

Sustainable Development in Switzerland

Factors for an indicator system

2

Geography and environment

A pilot study based
on the methodology
of the United Nations
Commission on Sustainable
Development (CSD)



Office fédéral de la statistique
Bundesamt für Statistik
Ufficio federale di statistica
Swiss Federal Statistical Office



BUWAL Bundesamt für Umwelt, Wald und Landschaft
OFEPF Office fédéral de l'environnement, des forêts et du paysage
UFAPP Ufficio federale dell'ambiente, delle foreste e del paesaggio
SAEFL Swiss Agency for the Environment, Forests and Landscape

Neuchâtel, 2000

The «Swiss Statistics» series published by the Swiss Federal Statistical Office (SFSO) covers the following fields:

- | | |
|-------------------------------------|---|
| 0 General topics | 10 Tourism |
| 1 Population | 11 Transport and communications |
| 2 Geography and environment | 12 Monetary policy, financial markets and banks |
| 3 Labour force | 13 Social security and insurance |
| 4 National Accounts | 14 Health |
| 5 Prices | 15 Education and science |
| 6 Production, trade and consumption | 16 Culture and living conditions |
| 7 Agriculture and forestry | 17 Politics |
| 8 Energy | 18 Public finances |
| 9 Construction and housing | 19 Law enforcement |
-

Sustainable Development in Switzerland

Factors for an indicator system

A pilot study based on the methodology
of the United Nations Commission
on Sustainable Development (CSD)

Authors

André de Montmollin, David Altwegg

Swiss Federal Statistical Office

Published by

Swiss Federal Statistical Office

Swiss Agency for the Environment, Forests and Landscape

Contacts for further information: André de Montmollin, SFSO, Phone 0041 (0)32 713 64 72
e-mail: andre.montmollin@bfs.admin.ch
Ariane Sotoudeh, SAEFL, Phone 0041 (0)31 323 07 33
e-mail: ariane.sotoudeh@buwal.admin.ch

Project managers: André de Montmollin, SFSO, David Altwegg, SFSO

Project team: Ariane Sotoudeh, Peter Grolimund, Nicolas Perritaz, Antoine Perruchoud, SAEFL
Dominique Martin, SFSO

Obtainable from: Swiss Federal Statistical Office
CH-2010 Neuchâtel
Phone 0041 (0)32 713 60 60 / Fax 0041 (0)32 713 3 60 61

Order number: 320-9900-01

Price: Sfr. 18.–

Series: Swiss Statistics

Field: 2 Geography and environment

Original text: French/German

Translation: SFSO and SAEFL Translation Services

Graphics/Layout: SFSO

Copyright: SFSO, Neuchâtel 2000
Reproduction with mention of source authorized
(except for commercial purposes)

ISBN: 3-303-02054-X



Contents

Preface

1 Introduction

2 Approach

3 Pilot project objectives

4 The indicators

4.1 Role of indicators

4.2 The CSD indicator system

5 Selection of indicators

5.1 Adopted approach

5.2 Results of the selection procedure

5.3 Gaps in the CSD indicator system

5.4 Indicators that cannot be implemented

6 Presentation and evaluation of indicators

6.1 Evaluation of indicators individually

6.2 Evaluation of the indicator system used

6.3 Evaluation of the adopted approach

6.4 Evaluation of sustainability

7 Continuation of work

7.1 Development of a «hybrid solution»

7.2 Presentation of results

8 Indicators (french or german)

Social aspects

1 Unemployment rate

2 Gini Index of income inequality

3 Net migration rate

4 Gross Domestic Product (GDP) spent on education

5 School life expectancy

6 Per capita consumption of fossil fuel by motor vehicle transport

7 Percent of population in urban areas

8 Area and population of urban formal and informal settlements

9 Floor area per person

Economic aspects

10 Gross Domestic Product (GDP) per capita

11 Annual energy consumption

12 Share of consumption of renewable energy resources

13 Total ODA as a percentage of GNP

14 External debt as a percentage of GNP

Environmental aspects

15 Domestic consumption of water per capita

16 Biochemical oxygen demand in water bodies

17 Land use changes

18 Use of agricultural pesticides

19 Use of fertilisers

20 Energy use in agriculture

21 Arable land area per capita

22 Protected area as a percentage of total area

23 Threatened species as a percentage of total native species

24 Emissions of greenhouse gases

25 Emissions of nitrogen oxides

26 Consumption of ozone-depleting substances

27 Ambient concentration of pollutants in urban areas

28 Household waste disposal per capita

29 Waste recycling and reuse

30 Generation of hazardous wastes

31 Import and export of hazardous wastes

32 Area of land contaminated by hazardous wastes

33 Generation of radioactive wastes

9 Bibliography

Annex 1: Full list of CSD indicators with results of selection stages

Annex 2: Explanations for the selection or elimination of the 59 relevant and implementable indicators

Annex 3: Framework for presenting sustainable development indicators

Annex 4: Proposal for flagship indicators in the field of transport

Annex 5: Economic indicators (proposals) Environmental Management System (EMS) Ethical, social or environmental investments



Preface

At the 1992 Conference on Environment and Development in Rio, Switzerland undertook to design and implement a policy aimed at promoting sustainable development. This commitment took practical shape initially in a sustainable development strategy published by the Swiss Federal Council in 1997 and subsequently through explicit mention of sustainable development in the preamble to and objectives of the new Federal Constitution adopted by the electorate on 18 April 1999.

The concept and aims of sustainable development fuel a far-ranging debate and raise many questions in the minds of both politicians and the general public. Are we a sustainable society? And if not, are we moving towards a sustainable society? Where do we stand in relation to other countries? What demands does sustainable development impose on our larger community?

To conduct a constructive discussion, we need assessment criteria and an instrument for measuring these criteria, which should not only permit the monitoring of sustainable development but also contribute to an increased awareness of its requirements and implications.

The Swiss Federal Agency for The Environment, Forests and Landscape (SAEFL) and the Swiss Federal Statistical

Office (SFSO) have taken the initiative on laying the foundation for such an instrument by conducting a joint pilot study on sustainable development indicators. The objective of this study is not to arrive at an operational system of indicators but to establish an initial indicator set, thus triggering a broad debate among the main players in sustainable development. Both our Offices have decided to emphasise existing indicators and their incorporation into an international context. For this reason, the study is largely based on the system of indicators drawn up by the United Nations Commission on Sustainable Development (CSD) and on existing statistical data.

This document is the fruit of close cooperation between the SAEFL and the SFSO. It has benefited from the expert advice of their staff as well as from the support of other producers of statistics for information purposes. We take this opportunity to express our deep gratitude for their assistance.

SAEFL

Arthur Mohr

Head, Sustainable
Development Division

SFSO

Michel Kammermann

Head, Spatial Economics
Division



1 Introduction

In June 1992, at the United Nations Conference on Environment and Development held in Rio, Switzerland undertook to design and implement a national sustainable development policy and to play an active role in international efforts in this field. The Agreements signed in Rio by 182 countries include Agenda 21, the general reference document for work on sustainable development. In its 40 chapters, this document proposes actions to be undertaken in the areas of economic and social development and the management and preservation of natural resources as well as in the reinforcing of solidarity and the implementation of sustainable development.

The concept of sustainable development was defined in 1987 by the World Commission on Environment and Development (also known as the Brundtland Commission) for which it «meets the need of the present without compromising the ability of future generations to meet their own needs.» Sustainable development is based on the three pillars of social solidarity, economic efficiency and ecological responsibility. It postulates that they are all equally valid and that none of the three can develop at the cost of the other two.

Agenda 21 calls on countries to draw up action plans for implementing sustainable development at national level and to encourage the creation of local Agenda 21 bodies to pursue the same objective at community level.

According to Switzerland's new Constitution (art. 2, par. 2), which was adopted by the electorate on 18 April 1999, the Swiss Government is to promote sustainable development. Its objectives are set out in the legislation schedule for the period 1995–1999, which also refers to the Federal Council's resolve to take them into account in all areas coming within its purview. This resolve was given concrete shape in 1997 with a strategy that set out the actions and measures likely to promote sustainable development¹⁾. The latter include the setting up of a «Council for Sustainable Development» to advise the Government on such matters.

2 Approach

According to Agenda 21, the results of implementing sustainable development should be monitored using a system of efficient indicators which are coordinated at international level (Agenda 21, chapter 40). These indicators must be consensual and provide a representative picture of the three dimensions of sustainable development (society, economy, environment). They must be easy for all to interpret and understand, be comparable with other countries and be founded on a sound scientific and technical basis. They are intended both for policy-makers and for the general public.

The Swiss Federal Agency for The Environment, Forests and Landscape (SAEFL) and the Swiss Federal Statistical Office (SFSO) have taken the initiative of launching a joint pilot project in this field, with the aim not of producing a definitive system of indicators, but rather of suggesting an initial list, thus triggering a wide-ranging debate with the interested parties. This project is the first step on the way towards a more elaborate system and it meets the need for rapid action in this field. For this reason, the two Offices decided not to involve other Offices or institutions directly in the pilot project but to conduct the work themselves, thereby cutting down on the usual consultation procedures to some extent. Partners of the two Offices and other interested parties will have an opportunity to air their views following publication of the pilot study results.

Numerous institutions and organisations are currently developing indicator systems for sustainable development using approaches that sometimes differ considerably. In the face of this abundance of highly interesting systems, many of which are still in the research stage, the two Offices have opted for indicators which can be rapidly constructed using available data, which meet public statistics requirements²⁾ and which are comparable with other countries.

