

Monitoring Sustainable Development

MONET

21

Nachhaltige Entwicklung und regionale Disparitäten
Développement durable et disparités régionales
Sviluppo sostenibile e disparità regionali

Final Report
Methods and Results

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Monitoring Sustainable Development

MONET

Final Report – Methods and Results

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Foreword

By ratifying «Agenda 21» and the Rio Declaration in 1992, Switzerland committed itself to sustainable development; this aim was included in the revised Federal Constitution in 1999. Subsequently, various sectors pointed out the need for a measuring instrument which would help monitor Switzerland's progress in achieving sustainable development, as set out in the new constitution.

In spring 2000 the Swiss Federal Statistical Office, the Swiss Agency for the Environment, Forests and Landscape and the Swiss Federal Office for Spatial Development launched the MONET project with the aim of setting up a system of indicators which could be used to measure sustainable development in Switzerland. The basis for the project was the results of a pilot study carried out in 1999, as well as existing indicator systems and the experience gained in other countries. During the three-year duration of the project, a systematic set of indicators was created which is now available to the general public and which should provide an up-to-date overview of the social, economic and ecological aspects of sustainable development in Switzerland.

This report describes the methods used in the MONET project and the results obtained. The procedure of drawing up the indicator system and the experience gained during the project are described in detail. This should serve on the one hand to ensure reproducibility and transparency, and on the other to make our findings available for similar projects. A second report* includes

a summary of the individual indicators, initial conclusions concerning the status of sustainable development in Switzerland from the point of view of a number of journalists and a brief assessment of development by members of the project's advisory groups. The individual indicators with detailed commentaries and background information can be found in the MONET database in French or German at <http://www.monet.admin.ch>.

The MONET project was carried out in close collaboration by three federal offices. Representatives from these three offices and a large number of specialists from the federal administration, science, private industry and NGOs were included in the working and advisory groups and made an important contribution towards the end-result through their specialised knowledge. We should like to take this opportunity to thank them all for their collaboration.

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* Swiss Federal Statistical Office / Swiss Agency for the Environment, Forests and Landscape / Swiss Federal Office for Spatial Development: Sustainable Development in Switzerland – Indicators and Comments, Neuchâtel 2004.

Summary

Agenda 21 and the Federal Council's Strategy for Sustainable Development both demand the regular production of sustainability indicators. The Swiss Federal Statistical Office (SFSO), the Swiss Agency for the Environment, Forests and Landscape (SAEFL) and the Swiss Federal Office for Spatial Development (ARE) accordingly launched the Monitoring Sustainable Development project (MONET) with the aim of setting up a system of indicators for observing sustainable development.

In view of the many different interpretations of the term «sustainable development», and in line with recognised principles (Bellagio principles) it was evident that the first step would be to define a clear frame of reference. On the basis of the definition of sustainable development used in the so-called Brundtland Report, 43 postulates were drawn up for the three target areas social solidarity, economic efficiency and ecological responsibility.

The second step was to select indicators which could be used to observe whether Switzerland is developing along the lines of these postulates. In order to visualise as fully as possible the areas which are relevant for sustainable development in Switzerland and to allow a process-orientated approach, this was done with the help of a grid. This grid takes into account on the one hand 26 themes and on the other five different types of indicators. The latter include the degree of satisfaction of needs (level), the status and potential with regard to

resources (capital), the use and misuse of capital (input/output), efficiency and disparities (structural criteria) and measures taken (response).

The individual indicators were selected in collaboration with 13 working groups, involving over 80 specialists. A series of prerequisites were taken into consideration in this selection process. In particular each indicator had to be clearly linked to at least one of the postulates, different types of indicators were to be used, indicators in common international use were to be taken into account as far as possible, the corresponding data were to be available and the number of indicators per theme should be limited. Finally, using an iterative procedure, a set of indicators was established made up of 135 feasible indicators and 28 indicators which are not feasible at present owing to lack of data or measurement concepts. For each of these indicators the data were subsequently collected and accompanying texts and background information was drawn up according to a standard format. They were then published on an internet platform according to models for SFSO indicators.

With the above mentioned procedures the first phase of the MONET project was completed. The subsequent tasks will be in particular to regularly update the data and the accompanying texts, to publish key indicators or synoptic tables, to evaluate the set of indicators on the basis of feedback from users and to revise the set of indicators.

1 Introduction

1.1 Background

At the United Nations conference on the environment and development (UNCED) which was held in Rio de Janeiro in 1992, Switzerland undertook to define and implement a national policy on sustainable development. In this connection, Agenda 21 constitutes the most important reference document. In its 40 chapters it proposes measures concerning social and economic development, management of natural resources and strengthening solidarity, as well as setting out an action plan. It invites various countries to draw up action plans themselves to promote sustainable development. The Rio + 10 Summit, which took place in Johannesburg in September 2002, underlined the strategy set out in Agenda 21 with the adoption of a declaration and an action plan.

The importance of monitoring development had already been recognised at the 1992 conference. The final chapter of Agenda 21 accordingly proposes setting up a system of pertinent and internationally coordinated indicators. The United Nations Commission on Sustainable Development (UN-CSD) has therefore drawn up a list of indicators in order to facilitate a coordinated evaluation of sustainable development at an international and national level. Numerous countries have also started to devise systems of indicators adapted to their own particular situation and their local needs. Switzerland has joined this movement by setting up a national system of indicators grouped according to theme and by taking various initiatives at a cantonal and local level.

1.2 Why a monitoring system is set up in Switzerland

In accordance with the new Swiss Federal Constitution (Preamble and Art. 73)¹ the federal authorities will aim to ensure sustainable development of the social, economic and ecological aspects of our country. The Rio Interdepartmental Committee (IDC Rio)² is required to regularly produce suitable indicators as part of legislative planning for 1999-2003³ and the Federal Council's Strategy for Sustainable Development 2002.⁴ This requirement was also included in the federal statistical multi-year programme (Project 2.51). In a motion submitted on 29 May 2000,⁵ the National Council commit-

tee responsible for dealing with the Federal Council's report on the legislature programme for 1999-2003⁶ demanded that a system of sustainability indicators be set up and that disparities at a geographical and social level be reduced by the end of 2001. Together with the usual financial indicators, this system should become a general management and steering tool. In its reply, the Federal Council underlined the usefulness and the need for such a management system, while pointing out that its creation would meet with major methodological problems which would be impossible to solve within the time allotted. On the suggestion of the Federal Council, the motion was referred by the National Council on 20 June 2000 in the form of a postulate.

Between 1997 and 1999 the Swiss Federal Statistical Office (SFSO) and the Swiss Agency for the Environment, Forests and Landscape (SAEFL) carried out a joint pilot study focusing on indicators for sustainable development and based primarily on the indicators used by the United Nations Commission on Sustainable Development (UN-CSD). The results of this study, which was to lay the foundations for a system of indicators and gave rise to a broad debate among the principal players in the field of sustainable development, were published in August 1999.⁷

According to the conclusions of the pilot study, the system of indicators used by the UN-CSD are only partially suited to monitoring sustainable development in Switzerland. The system has some major shortcomings with regard to health, mobility, the activities of private industry and tourism. Furthermore, the model used for the typology of the indicators (pressure – state – response), which was initially designed to meet the requirements of environmental statistics, is not suitable for evaluating social and economic aspects nor for devising a clear and univocal model of the interactions between the different areas of sustainable development. This study also showed that the sectors concerned and the specialised institutions tended to demand too large a number of indicators for their particular areas or to propose, for political reasons, indicators which had only an indirect link with sustainable development.

¹ Constitution of the Swiss Confederation dated 18 April 1999.

² IDC Rio 1997.

³ Swiss Federal Chancellery 2000.

⁴ Swiss Federal Council 2002.

⁵ Motion no. 00.3225.

⁶ Committee of the National Council no. 00.016.

⁷ SFSO and SAEFL 1999.

In autumn 1999 the pilot study was followed by interviews with representatives of the federal and cantonal administration, various economic, environmental and social organisations, scientific and research bodies and the former Council for Sustainable Development. It was found that these organisations had very different, often contradictory, expectations.⁸ The information which was obtained is given below.

- A system of indicators of sustainable development should be neutral, objective and transparent. It should not be affected by political considerations.
- The new system of indicators should have links and be in agreement with international, sectoral and local systems of indicators.
- The system of indicators should include all the dimensions of sustainable development, even those which are not the subject of particular political measures.
- The sections of Agenda 21 dealing with the economy and society were insufficiently addressed by the pilot study. Health, mobility, gender equality and cultural diversity are not covered at all, or only inadequately, by pertinent indicators.
- The indicators should not be chosen solely as a function of the availability of data. Old «problems» are often well documented while new ones or those envisaged are poorly documented, if at all. The system should therefore also include indicators which cannot be applied immediately, although they correspond to a priority demand.
- The creation and dissemination of a system of indicators should be accompanied by a public relations policy which guarantees that users' needs will be taken into account and that they will accept and understand the system.
- Since sustainable development is a process of constant evolution the system of indicators should be set up in stages in an iterative manner.
- The framework for presenting the indicators in the report on the pilot study has been largely approved and should be used again for this type of publication.
- Expectations regarding the objectives and functions of such a system of indicators vary considerably from one interest group to another.

- As far as the follow-up to this work is concerned, some people recommend a simple improvement on the pilot study while others would like to see an in-depth study based on the preliminary studies.
- Certain groups are calling for a unique, small-scale system while others want a global system capable of generating specific sub-groupings.

The recommendations and the opinions voiced during the interviews as well as the information obtained from the pilot study have been included in proposals for a continuation of the work on indicators of sustainable development. These proposals,⁹ presented in the form of a project outline, provided the departure point for a new mandate for the directors of the SFSO and the SAEFL.

In June 2000, postulate 00.3225 entitled «Drawing up an indicator system as a management tool» was referred in connection with the parliamentary debate on the report concerning the legislative planning for 1999-2003. On this basis the Federal Chancellery began to draw up a system of management indicators. These are for use in analysing the situation and monitoring the success of the federal policy. They therefore do not allow for trends to be observed outside the political context, neither do they have a direct link with sustainable development.¹⁰

1.3 The mandate

In May 2000 the directors of the Swiss Federal Statistical Office and the Swiss Agency for the Environment, Forests and Landscape drew up a mandate for the MONET project (Monitoring Sustainable Development). The aim of this project is to set up a system of indicators to monitor sustainable development in Switzerland. In autumn 2000 the newly founded Swiss Federal Office for Spatial Development (ARE) joined the two other federal offices involved in the project.

A project team was mandated to implement the project. The team was made up of representatives of all three federal offices and involves approximately 3.8 full-time jobs on average. It was advised on technical matters by a technical advisory group and was monitored by the project supervisors, who in turn were monitored by a strategic advisory group made up of representatives from political and scientific circles and the administration. A diagram of the organisation of the project, including the names of the members of each element, can be found in Appendix A.

⁸ SFSO and SAEFL: Hearings über Nachhaltigkeitsindikatoren, Zusammenfassung. [Forum on sustainability indicators, summary], 1999, unpublished.

⁹ SFSO and SAEFL: Projet MONET – Description du projet et programme de travail. [MONET project – Monitoring Sustainable Development: Description of the project and work schedule], 2000, unpublished.

¹⁰ The implementation of the two projects was coordinated. In particular, in cases where the same indicators were used, care was taken to ensure that the same definitions and data were also used.

2 Aims of the project

The principals described the objectives of the project in the following terms:

- The prime objective is to set up an operational system of indicators of sustainable development. This system should facilitate the measurement, documentation and description of the state of progress in Switzerland, as well as its position in relation to other countries, from the point of view of the social, economic and ecological aspects of sustainable development.
- The system should be designed to provide information for the general public, political players and the federal administration. By helping to publicise the objectives of sustainable development, the system will constitute an instrument for creating awareness among the population.
- The system will be transparent, open and evolutionary. It will help to set up links with sector, regional or local systems of indicators of sustainable development.

In order to achieve the above-mentioned objectives and to meet the needs of users identified in the pilot study and the interviews, the project should fulfil the following requirements:

- it should be constructed around a systematic framework (grid) in order to meet the criteria of independence, neutrality and transparency inherent in public statistics and to allow for future development;
- existing indicators (in particular those used by the UN-CSD) should be included in the grid according to a transparent and duly documented selection procedure;
- it should be possible to identify sub-groups adapted to users' needs;
- it should present the indicators in an attractive way which is suited to users' needs.

The aim of this project is not to assess whether Switzerland is sustainable or not, however. It should indicate whether Switzerland is on the right path for achieving sustainable development or on a different path. The conclusions which will be drawn from the results of the project will, by their very nature, be relative.

3 Monitoring sustainable development

3.1 The challenge

The concept of sustainable development was first described in a report entitled «Our Common Future»¹¹

¹¹ Brundtland, 1987.

published by the Brundtland commission. The definition provided here left room for various interpretations. At the Rio Conference in 1992 and over the years which followed, the content of this concept was defined more precisely, and it has been confirmed since through a wide range of agreements, national programmes, action plans and scientific studies. Today there are very few political areas which have not been the subject of an examination based on sustainable development. It should be noted that sustainable development is a continuing process during which the definitions and activities it generates are in constant evolution.

The evolutionary process which consists of reflecting on how we can ensure that our descendants have a decent future and assuming responsibility for our actions is in itself positive, although there is also the risk that theory will be put into practice in a number of different ways, creating a highly complex situation. It is for this reason that there are many different interpretations of what constitutes sustainable development, a term which is often misused to serve particular interests.

The needs of future generations have given rise to such an abundance of interpretations, definitions, contradictory interests, expectations and claims that devising a monitoring tool which is universally accepted is an almost impossible task. There is therefore no clear or unique solution. It would not be surprising to find a mass of proposals for setting up indicator systems, or that each country finds its own solution by using its own methods.

We describe below a selection of the methods used by other countries and some general comments on the conditions which need to be respected if such a project is to be successful; we shall subsequently describe the method used for the MONET system.

3.2 The situation in other countries

There is no doubt that it makes little sense to reinvent the wheel. For this reason, we shall now examine how other countries have gone about setting up a national system of indicators of sustainable development. In particular, we shall look at whether certain approaches have proved to be especially suitable and have been adopted by other countries. On the other hand, we have not taken into consideration proposals concerning subsidiary geographical or administrative units (German «Länder», French «départements» or boroughs) nor those made by research institutes.

In the meantime, most OECD countries have drawn up a strategy for sustainable development or are in the

process of doing so. In many cases they also intend to monitor the implementation of this strategy using indicators or already have a corresponding tool at their disposal.¹² In most of the countries, a combination of various offices is leading the way (e.g. Australia, Canada, Germany, Luxembourg, Mexico, Norway, Portugal, Sweden, USA), while in others it is the government or a sustainability committee set up by it (e.g. Belgium, Denmark, Netherlands, Slovakia), or the environment department (e.g. Czech Republic, New Zealand, Spain, Turkey), in some cases with the collaboration of other departments (e.g. France, Finland, Ireland, Korea, UK).

Most countries as well as international institutions have adopted an indicator system based on the factors community, economy and environment or more detailed thematic categories. In addition, many formulate their set of indicators on the basis of various types. The models used include for example pressure/state/response (UN-CSD, EUROSTAT, Belgium, Denmark, Finland, Iceland, Korea, and Portugal), needs/activities/pressures/state/impact/response (Germany), capital for future generations/efficiency/equality/adaptability (Sweden), endowments and liabilities/procedures/current results (USA), here and now/here and later/elsewhere (Mexico) or pure capital stock models (Canada).

