthetics); prices reflecting ecological and social costs; polluter-pays principle; regional and local marketing networks; fair trade | efficient use of resources; nature's rhythms (regeneration, "propertime"); biodiversity; ecological lifecycle systems; regenerative energy; precautionary principle; avoiding ecosystem degradation (reducing pollutants, emissions, waste) |
| **Social dimension** | **Cultural dimension** |
| promoting human health; equal rights to the use of natural resources and to development; intrasocial justice; accounting for the interests of future generations; democratization; participation of all population groups in all areas of life, networks, livelihood through work | Ethical verification; sustainable lifestyle; holistic perception of nature; aesthetic perception of sustainable development; local cultural diversity of paths to sustainable development; traditional knowledge; experience of time; material culture; consumer awareness; local community; international exchange; global responsibility; cosmopolitan culture |

**Fig. 2.4** The four-dimensional model of sustainability (Following Stoltenberg 2010)

The goal of sustainable development is in this sense the avoidance of irreversible damage in all three dimensions.

The controversies in this discussion are found on two levels. On one hand, there are the arguments between advocates of the unidimensional and the multidimensional models, as discussed above. There is, however, a further controversy among those who endorse the unidimensional model but have different ideas about which dimension should be given priority. At an international level, developing and undeveloped countries have so far clearly given priority to social and economic development perspectives (including the issue of the global distribution of resources), which leads to their demands that the more-developed countries take the first step and shoulder the main burden. In contrast, countries in the northern hemisphere put ecological issues in the foreground (not least because they can afford to) and demand that the countries of the southern hemisphere take the initiative in solving these problems, where they believe progress can often be made at lower costs (Fig. 2.4).

In addition to the dimensions specified in the *Brundtland Report* of nature, society, and the economy, the additional dimensions most often discussed are the cultural, institutional, and, in developing and undeveloped countries, the political. Culture is defined (e.g., Meyer's Universal Dictionary 1983) as what human beings have created in a given period of time and in a defined region in their interaction with the environment. This includes, for example, language, religion, ethics, law, technology, science, art, and music, but also the processes of creating culture and cultural models, including individual and social lifestyles and types of behavior. Culture can therefore be understood as consisting of cultural values, world views, norms, and traditions which shape human beings' use of nature, their social interaction, and their economic means of production and consumption. This is a pragmatic understanding of culture which "enquires about the systems of knowledge that structure individual and social practice" (Holz and Stoltenberg 2011). Culture is understood less as a theoretical concept and more as an operative one. "A process of reflecting on sustainable, ethical values is primarily a cultural task. Sustainable development requires a change to a sustainable lifestyle" (Teller and Ax 2003: 89f). Calls for a culture of sustainability can be located at this level (Stoltenberg and

Michelsen 1999; Reisch 2002; Stoltenberg 2010). In this understanding, culture plays an important role in attaining a sustainable society and should be viewed as a separate dimension "since due to the concept of 'sustainability', our lifestyles, value systems, our education and economic systems or our way of developing technology as cultural background" of the other dimensions must be "critically evaluated and, if necessary, changed" (Stoltenberg 2000: 12).

- ***Task:*** *Find aspects of a problem of global unsustainable development, determine which sustainability dimension they are part of, and suggest appropriate proposals for solutions.*
- ***Question:*** *How do you evaluate the self-evident way that the ecological dimension is considered to have priority over the other dimensions?*

## *2.3 Weak and Strong Sustainability*

A distinction is made in the scientific literature between *weak* and *strong sustainability* (see von Hauff 2014; Ott 2009; Meyer-Abich 2001; Scherhorn and Wilts 2001; SRU 2002; Ott and Döring 2008; Egan-Krieger et al. 2009). The chief distinction is based on what should be preserved over the long term and, closely related to this, whether existing types of capital are substitutable (see Table 2.1). Capital here is generally defined as a stock "whose yield is available and of use to *homo economicus*" (SRU 2002: 65).

A problematic aspect in the history of economics was the reduction of natural factors of production to "land" and "resources." Land and nonrenewable resources are now seen to be only components of "natural capital," the complex of which is increasingly recognized in more recent economic theory (Held and Nutzinger 2001). However, it is difficult to be more precise about what natural capital is, as its components are interrelated. Lists of different types of natural capital accordingly suffer from overlapping items. In fact, it is not possible to create a list of differentiated, unambiguous, distinct elements of natural capital. Instead, natural capital is characterized by all-encompassing terms such as "natural resource base," "natural basis of life," "ecosystem capacity," "stability of ecological systems," "biodiversity," etc. (SRU 2002: 64).