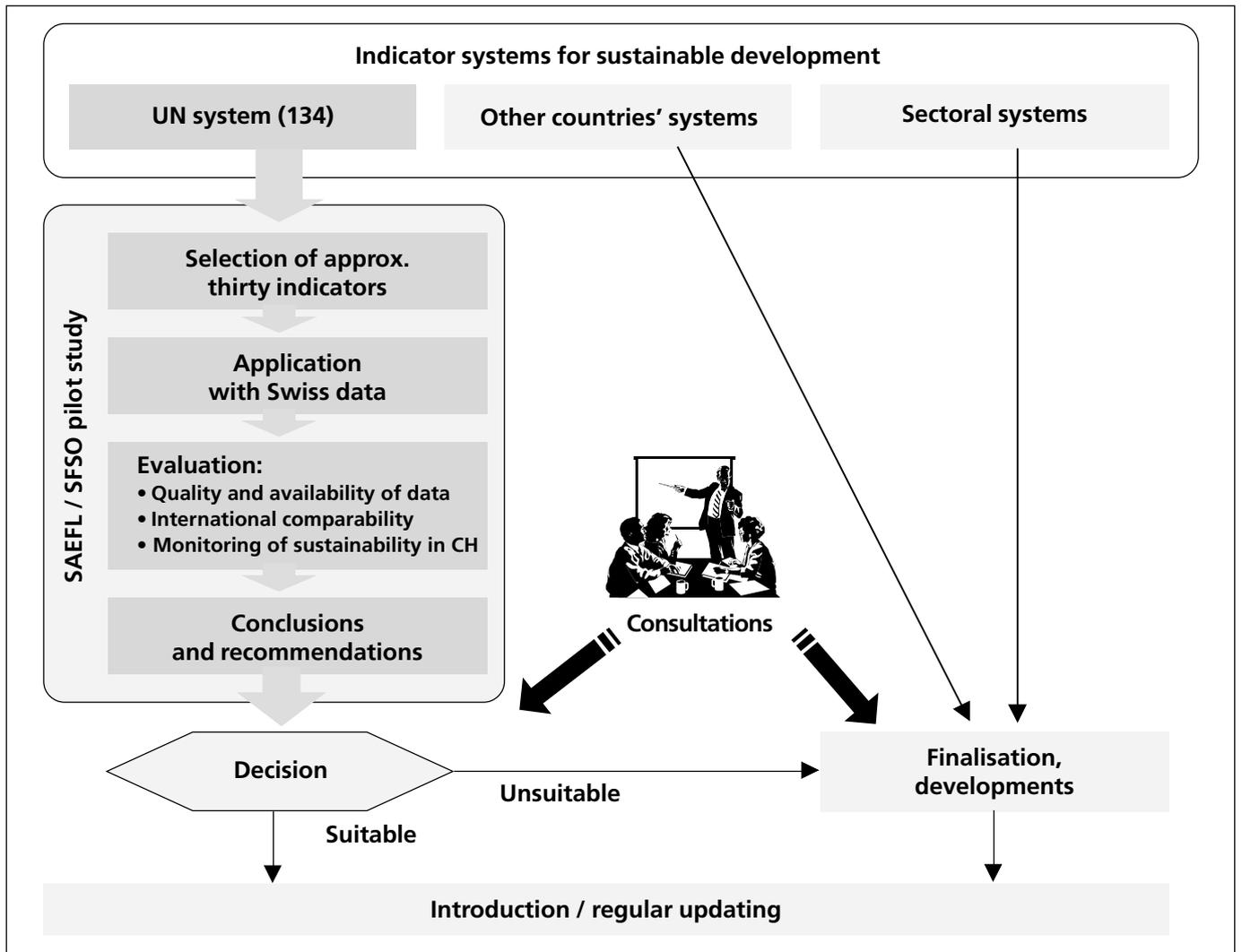
The list of indicators created by the UN Commission on Sustainable Development (CSD)³⁾, designed with the aim of permitting coordinated evaluation of sustainable de-

¹⁾ Federal Council: Sustainable development in Switzerland – Strategy, Berne, 1997

²⁾ The main requirements are: comparability as regards time and territory, topicality, representativity and reliability (Message concerning the Federal Statistics Act of 30 October 1991).

³⁾ United Nations: Indicators of Sustainable Development – Framework and Methodologies, New York, 1996

Illustration 1: Adopted approach



velopment at global level, meets the requirements of the two Offices. Bearing these characteristics in mind together with international comparability requirements and the resources available, the Offices decided to forgo developing new indicators within the framework of the pilot study and to base their work on the CSD list.

The project is being conducted in several phases (see illustration 1). A small working group made up of SAEFL and SFISO staff selected relevant indicators from the CSD list. These were subsequently constructed and evaluated, and this documentation sets out the evaluation findings. Discussions will now be held with interested parties to conduct a joint evaluation of their requirements and to collect ideas and proposals about how the work should continue.

3 Pilot project objectives

The objectives of the pilot project are:

- to evaluate and present an initial limited set of indicators for sustainable development that are suitable for Switzerland and representative of the three dimensions (social, economic and environmental),
- to encourage discussion with interested parties in order to ascertain their needs and expectations,
- to collect the experience needed to implement a more developed system of indicators for sustainable development.



Bearing in mind these objectives, international comparability requirements, the resources available and the absence of a precise operational interpretation of sustainable development, the project is governed by the following three prerequisites:

- 1 the study is based wholly on the 134 CSD indicators. No new indicators will be developed,
- 2 the indicators adopted can be implemented quickly using existing data that must be of good quality, well documented and regularly updated,
- 3 under no circumstances can the indicators quantify a society's sustainability in absolute terms. They can only indicate the direction or movement of sustainable development.

4 The indicators

4.1 Role of indicators

As tools for description and communication and for disclosing and highlighting complex information, indicators are important components of any statistical system. They integrate, combine or aggregate multiple data which can be one-, two- or three-dimensional in order to make them easier to understand.

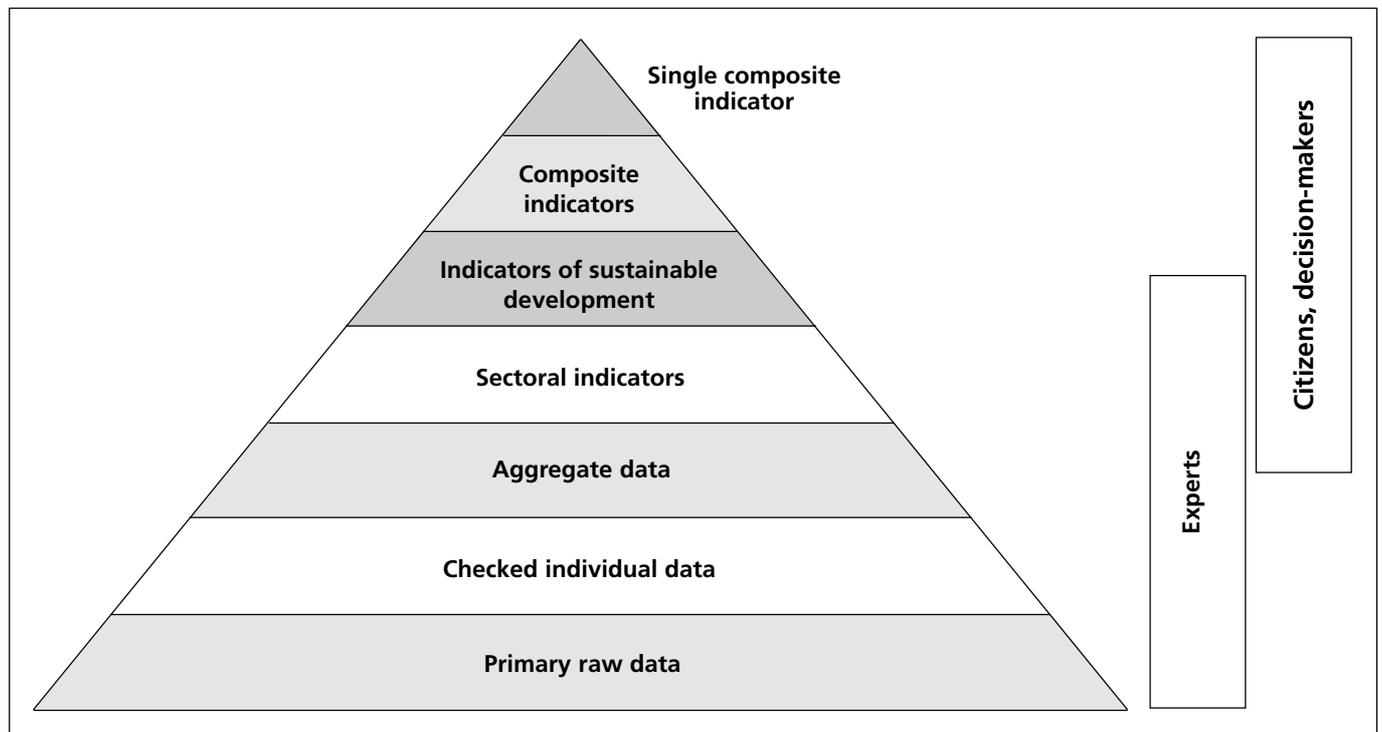
The role of indicators in a statistical information system can be illustrated by the information pyramid (see illustration 2). The base of the pyramid is made up of primary raw data collected through surveys, measurement networks or administrative sources, of checked and documented individual data and of fundamental aggregated data. This data segment, the most significant in terms of quantity, is mainly intended for experts. The upper part of the pyramid comprises sectoral indicators which can be incorporated into systems of indicators of sustainable development. The latter can be aggregated numerically taking the form of composite indicators or indexes, or may even be integrated into a single indicator (such as social well-being and economic prosperity). To our knowledge, this type of integration is still in the research stage.

The base of the pyramid is not totally inaccessible to indicator users. Thanks to comparatively clear information about the source of the data (metadata), users can access data used to construct the indicators.

4.2 The CSD indicator system

CSD's list of 134 indicators was created to obtain a standardised information base in a large number of countries with varying degrees of development and to allow evaluation of Agenda 21 implementation at both a global level and on a country-by-country basis.

Illustration 2: Statistical information pyramid (based on Braat, 1991)





CSD indicators are structured using two axes:

- the structure of Agenda 21's chapters, spread over 4 aspects: social (41 indicators), environmental (55), economic (23) and institutional (14),
- classification of indicators according to the «Driving Force – State – Response» (DF–S–R) model derived from the «Pressures–State–Response» (P–S–R) framework used by the OECD to construct environmental indicators⁴⁾ (DF: 42 indicators, S: 58, R: 34).

The logic of both the P–S–R and DF–S–R models is based on causality. The pressure or driving force of human activities directly or indirectly brings about changes in the state of the environment, changes which cause an imbalance in the system and provoke a reaction from social players in the form of technical or political measures or actions

The CSD list is currently being tested by many countries using a common methodology. Several reports on these tests are already available (see bibliography). This list will certainly be modified and supplemented on the basis of the reported experiences, and a new version will be issued in 2001.

Some of the indicators have already been published by Eurostat with the data available from countries of the European Union⁵⁾. The experiences of these countries reveal the limitations of this approach when it comes to clear, unambiguous modelling of complex relations between the areas or aspects of sustainable development⁶⁾. Thus, while the DF–S–R model can easily be applied to environmental indicators, the same cannot be said for social or economic indicators where the distinction between driving force and state is difficult to establish. Moreover, the model does not take account of the risks, exposition or irreversible nature of dysfunctioning of the system⁷⁾.