There are also considerable differences in the size of the sets of indicators used. This varies from a few dozen to as many as 307 (France). The vast majority of sets comprise between around 80 and 150. Most countries are happy with a sequential presentation of the results. (For the moment) a numerical aggregation is not used for calculating a single «sustainability index». There is also a degree of reticence regarding synoptic tables, although such proposals have been voiced by research institutes.¹³ In contrast, a few countries (e.g. UN-CSD, Denmark, Germany, and UK) select particularly relevant indicators which they term headline or key indicators.

A comparison of the different methods used reveals a heterogeneous picture. Apparently the international community has not been able to agree that certain procedures are more suitable than others. Each country has therefore taken the liberty of choosing a model which suits its specific needs. Surprisingly, the result is a large degree of similarity in the themes examined. There are, however, marked differences in the choice of individual indicators, despite the fact that many countries underline the importance of international comparability. And even when an indicator has an identical name in various countries, differing definitions and calculations may be used with the result that comparability is questionable.

3.3 The requirements of an indicator system

In order for the indicator system to be able to fulfil its purpose one series of requirements must suffice. As early as 1996 an international team of experts formulated basic rules for devising sustainability indicators which they called the Bellagio principles.¹⁴ They include: a clear idea of sustainable development and the aims involved, taking into account all important areas, choice of appropriate time-frames and areas of study, limited number of indicators in order to guarantee a high degree of significance, publication of methods and results, a participative process for drawing up the indicators, the possibility of developing the indicator system further, and the creation of institutional means for producing indicators.

As far as the MONET project is concerned, the following requirements are important.

- Adherence to the basic principles for official statistics. These include among others:
 - professionally independent production of representative results,
 - concentration on the aim of achieving as true as possible an image of the real situation when choosing methods and processing results,
 - transparent documentation concerning the methods used to collect data and obtain results,
 - avoidance of one's own surveys if the data can be collected by a third party,
 - immediate publication of the most important results in an easily comprehensible form,
 - allowing access to unpublished data through another suitable channel.
- Flexibility: since the interpretation of sustainable development may change and new phenomena may occur, we cannot claim that our present system of indicators will retain its validity indefinitely. The system that is created must be geared to adapting to new developments without the chosen approach being seriously brought into question. Neither should it be expected that an optimum solution can be found right away. It is more probable that an iterative process comprising various stages will be necessary.
- An interdisciplinary and holistic perspective: sustainable development involves all areas of life and in particular the relationship between them. Accordingly, the set of indicators should use available knowledge from various disciplines.

¹² Cf. OECD 2002.

¹³ Cf. European Statistical Laboratory 1999.

¹⁴ Cf. IISD 1996.

- Consideration of existing indicators: for reasons of comparability with other countries, as well as the fact that resources are limited, internationally defined indicators should be used whenever possible and suitable.
- The possibility of creating sub-groups of indicators: with the chosen indicators of sustainability it should be possible to take into account various needs and reach different target groups. For example, certain indicators are suitable for international comparisons while others are more use in creating awareness among the population.
- The possibility of applying the methods used to subsidiary indicator systems: individual cantonal and local authorities as well as specialised sectors (agriculture, transport, health care, etc.) are planning to draw up sustainability indicators for their requirements or have already done so. Whenever possible, a method should therefore be devised that can also be applied in another context.

3.4 The procedure chosen for the MONET project

In order to avoid the risk of arbitrariness or one-sided influence of any one interest group a systematic procedure was chosen for the MONET project (see Figure 1).

As experience gained in other countries has shown, a precise description of the regulatory framework is essential if the set of indicators is to be specific and widely

accepted. The first step was therefore to draw up an interpretation of the term «sustainable development» and to set it down in postulates (see Chapter 4).

The second step was to select indicators with which it would be possible to observe whether Switzerland is developing according to these postulates (Chapters 5 and 6). The set of indicators thus obtained (Chapter 7) then becomes a gauge for measuring the degree of convergence with the postulates in Switzerland: by comparing the changes observed through the indicators with the action recommended in the postulates an assessment can be made as to whether Switzerland is developing along a sustainable path.

4 Interpretation of the term «sustainable development»

4.1 Method

The aim of this chapter is to establish a definition and interpretation usable for the MONET project of the concept «sustainable development» on the basis of preliminary work carried out internationally and in Switzerland. The document sets out with the content-defining frame of reference (Section 4.2), which is to be used as the basis for developing the indicator system for monitoring sustainable development in Switzerland. In so doing, the objectives of sustainable development are stated in practical terms using target dimensions (Section 4.3) and subsequently postulates (Section 4.4) and

Figure 1: Procedure for creating a system of indicators

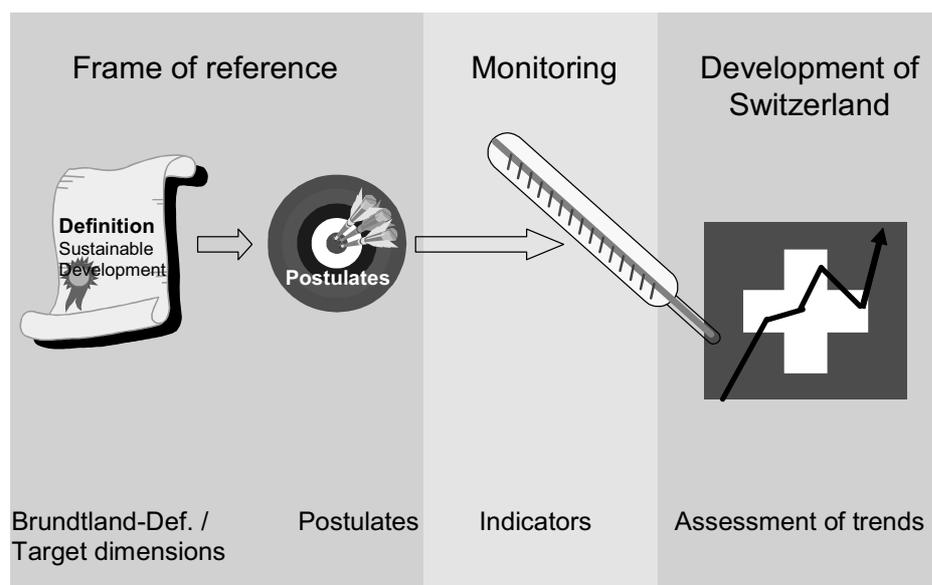
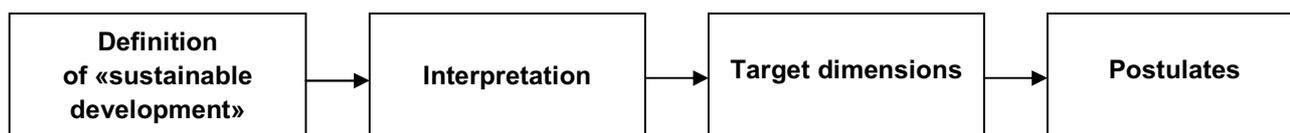


Figure 2: Stages in the interpretation



put in a form usable to develop the indicator system (see Figure 2).

The first step of a precise definition of the concept is vital to the success and acceptance of an indicator system. Such a definition is also demanded by the first of the «Bellagio Principles» (see Section 3.3), an international guide to monitoring sustainable development: «Assessment of progress toward sustainable development should be guided by a clear vision of sustainable development and goals that define that vision». The experts consulted during the pilot project¹⁵ also referred repeatedly to the importance of defining targets.¹⁶ Previous experience has in fact shown that a set of indicators can be meaningful only within a specific frame of reference and a general, context-independent definition is largely meaningless.

A clear frame of reference also assumes such centrality because there are various definitions of «sustainable development» and many different contexts in which they are used. All these interpretations are integrated into ethical and normative frameworks because sustainable development is an inherently normative concept. It is the goal of this chapter to develop this frame of reference for MONET in a transparent and comprehensive manner.

Even this project will not be able to determine conclusively what sustainable development may or ought to mean for Switzerland. MONET understands sustainable development, as proposed by the German Parliament's commission of enquiry, «in a similar manner to the positive and open-ended terms 'freedom' and 'justice' to be a 'regulative idea' (...), which can only be defined in a provisional and hypothetical manner» (German Lower House of Parliament, 1998).¹⁷ Against this background,

the interpretation proposed here is another step along the continuous road to imparting meaning to the term for Switzerland.¹⁸ In particular, formulating postulates for the three target dimensions (on the basis of previous endeavours to state sustainable development in practical terms for Switzerland) may be a valuable contribution to the sustainability debate.

4.2 The Brundtland definition

By signing the Rio Declaration and «Agenda 21», Switzerland committed itself to sustainable development and underlined this intention by introducing the concept into the revised Federal Constitution (1999).¹⁹ The most widely known definition of sustainable development, which is used both in its original and in modified form as the basis for innumerable other definitions, is that given in the «Brundtland Report»: «Sustainable development is development which meets the needs of the present without compromising the ability of future generations to meet their own needs».²⁰ This definition constitutes also the basis for the Swiss Confederation's relevant documents on sustainable development.

The Brundtland definition places humans or *the maintenance of options for meeting human needs* at the focus of attention and is based on the ethically founded value of *solidarity within and between generations*. This anthropocentric²¹ viewpoint tallies with what is currently the most significant international document relating to sustainable development, the Rio Declaration on Environment and Development (UNCED 1992a),²² principle 1 of which states «Human beings are at the centre of concerns for sustainable development».

¹⁵ SFSO/SAEFL 1999

¹⁶ SFSO and SAEFL: Hearings über Nachhaltigkeitsindikatoren, Zusammenfassung. [Forum on sustainability indicators, summary], 1999, unpublished.

¹⁷ «Regulative idea» is here understood to have the meaning proposed by the philosopher Kant, namely an epistemological, ideal construct which guides human reason in its seeking and learning processes.

¹⁸ To date, even at the Federal level, there is no generally accepted, simple, tangible and practicable interpretation of «sustainable development» for Switzerland, cf. Mauch Consulting, Infras, Ernst Basler & Partner AG, 2001.

¹⁹ In the Mauch Consulting, Infras, Ernst Basler & Partner AG study (2001, pp. 56 et seq.) it is convincingly explained, how the concept of sustainable development is strengthened by the value attached to it in the Swiss Federal Constitution. According to the Constitution, the elements of the concept are: long-term conservation of habitat for the benefit of all humans alive now and in the future under dignified and just conditions.

²⁰ Cf. Brundtland 1987.

²¹ There are essentially two standpoints for viewing sustainable development: the anthropocentric standpoint takes humans and their needs as the starting point and regards environmental protection as a necessary contribution to human well-being. The physiocentric standpoint focuses on the protection and conservation of nature for nature's sake – irrespective of any utility to humans.

²² UNCED 1992a, p. 1.

The Brundtland Report's understanding of sustainable development is also the basis for various initiatives and activities at the Swiss Federal level in the context of the «Agenda 21» follow-up process (UNCED 1992b).²³ The MONET project would like to ensure continuity in this connection.

The Brundtland Report's anthropocentric and option-oriented definition of intra- and inter-generational justice is a guiding principle for the MONET project too:

Sustainable development is development, which meets the needs of the present without compromising the ability of future generations to meet their own needs.

4.3 Interpretation of the Brundtland definition

The success of the Brundtland Report's definition is attributable not least to its wide range of possible interpretations. The definition must thus be operationalised by a semantic analysis of the concept «sustainable development» (Section 4.3.1) and a discussion of the requirements «maintenance of options for meeting needs» and «solidarity within and between generations» (Section 4.3.2). The significance of natural environmental conditions to fulfilling these requirements is discussed in a third section (Section 4.3.3). A summary of the interpretation can be found in Section 4.3.4.

4.3.1 Semantic analysis of the term «sustainable development»

Viewed individually, the terms have the following meaning:

- **Sustainable**
Sustainable connotes with «durable», «long-lasting», «constant», «permanent» and «continuing». However, the status quo has no intrinsic value, or, in other words, is not in itself worth maintaining. Value judgments are necessary to decide where and how something is to be maintained or preserved.
- **Development**
In the human development report (UNDP 1994), development is described as a process which increases people's opportunity of choice. This includes both qualitative and quantitative features. «Development» thus differs from «growth», which entails a quantitative increase in physical variables.

In particular, the word «sustainable» with its positive connotations is used in combination with various nouns for many different purposes, which have little to do with sustainability as defined above. The concept «sustainable development» thus cannot be divided into its constituent terms. *According to the above analysis, when viewed as a whole, the concept «sustainable development» means indefinitely ensuring necessary change or maintaining dynamic relations and retaining or extending potential. On the other hand, it does not necessarily mean maintaining the standard of living, as could be inferred from «sustainable» alone.*

4.3.2 Discussion of the requirements of «intra- and intergenerational equity» and «options for meeting needs»

The phrases «intra- and intergenerational justice» and «maintenance of options for meeting needs» play a central part in the explanatory portion of the definition. Both have a major impact upon the evaluation of observed developments with regard to sustainability. The terms have the following meanings:

- **Intra- and intergenerational**
The entitlement to having needs met is taken to *extend over space and time*. It applies to all human beings currently alive and to the future population of the earth.
- **Justice**
Justice is a culturally determined concept. The postulate of intra- and intergenerational justice thus leaves considerable latitude for interpretation. However, the most consensual possible concept of justice is required for a global issue such as sustainable development. The observation of human rights has proved to be the globally most widely accepted concept of justice. Human rights provide an ethically founded framework for the right to dignified life and free development of personality and the obligation to guarantee the same right to others. The concept is pared down to the essential in terms of the «ethically right» and excludes the discretionary in terms of the «morally good» (such as the Christian precept, «Love your neighbour as yourself»). Human rights have accordingly proved to be the most practical basis for dignified coexistence irrespective of time and culture. However, the actual manner in which human rights are observed is not addressed here as it may vary from region to region and is determined by a society's moral values. For the purposes of sustainable development, observation of human rights is defined as follows: Sustainable development entails the indivisibility of human rights over time and space in terms of guaranteeing human dignity and maintenance and

²³ UNCED 1992b.

long-term preservation of environmental,²⁴ material and cultural living conditions, which are essential for the free development of personality.²⁵

- **Maintenance of options**

The phrase «maintenance of options» for meeting needs is another key concept in the definition of sustainable development; it is interpreted in two ways in discussions of sustainable development:

- In the «weak sustainability» approach, a capital stock may be replaced by another, for instance natural by produced capital («It's OK as long as the total remains the same»). In other words, a landscape may be destroyed, provided that it can be replaced by a «virtual reality» experience. In this case, sustainable development requires the maintenance of at least one further possible course of action. All that is essential is that there is an option, irrespective of what it looks like.
- In the «strong sustainability» approach, produced, natural and social capital are regarded not as freely interchangeable, but as complementary. In this case, sustainable development requires that as many options for current and future action as possible remain open. Maintaining the largest possible number of options entails comprehensive protection of the full diversity of the natural foundations of life and the economy.²⁶

If «development» is understood as a process which should not limit but instead expand the opportunity of choice and action of all humans, this means that capital stocks should not in principle be substituted, but should instead be preserved whenever possible. The aim is accordingly to obtain a representation of the distribution of economic, social and environmental resources between the individual generations in which opportunity of choice and action is at least maintained along the time axis. Legal philosophy provides one practical response in the form of Rawls' fairness criterion, which seeks to determine the concept of justice people would select if they did not know their actual position in society in advance. When this question is asked, a distribution is deemed just if the benefit to the most disadvantaged individual is maximised.²⁷ If this principle is applied to intergenerational distribution, this means that any

current use of capital must bring about at least equally large advantages for future generations. Capital may accordingly only be used if, as a consequence, the options of the most disadvantaged generation are not compromised.