There are a number of different types of capital (cf. Ott 2009; SRU 2002):

- Natural capital (natural resources, such as water and air)
- Manufactured capital (machines, factories, equipment, infrastructure)
- Cultivated natural capital (forests, plantations, domesticated animals)
- Social capital (moral concepts, institutions)
- Human capital (person-specific knowledge, such as education and skills)
- Knowledge capital (nonperson specific, stored, and retrievable knowledge)

The concept of weak sustainability "is based on the understanding that the substitutability of different kinds of capital is, in principle, to a large extent unlimited" (Ott 2009). This implies that natural capital can be replaced or substituted by other

**Table 2.1** Concepts of sustainability

| | Very weak sustainability | Weak sustainability | Strong sustainability | Very strong sustainability |
|---|---|---|---|---|
| What should be preserved? | Total capital (human-made and natural) | Essential natural capital | Nonrenewable natural capital | Nature has its own value |
| Why? | Human welfare | Human welfare | Human welfare and obligations to nature | Obligations to nature |
| Management strategy? | Maximization of economic growth | Sustainable economic growth | Zero growth; sustainable growth if environment is not endangered | Zero growth, sometimes reduction of economic values |
| Substitutability between human-made and natural capital? | Unlimited in principle | Not always possible between man-made and natural capital | Not always possible between man-made and nonrenewable natural capital | Rejects substitutability debate |
| Ethics? | Instrumental value of nature | Instrumental value of nature | Priority: value of the ecosystem | Intrinsic value of nature |

Eblinghaus and Stickler 1998; Dobson 2002; Rieckmann 2004; Steurer 2001

types of capital (natural capital), for example, forests by parks or natural lakes by swimming pools. The assumption is that it does not matter what the physical composition of the capital stock is, that is, passed on to the next generation. What is important is that the total capital and total utilization, in effect, the total level of welfare remains constant. Weak sustainability is thus related to neoclassical utility theory, in which it is irrelevant how the utility is created.

The paradigm of weak sustainability emerged as a reaction to the first report by the Club of Rome "The Limits to Growth" (Meadows 1972). In 1974, at the "Symposium on the Economics of Exhaustible Resources", the topic of economic growth with finite resources was discussed. Joseph Stiglitz proposed three factors that were not addressed in the Club of Rome study, which called into question the findings of the report "The Limits to Growth." These three factors recognize the central importance of technological progress: "There are at least three economic forces offsetting the limitations imposed by natural resources: technical change, the substitution of man-made factors of production (capital) for natural resources, and returns to scale" (Stiglitz 1974: 123). These three factors, according to the view of the economists who attended the symposium, make it possible for all people living with a constant per capita consumption in the future to have at least the same level as the people living today. Commenting on the 1987 Brundtland Report, Robert Solow defined sustainability as follows: "I could say this about that: it is an obligation to conduct ourselves so that we leave to the future the option or the capacity to be as well off as we are" (Solow 1993: 181). In the final analysis this means that there is no imperative to preserve certain elements of nature.

The capital stock left to subsequent generations is composed of cumulative real capital and natural capital (i.e., the combined state of the environment). Both kinds of capital are generally interchangeable over time, although the substitution of natural by real capital is the dominant form. It is crucial here that consumer goods can be made available in the same volume at all times and the level of consumption is preserved for the individual, that is, our children and their children (v. Hauff 2014: 47). In this context, it is all about how to evaluate the future costs of exploiting nature today or the ongoing reduction of natural capital. The questions arise as to intertemporal justice, which examines how, for example, pollution and the use of finite resources can be projected to future periods.

This is the position taken by the neoclassical theorists with regard to sustainable growth, which led to the paradigm of weak sustainability and remains, to this day, the dominant neoclassical position on sustainability.

Steurer (2001) sees the "quantitative growth paradigm" in weak sustainability. Finally, it may be said of the weak sustainability paradigm that the proponents of solutions to problems – similar to many growth theorists – focus mainly on technological progress or technical solutions. A key assumption according to the Hartwick Rule is that technical advances lead to the substitution of natural resources. This is the context of the term technical optimism. However, whether these solutions always arrive at the required time is an issue that is often neglected (Table 2.2).

Advocates of strong sustainability, on the contrary, believe that human-made capital and natural capital can only be complementary and are thus only interchangeable to a very limited extent (cf. Daly 1999a; Ott 2009; Ott and Döring 2008).