Several sector-based systems for social or environmental indicators in respect to sustainable development are currently being designed by agencies in the Swiss federal administration or within the framework of research projects. These indicators cover, inter alia, forestry, agriculture and the environment, biodiversity and transport. The SFSO regularly publishes indicators for education, technology and health. The pilot project fits into a global context and in no way competes with these more specialised sector-based systems. It aims instead to observe

sustainable development trends and does not intend to fine-tune such policy or suggest sectoral measures. Links or overlaps with these projects can nevertheless be established to allow indicator users to move easily between systems, depending on their needs, avoiding duplications and conflicting results.

5 Selection of indicators

The concept of sustainable development is defined at a global level, so its interpretation depends to a great extent on national, regional and local particularities or present and future needs, as well as on the sensitivity and opinions of those involved in the process. Thus, a list of sustainable development indicators will necessarily be subjective and partial, and cannot satisfy all expectations.

5.1 Approach used

A strategy for indicator selection was designed on the basis of clearly defined criteria in order to guarantee the clarity and objectivity of the selection process (see illustration 3).

All 134 CSD indicators were filtered using two sets of criteria: one material and the other technical.

The material criteria (see box 1), which take account of the message or content of each indicator, were developed in compliance with the general principles of sustainable development, taking into consideration Swiss Government strategy as well as the report of the Interdepartmental Committee Rio (IDC Rio)⁸⁾. Both the geographical importance and importance over time of the problems described by the indicators, as well as their environmental, social and economic scope, were also taken into account. The indicators were not chosen according to their classification in the DF–S–R framework. As we have already seen, this approach, which is mainly used for constructing environmental indicators, does not seem suitable for modelling the components of sustainable development.

For the technical criteria (see box 2), the main consideration was data availability as well as the requirements of official statistics (see footnote 2). In actual fact, the first criterion – data availability – was often decisive for selecting an indicator.

⁴⁾ OECD, 1993

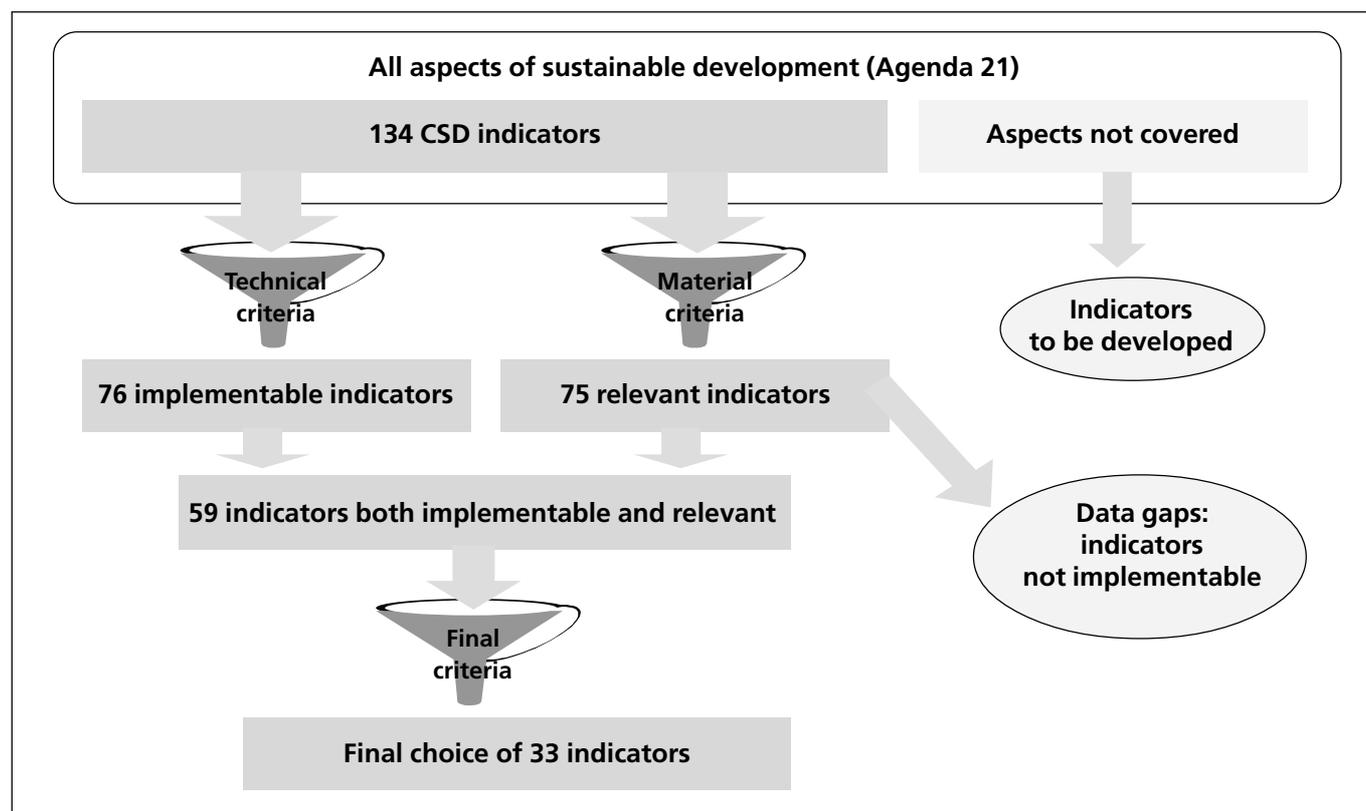
⁵⁾ Eurostat, 1997

⁶⁾ Eurostat, 1998

⁷⁾ Blanchet and November, 1998:30

⁸⁾ IDC Rio: Sustainable development in Switzerland – State of implementation, Berne, 1997

Illustration 3: Strategy for choosing the indicators



Box 1: Material criteria

- Does not concern Switzerland (negative criterion)
- Swiss Federal Council strategy
- IDC Rio report⁹⁾
- Concerns all language regions
- Concerns all social classes and age groups
- Concerns men and women
- Importance over time and geographical importance
- Ecological importance
- Quantifiable
- Transparency
- Proven scientific basis

The final criteria (see box 3) have been derived from the need, dictated by the resources available, to restrict the final number of indicators adopted. They are motivated by a wish to avoid over-representation of a specific theme, duplication or indicators containing little information (yes/

no indicator). Moreover, they also take into account the importance of the topic in the Swiss context and the urgency of the environmental problem («ecological scarcity»). Lastly, they favour indicators that react quickly to changing socio-economic conditions.

Box 2: Technical criteria

- Data available
- Past time series
- Future time series
- Homogeneous series
- Quality of data (estimate, etc.)
- Documentation of data
- International compatibility
- Data representative for the whole of Switzerland
- Data representative for all age groups
- Data representative for all social classes
- Geographical breakdown possible
- Breakdown by sector of activity possible
- Breakdown by age group possible
- Breakdown by social class possible

⁹⁾ IDC Rio, 1997



The first two filters produced a set of 59 indicators which met both the material criteria (relevant indicators) and technical criteria (implementable indicators). The 59 indicators adopted were then filtered using the final criteria, resulting in a final restricted choice of 33 indicators. This final selection, which is mainly a pragmatic one, meets one of the project's initial objectives (production of a limited set of indicators). The complete list of CSD indicators, together with the results of the selection stages, can be found in annex 1.

Box 3: Final criteria

- Importance of topics in the Swiss context
- Balanced distribution of indicators over the maximum possible number of topics
- No similar or duplicated indicators
- Unambiguous, widely accepted interpretation of indicator's links to sustainable development
- Fast reaction to changing socio-economic conditions
- Important information content (no «yes/no» indicators)
- Consideration of priority tasks depending on the urgency of the social or environmental problems (ecological scarcity)
- Consideration of overall aspects and not specific problems

This selection strategy also makes it possible to identify the sustainable development areas which are not addressed by the list of CSD indicators («aspects not covered, indicators to be developed» in illustration 3) and to highlight indicators considered relevant but which cannot be implemented due to unavailable data («data gaps, indicators not implementable» in illustration 3). Aspects not covered and indicators to be developed – as well as those which are not implementable – are discussed in Sections 5.3 and 5.4.

5.2 Results of the selection procedure

The final choice comprises 33 indicators: 9 social indicators, 5 economic indicators and 19 environmental ones. The selection procedures were applied as objectively as possible. As regards the technical criteria, it should be noted that some criteria, such as those concerning the availability and quality of the data, were evaluated on an approximate basis. Without substantial investment it would not have been possible to establish with any certainty whether certain data were actually available or

not. Several of the indicators adopted either could not be implemented as planned or caused unforeseen problems. In particular this is the case for the «Gini index of income inequality», which generated additional work and the «Land contaminated by hazardous wastes», which could not be calculated due to lack of data. The list of 59 indicators adopted (1st stage of selection), along with explanations as to why they were selected or eliminated, can be found in annex 2.

At first sight, distribution of the 33 selected indicators over the three sectors – society, economy and environment – seems to overemphasise environmental indicators. In actual fact, this corresponds to the distribution of the indicators in both the CSD list and that drawn up by Eurostat. Moreover, certain information assigned to one category could just as easily pertain to another. For instance, the indicator for «Consumption of fossil fuel by motor vehicle transport» is included with the social aspects, however it could just as easily be included in the environmental (air pollution abatement chapter) or economic (changes in consumer behaviour chapter) sectors. The institutional sector is not represented in the final selection because none of the CSD indicators in this sector passed the final filter (final criteria) due to their low information content (yes/no indicators) or their ambiguous interpretation.

Several important sustainable development fields for which the CSD list proposes indicators are not represented in the final selection of 33 indicators. These are: health, forests, chemical substances and environment-threatening organisms. In the future, these fields will have to be covered either by indicators from other systems or by indicators that have been specially developed for the task. Explanations for the rejection of indicators concerning the above-mentioned fields are included in annex 2.

5.3 Gaps in the CSD indicator system

Two aspects of sustainable development which are important for Switzerland are not considered by the CSD indicator system.

- Apart from the indicator «Consumption of fossil fuel by motor vehicle transport», **transport and mobility** are virtually not touched on by CSD indicators. Moreover, they are not explicitly mentioned in Agenda 21. However, transport policy is a key factor in Swiss Federal Council strategy. In the future, the CSD indicator list will have to be supplemented with some indicators concerning mobility and transport. Proposals along this line can be found in annex 4.
- **Actions taken by the private sector and consumers** to promote sustainable development are also not addressed in the indicators presented here. The CSD



economic indicators are either too heavily aggregated or they only concern aspects that come within the public domain, on which the private sector has little direct influence. Agenda 21 advocates strengthening the role of the economy and industry in sustainable development. Swiss Federal Council strategy provides for measures aimed at stimulating the responsibility of producers in respect to sustainable development and raising consumer awareness. Two proposals for indicators about actions taken by private enterprise and investors can be found in annex 5.