Without directly referring to the fairness criterion, Minsch (1996) postulates an analogous principle for non-renewable resources: non-renewable resources may only be used to the extent that physically equivalent replacement is achieved in the form of renewable resources or greater productivity of renewable resources.²⁸

- **Meeting of needs**

In a global context, meeting of needs may be understood as *fulfilling basic biological, psychological and social needs* in such a manner as to *ensure subsistence*. This interpretation is sufficient until this goal has been achieved, but not once the basic needs of a large majority have been more than adequately met. In this case too, human rights could again be of assistance with the concept of «*guaranteeing human dignity*». Human dignity is here seen in not an absolute but instead a relative sense; in other words, human dignity may, for example, be measured relative to average quality of life or the living conditions of a majority. However, the level to which needs are to be met differs from country to country and is subject to negotiation. Due to this latitude in interpretation, once the basic needs essential to life of humans currently alive have been met, greater weighting is assigned to meeting the fundamental needs of future generations than to current (subjective) human dignity.

The first part of the interpretation of the Brundtland Report's definition now reads:

Sustainable development means **ensuring dignified living conditions with regard to human rights by creating and maintaining the widest possible range of options for freely defining life plans. The principle of fairness among and between present and future generations should be taken into account in the use of environmental, economic and social resources.**

²⁴ As the awareness grew in the light of the worsening global environmental situation that, of necessity, the concept of human rights must also include environmental living conditions, «communal» rights were formulated as a third generation of human rights, a category into which the Rio Declaration (UNCED 1992a) falls. Cf. SNK *Justitia et Pax* 1993, p. 13.

²⁵ Cf. SNK *Justitia et Pax* 1993, pp. 11 et seq.

²⁶ Cf. Minsch et al. 1996.

²⁷ Rawls 1999.

²⁸ Minsch et al. 1996, p. 29.

4.3.3 Maintaining biodiversity

In addition to meeting needs and intra- and intergenerational justice, there is a further significant core concept of sustainable development: *preservation of the utility and qualities of natural resources over the course of time*.²⁹ In order to guarantee that needs are met over time and space, it is necessary to husband resources, primarily natural resources, whose availability is finite.

The argument that maintaining the largest possible number of options entails comprehensive protection of the full diversity of the natural foundations of life and the economy,³⁰ is expressed in numerous documents relating to sustainable development: «ensuring natural diversity»,³¹ «balance between nature and its capacity for renewal and the use made of it by human beings»,³² «maintaining the health of biosystems»,³³ «conservation of plant and animal genetic resources».³⁴ The significance of this matter also found expression at the 1992 Rio conference, when, together with the Rio Declaration and «Agenda 21» and two other documents, the Biodiversity Convention (UNCED 1992c) was adopted.

Ecosystem diversity, species diversity and genetic diversity are all facets of the protection of biodiversity. In addition to the irreplaceable function of the plant and animal kingdoms as a source of food and a factor in production, high levels of biodiversity increase the chances of plants and animals surviving when faced with rapid changes, such as accelerated climate change. Moreover, since the interrelationships and workings of ecosystems and the part played by individual species in the system are still poorly understood, biodiversity must ultimately be considered a non-renewable resource and must consequently be comprehensively protected in order to maintain scope for action.

Introducing the demand for the protection of biodiversity into the definition of sustainable development brings the sustainability of the earth's ecosystem into the equation, because maintaining biodiversity entails substantially maintaining further renewable and non-renewable resources and sinks, including abiotic components of ecosystems, and taking a critical look at interventions in nature which may bring about accelerated change (e.g. climate change) or conceal other risks.

The purpose of mentioning biodiversity is not to assign particular significance to the environmental component, but instead to point out that loss of biodiversity will re-

strict future generations' options for meeting needs and that such a process would moreover be irreversible. The reason for mentioning biodiversity and not the natural environment as a whole is that this anthropocentric concept of biodiversity does not focus on maintaining natural resources for their own sake, but instead in terms of their utility to humans. Moreover, maintaining biodiversity in any case entails careful management of natural resources.

The second part of the interpretation of the Brundtland Report's definition thus reads:

Putting these needs into practice³⁵ entails **comprehensive protection of biodiversity** in terms of ecosystem, species and genetic diversity, all of **which are the vital foundations of life**.

4.3.4 Summary of the interpretation

The Brundtland definition can be interpreted as follows:

1. Sustainable development is development which meets the needs of the present without compromising the ability of future generations to meet their own needs.
2. Sustainable development means ensuring dignified living conditions with regard to human rights by creating and maintaining the widest possible range of options for freely defining life plans. The principle of fairness among and between present and future generations should be taken into account in the use of environmental, economic and social resources.
3. Putting these needs into practice entails comprehensive protection of biodiversity in terms of ecosystem, species and genetic diversity, all of which are the vital foundations of life.

The above interpretation of the Brundtland definition establishes a relationship between meeting human requirements and environmental development. This principle complies with the understanding of sustainable

²⁹ Cf. Pearce/Turner 1990 in Minsch et al. 1996, p. 23.

³⁰ Minsch et al. 1996, p. 26.

³¹ IDC Rio 1995, p. 11.

³² Swiss Federal Constitution, Article 73.

³³ Minsch et al. 1996, p. 27, postulate 1.

³⁴ FAO 1988.

³⁵ Cf. part 1 of the interpretation.

development as enshrined in the Federal Constitution: «The federal and cantonal authorities shall strive to achieve a balance in the long term between nature and its ability to renew itself on the one hand and its exploitation by the population on the other.»³⁶

4.4 Qualitative objectives

The next step is to define target dimensions for various issues, which will be observed using an indicator system

Society	Economy	Environment	
Social acceptance	Economic feasibility	No environmental damage	(1988 ³⁸)
Social compatibility	Economic compatibility	Environmental compatibility	(1995 ³⁹)
Safeguarding of social solidarity	Maintenance of economic efficiency	Protection of natural environment	(1999 ⁴⁰)
Social solidarity	Economic efficiency	Environmental responsibility	(2000 ⁴¹ , 2002 ⁴²)

for sustainable development. Many publications from industrialised countries relating to sustainable development reveal a predominance of environmental concerns, which should be understood against the background of their development. However, a broader interpretation has now taken over, which relates sustainable development to the fields of society, economy and environment. The three dimensions are central to «Agenda 21» (UNCED 1992b) adopted at Rio in 1992, which is an important frame of reference for efforts in the field of sustainable development, and also in the «Bellagio Principles».³⁷ This understanding of sustainable development has also formed the basis of all Swiss Federal studies since 1992.

The three dimensions are often represented as independent pillars or columns or as a «magic triangle». On the one hand, this is a sensible way of setting out which areas may be subsumed under the concept «sustainable development». The data sources which are required to construct the individual indicators are also often classified in a similar way. On the other hand, one criticism is that this approach divides more than unites and the division is artificial. It is therefore sometimes difficult to

assign indicators clearly to one of the three dimensions. In any case, sustainable development should have more to do with the interfaces and interdependences between the columns than with the individual pillars.

This criticism may be countered by formulating qualitative target dimensions for all three columns, which may then be applied to all the dimensions. This method has already found expression internationally (e.g. FAO 1988) and in Federal documents:

For the MONET project – not least to ensure continuity – the most up-to-date wording used by the Federal Council has been adopted. This suggests that sustainable development includes the three target dimensions «*social solidarity*», «*economic efficiency*» and «*environmental responsibility*», which all apply in an overarching manner to society, the economy and the environment.

Depending on interests and point of view, greater weight is attached to one or other area (often the environment, but also society and the economy, for example in a report for IDC Rio⁴³). In general, however, the emphasis is upon their equal value. This is of considerable importance if it is to be ensured that the national indicator system is accepted and used by as many as possible of those involved. In any case, it is not to the three independent areas «society», «economy» or «environment» that equal weight must be attached but rather to the *target dimensions*, i.e. «social solidarity», «economic efficiency» and «environmental responsibility». This means e.g. that environmental protection measures have to be economically efficient and economic-political decisions have to be socially acceptable and ecological.

³⁶ Swiss Federal Constitution 1999, Article 73.

³⁷ Cf. Section 3.3.

³⁸ FAO 1988.

³⁹ IDC Rio 1995, p. 12.

⁴⁰ Swiss Federal Chancellery 2000, p. 20.

⁴¹ IDC Rio 2000, p. 5.

⁴² Swiss Federal Council 2002, p. 9.

⁴³ Mauch Consulting, Infrac, Ernst Basler&Partner AG: Nachhaltigkeitspolitik in der Schweiz, Entwurf Anhang [Sustainability policies in Switzerland, draft appendix], 2000, p. 1, unpublished.

The three overarching aims of **social solidarity**, **economic efficiency** and **environmental responsibility** are selected as the target dimensions. The **three target dimensions** are of **equal importance**: in the long term, environmental, economic and social objectives cannot be achieved at the expense of the other objectives.

4.5 Postulates concerning sustainable development

So as to put the definition and target dimensions in more practical terms, the next step entails the formulation of postulates of sustainable development. These ultimately constitute the frame of reference which will allow as consistent and transparent a choice of indicators as possible.

The postulates are assigned by topic to the target dimensions «social solidarity», «economic efficiency», «envi-

ronmental responsibility» and divided into 20 areas. Since the three areas of society, economy and environment are recorded as target dimensions and not as capital stocks, the postulates allow statements to be made not only in relation to stock sizes but also to the meeting of needs and the defining of processes. The postulates need to relate directly and unambiguously to the definition and target dimensions and appear to be of long-lasting and wide-reaching relevance. As they are designed to be applicable for a long period, they do not include any current measures or approaches.

The postulates are based to a considerable extent on publications by IDC Rio, the UVEK departmental strategy⁴⁴ and the comments of the Council for Sustainable Development on the SFSO and SAEFL report entitled «Indikatoren der Nachhaltigkeit» [Sustainability indicators].⁴⁵ The postulates relating to social solidarity make use of social reports and living conditions statistics.⁴⁶ Wherever possible, existing postulates are adopted, although small amendments have on occasion had to be made to language or content.

⁴⁴ UVEK 1999.

⁴⁵ Council for sustainable development/Indicators working group/Criteria: Stellungnahme zum Bericht «Indikatoren der Nachhaltigkeit» von BFS und BUWAL. [Comments on SFSO and SAEFL report «Sustainability indicators»], 1999, unpublished.

⁴⁶ Berger-Schmitt and Noll 2000.

The postulates drawn up for the MONET project are as follows:

Postulates concerning social solidarity⁴⁷

General principle	1a	Ensuring human rights	Each member of society has a right to the dignity of human life and to the free development of their personality. Democracy, legal stability and cultural diversity are guaranteed.
	1b	Limited individual freedom	The limits of individual development are set where the human dignity of other contemporary individuals or of future generations is compromised.
Objective living conditions	2a	Meeting needs	The basic needs of the population must be met over the long term. Individuals should be permitted reasonable latitude in meeting material and non-material needs which extend beyond the basic needs.
	2b	Promoting health	Human health should be protected and promoted.
	2c	Fighting poverty	The dignity of human life requires freedom from poverty. Needy members of society shall benefit from solidarity in accordance with their needs. (4ä)
Subjective living conditions	3a	Satisfaction and happiness	Possibilities for present and future generations to find satisfaction and happiness in life should be maintained and promoted.
	3b	Development that takes well-being into account	Socioeconomic and environmental change must not be achieved at the cost of the physical and psychological well-being of the individual.
Fairness of distribution, equality of opportunity	4a	Ban on discrimination	No-one shall be discriminated against on the basis of whatever external or internal characteristic.
	4b	Equal opportunities and fair distribution of wealth	Each member of society should have the same rights and opportunities. Society should strive to achieve a more just distribution of resources.
	4c	Integration of the less fortunate	The integration of disadvantaged groups of the population and regions into economic, social, cultural and political life should be promoted.
Strengthening of social cohesion	5a	Intercultural and interpersonal understanding	In recognition of the fact that the proper functioning and survival ability of society are substantially based upon the solidarity of its members, exchange and understanding between individuals and groups should be promoted.
	5b	Social and political inclusion	Social and political participation should be promoted.
International solidarity	6a	Development cooperation	In developing countries and transition countries sustainable development shall be promoted by way of poverty alleviation. Assistance shall be provided in particular to the poorest developing countries, regions and people.
	6b	Promoting peace and democracy	Peaceful coexistence of peoples and nations, respect for human rights and democracy should be promoted.
Development and maintenance of human capital	7a	Development of human capital	Collective knowledge and sociocultural heritage should be maintained and increased over the long term.
	7b	Access to information and freedom of opinion	There should be no restriction to the flow of information. Free formation and expression of opinion must be guaranteed.
	7c	Encouraging learning	The ability to absorb and process information should be promoted.
	7d	Child-friendly environment	Children and young people in particular should be able to live in an open, motivating and future-oriented environment.

⁴⁷ Postulates for social solidarity based on Berger-Schmitt and Noll 2000.

Postulates concerning economic efficiency

General principle	8	Economic order in favour of the communal good	Economic activity should effectively and efficiently meet the needs of the individual and of society. The economic framework should be shaped in such a manner that it promotes personal initiative, thus putting self-interest to the service of the common good and ensuring the welfare of the present and future population. (④p)
Economic system	9a	Market as economic order	Goods allocation should primarily be by free market means. If the market fails or in the case of goods primarily in the public interest (merit goods), intervention in the free market is justified.
	9b	Genuine costs and principle of producer-pays	Prices should reflect the scarcity of natural resources and sinks and include external costs. The «polluter pays» principle should be applied consistently (with the exception of merit goods. (①ä, ②, ④ä)
	9c	Market intervention that conforms to the system	In the case of market intervention, market-economy tools should be chosen above all others. (④ä)
Efficiency and competitiveness	10a	Promotion of economic efficiency	The economic efficiency of a society and its productive, social and human capital must be at least maintained over time. The aim should not merely be to bring about an increase in quantity, but instead to ensure a constant improvement in quality. (①ä, ④ä)
	10b	Economic order that favours innovation and competition	The framework of the market system should be shaped in such a manner that innovation is encouraged and functional markets are maintained or improved. (④ä) Competitiveness and locational quality should be maintained and promoted. (④ä)
	10c	Promotion of research	Research and development activities which support sustainable development should be promoted. (③ä)
	10d	Limited public debt	Public-sector debt must be incurred only to the extent that it does not jeopardise the capability of future generations to meet individual and social needs.
Flexibility and stability	11a	Predictability of changes in the system	The framework of the market system should be shaped in such a manner that a long-term outlook is worthwhile and the social change necessary to adapt to future requirements is facilitated. (④ä) New measures should be foreseeable. (④ä)
	11b	Socially compatible rate of change	The rapidity or slowness of changes in the framework of the economic system must not jeopardise social peace.
Production and consumption of goods and services	12a	Ecologically acceptable production	Environmental impact and risks emanating from production plants should be minimised, while energy and material flows should be optimised.
	12b	Ecologically and socially acceptable consumption	Consumption of goods and services should be as environmentally compatible and socially just as possible.
	12c	Transparent information for private industry and consumers	Within and outside manufacturing companies information should be made available that serves to ensure sustainable development and consumption, e.g. through environmental management systems. (③ä)
Employment	13	Employment that is morally worthwhile and provides a decent living	The economic system should ensure that anyone desiring gainful employment is able to find meaningful work to support themselves.
International trade	14a	Environmentally and socially acceptable world trade	The multilateral trading system should take account of the need for careful management of natural resources and promote technologies which ensure efficient use of environmental resources and social justice. (②ä)
	14b	World trade from which all parties can profit	The multilateral trading system should assist in ensuring that one nation's individual and social needs are met without consequently compromising the ability of other nations to meet their own needs.