**Faces of Sustainability**
Herman E. Daly

- Born in 1938.
- Professor emeritus at the University of Maryland.
- 1988–1994 Senior Economist in the Environment Department of the World Bank.
- Daly was one of the first to warn of the ecological limits to economic growth. He was the originator of the management rules for sustainable development (Fig. 2.5).

**Fig. 2.5** Herman E. Daly (The European 2011)

**Table 2.2** The level model of sustainability

| Level | Theoretical status (cf. Stegmüller 1980; Ott and Döring 2008: 345 ff.) |
|---|---|
| 1. Idea (theory of inter- and intragenerational justice) | Core theory |
| 2. Conception (strong or weak sustainability, mediating conceptions) | |
| 3. Constant natural capital rule, management rules | |
| 4. Guidelines (resilience, sufficiency, efficiency) | Bridge principle |
| 5. Action dimension (nature conservation, agriculture and forestry, fishery, climate change, etc.) | Application cases |
| 6. Target systems, special concepts and models, and indicators | |
| 7. Implementation, institutionalization, instrumentation | |

Following Döring 2009

Some scholars would require that the volume of the individual elements of natural capital (such as climate factors, landscapes, biodiversity, etc.) should be kept as constant as possible. The assumption is that human beings are dependent on the ecological functions of nature, and so, these are not substitutable (cf. SRU 2002). However, a certain degree of substitution is possible within specific types of capital. For example, the loss of a forested area can be replaced by reforesting in another area, or the use of oil can be compensated by investments in renewable energies. The "limits to growth" paradigm can be seen in the concept of strong sustainability (Steurer 2001). The environmental space concept is an attempt to operationalize strong sustainability (cf. Table 2.1) by defining "the resource base and sink functions that people use in their natural environment without irreversibly damaging it" (SRU 2002: 65).

Strong sustainability is the opposite of the neoclassical sustainability concept and was developed by the proponents of ecological economics. They soundly reject the substitution rule. One of the most important advocates of ecological economics is Herman E. Daly. In many publications over the past decades, he advanced the idea of a "steady-state economy". This aims at a stationary state. Thoughts on the stationary state have been introduced by other economists too. For example, Adam Smith wrote about a stationary state back in the 1700s (Smith 1776: 99). However, he concluded that this state leads to poverty, and from his reasoning, he deduced that only growth can guarantee prosperity. Other economists in contrast to Smith assumed the existence of a stationary state and thought of it as desirable. These include economists such as Malthus, Marx, Mill, Schumpeter, and Keynes.

In more recent times, the steady-state approach has been driven primarily by Daly, who was inspired by John Stuart Mill. He justifies the limits of quantitative growth with two laws of thermodynamics. In doing so, he borrowed from the writings of Georgescu-Roegen, who among others, called for a greater involvement of scientific principles in economics (Georgescu-Roegen 1971). In contrast to the neoclassical economists, he came to the conclusion that quantitative growth not only reaches a limit at a certain point but even becomes uneconomical. His considerations

are based on the realization that on a microeconomic level, a state can occur that can be labeled as uneconomical.

A business or a household aims for a level of activities that is optimal. If this level is exceeded by other activities, it may be that the additional costs (marginal costs) are greater than the marginal utility. Daly describes this case as "uneconomic". Considering this from a macroeconomic perspective, the microeconomic variables mentioned are to be aggregated to the macroeconomic level. Consequently, ever more natural resources (green flow) are used to produce tangible goods (brown flow). "As we expand the brown flow, we reduce the green flow" (Daly 1999b: 5). This case, according to Daly, represents "uneconomic growth".

To specify this point in more detail, it is necessary to examine the costs and benefits of increasing growth separately from one another. The economic limit of growth is reached when the marginal costs of growth are equal to the marginal utility, that is, when an economy has reached its optimum size. This assumes capital stock is kept at a constant level. This can be achieved if the employment figures remain constant, which, in turn, requires that the population also remain constant. This implies that the birthrate and immigration is balanced with the death rate and emigration.

The steady-state economy can be thought of as an economic system that is designed to ensure a constant supply of tangible goods that is sufficient to provide the "good life" for the population. However, the specifics of this design have not been adequately demonstrated. It is also not clear what happens if such a state is not achieved for all people. The neoclassical economists, in particular, are quick to critique other points. Primarily, this concerns the question of the macroeconomic effects, which have not been sufficiently analyzed by Daly. In the context of an economy with no growth: effects on the labor markets, wealth distribution, poverty, the financial sector, commerce, and the tax system which, in turn, affects the state budgets.

Conclusion: The neoclassical position stands in irreconcilable opposition to the ideas of environmental economics even up to this day.