European countries participating in the official trials of CSD indicators have reached similar conclusions about the gaps in the indicator system. In their view, the main areas that are only inadequately or not at all covered by the UN system are¹⁰⁾:

- transport,
- the role of the private sector,
- economic development,
- biotechnology,
- tourism,
- biodiversity

Although the last area is represented by two indicators, it is not dealt with comprehensively enough since biodiversity is a central factor in sustainable development. Moreover, it is an integral part of the latter's definition (see chapter 1). Consequently, biodiversity merits special attention, as regards both the collection of data needed for its monitoring and the place it should have in a system of indicators for sustainable development.

5.4 Indicators that cannot be implemented

Four indicators on the CSD list that are regarded as particularly important cannot currently be implemented. These are:

- **Head count index of poverty:** this indicator, which describes the proportion of the population with a standard of living below the poverty line, cannot currently be implemented due to lack of adequate data on the one hand and due to problems involved in defining the poverty line on the other. In the end, it could supplement or replace the «Gini index of income inequality» indicator.

- **Proportion of potentially hazardous chemicals monitored in food:** this health indicator cannot be implemented due to lack of adequate data.
- **Environmental protection expenditure:** this indicator would be important for describing the action taken by government bodies and the private sector to promote environmental protection. The data needed to calculate this indicator have been surveyed only once (1992/1993) during a pilot survey, and so there is no time series.
- **Changes in land condition:** this indicator describes the proportion of degraded land over a specific period by type of degradation. It would be an indicator for the qualitative protection of land but cannot currently be implemented because it requires methodological work in addition to the collection of a substantial amount of data.

6 Presentation and evaluation of indicators

Each indicator is presented using a set grid designed to provide all the information necessary for comprehension, interpretation and evaluation. This grid comprises a detailed description of each indicator, its links to sustainable development and to federal policy. The indicator's values are presented in graphic form. A detailed description of the grid and the content of each heading is included in annex 3. The indicator data sheets are given in chapter 8.

The indicators and the results obtained were evaluated in four stages:

- 1 individual evaluation of each indicator,
- 2 evaluation of all 33 indicators in terms of their ability to describe the development of the main fields of sustainable development,
- 3 evaluation of the approach followed and the options chosen,
- 4 evaluation of sustainability using the 33 indicators.

6.1 Evaluation of indicators individually

Each indicator was evaluated in terms of its relevance in the Swiss context, its ability to contribute to the monitoring of sustainable development, the quality and

¹⁰⁾ Eurostat, 1998



availability of the data and its international compatibility. This evaluation was carried out using four classes defined and illustrated by the following symbols:

number and quality (see chapter 6.1) of the indicators concerned. The list of these areas is not definitive and will undoubtedly be supplemented and amended later. Their

	Suitable indicator: The indicator is suitable for monitoring sustainable development in Switzerland and the data used are of good quality.
	Partially suitable indicator: The indicator is better suited for international comparisons than for monitoring sustainable development in Switzerland.
	Indicator requiring development: The problem addressed by the indicator is relevant but the definition needs to be adapted to the Swiss context and Swiss data.
	Unsuitable indicator: The indicator is not relevant or the data required are not suitable for describing the phenomenon under study.

All 33 indicators selected were evaluated according to the same framework even if, as in certain cases, it transpired that some of them were unsuitable. This approach was dictated by the desire to make the evaluation and decision process transparent and was also applied to the statistical data, which are always shown in graph form, even if the indicator is unsuitable.

Table 6.1 summarises the evaluation of all the indicators. Of the 33 indicators, 12 are suitable, 13 partially suitable, 3 require development and 5 are unsuitable.

It should be recalled that this evaluation was conducted under the terms of the objectives of this pilot project, which are first and foremost to provide information for monitoring sustainable development and encouraging debate.

6.2 Evaluation of the indicator system used

The evaluation focuses on the degree of coverage for areas of sustainable development regarded as important for Switzerland. This is estimated on the basis of the

demarcation and assignment to a sector (social, economic or environmental) are subjective and could also be altered. Several indicators have been assigned to several areas.

The areas «Prosperity, poverty», «Health», «Education» and «Use of territory, urban development» come under the social aspect, while the economic aspect covers «Economic performance», «Consumer habits and consumer awareness», «Energy», «Mobility» and «International solidarity», and the environmental sector follows a broad outline of the chapters in Agenda 21.

Table 6.2 summarises the evaluation and mentions the main gaps in each field and existing indicator system, certain elements of which could be used to supplement the list, thus contributing to better coverage of the area.

The system of 33 indicators provides satisfactory coverage of the economic aspect (as described by the system of indicators). The social and environmental aspects feature gaps, some of them substantial. «Energy» and «Economic performance» are well covered, whereas «Prosperity», «Consumer

The evaluation uses 4 classes defined and illustrated by a pictogram as follows:

	Suitable indicators, area well covered
	Suitable indicators, area inadequately covered
	Unsuitable indicators, area not covered
	No indicators, area not covered



Table 6.1: Evaluation of indicators

1	Unemployment rate	
2	Gini index of income inequality	
3	Net migration rate	
4	Gross Domestic Product (GDP) spent on education	
5	School life expectancy	
6	Per capita consumption of fossil fuel by motor vehicle transport	
7	Percent of population in urban areas	
8	Area and population of urban formal and informal settlements	
9	Floor area per person	
10	Gross Domestic Product (GDP) per capita	
11	Annual energy consumption	
12	Share of consumption of renewable energy resources	
13	Total ODA as a percentage of GNP	
14	Debt as a percentage of GNP	
15	Domestic consumption of water per capita	
16	Biochemical oxygen demand in water bodies	
17	Land use changes	
18	Use of agricultural pesticides	
19	Use of fertilisers	
20	Energy use in agriculture	
21	Arable land area per capita	
22	Protected area as a percent of total area	
23	Threatened species as a percent of total native species	
24	Emissions of greenhouse gases	
25	Emissions of nitrogen oxides	
26	Consumption of ozone-depleting substances	
27	Ambient concentration of pollutants in urban areas	
28	Household waste disposal per capita	
29	Waste recycling and reuse	
30	Generation of hazardous wastes	
31	Import and export of hazardous wastes	
32	Area of land contaminated by hazardous wastes	
33	Generation of radioactive wastes	



habits», «International solidarity» and «Air» are inadequately covered; the other areas are not covered at all.

In conclusion, it can be said that the set of 33 indicators derived from the CSD list in accordance with the procedure described in chapter 5.1 is only partially suited to monitoring sustainable development in Switzerland.

6.3 Evaluation of the approach adopted

The procedure followed, together with the decision to focus solely on the list of CSD indicators has not produced sufficiently conclusive results. The environmental aspect and several other fields are inadequately covered (see chapter 6.2). This approach has nevertheless offered several advantages, such as comparability with other countries, transparency of the selection processes and simple, intelligible structuring of the indicators. Solutions will have to be found to remedy the flaws of the proposed system.

Several possibilities can be envisaged and these are shown in illustration 4. Obviously, new «made-to-measure» indicators could be developed in response to Switzerland's particular characteristics. In this way, it might be possible to construct indicators that satisfy federal requirements and the needs of Agenda 21 local units. However, developing new indicators requires considerable resources and would take a long time. What is more, these indicators would still not be compatible at the international level.

The «hybrid solution» shown in illustration 4 seems to be the best choice. It would preserve international compatibility by selecting existing indicators, most of which have been tested, from the lists of indicators used by other international organisations or institutions. Moreover, this approach would guarantee links to – or conformity with – existing systems and those being developed in Switzerland. The «hybrid solution» will, however, necessitate the development of a new approach for selecting indicators as it will no longer be possible to base this choice on the sectoral vision of Agenda 21's chapters as used by the CSD list.

The question of the number of indicators needed also crops up. It is not impossible that a future system of indicators for sustainable development will comprise more indicators than the list proposed within the framework of the pilot project. This could raise presentation and aggregation problems. Too many indicators mean less transparency, which makes the system less intelligible, requiring

either aggregation or presentation methods or the creation of a hierarchy of indicators (declaration of flagship indicators). This problem is discussed in greater depth in chapter 7.2.

6.4 Evaluation of sustainability

It is not yet possible to undertake an evaluation of sustainable development in Switzerland using the indicators selected. Some indicators are not sufficiently adapted to Switzerland's specific situation and sustainable development fields are imperfectly covered. This evaluation, which was not one of the pilot project's objectives, can be carried out as soon as a more developed indicator system is available.

7 Continuation of work

One of the objectives of this pilot study is to identify user expectations and trigger a debate on the requirements for monitoring sustainable development and for work that needs to be done. This work will be dedicated not only to developing a system for monitoring sustainable development that is accepted by the majority and based on a pragmatic approach, but also to the constructing an aggregated or simplified presentation of the results.

7.1 Development of the «hybrid solution»

In chapter 6.3, we saw that the «hybrid solution» could constitute a consensual, pragmatic approach that uses a simple, coherent modelling of the main areas of sustainable development in Switzerland. In this way, it will be possible to choose and evaluate from among the other indicator systems – for instance those published by the SFSO - the indicators best suited to meet future needs as well as the present and future expectations of partners in sustainable development.

In all cases, a pragmatic, realistic approach should be retained – one which draws on existing indicator systems and is based on the available data. Lastly, indicators that can also be used by regional indicator systems should also be taken into consideration whenever possible.