Postulates concerning ecological responsibility

General principle	15a	Preservation of natural resources	The natural foundations of life should be maintained in the long term and existing damage should be repaired. (①Ua)
	15b	Preservation of biodiversity	The dynamic diversity of nature must be preserved. (②p)
Consumption of resources	16a	Limits for consumption of renewable resources	Consumption of renewable resources should be kept below the regeneration threshold. (①a)
	16b	Limits for consumption of non-renewable resources	Consumption of non-renewable resources should be kept below the development potential for renewable resources. (①a)
Materials and wastes	17a	Limits for degradable waste and toxins	Pollution of the environment with degradable waste and pollutants should be minimised. Contamination should on no account exceed the absorption capacity of the ecosystem. (②a)
	17b	Avoidance of non-degradable toxins	The emission of non-degradable pollutants into the environment should be prevented wherever possible. (②a)
Risks	18a	Ecological compensation	Any impairment to nature should be offset such that biodiversity is maintained and the quality and continuity of the ecosystem are ensured. (②p)
	18b	Minimisation of ecological risks	Accident risks with wide-ranging impact upon humans and the biosphere are permissible only insofar as, even in the worst case scenario, they do not cause any permanent damage for a subsequent generation. (②)
	18c	Caution in the case of uncertainty	Severe or irreversible environmental damage should be prevented, even if the scientific community is not absolutely certain of the actual risk. (Rio Declaration, a)
Rate of change	19	Taking into consideration the time needed for natural processes	The rate of anthropogenic intervention in nature must be in balance with the tempo of the natural processes of relevance to the environment's capacity to respond and regenerate. (④a)
Natural and agricultural landscape	20	Acceptable natural and agricultural landscapes	Development of the natural habitat of humans must be guided by the concept of human rights. Human dignity requires a decent natural and agricultural landscape. (④p)

Key

- ① UVEK 1999: UVEK departmental strategy. Bern. (①U: Chapter entitled «Sachziele Umwelt» [«Environmental goals»])
 - ② DC Rio 1997: Nachhaltige Entwicklung in der Schweiz – Stand der Realisierung [Sustainable development in Switzerland – Implementation status]. Bern.
 - ③ Öko-Institut 1999: Soziale und ökonomische Nachhaltigkeitsindikatoren [Social and economic sustainability indicators]. Freiburg i. Br.
 - ④ Council for sustainable development/Indicators working group/Criteria: Comments on SFSO and SAEFL report «Indikatoren der Nachhaltigkeit» [«Sustainability indicators»]. Bern 1999, unpublished.
- a adapted
p partly adapted

4.6 Relationship between the postulates and the regulatory framework for the study of «Sustainable Development Policy in Switzerland – Assessment of the Current Situation and Future Prospects»

As part of the study entitled «Politik der Nachhaltigen Entwicklung in der Schweiz» [«Sustainable development policy in Switzerland»],⁴⁸ which was carried out for IDC Rio, an interpretation of the term «sustainable development» was drawn up. This «Policy Study» summarised the current situation and the trends in federal policy concerning sustainable development and, on that basis, set out future prospects. It served as a basis for drawing up the Federal Council's 2002 sustainable development strategy.

Both the MONET project and the Policy Study are based on an ethico-philosophical concept and are compared below.

- The Policy Study understands sustainability as a «regulative idea» and is based on an ethics of duty as an expression of a fundamental understanding of justice spanning societies and generations.⁴⁹ Justice is understood to mean mutuality and even-handedness, which are founded on the primacy of human dignity and the autonomy of others. This interpretation is very readily compatible with the MONET interpretation, in which intra- and intergenerational justice is equated with maintenance of dignified conditions in terms of human rights and with Rawls' fairness criterion. The common denominator is best expressed by the «golden rule» quoted in the study: «Do as you would be done by».
- Instead of the Federal Constitution, MONET took as the basis for its interpretation the definition of sustainability used by Brundtland, Rio and the Agenda 21. The Federal Constitution was not after all conceived as a constitution for sustainability and deals with many other matters. The Policy Study has shown, however, that overall the general principles of the Federal Constitution are in line with those of sustainable development. From this perspective, the Federal Constitution may be considered as confirming the concept, if not as its foundation. In the end, it is the aim of every free democratic state founded on the rule of law to keep open a wide range of life plans and options for today's and future generations, an aim by which the MONET interpretation sets great store.

The studies differ more strongly with regard to their methodological approach:

- The Policy Study⁵⁰ is based on a *capital stock model* which is used with a view to achieving a «*Weak Sustainability Plus*» and is set out using a series of criteria which is as follows:

$$C_{\text{sustainability}} = C_{\text{environment}} + C_{\text{economy}} + C_{\text{society}}$$

Sustainability is achieved when only interest and not capital is used for everyday living. MONET goes down another route and attempts to overcome the boundaries of the three «capital stocks», which are in any case not always easy to draw, at an earlier stage. To this end, *target dimensions* have been defined which are intended to span the various areas and which are stated in more practical terms by *postulates*. In MONET, the capital stocks are used at a more practical level: the indicator system is based on a stock-flow model. In this way it is possible to observe not only capital stocks but also driving forces, structural criteria such as efficiency and disparities, and responses (see Section 5.3).

- The Policy Study propagates the idea of «*Weak Sustainability Plus*», i.e. capital sub-stocks may decline if they are appropriately substituted, total capital so remaining the same. In addition, threshold values must be complied with in certain areas. MONET has *not* adopted *any* such *label*. Its most favoured option would be «*Strong Sustainability Minus*», as, although changes to capital sub-stocks are also possible in MONET, substitution processes should, in accordance with the central tenet of sustainable development, i.e. «maintenance of/increase in opportunity of choice and action», be the exception and not the rule.
- In the Policy Study the three capital stocks of society, economy and environment are operationalised using a primarily qualitative criteria grid. In addition to the normative framework, official sustainable development documents determine both the *criteria grid* in the Policy Study and the MONET *postulates*. Nevertheless, the contents of the criteria and the postulates overlap only in part. While it should be possible to total the contents of the criteria to obtain a capital stock variable, the postulates do not relate solely to stock variables, but also to meeting needs and defining processes. Neither of the two approaches is immune to a degree of subjectivity in terms of the choice of criteria or postulates.

It can be concluded that the two studies are based on a similar ethico-regulatory concept. They differ considerably, however, in their methodological approach.

⁴⁸ Mauch Consulting, Infrac, Ernst Basler & Partners AG 2001.

⁴⁹ Mauch Consulting et al. 2001, pp. 55-65.

⁵⁰ Mauch Consulting et al. 2001, pp. 65-79.

5 Setting up the indicator system

5.1 Method

Unlike a simple list of indicators, an indicator system is based on a clearly defined structure which provides a logical and systematic framework for the selection of indicators. In the MONET project, the system takes the form of a grid (see Section 5.2), the two axes of which combine two different approaches to sustainable development (see Sections 5.3 and 5.4). The individual indicators must then be inserted into this grid and must correspond to additional criteria (see Section 6.2).

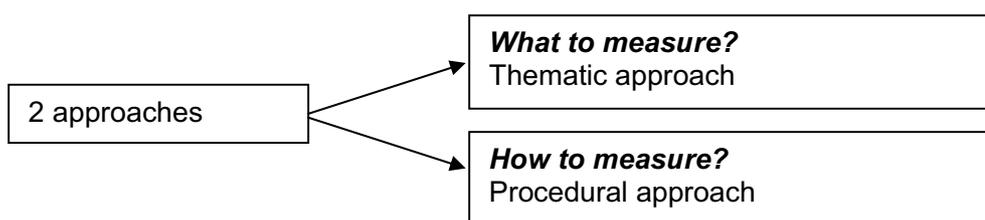
- If necessary, it should be possible subsequently to add new indicators (extendable structure).

5.2 Two-dimensional grid

In existing indicator systems for sustainable development, a distinction may be drawn between those which are structured by topic and those which are structured by process (see Figure 3).⁵¹

- The thematic approach starts by asking the question as to which content is relevant with regard to sustainable development and should be illustrated with indicators.

Figure 3: Approaches used for setting up indicator systems



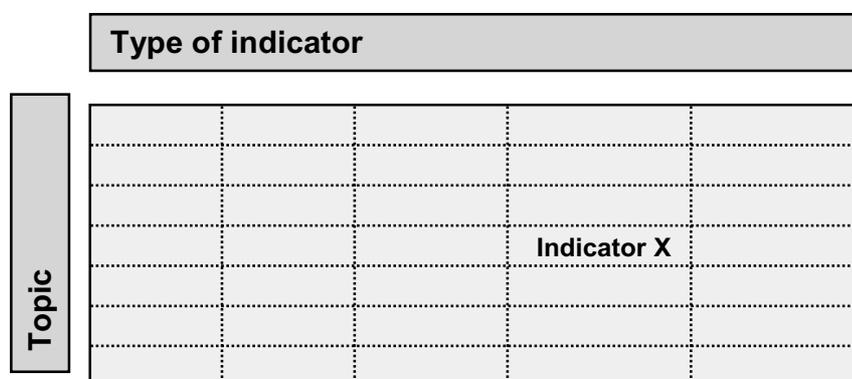
The following considerations were fundamental to defining the structure:

- The indicator system should provide the most general and comprehensive possible model of the sectors or topics of relevance to sustainable development in Switzerland.
- The structure of the system should allow subgroups of indicators to be selected in line with the needs of differing target audiences.
- It should be possible to create links with other indicator systems by incorporating existing indicators into the system (open structure).

- The procedural approach, in contrast, focuses on mechanisms and causal connections and attempts to record these in a model. The purpose of creating various types of indicators corresponding to the individual variables of the model is to create as complete a model as possible of the processes which have an influence upon sustainable development.

Both of the stated approaches are of importance in an indicator system and the intention in the MONET project is accordingly to combine them in a grid (see Figure 4): the columns of the grid correspond to five different types of indicators (see Section 5.3), while the

Figure 4: Grid for setting up an indicator system



⁵¹ A review of structuring options may be found, for example, in Hardi, 1997.

rows correspond to the topics to be illustrated (see Section 5.4).

Structured in this manner, the indicator system is comparable with the system of the United Nations Commission on Sustainable Development (UN-CSD), which to some extent has such a two-dimensional structure.⁵² The MONET system, however, is based on a more refined indicator typology.

The grid is, however, subject to limitations. In particular, it should be noted that:

- the grid is not intended as a means of communication but instead is only used to permit systematic selection of the indicators.
- the grid is idealised and the ultimate indicator system will reflect certain limitations (availability of data etc.) and will thus exhibit gaps.

5.3 Type of indicator axis

The indicator classification developed for the MONET project is based on a stock-flow model, which describes the dynamics of the operations of relevance to sustainable development (see Figure 5). The model has similarities with the «driving force-pressure-state-impact-response» model⁵³ used in some indicator systems. Unlike the latter, however, it is not tailored to the requirements of environmental applications, but is also applicable to social and economic topics. A mathematical account of the interrelationships can be found in Appendix B.

The five types of indicators used are described below:

Level (L)

Contents

Extent to which the needs of the individual and society are met.

Principal question

To what extent is a human need met?

Description and background

This is described by fundamental variables, only few of which are required: level of consumption or living conditions (mobility, home heating levels, nutrition, housing, education, culture, participation etc.).

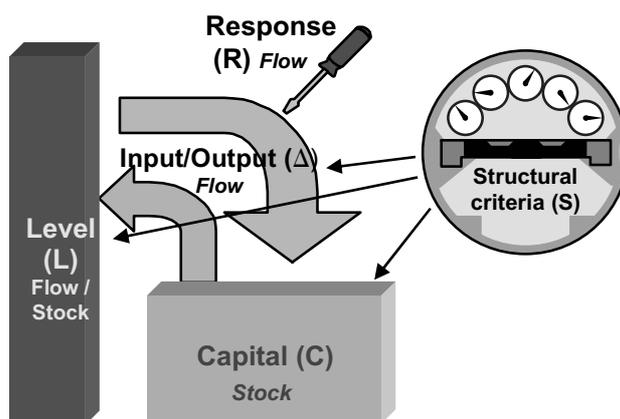
Value measured

«Level» variables are generally flow variables, which are often stated in relationship to other variables (e.g. GDP per capita, living space per capita, distance travelled per capita, unemployment rate). The variables are not broken down by population group or region.

Delimitation vis-à-vis other types of indicators

A «level» indicator measures the extent to which a need is met and not the continuous consumption of resources required for that purpose ($\rightarrow \Delta$).

Figure 5: Indicator typology



⁵² United Nations 1996.

⁵³ The D-P-S-I-R model is an extension of the «pressure-state-response» model developed in the 1970s for environmental applications. It is used, for example, by the European Environment Agency (EEA) for classifying environmental indicators, cf. European Environment Agency 1999.

Capital (C)

Contents

Status and potential of (environmental, economic and social) resources.

Principal question

What degree of provision is available to satisfy a particular need?

Description and background

To be able to meet the needs described under «level», appropriate provision of natural, economic and social resources, i.e. «capital», is required. «Capital» includes, for instance, production facilities, infrastructure, social and cultural institutions, environmental resources or knowledge. It also includes obligations (debts, contaminated sites) to future generations.

Value measured

«Capital» is measured using stock variables. These may be represented as absolute values (drinking water supply, newspaper circulation figures) or relative values (proportion of threatened species, hospital beds per capita). They are not broken down by population group or region.

Delimitation vis-à-vis other types of indicators

Capital indicators estimate stocks and the (chronological) accumulation or decline thereof, but not consumption (flow $\rightarrow \Delta$).

Input/Output (Δ)

Contents

Flows originating from «capital» in order to meet the needs described under «level», together with appreciation or depreciation of «capital» (e.g. through investment or pollutant emissions).

Principal question

To what extent does the capital appreciate or increase or depreciate or diminish?

Description and background

Meeting the needs described under «level» generally requires consumption of a proportion of the capital and is often associated with emissions. Meeting human needs thus has an effect on the capital (or on various kinds of capital). Conversely, measures are taken to maintain or even improve total capital (e.g. in the form of net

investments in the economy or environmental protection measures). «In- and outputs» may thus have positive or negative effects on capital.

Value measured

These are always measured by flow variables. They may be represented as absolute values (e.g. greenhouse gas emissions in tonnes) or relative values (e.g. proportion of GDP spent on education, phosphorus input per hectare). They are not broken down by population group or region.

Delimitation vis-à-vis other types of indicators

Measurement relates to continuous consumption (flow), but not accumulation or decline ($\rightarrow C$, stock)

Structural criteria (S)

Contents

Assessment of «in- and output» relative to (economic, social and environmental) efficiency and of disparities in the meeting of needs («level») or in the provision of «capital».

Principal question

To what extent is the capital used in a socially responsible and (economically and environmentally) efficient manner?