- ***Task:*** *Choose an example of non-sustainable development, go through the possibilities and limits of applying the concept of strong sustainability, and come up with ideas for possible solutions.*
- ***Question:*** *In which areas of international environmental policy can elements of the strong sustainability concept be found?*

## *2.4 The Integrative Concept of Sustainable Development*

From 1998 to 2002, a number of different members of the Helmholtz Association of German Research Centres (HGF) carried out a research project to define and implement the concept of sustainable development. They developed an integrative concept of sustainable development, defined by its constitutive elements, its goals, and

its rules (cf. Kopfmüller et al. 2001; Coenen and Grunwald 2003), and applied it to the situation in Germany. It has to be understood that apart from this German discourse, there is extensive relevant work from other communities and countries (among others, the triple bottom line (Elkington 1997), sustainability assessment (Gibson 2006; Hardi and Zdan 1997), or the development of indicators for sustainable developments (Bossel 1999)).

Constitutive elements of the integrative HGF concept are those that, based on a review of the research literature, were found to be essential in shaping the concept of sustainable development. A central constitutive element is intra- and intergenerational justice. The Brundtland Commission famously defined sustainable development as a state "that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED 1987). Intragenerational justice refers then to the needs of the present generation and has as its goal that all human beings on Earth are able to enjoy a decent life – one that at least satisfies its fundamental needs. Intergenerational justice, on the contrary, strives to ensure that future generations will also be able to satisfy their needs. This will only be possible if the present generation passes on to the next generation the conditions that will allow them to choose their own lifestyle. As this critically involves the fair distribution of natural resources, economic goods and basic social goods, distributive justice plays an important role. In the literature, there are a number of different perspectives on the relationship between intra- and intergenerational justice. The HGF approach is based on the definition of sustainable development discussed above and sees both principles as equally important.

Another constitutive element is sustainable development's global orientation. The global validity of sustainability is based on three levels. The first is an ethical one. In a global ethic, all human beings have a moral right to satisfy their basic needs, to fulfil their desire for a better life, to preserve the ecosystem functions essential to life, and to have equal access to global resources. Secondly, there is a problem-oriented justification. Many of the known sustainability problems, such as the anthropogenic greenhouse effect, the destruction of the ozone level, the loss of biodiversity, population growth, and unemployment, are global problems and differ only in their regional characteristics. And thirdly, there is a strategic justification for sustainable development. The problems of non-sustainable development are global and the strategies for their solutions must be identified, developed, and implemented on a global level.

A further constitutive element is the anthropocentric approach. The concept of sustainable development is above all a concept that focuses on human needs. Human beings are conceded rights to use nature, but these rights are related to duties. The thoughtful and careful use of natural resources is an example of such a duty, and it is in the best interests of human beings. It is crucial to preserve the functions nature fulfils for humankind over the long term. The use of nature does not only consist of exploiting raw materials or disposing of waste materials but also of cultural uses, such as the "aesthetic use" of landscapes. This is referred to as an "enlightened anthropocentric approach". Missing from this discourse is the concept of nature or nonhuman creatures having their own rights (e.g., animal rights).

Part of the HGF research project was to first develop "general goals of sustainable development" (cf. Coenen & Grunwald) so as to then specify the constitutive elements. These goals are the necessary conditions for a sustainable development that would fulfil the constitutive elements described above.

*General* goals include:

- *Safeguarding human life:* It is of utmost importance that the present generation be prevented from destroying the conditions for the life of future generations. That means first of all that the functions of nature necessary for human life must be maintained. A further consequence is that all human beings in the world are ensured the possibility to lead a decent life.
- *Maintaining society's productive potential*: Coming generations must have similar opportunities to meet their needs, which may differ from those of the present generation. This gives us another general goal of sustainable development, namely, that the productive capacity of (global) society be preserved in a very general sense over time. In addition to natural (renewable and nonrenewable) resources, society's productive potential includes human knowledge.
- *Preserving the scope for development:* The requirement not to endanger the possibility for future generations to satisfy their needs must include both material and immaterial needs. Today's generation thus should not restrict the scope for coming generations to take different paths of development. This also means that the possibilities for individuals to develop themselves must be preserved, both today and in the future.

In order to operationalize these goals, so-called sustainability rules have been developed. A distinction is made between:

- *Substantive rules of sustainability*: These rules are considered the minimum conditions for reaching the goals of sustainability. They are also referred to as the "what rules" of sustainability.
- *Instrumental rules of sustainability*: These rules describe the institutional, economic, and political conditions for sustainable development. They are about how to fulfil the minimum conditions for sustainable development and so, are also referred to as the "how rules" (cf. Kopfmüller et al. 2001).