7.2 Presentation of results

While an effective list of indicators is a prerequisite for monitoring sustainable development, it is also necessary to think about the presentation of the results in order to

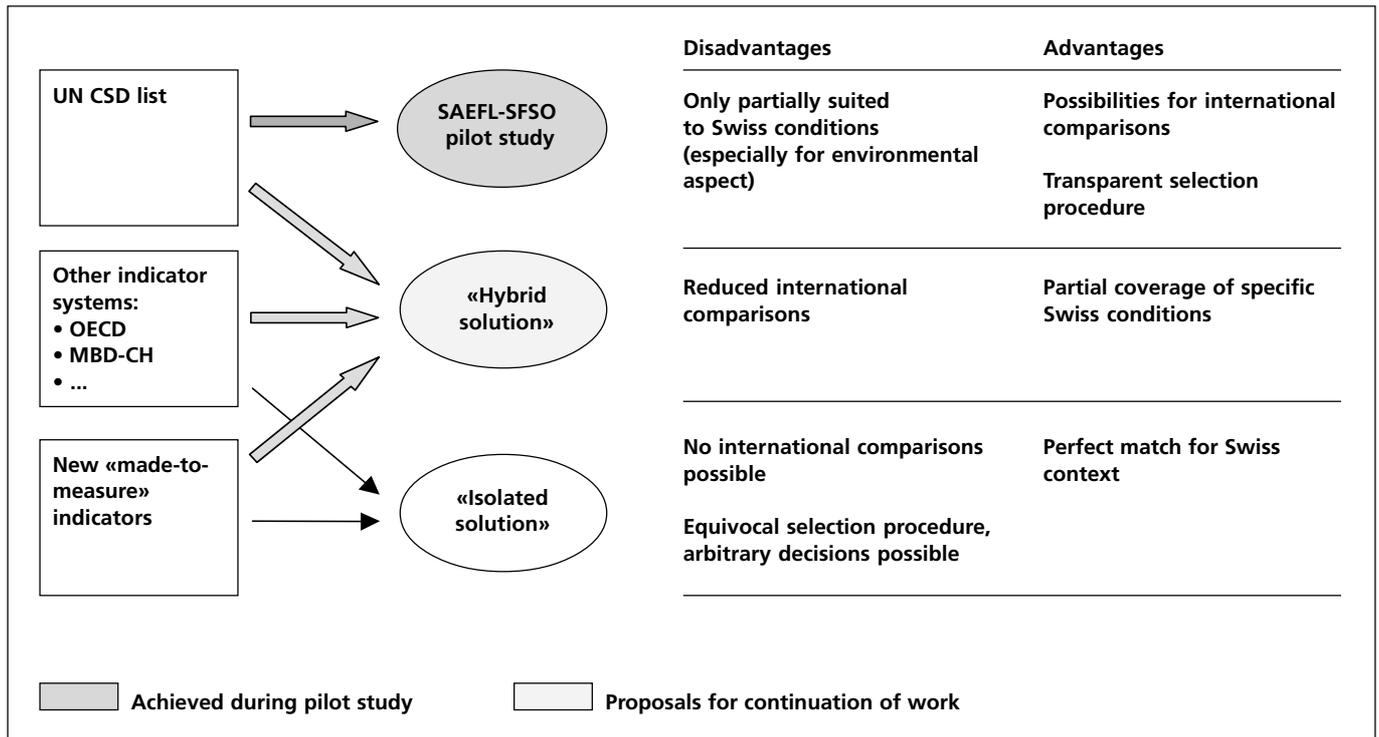
Table 6.2: Evaluation of the indicator system

Area	Field	No.	Indicators	Evaluation	Area cov.	Gaps in 33 indicator systems	Other indicator systems
Society	Prosperity, poverty	1	Unemployment rate			Poverty indicators, cf. chapter 5.3	
		2	Gini index of income inequality				
		10	GDP per capita				
		9	Floor area per person				
	Health				See chapter 5.2	OECD, WHO	
	Education	4	GDP spent on education			Quality of education, life-long education	OECD, SFSO education indicators
5		School life expectancy					
	Use of territory, urban development	3	Net migration rate			Marginal regions	
7		Percent of population in urban areas					
8		Area and population of urban settlements					
9		Floor area per person					
Economy	Economic performance	10	GDP per capita			Technological level	SFSO Science and Technology Indicators
		14	Dept as a percentage of GNP				
		1	Unemployment rate				
	Consumer habits and consumer awareness	11	Per capita energy consumption			Consumption indicators, durability of consumer goods, labels, certificates	See annex 5, UN, 1998
		12	Consumption of renewable energy resources				
		6	Per capita consumption of fossil fuel by motor vehicle transport				
	Energy	11	Per capita energy consumption				
		12	Consumption of renewable energy resources				
6		Per capita consumption of fossil fuel by motor vehicle transport					
Mobility	6	Per capita consumption of fossil fuel by motor vehicle transport			Efficiency, volume, pollution	See annex 4	
International solidarity	13	Total ODA as a percentage of GNP			Net N-S financial flows		

**Table 6.2: Evaluation of the indicator system** (continuation)

Area	Field	No.	Indicators	Evaluation	Area cov.	Gaps in 33 indicator system	Other indicator systems
Environment	Water	15	Consumption of water per capita			Quality of drinking water, pollution by toxic substances	
		16	Biochemical oxygen demand in water bodies				
	Air	24	Emissions of greenhouse gases			Particulates (PM10)	
		25	Emissions of nitrogen oxides				
		26	Consumption of ozone-depleting substances				
		27	Ambient concentr. of pollutants in urban areas				
	Soil	17	Land use changes			Soil quality, see chapter 5.3	
		21	Arable land area per capita				
		32	Land contaminated by hazardous wastes				
	Agriculture	18	Use of agricultural pesticides			Manuring audit	OECD agricultural-environmental indicators
		19	Use of fertilisers				
		20	Energy use in agriculture				
		21	Arable land area per capita				
	Forests						Forestry indicators
	Biological diversity	22	Protected area as a percent of total area				MBD-CH (Monitoring of biodiversity in Switzerland)
		23	Threatened species as a percent of total native species				
Toxic substances							
Dangerous organisms							
Wastes	28	Household waste disposal per capita					
	29	Waste recycling and reuse					
	30	Generation of hazardous wastes					
	31	Import and export of hazardous wastes					
	32	Land contaminated by hazardous wastes					
Radioactive wastes	33	Generation of radioactive wastes			Nuclear wastes		

Illustration 4: Evaluation of approach followed and implementation proposals



make them accessible to as many people as possible. This can be done through quantitative or qualitative aggregation of the indicators or by highlighting a reduced number of indicators designated as more important or more representative than the others (flagship indicators).

Quantitative aggregation amounts to adding together or combining the indicators in a restricted number of indices. The main disadvantage of this method is a lack of transparency due to the arbitrary decisions it requires. Moreover, for the time being, there is no aggregation factor or any way of combining physical data with economic or social data that is both objective and widely accepted.

Qualitative aggregation amounts to grouping indicators in a synoptic presentation, making it possible to retain all the

information until the end of the aggregation process, and thus guaranteeing proper transparency.

Flagship indicators make it possible to work with a sizeable indicator system while allowing simplified presentations of progress in sustainable development. The selection of flagship indicators is an arbitrary operation.

To our knowledge, these three approaches are not yet truly operational and, at international level, no consensus in favour of one or another of them is in sight. In the long run and depending on user expectations, it will certainly be possible to propose a method for presenting the system of indicators of sustainable development, and thus transforming them into a genuine monitoring tool.

8 Indicators

Presentation of 33 indicators in french or in german according to the framework presented in annex 3

Attention: If there is nothing specified, the reference about the Constitution concerns the current Constitution, that is valid until the end of 1999.

Sorry!

The indicators are only available in [French](#) and in [German](#).
Please select one of these languages



9 Bibliography

Blanchet, Corinne; November, Andràs: Indicateurs de développement durable appliqués à l'aménagement du territoire. Conseil Economique et Social. Genève, 1998

Braat, Leon: The predictive meaning of sustainability indicators. In: Kuik, Onno; Verbruggen Harmen (Ed.): In search of Indicators of Sustainable Development. Dordrecht, 1991

Ernst Basler + Partner: Measuring the Sustainability of Transport. Materials of NRP 41 «Transport and Environment», Project C5. Bern, 1998

Eurostat: Indicators of Sustainable Development – A pilot study following the methodology of United Nations commission on Sustainable Development. Luxembourg, 1997

Eurostat: Seminar of European Countries Participating in the Testing of the CSD List of Indicators of Sustainable Development, 12 – 13 November 1998 in Luxembourg

Federal Council: Sustainable Development in Switzerland - Strategy. Bern, 1997

IFEN: Test des indicateurs de développement durable des Nations Unies – Rapport de la France. Etude et travaux n° 17. Orléans, 1998

Interdepartmental Committee Rio (IDC Rio): Sustainable Development in Switzerland – State of Implementation. Bern, 1997

OECD: OECD Core Set of indicators for environmental performance reviews. Environment Monographs N° 83. Paris, 1993

United Nations: Indicators of Sustainable Development – Framework and Methodologies. New York, 1996

United Nations: Measuring changes in Consumption and Production Patterns – A set of Indicators. New York, 1998

Annex 1
Full list of CSD indicators
with results of selection stages



Chapter Agenda 21	Indicators	Relevant indicators	Implementable indicators	Adopted indicators	Final choice	Indicators not implementable
Economic category	23	12	14	8	5	1
2 International cooperation	GDP per capita Net investment share in GDP Sum of exports and imports as a percent of GDP Green GDP Share of manufactured goods in total merchandise exports	✓ ✓ ✓	✓ ✓ ✓	✓ ✓	✓	
4 Changing consumption patterns	Annual energy consumption Share of natural resource intensive industries in value-added Proven mineral reserves Proven fossil fuel energy reserves Life time of proven energy reserves Share of manufacturing value-added in GDP Share of consumption of renewable energy resources	✓	✓	✓	✓	
33 Financial resources and mechanisms	Net resources transfert / GNP Total ODA given or received as a percentage of GNP Debt / GNP Debt service / export Amount of new or additional funding for sustainable dev. Environmental protection expenditures / GDP	✓ ✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓	
34 Transfer of environmentally sound technology, cooperation and capacity building	Capital goods imports Foreign directs investments Share of environmentally sound capital goods imports Technical cooperation grants	✓ ✓	✓ ✓	✓		✓
Environmental category	55	34	37	31	19	1
18 Protection of the quality and supply of freshwater resources	Annual withdrawals of ground and surface water Domestic consumption of water per capita Groundwater reserves Concentration of faecal coliform in freshwater Biochemical oxygen demand in water bodies Waste-water treatment coverage Density of hydrological networks	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓	✓	
17 Protection of the oceans, all kinds of seas and coastal areas	Population growth in coastal areas Discharges of oil into coastal waters Release of nitrogen and phosphorus to coastal waters Maximum sustained yield for fisheries Algae index	✓				
10 Planing and management of land resources	Land use change Changes in land condition Decentralized local-level natural resource management	✓ ✓	✓	✓	✓	✓
12 Combating desertification and drought	Population living below poverty line in dryland areas National monthly rainfall index Satellite derived vegetation index Land affected by desertification					