Description and background

Depending on the form taken by the «in- and outputs», particular needs may be met to varying degrees of sustainability. In other words, this section deals with the effects on sustainability in relation to the improvements achieved in meeting needs. Structural criteria are:⁵⁴

- Economic, environmental and social efficiency: this describes what environmental, economic and social resources have to be used to meet particular needs. A well-known example is environmental efficiency, expressed in the case of motor vehicles, for instance, as fuel consumption per 100 km. The proportion of particularly sustainable behaviour choices involved in meeting certain consumer needs also provides information on efficiency. Examples are the proportion of journeys made using public transport (modal split), of cars with catalytic converters, of recycled drinks packaging or of foodstuffs produced under socially responsible labels.
- Disparities: These relate to the distribution of met needs and capital between various popula-

⁵⁴ These criteria may be derived from the definition of sustainable development: fairness among and between present and future generations involves both efficient use of resources and social justice.

tion groups (young and old, men and women, etc.) or between individual regions (town and country, peripheral regions, etc.).

Value measured

«Efficiency» is always expressed as a relative variable (e.g. nitrogen oxide emissions per km) or defined as a proportion (e.g. proportion of journeys made using public transport). The description of «disparities» is broken down by population group (e.g. proportion of women completing tertiary education) or region (e.g. regional economic output) or distribution index (Gini income distribution index). The «structural criteria» often use the same measurement variables as are used for the L, C or Δ indicators, but always in relation to the use of resources or broken down by population group or region.

Delimitation vis-à-vis other types of indicators

Efficiency indicators describe consumption (or investments, emissions) in relation to the result, but never as an absolute value ($\rightarrow\Delta$). Disparity indicators demonstrate distributions, but never average values for the total population (\rightarrow L, C).

Response (R)

Contents

Social and political measures aimed at influencing in- and output.

Principal question

How have the social and political systems reacted in their efforts to influence development?

Description and background

This heading comprises measures of an institutional kind with which society hopes to influence certain developments. They include legislative and fiscal measures together with efforts aimed at achieving voluntary changes in behaviour (e.g. information, labelling, voluntary declarations). These «responses» have an impact – usually delayed – on «in- and outputs».

Value measured

«Responses» are recorded using flow variables (e.g. transfer payments to the poor) or descriptive absolute or relative values (e.g. number or proportion of local communities charging a refuse collection fee). They are not broken down by population group or region.

Delimitation vis-à-vis other types of indicators

The decisive factor in differentiating institutional «responses» from «in- and output» is whether an institutional measure taken in response to an undesirable development is involved. For example, the indicator «number of local communities charging a refuse collection fee» falls under «responses», while the indicator «waste disposal expenditure» falls under «inputs».

The following Table (Figure 6) contains a summary of the characteristics of the five types of indicators.

Figure 6: Types of indicators and their characteristics

Type of indicator Characteristics	Level (L)	Capital (C)	Input/Output (Δ)	Structural criteria (S)	Response (R)
Description of meaning	Extent to which needs are met	Status of and changes to resources	Use and influencing of capital	Efficiency, disparities	Social and political measures
Stock or Flow variable	Stock / Flow	Stock	Flow	Stock / Flow	Flow
Relative variables	yes	yes	yes	yes	yes
Absolute variables	no	yes	yes	no	yes
Breakdown by population group or region	no	no	no	yes	no
Counterpart in DPSIR model	Driving force	State	Pressure / Impact	None	Response
Delimitation vis-à-vis other types of indicators	\neq continuous consumption of resources ($\rightarrow\Delta$)	\neq variable for measuring consumption ($\rightarrow\Delta$)	\neq variable for measuring accumulation or decline of stock (\rightarrow C)	\neq absolute variable ($\rightarrow\Delta$) $\neq \emptyset$ average of the total population (\rightarrow L)	

Figure 7: Examples for typology of indicators

Type of indicator / Topic	Level (L) Degree to which needs are met	Capital (C) Status and potential of resources	Input/Output (Δ) Use and influencing of capital	Structural criteria (S) Efficiency, disparities	Response (R) Social and political measures
Mobility	Annual per capita distance travelled in km (1)	Number of private motor vehicles Public transport infrastructure (e.g. number of kilometres of track)	Per capita fuel consumption in road transport	Modal split (proportion of annual per capita distance travelled on public transport in km) Average fuel consumption per 100 km	Revenue from the heavy vehicle fee
Education	Measurement of skills Average school life expectancy (2)	Total library provision Number of places in tertiary education	Annual number of lessons given Proportion of GDP spent on education	Proportion of women completing tertiary education Comparison of educational grants between regions	Expenditure on educational campaigns
Competitiveness	GDP per capita (3)	Average school life expectancy (2) Number of patents in force Ratio of foreign debt to GDP	Net investment New patent applications per annum New borrowing	Regional GDP (3) Labour productivity (GDP/working hour) Comparison of borrowing between regions	
Soil	Living space per person	Proportion of undeveloped land	Annual soil sealing in m ²	Population density factor (living space per built-up area)	
Water	Daily water consumption per capita	Quality of water-courses ppm nitrate in drinking water	Annual nitrogen input per hectare	Proportion of households connected to sewage treatment plants	Permitted head of cattle per hectare
Air	Annual per capita distance travelled in km (1) (4)	Average annual values for NO _x immission concentrations	Annual NO _x emissions in tonnes (3)	NO _x emissions/km journeys made (3) Proportion of cars with catalytic converter	Level of supplementary petrol duty

- (1) An indicator may arise in several topics (in this example in the topics «mobility» and «air»).
- (2) The same indicator may occur in various columns, depending on the topic: the indicator «school life expectancy» describes a level for the topic Education (meeting a training need) but capital for the topic Competitiveness (training as an economic resource).
- (3) Indicators may occur as relative variables with different terms of reference: «GDP per capita» in the Level column, «regional GDP» in the Structural criteria column. Or «NO_x emissions in tonnes per year» (absolute value) in the column « Δ », «NO_x emissions per km journeys made» (efficiency) in the column «S».
- (4) This level indicator represents a need (mobility), the meeting of which has a considerable effect on the air (impairment of air quality). Another conceivable indicator could be «respiratory diseases» as a circumlocution for the need «health».

Figure 8: Various types of indicators

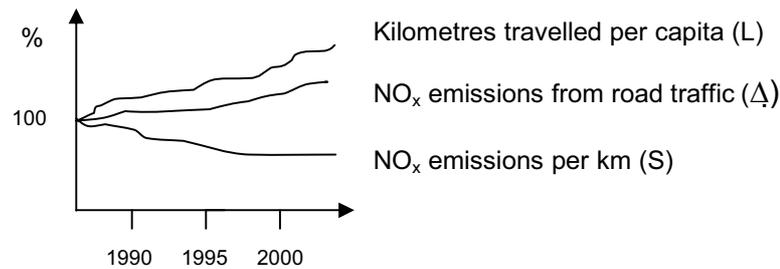


Figure 7 contains hypothetical indicators for various topics, intended as an illustration of the types of indicators. Important criteria (e.g. clear measuring concept, data availability) were not taken into account in the selection process.

Combining different types of indicators allows complex statements to be made on particular topics and prevents arbitrary assessment of developments. This may be illustrated using the following (hypothetical) example relating to the topic «mobility» (see Figure 8):

An isolated examination of the indicator of the type «Structural criteria» (S) in Figure 8 might lead to the following interpretation: an increase in efficiency (introduction of the catalytic converter) led to a reduction in NO_x emissions per kilometre travelled, which represents a development towards sustainability.

The increasing NO_x emissions from road traffic (input/output indicator), on the other hand, indicate a development away from sustainability. The reasons for this discrepancy lie in increasing mobility, which is expressed in an increase in kilometres travelled per person (level indicator). The increase in efficiency is therefore overcompensated for by growth, which, overall, must be judged as a negative development.

Without this typology, it would be inevitable that statements would either be unduly optimistic or overdramatic. By combining different types of indicators, on the other hand, it becomes possible to make a complex statement with respect to sustainability. Moreover, combining different types of indicators highlights where there is room to manoeuvre and allows scenarios to be drawn up: how much mobility can we afford in the future while staying within with specific pollutant limit values? By how much more would efficiency have to be improved if emissions were to be reduced while mobility remained the same?

In practice, the indicators from one topic, unlike in the above (ideal) example, frequently do not display any clear causal associations. Nonetheless, an examination of several types of indicators can throw light on various as-

pects of a problem, thus averting the danger of arbitrariness and biased (interest-led) assessment.

However, there are limits to the practical implementation of the model. Indicator typology should therefore be viewed as an orientation aid, not a «strait-jacket». This means:

- It is not necessary to apply all five types of indicators in each topic area (indeed, in many cases it would not make any sense to do so). However, individual types of indicators should not crop up with undue frequency in the system as a whole.
- It is not possible to allocate every indicator unambiguously to one of the five types. However, this is not a good reason for omitting an indicator from the system.
- A causal relationship between the individual indicators of a topic area is desirable, but not essential.

5.4 Theme axis

Sustainable development is an anthropocentric concept, thus it is obvious to choose individual and social issues and specify them as a list of topics. The political sphere, which after all addresses such issues, provides a useful starting point. However, it must be remembered that politics does not necessarily encompass all topics which are of relevance to sustainable development.

With regard to Switzerland's future sustainability strategy, IDC Rio⁵⁵ commissioned a study into the status of Federal policy in terms of the implementation of sustainable development.⁵⁶ For the purposes of analysis, Swiss policy was divided into 25 policy areas (summarised into five thematic policy sectors). For pragmatic reasons, we brought our list of topics as far as possible into line with this classification: firstly to ensure compatibility of MONET with efforts at the national level and, secondly, to simplify the selection and production of indicators as far as possible (the Government agencies which are to contribute data and expertise to the de-

⁵⁵ The Interdepartmental Committee Rio (IDC Rio) is an internal committee within the Swiss administration for implementing the decisions taken at the 1992 Rio Conference.

⁵⁶ Mauch Consulting, Infras, Ernst Basler & Partner AG 2001.

Figure 9: List of topics

Topics		Specifications and examples	Postulates of sustainable development		
			Social solidarity	Economic efficiency	Environmental responsibility
1	Social security and prosperity	Social insurance, assistance, income	2c	10a	
2	Health		2b		15a
3	Subjective living conditions	Contentment, happiness, well-being, social integration	3a,b, 7d	13	20
4	Housing	Living space, housing quality	2a		
5	Culture and leisure	Cultural diversity, freely disposable time, leisure and cultural activities on offer	1a, 2a		
6	Social cohesion and participation	Social and political participation	5a,b		
7	Development cooperation		6a,b	14a,b	
8	Education and science		7a-d	10a	
9	Information	incl. information about sustainable production	7b	10c, 12c	
10	Physical security	War, criminality, natural hazards, high-risk technologies, genetic engineering	2a,b, 3a,b	12a	18a,b
11	International trade and competitiveness	Innovative ability, national budget, etc.		10a-d	
12	Domestic markets	Prices, market instruments, regulatory framework		9 a-d, 11a,b	
13	Employment	Employment, working conditions	2a	13	
14	Research, development and technology			10a,c	
15	Production	In all sectors		12a, c	
16	Consumption	E.g. consumption behaviour		12b, c	
17	Mobility	incl. goods transport	2a	10a	15a
18	Materials, wastes and immissions	Incl. radioactive waste, noise, non-ionising radiation (excluding atmospheric pollutants)	2b	12a	17a,b, 18a,b
19	Soil	Soil use, soil fertility	2a		16b, 17a,b, 18b
20	Water		2a		16a, 17a,b
21	Air	Atmospheric pollutants	2b		12a,b 17a,b
22	Climate				18b, 19
23	Land use	settlements, natural landscapes			16b, 20
24	Biodiversity	Protection of biotopes and species			15b,16a, 18c, 19
25	Energy		2a	11a	16a,b
26	Forests				16a, 20

velopment of the indicator system are largely organised in accordance with these policy areas).

However, since MONET differs from the above-mentioned study in both its objectives and fundamental concepts, the policy areas cannot be adopted without making certain adjustments and additions. The following considerations were central to this process:

- **Objective:** The purpose of the MONET project is not primarily to monitor current policies, but instead to provide a model of sustainable development that is as general and comprehensive as possible. The list of topics should thus not simply reflect current reality but also include topics which are not (yet) on the political agenda.
- **Weighting of the dimensions:** The definition and specification of sustainable development carried out for the MONET project is based on a division into three target dimensions (social solidarity, economic efficiency and environmental responsibility), which are of equal importance. When selecting the topics, care was taken to ensure that coverage of the dimensions is as uniform as possible. However, no attempt was made to assign the topics to particular dimensions, as this is not appropriate for many topics (e.g. energy, mobility).
- **Special features of the structure of the indicator system:** the MONET system is structured so that certain aspects of sustainable development, such as «equality of opportunity» and «regional disparities», are integrated across all topics. These topics are modelled by the «structural criteria» (columns of the grid) and thus no longer need to appear in the list of topics.

Figure 9 lists the 26 topics of the MONET indicator system and indicates how they relate to the sustainable development postulates (see Section 4.5). The list of topics

reflects the current approach and may be adjusted to new requirements. It is not possible to make a definitive judgement as to the topics which are or will become relevant to sustainable development.

The interrelationships between the topics and the postulates are diverse and multidimensional. In each case, the table lists only the most important postulates which are deemed to be central evaluation criteria for a topic.

6 Selecting individual indicators

6.1 The selection process

The grid comprising types of indicators and themes provided the basic structure for setting up the indicator system. The next step was to fill in the indicators on the grid. Since this task requires specific knowledge of the various disciplines, and the offices directly affected were to be included, the process involved the participation of 13 working groups with over 80 specialists representing 20 federal offices. Their task was to propose indicators for their field with which it would be possible to assess whether Switzerland was developing in line with postulates concerning sustainability (see Figure 10). In this process, various prerequisites had to be respected (see Section 6.2), for example the number of indicators per theme, international comparability or the availability of data.