The substantive rules of sustainability can be ordered according to the general goals of sustainable development described above:

1. *Preserving human life:* Dangers and unacceptable risks for human health from anthropogenic environmental degradation are to be avoided. Basic human needs (housing, food, clothing, health) must be satisfied, and major risks to life (illness, invalidity) must be minimized. All members of society must be guaranteed the

opportunity to secure a livelihood (including raising children and being cared for in old age) by work freely taken up. This rule goes beyond satisfying basic human needs to ensuring an autonomous life. The use of the natural environment is to be justly distributed by means of the fair participation of all. Extreme differences in income or wealth are to be reduced. Poverty that makes it impossible to take an active role in social life must also be eliminated.

2. *Maintaining society's productive potential*: The rate at which renewable resources are used must not exceed their regenerative capacity nor endanger the productivity or functionality of the ecosystem. The availability of resources known to be nonrenewable is to be preserved over time. This involves reducing their consumption (sufficiency), increasing their productivity (efficiency), or replacing them with renewable resources (consistency). Releasing materials into the environment must not exceed the capacity of environmental media and ecosystems to absorb them. Technological risks with potentially catastrophic effects for human beings and the environment are to be avoided. Manufactured, human, and knowledge capitals are to be developed so that the economic productivity can be maintained or enhanced.
3. *Preserving the scope for development:* All members of society must have the same opportunities regarding access to education, information, professions and occupations, public office, and social, political, and economic positions. All members of society must be able to participate in socially relevant decision-making processes. This includes, for example, maintaining or enhancing democratic types of decision-making or conflict regulation. The cultural heritage of humanity and cultural diversity are to be preserved. Cultural and natural landscapes or landscapes with special characteristics and beauty are to be preserved. In order to guarantee the social integrity of society, a sense of law and justice, tolerance, and solidarity and an orientation to the common good, as well as the potential to deal with conflicts nonviolently, are to be strengthened.

The instrumental rules of sustainability are the so-called how rules. These are about economic and institutional aspects of sustainable development (cf. Coenen and Grunwald 2003).

1. *Internalization of social and ecological costs*: Prices must reflect the ecological (e.g., resource scarcity, degraded ecosystems) and social costs (e.g., child labor, health risks, unemployment) that are created in economic processes.
2. *Appropriate discount rate*: Discounting must not discriminate against present or future generations.
3. *Responsible debt-making*: New debts should be limited to investments that serve to satisfy future needs.
4. *Fair global economic conditions*: Fair participation in economic processes, especially access to the market for developing and undeveloped countries.
5. *Promoting international cooperation*: Countries, NGOs, companies.
6. *Increasing social awareness of relevant problems*: Increasing perception and awareness of problems, consciousness of problems, and consciousness of the

possibilities for all social actors to take action through institutional innovation.

7. *Development of institutional conditions*: For the analysis and evaluation of the effects of social actions.
8. *Increasing the capacity for governance*: New types of social governance are necessary for sustainable development.
9. *Promoting the self-organization potential of social actors*: New types of cooperative and participative decision-making need to be developed that will contribute to the strengthening of civil society while still functioning alongside established institutions.
10. *Strengthen the balance of power*: Opinion-building processes, negotiation, and decision-making processes should be constructed so that all actors have the possibility to articulate their interests and demands. This process should be transparent. All those involved should have the same opportunities to gain acceptance for their position.

These rules provide a normative base for sustainable development and serve as a means to achieve its goals. In order for these rules to be practically relevant, they need to be guided by indicators, which are a further step to operationalizing the integrative concept of sustainable development.

- ***Task:*** *Compare the integrative concept of sustainable development with the concept of strong sustainability and find the similarities and differences of both approaches.*
- ***Question:*** *Which strengths and weaknesses do you see in the integrative concept of sustainable development?*

The normative concept of sustainable development has quite a long history. Since the Brundtland Report and the Rio Conference "Environment and Development" in 1992, a variety of different implementation strategies are discussed. Thus, a distinction is made between strong and weak sustainability, and different dimensions of sustainability – ecological, economic, social, and cultural – are referred to. Sustainable development has to be understood as a process that ought to include as many people as possible and is confined within well-defined corridors (upper and lower limits) and is limited. Scientific research on non-sustainable development and possible solutions is usually inter- and transdisciplinary, directly involving relevant social actors. Sustainable development is understood as the search, thinking, and design process that focuses on the idea of a just and sustainable society.

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