Chapter Agenda 21	Indicators	Relevant indicators	Implementable indicators	Adopted indicators	Final choice	Indicators not implementable
13 Sustainable mountain development	Population change in mountain areas Sustainable use of natural resources in mountain areas Welfare of mountain populations	✓ ✓	✓	✓		
14 Promoting sustainable agriculture and rural development	Use of agricultural pesticides Use of fertilizers Irrigation percent of arable land Energy use in agriculture Arable land per capita Area affected by salinization and waterlogging Agriculture education	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓	
11 Combating deforestation	Wood harvesting intensity Forest area change Managed forest area ratio Protected forest area as a percent of total forest area	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓		
15 Conservation of biological diversity	Threatened species as a percent of total native species Protected area as a percent of total area	✓ ✓	✓ ✓	✓ ✓	✓ ✓	
16 Environmentally sound management of biotechnology	R & D expenditure for biotechnology Existence of national biosafety regulations or guidelines	✓	✓ ✓	✓ ✓		
9 Protection of the atmosphere	Emissions of greenhouse gases Emissions of sulphur oxides Emissions on nitrogen oxides Consumption of ozone depleting substances Ambient concentrations of pollutants in urban areas Expenditure on air pollution abatement	✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓	
21 Environmentally sound and management of solid wastes sewage-related	Generation of industrial and municipal solid waste Household waste disposed per capita Expenditure on waste management Waste recycling and reuse Municipal waste disposal	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	
19 Environmentally sound management of toxic chemicals	Chemically induced acute poisonings Number of chemicals banned or severely restricted		✓			
20 Environmentally sound management of hazardous wastes	Generation of hazardous wastes Imports and exports of hazardous wastes Area of land contaminated by hazardous wastes Expenditure on hazardous waste treatment	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	
22 Management of radioactive wastes	Generation of radioactive wastes	✓	✓	✓	✓	



Chapter Agenda 21	Indicators	Relevant indicators	Implementable indicators	Adopted indicators	Final choice	Indicators not implementable
Institutional category	15	6	1	1	0	0
8 Integrating environment and development in decision-making	Sustainable development strategies Program for integrated environmental and economic accounting Mandated Environmental Impact Assessment National councils for sustainable development	✓ ✓				
35 Science for sustainable development	Potential scientists and engineers per million population Scientists and engineers engaged in R & D per million population Expenditure on research and development as a percent of GDP	✓ ✓	✓	✓		
37 International cooperation						
38 International institutional arrangements						
39 International legal instruments and mechanisms	Ratification of global agreements Implementation of ratified global agreements	✓ ✓				
40 Information for decision-making	Main telephone lines per 100 inhabitants Access to information Programs for national environmental statistics					
23 Strengthening the role of major Groups	Representation of major groups in national councils for SD Ethnic minorities in national councils for sustainable development Contribution of NGOs to sustainable development					
Summary	Indicators CSD	Relevant indicators	Implementable indicators	Adopted indicators	Final choice	Indicators not implementable
Total	134	75	76	59	33	4

Annex 2

**Explanations about the selection
or elimination of the 59 relevant
and implementable indicators**



Remark:

Indicators in the «implementable and relevant» category which were not selected (see figure 3) are in italics.

Unemployment rate	Classic indicator of sustainable development. Unemployment is a key factor in determining impoverishment and precarious existence in the developed countries.
Gini index of income inequality	Poverty is a major social problem in the developed countries (see unemployment rate indicator). In the absence of statistics on poverty, this indicator provides a good picture of income distribution among a country's population. In the long run, it will be replaced by a poverty indicator.
<i>Ratio of average female wage to male wage</i>	<i>The available data are hard to interpret. They do not take full account of how age and professional experience affect salary levels.</i>
<i>Population growth rate</i>	This indicator mainly concerns developing countries with a high birth rate. In Switzerland, population growth is through due to migration (see Net migration rate indicator).
Net migration rate	In Switzerland, population growth is through due to migration (see Population growth rate indicator).
<i>Total fertility rate</i>	<i>Does not concern Switzerland. This indicator is of greater relevance to countries with a high fertility rate, which are under considerable demographic pressure.</i>
<i>Population density</i>	<i>Duplicates the «Area and population of urban settlements» indicator. The Alps are sparsely populated, and the population is concentrated in the Central Plain. The average density calculated for the whole country does not contribute much information.</i>
School life expectancy	Of interest for describing access to post-compulsory education/training (duration longer than the nine years of compulsory schooling).
<i>Women per hundred men in the labour force</i>	<i>No definite link to sustainable development. Depends on local culture and customs. A high percentage may signify a precarious economic situation.</i>
GDP spent on education	Illustrates a government's commitment to promoting education.
<i>Life expectancy at birth</i>	<i>This indicator is important for comparisons with less developed countries. This is not a very important topic for Switzerland where life expectancy is already high and potential for progress slight.</i>
<i>Total national health expenditure related to GNP</i>	<i>This indicator can be interpreted in two conflicting ways. For a developing country, it is important for health expenditure to increase to a certain amount. In the case of developed countries, high expenditure may be a factor in precarious existence and social injustice.</i>



Rate of growth of urban population	<i>Duplicates the «Area and population of urban settlements» indicator, which also makes it possible to monitor movement of the urban population.</i>
Per capita consumption of fossil fuel by motor vehicle transport	This indicator is not a social indicator a priori. It is the only indicator on of mobility on the CSD list and so has to be included for want of anything better.
Human and economic loss due to natural disasters	<i>This topic is not important enough in the Swiss context to feature on the list. The methodology for calculating economic data should be finalized. The link to sustainable development is doubtful.</i>
Percentage of population in urban areas	Important for describing the problems of urban areas and agglomerations.
Area and population of urban settlements	Important for describing the development of urban sprawl and the resident population. Population density is important for describing the environmental burden it constitutes.
House price to income ratio	<i>Could be regarded as an indicator of economic scarcity. No clear links with sustainable development.</i>
GDP per capita	The epitome of economic development indicators. Does not take account of the «evils» of economic development in respect of to the environment or certain social aspects of society. That is why the CSD also advocates the use of a «green» GDP.
Net investment share in GDP	<i>Account should be taken of the sustainability of investments. A sizeable investment is not necessarily a sign of sustainable development.</i>
Annual per capita energy consumption	Important. Sizeable energy consumption is a sign of economic vitality. It is also an important source of harmful effects (pollution, greenhouse gas emissions).
Share of manufacturing value-added in GDP	<i>No clear link to sustainable development. Account should be taken of the sustainability of the industrial processes and their consumption of non-renewable energy resources.</i>
Share of consumption of renewable energy resources	Important indicator for monitoring the development of the consumption (and production) of renewable energy resources.
Total ODA given or received as a percentage of GNP	Important indicator of international solidarity. Describes a country's commitment to solidarity. The destination of the aid (construction, education, etc.) should be studied examined to ascertain whether the aid given really actually contributes to sustainable development.
Technical cooperation grants	<i>Duplicates ODA expenditure.</i>
Domestic Consumption of water per capita	Use of a vital resource which could become scarce. Consumption also signifies use of energy.



Groundwater reserves	<i>Indicator which is currently being developed. No definition exists. No representative data available.</i>
Concentration of faecal coliform in freshwater	<i>Freshwater quality is good. Not relevant for Switzerland.</i>
Biochemical oxygen demand in water bodies	Important for describing the quality of water bodies and their pollution through by waste water, faecal matter and fertilizers.
Waste-water treatment coverage	<i>Waste-water treatment (percentage of waste water treated) is almost at its maximum. This indicator should not vary much in future.</i>
Land use changes	Land is a vital commodity, which is necessary for producing food, maintaining biodiversity and protecting the landscape.
Population change in mountain areas	<i>No clear link to sustainable development. Moreover, while interesting in itself, the topic of marginal areas addressed by this indicator is not of prime importance to Switzerland's sustainable development.</i>
Use of agricultural pesticides	Important for describing environmental food production.
Use of fertilizers	Important for describing environmental food production.
Energy use in agriculture	Important for the energy audit of agricultural production.
Arable land area per capita	Important for describing a country's self-sufficiency capability and demographic pressure on farming land.
Agricultural education	<i>This indicator was not selected because it would have resulted in over-representation of agriculture.</i>
Wood harvesting intensity	<i>Swiss forests have been worked on a sustainable basis (as regards the area and quantities harvested) for more than a century. The indicators on the CSD list describe problems which are not important in the Swiss context.</i>
Forest area change	<i>See previous indicator. Swiss forests are currently under-exploited and forest areas are increasing.</i>
Threatened species as a percentage of total native species	Preserving biodiversity is one of the major challenges of sustainable development. In the absence of a more specific indicator for this problem complex, use of this indicator is a «must».
Protected area as a percentage of total area	Represents a country's commitment to protecting natural areas. Could be important for international comparisons.
Existence of national bio-safety regulations or guidelines	<i>Yes/no indicator. Little information content. Provides no information about the efficiency of the regulations.</i>
Emissions of greenhouse gases	Very important. Also makes it possible to monitor fossil fuel consumption.



Emissions of sulphur oxides

SO₂ emissions are no longer an environmental problem thanks to the regulations about on the level of sulphur in diesel fuel and in heating oil. These emissions should not change. The topic is not very important for Switzerland. Risk of over-representation of chapter 9 (Protection of the atmosphere).

Emissions of nitrogen oxides

Important indicator for measuring emissions caused mainly by road transport. NO_x emissions have major repercussions on health (summer smog, O₃) as well as on biodiversity (nitrogen input on lean meadows).

Consumption of ozone-depleting substances

Important indicator because it concerns global, long-term problems.

Ambient concentrations of pollutants in urban areas

Important in the Swiss context. Considerable repercussions on health.

Generation of industrial and municipal solid waste

Industrial waste in Switzerland is not quantifiable. Risk of over-representation of the waste sector.

Household waste disposal per capita

Important for sustainable use of resources and for the longevity of consumer goods. Allows monitoring of consumer behaviour.

Expenditure on waste management

Average importance. Ambiguous interpretation. Little data available. Would lead to over-representation of the waste sector.

Waste recycling and reuse

Important. Describes a country's commitment to reducing the use of resources and the pollution caused by waste.

Municipal waste disposal

Not important in Switzerland. In principle, all waste is disposed of properly.

Generation of hazardous wastes

Hazardous wastes are potentially dangerous for the environment.

Imports and exports of hazardous wastes

A country should be able to dispose of its own hazardous wastes.

Area of land contaminated by hazardous wastes

Important for protecting the land, which is a vital asset. Contaminated land can affect drinking water and the food chain.

Generation of radioactive wastes

Important for the risk these wastes represent for present and future generations.

R & D expenditure as a percentage of the GDP

In principle, important for describing economic development potential. Does not take account of the sustainability of investments and expenditure.