Once the indicators proposed by the individual working groups had been entered into the common grid, the project team checked the consistency of the overall system. Among other things this involved improving the connection possibilities between indicators for different themes, as well as allotting indicators chosen by more than one group to one single theme. In addition, the

Figure 10: Selection of indicators

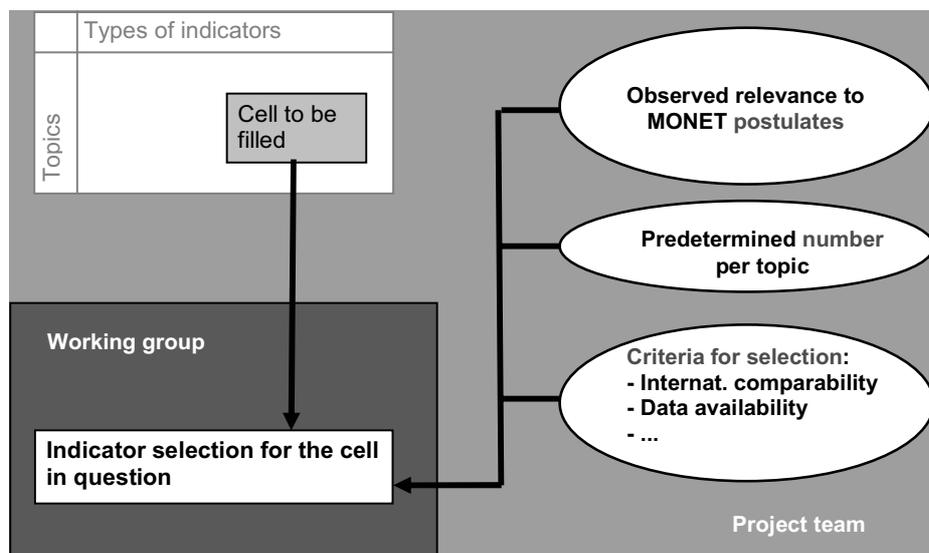


Figure 11: Criteria for selecting indicators

Criteria		Significance
Frame of reference	1. Of importance to Switzerland The indicator is relevant in the Swiss context, giving an indication of the «state of the nation».	XX
	2. Relevant with regard to MONET postulates The indicator may be directly derived from at least one of the MONET postulates.	XX
	3. Unambiguous with regard to evaluation The indicator is clear – there is no uncertainty about which direction is good and which bad. (* mandatory for capital and structural criteria only).	X*
	4. Responds rapidly to change The indicator responds rapidly to changed conditions.	X
	5. Temporal/spatial significance The indicator has far-reaching spatial and temporal significance.	X
	6. Urgency The indicator takes account of problems, including those over the long term, which are urgent in terms of sustainable development.	X
	7. Scarcity The indicator prefers objects which, in the long term, constitute a limiting factor.	X
User friendliness	8. Readily comprehensible The indicator is easy to interpret and its origin is transparent (physical things are preferable to monetary values and prices: e.g. number of years of healthy life instead of health expenditure)	XX
	9. Reasonable level of information content The indicator does not contain too little information (no yes/no indicators).	XX
	10. Relevant to the general public The indicator is attractive and relates to the users' everyday life.	X
	11. Politically relevant The indicator relates to an international or national commitment or objective.	X
Validity	12. Scientifically well-founded There is broad scientific consensus regarding the validity and reliability of the indicator.	XX
	13. Consensus regarding interpretation There is broad agreement with regard to the interpretation of the indicator.	X
Data availability	14. Available at low cost The indicator is based on readily available data or data which may be provided with little financial expenditure.	XX
	15. Regularly and homogeneously recorded data The indicator is based on data which at present are and in the future will be recorded regularly and in a homogeneous manner.	XX
	16. Quantifiable The indicator is based on quantifiable data. (This does not exclude subjective, qualitative statements.)	XX
	17. Representative of the whole of Switzerland The indicator is based on data which are representative of the whole of Switzerland.	X

XX: mandatory requirement **X:** desirable

suitability of all the indicators was examined a second time and, if necessary, alternative suggestions were made.

The revised set of indicators was then submitted to the individual working groups and the technical and strategic advisory groups for their views. The proposed modifications were carefully examined and taken into consideration as far as possible. Lastly, the final version of the set of indicators was approved by the project supervisors. This version is shown in Chapter 7.

6.2 Criteria for selection

The working groups were given various prerequisites for selecting individual indicators. These prerequisites were drawn up by the project team, also on the basis of the general requirements (see Section 3.3).

- Only indicators which were clearly related to a sustainability postulate should be selected.
- The number of indicators for each theme was limited. This meant that each working group was obliged to choose those aspects from among a large number which are of particular importance with a view to assessing sustainability.
- Within this limited number, various types of indicators were to be considered. What was required was at least either one input/output or a capital indicator, as well as one level indicator and a structural criterion, whenever possible. For the remaining indicators, it was required that no more than two indicators be proposed per box in order to avoid duplication.
- Since it is an expensive business to organise new surveys, which can in any case only be realised in the medium term, the working groups were instructed to use existing indicators whenever possible. At the same time, however, they were recommended to point out serious gaps.
- In order to allow for the possibility of comparisons with other countries the availability of common international indicators was to be checked when the grid was filled in. This involved consulting the reference list of indicators, those used by the UN-CSD⁵⁷ being given first priority, followed by those used by the OECD and EUROSTAT. Only if no common international indicators were available or if those were deemed inappropriate, other indicators were to be used.

In addition, a series of further criteria concerning reference framework, user-friendliness, validity and availability of data were to be taken into consideration (see Figure 11).

⁵⁷ Cf. United Nations 2001.

7 The MONET system of indicators

7.1 List of the indicators selected

A system including 163 individual indicators was devised using the selection process described above. The indicators are shown in Figure 12.

The indicator grid is divided into a total of 26 themes (see description in Section 5.4). With each indicator, the trend in relation to one or more postulates can be followed. The numbers given in the column headed «Reference to postulates of sustainable development» show for each indicator which postulates are most relevant. The text of the postulates is given in Section 4.5.

In addition, the set of indicators embraces various aspects which are relevant to sustainable development: the degree to which social needs are met, expenditure for that purpose, the current situation with regard to resources and the level of efficiency and appropriateness of their use. The aspect in question is given in the column headed «Type of indicator».

The experts who made up the working groups also proposed a number of indicators which cannot be used at present owing to the lack of a measurement concept, the lack of data or for other reasons. These indicators are shown in italics in the table. They are merely working titles and need to be examined in more detail in feasibility studies.

There is already a sizeable list of indicators used in the MONET project, amounting to a total of around 135. Although this large number could be seen as a problem there is the advantage that it represents a pool of subgroups for specific applications. It includes flagship indicators, indicators that can be used for comparisons with other countries, or selections for specific questions.

The set of indicators shown in Figure 12 represents the basis for the production and dissemination of the MONET project sustainability indicators. Once this work has been completed it will be evaluated in detail and, if necessary, modified in line with new findings. Preliminary considerations in this connection can be found in Sections 9 and 10. Some indicators have already proved to be inadequate and may therefore be eliminated.

7.2 Characteristics of the set of indicators

Out of the 135 indicators which can already be produced 30 concern level, 30 input/output, 29 capital stock, 33 structural criteria and 13 responses. The first four

Figure 12: The indicators used in the MONET project

No.	Name	Type of indicator	Reference to postulates of sustainable development
1 Social security and prosperity			
1.1	Household income	L	1a, 2a, 2c
1.2	Inequality of income distribution	S	4b
1.3	Population living below poverty line	S	1a, 2a, 2c
1.4	Population living below poverty line by sex	S	2c, 4a,b
1.5	Transfer income of private households	R	2a, 2c
1.6	Net financial flow of social security	IO	2a, 2c
2 Health			
2.1	Healthy life expectancy	L	2b
2.2	Psychic well-being	L	2b, 3a, 3b
2.3	Health behaviour: physical exercise	IO	2b
2.4	Smoking habit	IO	2b
2.5	Expenditure on health	IO	2a, 2b
2.6	Expenditure on prevention and health-promotion	S	2b
2.7	<i>Social gradient of healthy life expectancy</i>	S	2b, 10a
3 Subjective living conditions			
3.1	Suicide rate	L	2b, 3a, 3b
3.2	Contentment with life	L	2a, 3a
3.3	Contentment with life by age	S	2a, 3a, 4b
3.4	Contentment with life by income	S	2a, 2b, 3a
3.5	Availability of a person to rely upon	IO	2b, 3a, 5a
3.6	<i>Identity creating environment</i>	IO	20
4 Housing			
4.1	Floor area per person	L	2a, 16b
4.2	Contentment with housing conditions	L	2b, 3a, 3b
4.3	Housing costs	IO	2a, 4b

4.4	Renovation activities	S	16b, 17a
4.5	Lack of housing	S	2a
5 Culture and leisure			
5.1	Regular use of a second national language	C	1a, 5a, 10a
5.2	Public expenditure on culture	IO	2a, 7a, 7d, 10a, 10d
5.3	Population disposing of sufficient spare time	L	3a
5.4	Journeys by air	L	16a, 16b, 17a, 17b
5.5	Share of human powered mobility in recreational traffic	S	2b, 16a, 16b, 17a
5.6	<i>Recreation opportunities in vicinity of residential area</i>	C	2a, 2b, 3a
5.7	<i>Attendance at cultural events</i>	IO	5a, 7a
6 Social cohesion and participation			
6.1	Active membership of associations and organisations	C	5a, 5b
6.2	Population eligible to vote	C	4c, 5b
6.3	Voluntary work	IO	2a, 5a, 5b, 10a
6.4	Women in the National Council	S	1a, 4a, 4b, 4c, 5b
6.5	Index of socio-demographic burden of cantons	S	4b, 4c, 5a, 5b
6.6	Inequality of tax burden	S	4c
6.7	School life expectancy of foreigners and Swiss citizens	S	4a, 4b, 4c
6.8	Naturalisation quota	R	4c, 5b
6.9	<i>Opportunity for participation in local processes</i>	C	5a, 5b
7 Development cooperation			
7.1	Total official development assistance (ODA)	IO	6a
7.2	ODA to least developed countries	S	6a, 6c
7.3	Attitude towards development assistance	R	6a
8 Education and science			
8.1	Reading skills of 15-year-olds	L	5b, 7a, 7c, 7d, 10a, 10b, 10c
8.2	Social gradient of reading skills of 15-year-olds	S	4a 4,b, 7d

8.3	School life expectancy	C	5b, 7a, 7c, 7d 10a
8.4	School life expectancy by sex	S	4a, 4b, 4c, 7a, 7c, 7d, 10a
8.5	Public expenditure on education	IO	5b, 7a, 7b, 7c, 10a
8.6	Hours spent on further education	IO	7a, 7c, 10a
9 Information			
9.1	Media use	L	7a, 7b, 7c, 10a
9.2	Internet use	L	7a, 7b, 7c, 10a
9.3	Internet use by sex	S	4a, 4b, 4c
9.4	Concentration of press	C	7a, 7b
9.5	Environmental management systems	R	12a, 12b, 12c
10 Physical security			
10.1	Violent crime	L	2a, 2b
10.2	Hazardous incidents	L	2a, 2b 18b, 18c
10.3	Killed and injured persons in road traffic	L	2a, 2b
10.4	Hazardous factories / plants	C	2a, 2b, 15a, 18b, 18c
10.5	Accident events caused by natural disasters	IO	2a, 2b, 3b
10.6	<i>Domestic violence</i>	L	2b, 3a
11 International trade and competitiveness			
11.1	Integration in international market	L	8, 9b, 10b, 14a, 14b
11.2	Swiss share in OECD exports	L	2a, 10a, 10b, 14a, 14,b
11.3	Level of public-sector debt	C	10b, 10d
11.4	Deficit/GDP ratio	C	10b, 10d
11.5	Tax revenue per GDP	C	10b
11.6	Labour productivity	C	10a
11.7	Duty-free import quota	IO	8, 9a, 10b, 14a, 14b
11.8	Corruption	S	8, 10b
11.9	Consumption of products from fair trade	R	12b, 14a
11.10	ODA provided to help build trade capacity	R	6a, 14b
11.11	<i>Capital stock</i>	C	10a

12 Domestic markets			
12.1	Level of prices	L	2c, 9a
12.2	Share of market in GDP	L	9a
12.3	Environment-related taxes	R	9a, 9b9c, 12a, 12b
12.4	Greening of the tax system	R	9a, 9b, 9c, 13
12.5	<i>Degree of internalisation of external costs of fossil fuels</i>	C	9b
12.6	<i>Degree of regulation of markets</i>	C	9a, 9c
12.7	<i>Subsidies harmful to the environment</i>	IO	9b
12.8	<i>Environment-related subsidies</i>	R	9b, 9c
13 Employment			
13.1	Unemployment rate	L	2a, 2c, 11b, 13
13.2	Contentment with work	L	3a, 3b, 13
13.3	Activity rate	C	10a
13.4	Job creation	IO	2a, 2c, 10a, 11b, 13
13.5	Working Poor	S	2a, 2c, 11b, 13
13.6	Wage disparities by sex	S	1a, 4a, 4b, 4c, 13
13.7	Vertical segregation in the labour market by sex	S	1a, 2c, 4a, 4b, 4c, 8, 10a
13.8	Total time spent on paid labour and family chores by sex	S	3a, 4a, 4b, 7d
14 Research, development and technology			
14.1	Patent applications	C	10a, 10b, 10c
14.2	Human resources in science and technology	C	10a, 10b, 10b, 13
14.3	Expenditure on research and development	IO	10a, 10b, 10c
15 Production			
15.1	GDP per capita	L	2a, 10a
15.2	Cultivated land	C	2a, 16a,, 16b, 20
15.3	Investment rates in GDP	IO	10a
15.4	Energy consumption in the industrial and services sector	IO	12a, 16a, 16b
15.5	Energy intensity in the industrial and services sector	S	12a

15.6	Organic farming	S	12a, 12b, 17a, 17b, 18a
15.7	<i>Material efficiency of economy</i>	IO	12a
16 Consumption			
16.1	Consumer expenditure	L	2a
16.2	Consumption of organic products	S	12b
16.3	Environment-related levies	R	9b, 12b
16.4	<i>Market share of non-food goods with eco-labels</i>	S	12b
17 Mobility			
17.1	Performance of passenger traffic	L	2b, 10a, 10b, 12a, 12b, 16b, 17a
17.2	Modal split in passenger transport	S	2b, 10a, 10b, 12a, 12b, 16b, 17a
17.3	Performance of goods traffic	L	2b, 10a, 10b, 12a, 16b, 17a, 20
17.4	Modal split in goods traffic	S	10a, 10b, 12a, 12b, 16b, 17a
17.5	Number of landings / take-offs	L	10a, 10b, 16a, 16b, 17a
17.6	Number of households with a car	C	10a, 12b, 16a, 16b, 17a, 17b
17.7	Accessibility of public transport	C	4b, 4c, 12a, 16b, 17a
17.8	Final energy consumption of traffic	IO	2a, 2b, 10a, 12a, 12b, 16b, 17b, 18c
17.9	Intensity of goods traffic per GDP	S	12a, 12b, 16b, 17a
17.10	Total costs of traffic	IO	9b
18 Materials, wastes and immissions			
18.1	Population exposed to noise	L	2b
18.2	Heavy metal contamination of sewage sludge	C	15a, 17b
18.3	Radioactive waste stocks	C	15a, 17b
18.4	Disposed household waste	IO	12a, 12b, 16a, 16b, 17a, 17b
18.5	Generation of hazardous waste	IO	2b, 12a, 12b, 17a, 17b
18.6	Waste recycling	S	12a, 12b, 16a, 16b, 17a, 17b

18.7	Non-ionising radiation	L	2b
19 Soil			
19.1	Heavy metal contamination	C	2a, 2b, 17b, 18c
19.2	Contamination with PAH (polycyclic aromatic hydrocarbons)	C	17b, 18c
19.3	Cropable land	C	2a, 15a, 16b, 20
19.4	Pollutants input into the soil	IO	17b, 18a, 18c
19.5	<i>Soil compaction</i>	IO	16a, 16b
19.6	<i>Risk of soil erosion</i>	IO	16a, 16b
20 Water			
20.1	Water use	L	2a, 16a
20.2	Nitrate concentrations in groundwater	C	17a
20.3	Phosphorus concentrations in lakes	C	17a
20.4	Public expenditure on wastewater treatment	IO	9b, 9c, 12a, 17a, 17b
20.5	Space requirement of flowing waters	C	18a, 18b, 20
21 Air			
21.1	Population exposed to excessive immissions	L	2b
21.2	Concentration of nitrogen dioxides	C	2b, 17a
21.3	Concentration of ozone	C	2b, 17a
21.4	Concentration of respirable fine particles	C	2b, 17a
21.5	Emissions of NO _x -, NH ₃ - and NMVOCs	IO	2b, 17a
21.6	Consumption of fossil fuels	IO	2b, 16b, 17a, 18c
22 Climate			
22.1	Annual mean temperature in Switzerland	L	18c, 19
22.2	Emission of greenhouse gases	IO	17a, 18c, 19
22.3	Carbon intensity of individual motorised traffic	S	12a, 12b, 17a, 18c, 19
22.4	Carbon intensity of economy	S	12a, 12b, 17a, 18c, 19

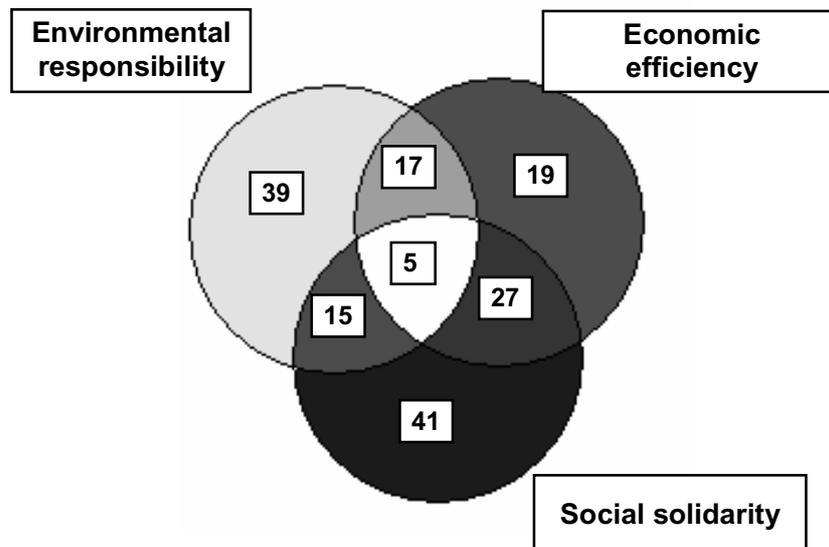
23 Land use			
23.1	Built-up area per capita	L	2a, 15a, 16b, 20
23.2	Landscape diversity	C	2a, 15a, 16b, 19, 20
23.3	Built-up area	IO	2a, 15a, 16b, 19, 20
23.4	Extent of utilisation	S	2a, 16b
23.5	Area identified for settlement	R	2a, 16b
23.6	<i>Urban sprawl</i>	S	<i>16b, 20</i>
24 Biodiversity			
24.1	Biodiversity	C	18a, 19, 20
24.2	Net change in the threatened status of species	C	18a, 19, 20
24.3	Diversity of habitats	C	15b, 18a, 19, 20
24.4	Livestock races and agricultural plant varieties	C	18a, 19, 20
24.5	Protected areas	R	15b, 18a, 18b, 19
24.6	Ecological balance areas	R	15a, 15b, 18a

25 Energy			
25.1	Useful energy consumption	L	2a, 16a, 16b, 17a
25.2	Output of power stations	C	2a, 10a
25.3	Final energy consumption	IO	2a, 12a, 12b, 16a, 16b, 17a
25.4	Energy intensity of economy	S	2a, 12a, 12b, 15a, 16a, 16b, 17a, 19
25.5	Renewable energies	S	15a, 16a, 16b, 17a, 18c, 19
25.6	«Minergie» buildings	R	12c
25.7	<i>Grey energy</i>	<i>IO</i>	<i>2a, 16a, 16b, 17a</i>
26 Forests			
26.1	Forest area	C	2a, 15a, 15b
26.2	Ecological quality of forests	C	18a, 19
26.3	Condition of protective forest	C	2a, 2b, 3b
26.4	Wood harvesting intensity	IO	15a, 16a, 18a
26.5	Subsidies for forestry	IO	10d, 15a

Indicators in italics are not feasible in near future.

Type of Indicator: L Level
 C Capital
 IO Input/Output
 S Structural criteria
 R Response

Figure 13: Coverage of the three qualitative objectives by the set of indicators



types of indicators are thus represented more or less equally. In contrast, relatively few response indicators have been selected. This can be partly explained by the fact that such indicators often do not provide a clear picture with regard to sustainable development (for example, increasing taxes linked with the environment may be the result of increased emissions, or alternatively of an increase in tax rates).

Distribution in relation to the three qualitative objectives is also of interest. One single indicator may relate to more than one objective, as can be seen from Figure 13. Social solidarity is the theme best taken into account with 88 indicators, while economic efficiency is the least covered theme with only 68. With 76 indicators, ecological responsibility is situated in the middle. The distribution pattern is not always clear, however, and should therefore be interpreted with caution.

8 Production and dissemination of the indicators

8.1 Presentation grid

After the individual indicators had been selected, data had to be collected and the corresponding accompanying text and background information (e.g. metadata) had to be drawn up. For publication on the web (see Section 8.2) all the indicators are shown on a standard grid. This should enable the reader to find information quickly and easily, as well as ensuring a homogeneous style of presentation. The individual headings and the elements given under them are listed in Figure 14, while Figure 15 gives a concrete example. This kind of detailed indicator presentation that is based on a database exists in French and German only.

Figure 14: Grid for publishing the individual indicators

Heading	Elements
Significance of the indicator	<ul style="list-style-type: none"> • Repetition (possibly modified) of the text of those postulates whose fulfilment is to be checked using the corresponding indicator. • Description of the indicator and the values used for measuring. • Brief assessment of the pertinence of the indicator in relation to observing the phenomenon described by the postulate (of the possibilities and limits). • Numbers and titles of the postulates which are relevant to the indicator in question. • List of other indicators which are linked to the indicator described. • Mention of the measures included in the Federal Council's Sustainable Development 2002 strategy if any relate to the indicator described.
Comments	<ul style="list-style-type: none"> • Description of the procedure and analysis of possible causes. If required, additional information about the composition of the final results (e.g. distribution according to age, gender or region). • Evaluation of the trend in relation to sustainable development. As a rule, the period of time since the publication of the Brundtland Report (1987) is the deciding factor. • Comparison of observations with corresponding data from selected countries or with mean values for groups of countries (in particular, EU or OECD).
Figures and tables of values	<ul style="list-style-type: none"> • Presentation of data in the form of a graph or bar chart. For the sake of clarity, whenever possible only one variable should be presented (no fragmentation). • List of individual values by year.
Definitions	<ul style="list-style-type: none"> • Definition of the indicator using the measuring values applied, scope of reference and time periods. Explanation of the terms used.
Methodology and remarks	<ul style="list-style-type: none"> • Mention and description of the surveys from which the data was taken. If necessary, description of how data was converted. • Assessment of international comparability by naming the organisations which use the same or similar indicators. • Description of measures taken in relation to the Federal Council's Sustainable Development 2002 strategy if it is mentioned under the heading «Significance of the indicator».
Sources	<ul style="list-style-type: none"> • Indication of data sources and surveys from which the data used was obtained. • Mention of publications in which the data first appeared. • Links to further information.

Figure 15: Exemple de présentation d'un indicateur⁵⁸

Intensité énergétique

Importance de l'indicateur

Le développement durable exige de satisfaire les besoins existentiels et, dans une certaine mesure, les besoins plus larges de la population (postulat 2a), sans que cela porte atteinte à l'environnement (postulat 15a). Quand la population s'accroît, la production et la consommation doivent ménager davantage les ressources de l'environnement. Autrement dit, l'économie doit réduire l'intensité de l'exploitation des ressources et de l'environnement.

Cet indicateur présente l'évolution de l'intensité des ressources en prenant pour exemple l'énergie, en raison de l'importance de cette dernière: l'économie en dépend, et la consommation d'énergie entraîne des conséquences écologiques. L'indicateur mesure la quantité d'énergie qui est consommée par rapport à la production économique, ce qui permet d'apprécier l'optimisation des flux de substances. Une réduction de l'intensité énergétique peut toutefois également s'expliquer par la délocalisation à l'étranger de processus de production particulièrement énergivores. L'ampleur de cette réduction détermine aussi si celle-ci est suffisante ou non à un développement durable: si la consommation d'énergie augmente en chiffres absolus (voir indicateur 25.3), il faut en déduire que la réduction de l'intensité énergétique a été plus que compensée par la croissance économique.

Postulats en relation avec cet indicateur: Nos 2a Satisfaction des besoins, 12a Production compatible avec l'environnement, 12b Consommation so-

ciale et compatible avec l'environnement, 15a Sauvegarde des ressources naturelles, 16a Limitation de l'utilisation des ressources renouvelables, 16b Limitation de l'utilisation des ressources non renouvelables, 17a Limitation des déchets biodégradables et des polluants, 19 Respect de la durée des processus naturels.

Lien avec d'autres indicateurs: Nos 12.4 Réforme fiscale écologique, 15.1 Produit intérieur brut par habitant, 15.4 Consommation d'énergie pour la production de biens et services, 16.1 Dépenses de consommation, 16.3 Prélèvements fiscaux liés à l'environnement, 17.8 Consommation finale d'énergie pour les transports, 22.2 Emissions de gaz à effet de serre, 25.3 Consommation finale d'énergie

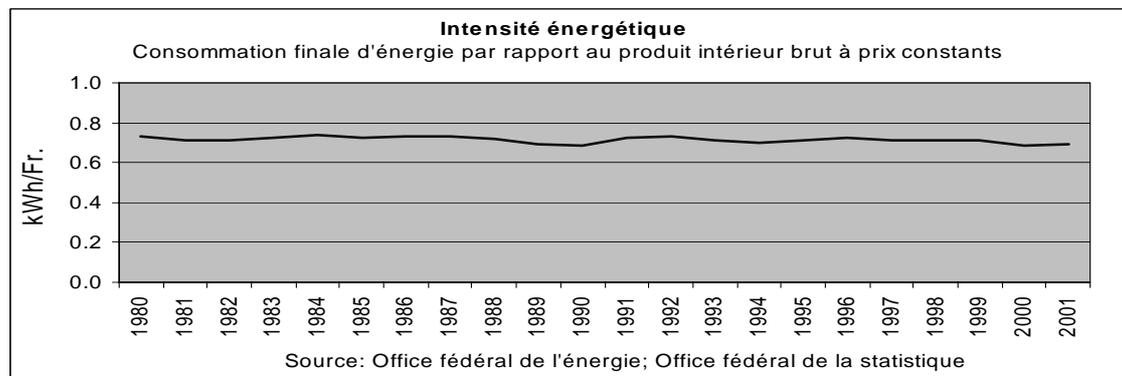
Relation avec la Stratégie 2002 pour le développement durable: action 9 «Développer les politiques énergétique et climatique»

Commentaire

L'intensité énergétique de la production évolue irrégulièrement depuis 1980. Une légère tendance à la baisse se dessine toutefois. Il n'est pas possible d'apprécier dans quelle mesure ce recul est neutralisé par un surcroît d'importations de biens dont la production exige une grande quantité d'énergie.

La réduction de l'intensité énergétique ne doit pas faire oublier que la consommation a augmenté en chiffres absolus (voir indicateur 25.3). Les progrès technologiques réalisés dans l'utilisation énergétique n'ont donc pu compenser qu'une partie de la hausse de la consommation induite par la croissance économique.

Graphique et tableau



⁵⁸ In French and German only.

Consommation finale d'énergie par rapport au produit intérieur brut à prix constants, en kWh par franc							
1980	0.73	1986	0.73	1992	0.73	1998	0.71
1981	0.72	1987	0.73	1993	0.71	1999	0.71
1982	0.71	1988	0.72	1994	0.70	2000	0.69
1983	0.73	1989	0.69	1995	0.71	2001	0.70
1984	0.74	1990	0.69	1996	0.73		
1985	0.72	1991	0.73	1997	0.71		

Sources: Office fédéral de l'énergie, statistique globale de l'énergie
Office fédéral de la statistique, comptes nationaux

Définitions

Consommation finale d'énergie par rapport au PIB, à prix constants.

Consommation finale d'énergie

L'énergie finale désigne l'énergie achetée ou produite par le consommateur pour un usage déterminé, p. ex. le courant d'éclairage ou l'essence pour l'automobile. Elle se situe à la fin de la chaîne commerciale. Contrairement à l'énergie brute, les pertes de transmission et de distribution, la consommation propre du secteur énergétique, les produits pétroliers non énergétiques obtenus dans les raffineries suisses (bitume, lubrifiant, etc.) et les produits servant à générer de l'électricité et de la chaleur à distance ont été déduits.

Produit intérieur brut

Mesure de la valeur de marché de tous les biens et services produits sur le territoire national d'un pays en l'espace d'une année.

Méthodologie et remarques

Les chiffres sur la consommation finale d'énergie sont extraits de la statistique globale suisse de l'énergie. Cette statistique de synthèse, établie par l'Office fédéral de l'énergie, se base sur plusieurs enquêtes sur la production et la consommation d'énergie. Le PIB est calculé tous les ans par l'Office fédéral de la statistique.

Stratégie 2002 pour le développement durable: action 9 «Développer les politiques énergétique et climatique»

La réduction des émissions de CO₂ est une priorité du Conseil fédéral. Le programme SuisseEnergie et les instruments de la loi sur l'énergie et de celle sur le CO₂ constituent les bases du développement de la politique énergétique et climatique actuelle en faveur d'un approvisionnement énergétique à long terme respectueux du climat.

Comparabilité internationale

L'indicateur a un usage international. Il est utilisé par l'OCDE et par l'Agence européenne pour l'environnement. Il figure également sur la liste de la CDD-NU.

Sources

Office fédéral de l'énergie: statistique globale de l'énergie
Office fédéral de la statistique: comptes nationaux

Publication: Office fédéral de l'énergie: Statistique globale suisse de l'énergie 2001. Berne 2001.

Liens:

<http://www.energie-schweiz.ch/imperia/md/content/statistikperspektiven/gesamtenergie/7.pdf>

http://www.bfs.admin.ch/stat_ch/ber04/vg2000/fvg2000.htm

The accompanying texts for the individual indicators were submitted to the sources of the data and selected

specialists from the federal offices directly involved and revised on the basis of the comments received.

8.2 Dissemination of the results

The provisional results of the MONET project are published at three levels: on a web platform for the individual indicators and in two printed publications.

The format used for SFSO indicators has been adopted for the internet presentation. Through the homepage visitors to the site can access a list of indicators arranged by theme. If a specific indicator is selected the visitor can then see the texts under the headings «Significance of the indicator» and «Comments», as well as a graph with a table of values (see Figure 15). There are also links to methodology, definitions and sources.

The «MONET – Indicators and Comments» report is aimed at the general public, the administration, NGOs, private industry, political circles, the media, schools and universities which are interested in sustainable development and already have some knowledge of the subject. The publication is made up of two parts:

- the indicator section, where a double-page shows all the indicators presented in a standardised form (brief explanation, graphs and symbols for assessing development). This aims to provide an overview of the indicator system as well as the current situation and development for each indicator. The indicators have not been aggregated or further assessed, however;
- the comments section, which includes three journalists' separate preliminary assessments of the current situation in Switzerland with regard to sustainable development, based on the indicator system. The aim of these commentaries is to identify the possible causes of positive or negative trends, as well as the areas where action should be given priority. In addition, members of the strategic and technical advisory groups have the opportunity to assess trends in brief.

In contrast, this publication, «Final Report – Methods and Results», is aimed more at specialists within Switzerland and abroad who deal with questions concerning the concept of indicator systems.

9 Experience with the procedure used

9.1 Regulatory framework and grid

Although helpful, formulating a clear regulatory framework at the same time proved to be time-consuming: thanks to the interpretation of the definition of sustain-

ability and in particular the postulates it was possible to reach a uniform understanding of what exactly should be measured. In this way the working groups were able to concentrate on selecting the individual indicators without first having to discuss at length the interpretation of the term «sustainable development». In controversial areas in particular, the postulates were helpful in finding indicators which could be used to shed light on the important aspects of sustainable development.