Annex 3
**Framework for presenting sustainable
development indicators**



Name of indicator

Official name according to UN terminology. Certain changes have been made in order to comply with the Swiss context and terminology.

UN definition

Official definition according to the CSD manual.

Swiss definition

Definition used for calculating the indicator, which refers only to the data used.

The indicator and sustainable development

Links between the indicator and sustainable development. Mention of the area concerned. Tie-ins with Agenda 21 or international agreements.

Links to Swiss federal policy

Tie-ins between the area described by the indicator and federal policy. The following are covered (in this order): international agreements, Swiss Federal Council strategy, the Federal Constitution and the new Constitution,

federal laws and the relevant ordinances, as well as Federal Council reports, action plans and concepts. Unless otherwise specified, references to the Constitution are to the current Constitution which remains in effect until the end of 1999.

Links to other indicators

Number and name of other indicators included in the final selection of 33 indicators and with a connection to the indicator in question.

Evaluation of the indicator

Evaluation of the indicator's ability to contribute to monitoring sustainable development or to further international comparisons, irrespective of the data available. Changes to the indicator or other more appropriate indicators are mentioned. The quality and availability of the data are also discussed. The heading concludes with an evaluation of the indicator according to 4 defined classes (see section 6.1). Evaluation is illustrated by a pictogram after the indicator title.

Evaluation of the data

Brief commentary on data movement in graphic form.

Technical information

Data production:	Mention of body responsible for producing the data
Source of data:	Reference to the statistics or publication from which the data is taken
Units used:	Units with the standard abbreviations
Availability of data:	Beginning of time series and periodicity
Regionalisation:	Geographical breakdown of data
Agenda 21 chapter:	Agenda 21 chapter to which the indicator refers

Annex 4
Proposal for flagship indicators
in the field of transport



1 Basic situation

Transport satisfies people's need for mobility and ensures the functioning of an economy that is based on the division of labour. It plays a key role in Swiss policy on sustainable development. All negative effects of transport in ecological (noise, vibration, air pollution, CO₂, land use, etc.), social (respiratory ailments, traffic accidents, stress, dangerous routes to school, etc.) and economic (direct costs, external costs) areas are considered harmful. But to what extent should transport development be pursued and what means of transport should be given priority within the framework of sustainable development? Opinions diverge on these questions.

Although transport is one of the main sources of pressure (or «driving forces» according to the DF–S–R model) on the environment, it is virtually absent from the list of UN indicators (and Eurostat indicators which are a selection of the UN ones). Only indicator Number 6, «Per capita consumption of fuel for transport» addresses a partial aspect of transport. According to the UN definition, it concerns only the consumption of fuel in the urban environment and is designed to illustrate living conditions in cities.

The future Swiss system of indicators will have to include indicators about transport, namely motor vehicles, railways, air transport and pipeline transportation. A list of global (or key) indicators should, wherever possible, cover all important areas of sustainable development while remaining a precise, easily comprehensible, clear and explicit monitoring tool. Thus, in each political field and in the main environmental sectors, the approach will be confined to a restricted number of flagship indicators, even if this entails more comprehensive indicator systems for mastering certain specific fields. A set of 22 indicators¹⁾ was developed within the framework of National Research Programme 41 to permit more precise analyses in the field of transport; a set of 31 indicators²⁾ was created for the same purpose by the European Environment Agency.

Below, two possible variants for supplementing the lists of global indicators are set out – one comprising seven indicators, the other two. The choice between the two variants will depend on the maximum number of variants to be used as well as on the reliability and availability of data about transport.

2 Variant with 7 indicators

The following seven indicators are intended to report on movements in transport and on the main effects of transport on the environment:

- 1 Persons-km and tonnes-km: passenger traffic is measured in persons-kilometre, and goods traffic in tonnes-kilometre (per year or per capita and per year). This indicator does not take into account vehicle weight, empty trips and load limits.
- 2 Consumption of energy for transport (in terajoules (TJ) per capita and per year).
- 3 Greenhouse gas emissions generated by transport: CO₂, N₂O and CH₄ emissions converted into CO₂-equivalent tonnes per capita and per year.
- 4 NO_x emissions caused by transport (in tonnes per capita and per year).
- 5 Changes in land use for transport purposes: annual percentage increase in area devoted to transport, absolute value of the area devoted to transport in km² or percentage of the area devoted to transport in terms of the total area dedicated to settlements and infrastructure.
- 6 Breathable airborne suspended particulates (PM10) caused by transport: it has yet to be checked whether the necessary data are available.
- 7 Excessive noise caused by transport: percentage of the population exposed to sound levels in excess of 60 dB(A) in their homes (emission level for inhabited areas during the day in accordance with the Noise Abatement Ordinance). However, there is no noise grid for the whole of Switzerland based on a geographical information system (GIS).

Points 2, 3 and 4 could be incorporated into pilot study indicator No 11 «Annual per capita energy consumption», No 24 «Emissions of greenhouse gases» and No 25 «Emissions of nitrogen oxides» by subdividing the corresponding graphs by sector of activity (transport, industry/crafts/services and households/agriculture). This would enable identification of the source for these three forms of environmental pressure. The incorporation of additional forms of information into these graphs would, however, make them less clear and harder to read, thus defeating the purpose of the exercise. Moreover, this would increase

¹⁾ Cf. Ernst Basler: Measuring the Sustainability of Transport, NRP 41 «Transport and Environment», Project C5, Berne 1998

²⁾ European Environment Agency: Proposed transport/environment reporting mechanism for the EU, Copenhagen, April 1998



the heterogeneousness of the indicator system; the majority of indicators would then be represented by a single curve while others (like those mentioned above) would be subdivided into several curves.

3 Variant with 2 indicators

In line with the basic idea of sustainable development, which consists of satisfying growing needs without worsening the state of the environment (and even improving it), the UN uses an indicator of volume and an indicator of eco-efficiency in certain areas. The size of the population, the Gross Domestic Product (GDP) and the surface area are indicators of volume. The indicators of eco-efficiency, which are defined in terms of indicators of volume, are per capita energy consumption, per capita water consumption, the volume of per capita household waste, the volume of hazardous wastes in terms of the GDP and the quantity of fertilisers per hectare of arable land. This approach, which is also suitable for the social area (e.g. floor area per person), allows comparisons between countries which differ as regards economic development, population and surface area. In principle, it would be possible to construct an indicator system made up of a small number of indicators of volume supplemented by a set of indicators of efficiency.

This approach can be adopted for transport: the negative impact of mobility does not depend solely on the volume of transport but also on the level of technological development of the vehicles. If technology progresses, mobility can be increased without worsening the condition of the environment. Thus a sustainable development policy can affect one or the other of the two variables: reduction of mobility *or* reduction of the specific impact on the environment.

If vehicle technology does not change, the pressure on the environment depends mainly on the total mass transported³⁾ (passengers, goods and vehicles themselves), distances covered and distribution over several vehicles. This applies, for instance, to noise, energy consumption, CO₂ emissions and air pollution. Consequently, the total mass transported multiplied by the number of kilometres covered can be used as an indicator of volume for passenger and goods transport. We will call this value «mass-kilometre».

Transport volume is usually expressed in persons-kilometre and in tonnes-kilometre, but these units have major drawbacks for appraising sustainable development:

- A vehicle can transport varying numbers of passengers. Four people having to make a certain journey may

use a single vehicle or four different ones. In both cases, the number of persons-kilometre will be the same but the sum of the negative effects (CO₂, air pollution, accidents, noise, stress) will be different. The «mass-kilometre» variable makes it possible to accurately report the effect of collective transport.

- The tare weight of a vehicle used to transport a certain number of passengers or goods varies. This weight has an impact on (affects) the environment but is not included in the persons-kilometre or tonnes-kilometre units of measurement. The «mass-kilometre» unit makes it possible to avoid this snag.
- Although they affect the environment, empty trips are not counted in the persons-kilometre or tonnes-kilometre units of measurement but they are counted in the «mass-kilometre» unit.
- There is no plausible aggregation method for persons-kilometre and tonnes-kilometre. In contrast, the addition of transport of passengers and goods expressed in mass-kilometres raises no problems.

The eco-efficiency indicator must reflect the pressures on the environment exerted by satisfying mobility requirements. A value which makes it possible to reflect a maximum number of ecological pressures is energy consumption. The link is obvious for CO₂, while for airborne pollutants, the technological level of the vehicles (engines, catalytic converters and filters) has to be considered alongside fuel consumption. In contrast, energy consumption provides no indication of landscape deterioration, breaking up of habitats, accidents, stress and other harmful effects of mobility. Nor does it give any input about noise, which is not, from the sustainability viewpoint, as important as the other nuisances because it does not affect future generations. In accordance with the principle of flagship indicators, simplifications must therefore be accepted and sectoral indicator systems must be used to monitor a specific area or policy.

If specific energy consumption is linked to the number of mass-kilometres, we can measure efficiency expressed in joules per mass-kilometre (J/t-km). Only an efficiency indicator calculated in this way is consistent with the volume indicator proposed. By multiplying the two indicators together it is easy to obtain transport energy consumption in absolute terms.

This approach necessitates further developments, especially as regards calculating the weight of vehicles and empty trips. The extent to which other countries take the total mass of vehicles into consideration and the importance of international comparisons in this area would also have to be examined.

³⁾ The word mass is used here in the sense described here, not as in physics.

Annex 5

Economic indicators (proposals)



Environmental Management System (EMS)

UN definition

Does not exist.

Swiss definition

Number of ISO 14001 certified companies and number of people employed in these companies.

The indicator and sustainable development

An EMS certificate indicates the presence of an efficient system for managing all ecological problems and risks, at both the decision-making and operational levels of a company. Depending on the economic and technological criteria as well, an EMS makes it possible to ascertain appropriate measures for the ongoing improvement of a company's environmental performance that far exceed the legal requirements. Responding to the basic principles of sustainable development, an EMS can play a central role in balancing ecological and economic interests (search for eco-efficiency) at the micro-economic level. The ISO 14001 standard is recognised worldwide. It was developed by industry itself, is applied on a voluntary basis and can be adapted to companies of all types and sizes. In particular, an ISO 14001-compliant EMS must draw up company organisation, procedures, responsibilities and ways and means for organising the environmental policies and objectives set by the company itself.

Link to Swiss federal policy

Under the strategy for sustainable development in Switzerland, the Swiss Federal Council aims to encourage EMS implementation. To this end, the Confederation must, for instance, reinforce procurement directives so as to promote environmentally friendly products and services, and hence, suppliers that have introduced EMS. Moreover, article 43a of the Environmental Protection Act gives the Federal Council powers to lay down regulations

about EMS introduction if necessary, naturally taking account of existing international standards such as ISO 14001.