In view of the degree of detail, the interpretation of sustainability and the wording of the postulates are unusual compared with other indicator projects. New territory was covered in particular with the wording of the postulates for economic efficiency and social solidarity. Individual postulates require more in-depth reflection, however. For example, the call for public funds for development aid to be principally directed towards poorer countries has to compete with the funding of projects aimed at maintaining peace and stability in emerging countries (mainly in eastern and south-eastern Europe).

Originally, drawing up the postulates was intended to help structure the individual themes. This was not the case, however, and instead the structure of the expertise on federal policy regarding sustainable development⁵⁹ was adopted with some slight modifications.

When the advisory groups were consulted, the structure of the indicator grid did not find unanimous approval. In particular, an alternative was proposed which comprised various activities (work, leisure, living, etc.) and various types of capital stock (money, soil, air, water, etc.). For reasons of feasibility, this proposal, which was interesting as a concept, was not pursued, however. The causal links between the given activities and the change in capital stock are mostly only qualitative and in particular unknown in such a detailed form. Consequently, the data required for drawing up such a grid (for example for the impact of leisure activities on air as a capital resource) is not generally available.

9.2 The selection process

The selection of individual indicators by the working groups proved to be time-consuming, as well as very demanding for the project team. The procedure was worth the effort, however, since it was possible to include the necessary expert knowledge as well as the participation of interested parties. Moreover, it was a way of creating awareness of the concept of sustainable development and more specifically the MONET project among the individual federal offices.

⁵⁹ Mauch Consulting, Infrac, Ernst Basler & Partners AG 2001.

The selection procedure proposed by the project team (indicator grid, selection criteria) was well accepted, which meant that the working groups showed a high level of commitment and produced constructive suggestions. Discussions within the working groups also revealed varying degrees of understanding of the term «indicator», however, as well as differing concepts of sustainable development. Reaching agreement was consequently a laborious process at times. Nevertheless, the result can be considered as generally acceptable.

It should be pointed out that the above remarks concerning participation and consensus refer only to the federal offices which were directly involved. With very few exceptions, the working groups did not include representatives from the private sector. Owing to limited resources and time it was decided not to attempt a broader inclusion. Representatives of scientific circles and non-governmental organisations had the opportunity to comment on the set of indicators as part of the consultation process carried out by the strategic advisory group. The influence of the private sector was quite considerable during the preliminary work in that during the hearings concerning the pilot study, representatives of various organisations provided valuable input regarding the design of the future indicator system.

The strict conditions (grid, criteria, limited number of indicators per theme and type) played a major role in ensuring that the set of indicators was relatively well balanced in its themes and that the three dimensions were covered to a similar extent. At the same time, however, they resulted in important and interesting indicators (e.g. structural criteria) sometimes being dropped in favour of more significant ones (e.g. indicators concerning tasks).

9.3 The set of indicators

The selection process, which lasted around 18 months, resulted in a set of indicators which offers a mass of information. It is also especially noticeable that the indicators for social solidarity are well represented in comparison with indicator sets for sustainability used by other countries.

The indicator system also has a number of aspects where there is room for improvement:

- Indicators that link several qualitative aims or several themes are in the minority. The result is therefore a long list of indicators which, although often interesting, are generally isolated and do not link up with others.
- The grid should also have served to enable indicators of various types within one theme to be directly linked, as indicated in Figure 8. It would have been desirable if the same values could have been used to measure indicators of level, input/output and structure. This is important in particular for reducing the risk of false interpretation. It must be admitted that this idea was achieved in only a few themes, either because the necessary data was not available or because the working group set other priorities owing to the limited number of indicators.
- The indicators for capital concern fairness vis-à-vis future generations and the structural criteria fairness within the present generation. For this reason they are of special importance in relation to assessing sustainability. And it was precisely with these two types of indicators that it was difficult to find suitable data for certain themes.
- Regarding sustainable development, observations concerning regional disparity would also have been of national interest. Appropriate data and methods are available only for a few of the indicators selected, however.
- No indicators were selected for certain postulates, either because suitable data could not be found or because it was not considered to be sufficiently important. This applies in particular to indicators for «child-friendly environment» (7d), «predictability of changes in the system» (11a), and «world trade from which all parties can profit» (14b).
- For certain indicators, statistics drawn up by private institutions were used instead of data gathered by independent public offices. Examples include the indicators for «corruption» (11.8), «environmental management systems» (9.5) and «consumption of products from fair trade» (11.9). In these cases, the selection of the characteristics observed or the independence of the evaluation were decisive.
- Several indicators which were considered appropriate by the working groups later proved to be unsuitable, of less use or controversial. For example, with regard to the indicator for «share of market in GDP» (12.2), not only has virtually no change been seen over the years but it is questionable whether state provision for sustainability is worse than private provision. Evaluations using indicators for globalisation (11.1, 11.2, 11.7 and 11.10) could also give rise to controversy. The aim of the indicator for «activity rate» (13.3) was to assess the value of household chores, bringing up children, or leisure time in comparison with work-time. These examples show that assessing suitability without considering in detail the relevance to sustainability can be problematic. A difficulty consequently arose owing to the fact that the list of indicators had to be edited and approved before the indicators' suitability could be verified in detail. Subsequent corrections are therefore essential.
- In most cases, the trend observed with individual indicators does not allow for any clear evaluation to be made in relation to sustainability, in particular regard-

ing response indicators. For example, «environment-related taxes» (12.3) could be the result of the tax system being made more environmentally stringent or equally of an increase in activities which damage the environment. Similarly, the increase in «transfer income of private households» (1.5) could indicate rising poverty or more solidarity within society. A similar ambiguity can also be seen in relation to «expenditure on health» (2.5) and «public expenditure on wastewater treatment» (20.4).

9.4 Production and dissemination

The detailed instructions concerning the content and structure of the accompanying texts for the indicator pages on the web platform proved their worth. Thanks to their clarity they made the editing process easier as well as helping users to find the answers to specific questions.

In most cases the graphic illustrations provided little information since they each contain only one piece of information. It would be of interest to combine different variables in one graph. In particular, graphic illustrations with only one or a small number of values do not really convey anything. This is not a reason for omitting such indicators, however, since further observations will be added in the future.

In the «Sustainable Development in Switzerland – Indicators and Comments» report a first step towards establishing links between the individual indicators is the synoptic presentation of all indicators for one single theme on one page. In this respect, further efforts need to be made in relation to inter-theme considerations, however.

10 Prospects

With the completion of the initial phase of the MONET project a first step in setting up a monitoring system for sustainable development in Switzerland has been achieved. The result is a set of 163 indicators which should make it possible for the first time to have a satisfactory overview of the successes and failures of Switzerland's efforts to achieve sustainability.

With this first phase of the project, the necessary work to establish a long-term monitoring system is far from over, however. Further work is needed to update the material we have now and to implement the knowledge

that has been gained. Accordingly, in its «Strategy for Sustainable Development», the Federal Council adopted measure no. 21 «Monitoring sustainable development». This measure comprises four tasks.

Firstly, the indicators already documented have to be regularly updated. This includes updating the graphic illustrations and tables as well as taking into account the latest developments in the commentaries.

Secondly, the set of indicators needs to be evaluated. It is only experience and feed-back from users that will show whether the system is suitable and where it needs to be modified. In view of the probability of new situations arising and new data being available, it is expected that additional indicators will have to be used. On the other hand, some indicators may well prove to be unsuitable or not indicative. After careful examination, it will have to be decided which indicators can be omitted or replaced by suitable alternatives without a major loss of information. The aim is to establish a long-term procedure by which the indicator system is at the same time streamlined and made more pertinent.

Thirdly, any obvious gaps in the data must be filled, including regionalised data. In this connection, various possibilities for gathering data should be checked out through feasibility studies and priorities should then be set.

Fourthly and lastly, the dissemination of the results obtained should be improved. On the one hand, the presentation of information should be diversified («MONET in Brief», a report on the state of sustainable development, brochures, etc.), and on the other, it will be necessary to summarise the specific results obtained using individual indicators in an overview. This can be approached in various ways.

- Key indicators:⁶⁰ from among the mass of indicators a selection is made of those which are considered particularly important and revealing. The result is a small set of especially significant and easily accessible indicators which can be used by the general public as yardsticks for judging the success or failure of sustainability policy.
- Synoptic tables:⁶¹ visual summaries can provide an overview of the various aspects of sustainable development.
- Sustainability index: a global index can be created from individual indicators to provide a global picture of the state of sustainable development.

⁶⁰ An example is the headline indicators used in the UK, cf. UK government 1998.

⁶¹ The Dashboard of Sustainability is recommended in this connection, cf. European Statistical Laboratory 1999.

The complexity of the subject can be reduced using key indicators and the principal messages can be communicated in an easily comprehensible way. On the other hand, the omission of a large part of the information may result in a one-sided or even distorted picture. Synoptic tables are therefore probably more suitable since they enable the reader to gain a more subtle and detailed picture of sustainable development. Divergent trends in different areas become apparent, which is important for decision-making and for planning the appropriate measures. Once evidence has been established it can have a considerable influence on opinion, as shown

by gross domestic product, for example. So far no general consensus has been reached, however, as to how to aggregate the data relating to the individual indicators, which is why this approach has been abandoned for the time being.

The overall aim is to obtain an up-to-date and appropriate measuring tool which is appreciated by the general public and creates awareness of the requirements of sustainable development. It is to be hoped that the results obtained from the MONET project help to meet these requirements as quickly as possible.

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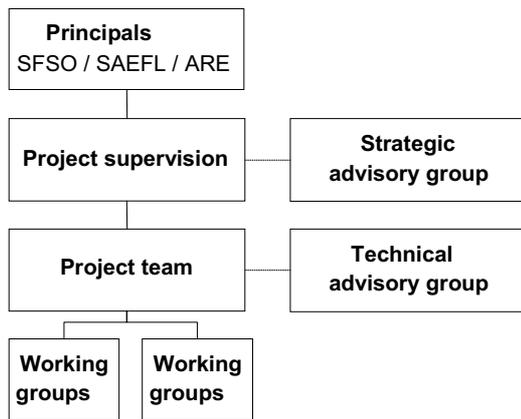
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Appendices

Appendix A: Project organisation



Project supervision:

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Secretariat for Economic Affairs), Peter Farago (Landert Farago & Partner, Zurich), Peter Knoepfel (IDHEAP), Christoph Koellreuter (FOCA, Basel), later replaced by Thomas Schoder, Hans-Jörg Lehmann (Swiss Federal Office for Agriculture), René Longet (equiterre), later replaced by Nicola Cantoreggi, Samuel Mauch (Mauch Consulting), Gabrielle Nanchen (Foundation for Sustainable Development in Mountain Areas), André Nietlisbach (Swiss Federal Chancellery), Christoph Ritz (Proclim), Karin Schulte (Office for Urban Development, City of Zurich), Otto Sieber (Pro Natura), Jean Simos (Central Office for Public Health, State of Geneva), Daniel Spreng (Centre for Energy Policy and Economics, Swiss Federal Institute of Technology Zurich), Denis Torche (Travail.Suisse), Ursula Ulrich-Vögtlin (Swiss Federal Office of Public Health)

Technical Advisory Group:

Olivier Jolliet (Laboratory for Ecosystem Management, Swiss Federal Institute of Technology Lausanne), Sonja Kahlmeier (Institute for Social and Preventive Medicine, University of Basel), Andreas Sturm, (Ellipson, Basel), Christian Suter (Institute of Sociology, University of Neuchâtel), Daniel Wachter (Federal Office for Spatial Development)

Working Groups:

13 working groups comprising experts from various specialised institutions

Appendix B: Mathematical model for indicator typology

Variables:

- L Level or extent to which needs are met and space used
- C Capital
- Δ Inputs and outputs
- ε Efficiency of capital utilisation (or $\pi = \varepsilon^{-1}$ specific resource consumption) (one of the structural criteria, S)
- R institutional responses

Provision of environmental, economic and social capital (C) is subject to continuous change, specifically as a function of in- and outputs Δ :

$$C_{t+1} = C_t + \partial C / \partial t \quad (1)$$

$$\text{where } \partial C / \partial t = f(\Delta_t) \quad (2)$$

The in- and outputs are here influenced – albeit often only over the relatively long term – by institutional responses (R):

$$\Delta_t = f(R_t, R_{t-1}, \dots, R_{t-n}) \quad (3)$$

Utilisation or improvement of capital, in other words in- and outputs (Δ), may proceed with a greater or lesser degree of efficiency. This has a direct impact upon the extent to which needs are met (L):

$$L_t = \varepsilon \cdot \Delta_t \quad (4)$$

Efficiency (ε) may accordingly be calculated as:

$$\varepsilon = L_t / \Delta_t \quad (5)$$

or the efficiency of specific resource consumption (π) as

$$\pi = \varepsilon^{-1} = \Delta_t / L_t \quad (6)$$

SFSO Publications

The Swiss Federal Statistical Office (SFSO) is the central and official purveyor of statistical information to the Swiss Government. It is officially mandated to supply this information to a wide range of users.

This statistical data is organized and disseminated on the basis of a subject-matter classification (see inside cover page).

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Sustainable development and regional disparities

SFSO / SAEFL / ARE: Sustainable Development in Switzerland – Indicators and Comments, Neuchâtel 2004

SFSO / SAEFL / ARE: Measuring Sustainable Development: Insights into MONET – the Swiss monitoring system. Neuchâtel 2002

SFSO and SAEFL: Sustainable Development in Switzerland – Factors for an indicator system. Neuchâtel 1999

These publications are available at the following internet address: <http://www.monet.admin.ch>

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SAEFL, Documentation, 3003 Berne, Fax +41 (0)31 324 02 16
Norbert Ledergerber, Phone +41 (0)31 324 78 30

ARE Publications

Sustainable Development Strategy 2002: Report of the Swiss Federal Council 27 March 2002

In this report, the Federal Council presents 22 specific measures to implement sustainable development.

Editor: Interdepartmental Rio Committee (IDARio)

Orders: BBL 812.014.e, free of charge, Swiss Federal Office for Buildings and Logistics (BBL), CH-3003 Bern.

On-line source: www.are.ch

Sustainability Assessment: Conceptual Framework and Basic Methodology

The purpose of the sustainability assessment framework is to evaluate and optimize federal projects and undertakings in relation to the goals of sustainable development. Published by Federal Office for Spatial Development (ARE), Department of Environment, Transport, Energy and Communications (DETEC).

Available from Internet: www.are.ch

www.are.ch

Regular updates on the national and international debate on sustainable development can be found on the website of the Federal Office for Spatial Development.

Both the United Nations Agenda 21 and the Swiss Federal Council's Strategy for Sustainable Development call for the regular production of sustainability indicators. Accordingly, the Swiss Federal Statistical Office (SFSO), the Swiss Agency for the Environment, Forests and Landscape (SAEFL) and the Federal Office for Spatial Development (ARE) launched the MONET project with the aim of setting up an indicator system for monitoring sustainable development. This brochure describes the methods chosen and results obtained.

In view of the many different interpretations of the term «sustainable development», the first step was to establish a clear frame of reference. On the basis of the definition of sustainable development used in the so-called Brundtland Report a total of 43 postulates were drawn up for the three target areas: social solidarity, economic efficiency and ecological responsibility. Subsequently, through a consultative process, indicators were selected by which it should be possible to monitor whether Switzerland is developing in line with these postulates. The result is a set of 135 indicators which are feasible today and 28 indicators which, owing to lack of data or measuring concepts, are not feasible at present.