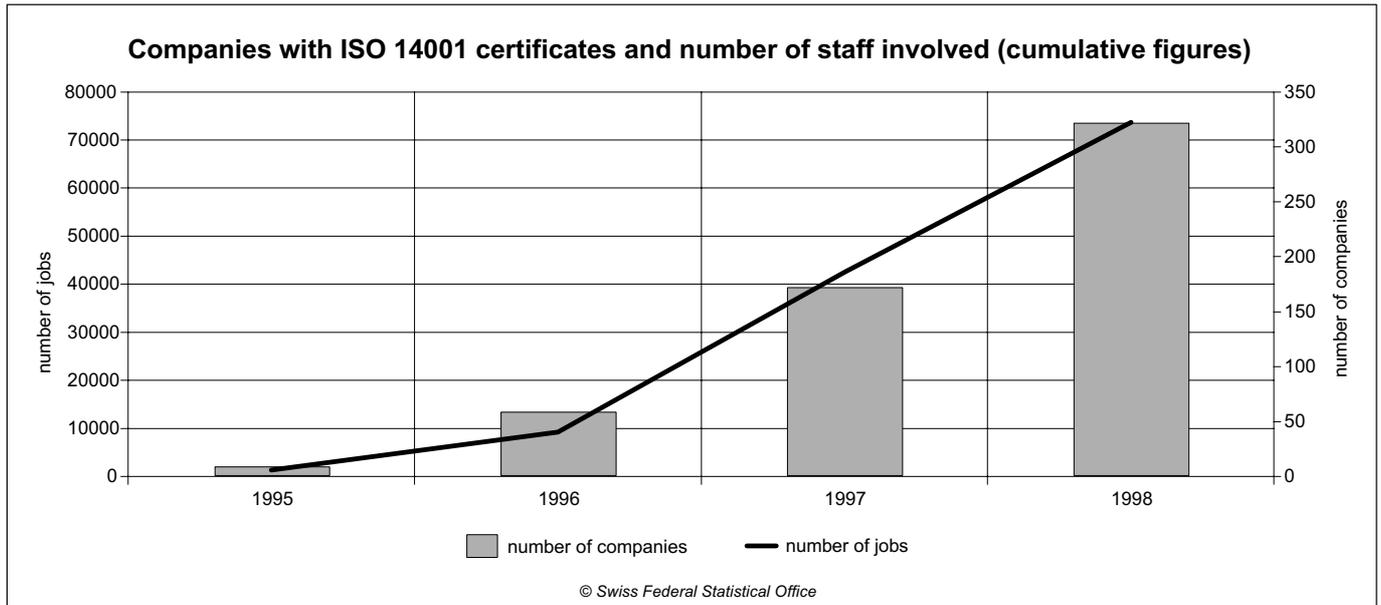
Evaluation of the indicator

This indicator makes it possible to evaluate the degree of use of a management tool which encourages ecological, sustainable corporate management. However, the mere existence of an ISO 14001-certified EMS does not make it possible to affirm that one company manufactures in a more environment-friendly fashion than another. An EMS guarantees both environmental awareness throughout the company and the establishment of procedures and measures that permit the identification, surveillance and minimising of its impact on the environment.

Adding up all staff employed by these companies gives an indication of their relative economic weights. In the future, this indicator can be further refined, for instance through data per branch. It would also be interesting to know how many ISO 14001-certified companies publish their environmental performance and objectives. Data about the number of employees is taken from the 1995 Federal Business Census, and some of them have been updated as part of another survey. Jobs in companies created after 1995 were not surveyed. Thus, the data given here do not fully reflect the actual situation.

Evaluation of the data

Since the definitive launch of the ISO 14001 standard in 1996 (a provisional version was already available in 1995), there has been steady, rapid growth in the number of ISO 14001 certificates. More than 330 Swiss companies had been awarded certificates by the end of 1998. In conjunction with the more than 6000 Swiss companies that have ISO 9000 (quality management) certificates, there is tremendous growth potential through the synergies created by ISO 9000 and ISO 14001, as well as the cost-benefit ratio connected with obtaining the ISO 14001 certificate.



Data production:	Institute for Economics and Ecology, University of St. Gallen (IWÖ-HSG)
Source of data:	Certification bodies
Units used:	Number of companies and number of jobs
Availability of data:	Annual, since 1995
Regionalisation:	NUTS III (Canton)
Agenda 21 chapter:	Chapter 30 Strengthening the role of economy and industry



Ethical, social or environmental investments

Definition

Does not exist.

Swiss definition

Total assets (in millions of CHF) of main investment media (funds, banks, holding companies, etc.) that take explicit account of ecological, ethical or social criteria.

The indicator and sustainable development

Financial resources are indispensable for achieving sustainable development and Agenda 21 makes explicit mention of the need for financial follow-up. The movement of these assets indicates the extent to which financial circles include sustainable development criteria in their business. From this point of view, it seems expedient to take action at the very source of any economic activity by trying to influence the flow of investment funds according to ecological and social criteria.

Link to Swiss federal policy

In its strategy for sustainable development in Switzerland, the Federal Council affirms the need to act according to the laws of the market, in this case the capital market, and to use them for sustainable development. Seen from this angle, information also plays an essential role. In fact, we are witnessing the advent of new financial products such as «eco funds», «sustainable funds», «alternative banks» or «green venture capital». Clear, transparent information about these new products should enable a potential investor to opt for «green» or «sustainable» investments. At

present, there are no government or private labels stipulating minimum requirements for the ecological, ethical or social character of these new financial products.

Evaluation of the indicator

This indicator lists all investment funds, banks and other companies or institutions in Switzerland, which offer options for investments that comply with the principles of sustainable development. On this basis, the total assets of these «green» or «sustainable» investments can be estimated.

However, one question remains unanswered: at what point can it be acknowledged that investments explicitly and selectively (for instance through strict exclusion criteria) meet the principles and conditions of sustainable development.

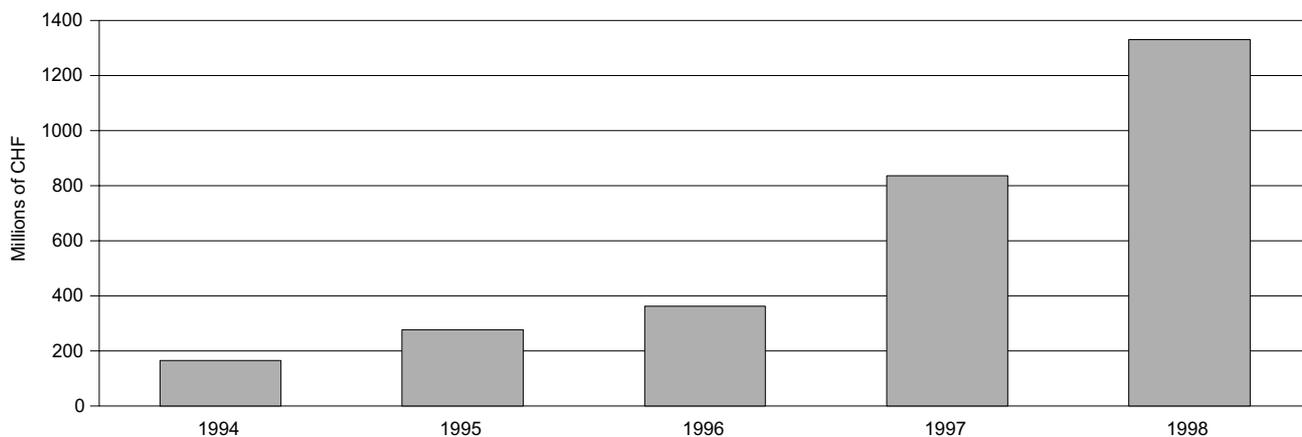
Neither the proportion of these investment funds from abroad nor the share invested abroad is known. Thus, in a global financial market, it is difficult to establish unambiguous links between these «alternative» funds and the development of sustainability in Switzerland.

Evaluation of the data

Over the past five years, there has been a steady increase in the number of «alternative» financial products on the market. The amounts given are an estimate of the cumulative assets of investment funds and other companies or institutions that offer the possibility of ethical or ecological investments in Switzerland. These assets – estimated at 1.3 billion CHF – remain marginal compared with some 600 billions CHF, the total approximate assets available in Switzerland in public pension schemes and investment funds.



Main media for ethical, social or environmental investments



© Swiss federal Statistical Office

Data production:	Centre Info Fribourg
Source of data:	Banks and financial institutions
Units used:	CHF
Availability of data:	
Regionalisation:	
Agenda 21 chapter:	

SFSO publications

As the Swiss Government's central statistics service, the Swiss Federal Statistical Office's mandate is to make statistical data available to a wide range of users.

The statistical information is distributed according to subject matter (see inside cover page), using different media:

<i>Distribution medium</i>	<i>Call</i>	<i>Distribution medium</i>	<i>Call</i>
Individual information	0041 (0)32 713 60 11	On-line databank	0041 (0)32 713 60 86
The SFSO on the Internet	http://www.statistik.admin.ch	Publications with in-depth information (sometimes on diskette also)	0041 (0)32 713 60 60
Press releases to inform the public about the latest findings	0041 (0)32 713 60 11		

More detailed information about the various distribution media is given in the List of Publications, which is updated every two years. To receive your free copy, see on the internet or call 0041 (0)32 713 60 60.

Geography and Environment

Additional publications:

The Environment in Switzerland 1997, facts, figures, perspectives (SAEFL and SFSO eds.)
Price SFr. 28.-, Order through: Swiss Federal Printing and Supplies
Office (EDMZ), CH-Bern,
Order number: German: 319.404d, French: 319.404f, Italian: 319.404i, English: 319.404eng

Information about environment statistics:

SFSO, Environment Unit, Phone: 0041 (0)32 713 62 53, Fax: 0041 (0)32 713 65 46
E-Mail: umwelt@bfs.admin.ch

In the revised Federal Constitution of 18 April 1999, Switzerland declares sustainable development as the guideline for the social, economic, and ecological future. To measure the success of sustainable policy a suitable monitoring instrument is necessary, as e.g. a set of representative indicators.

In this publication 33 indicators are presented and evaluated. They come from the system of indicators of the United Commission on Sustainable Development.

The pilot study is a first step towards an efficient and capable of development system of indicators. It will describe sustainable development in Switzerland and enable international comparisons.