



COMPARATIVE ANALYSIS OF INDICATOR SYSTEMS FOR SUSTAINABLE DEVELOPMENT

Prepared by the Bureau de coordination
du développement durable
of the Ministère du Développement durable,
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SUMMARY

This comparative analysis of thirty-six indicator systems¹ for sustainable development, systems that are in use or being developed in some thirty public administrations, brings to light the trends, strengths and weaknesses that characterize many of them. Among the characteristics and trends observed, one quickly notes a terminological and methodological ambiguity in the design of such systems that makes comparison difficult. Nonetheless, despite this ambiguity, one is struck by the emergence of a multitude of unique, dynamic systems being developed at all levels and at all scales in response to particular needs and conditions.

One dominant trend revealed by this comparative analysis is for the choice of indicators to be strongly influenced by the priorities of administrations, the three principal objectives being to inform stakeholders, to measure progress and to aid decision making. The four main consultative and participative mechanisms employed are interministerial collaboration, joint committees or working groups, public consultation and the analysis of foreign and international experience. Numerous criteria are used for the selection of indicators. The most common are: the quality, relevance and availability of data; simplicity; the ability to measure progress; adaptability; the ability to measure the achievement of objectives; and the ability to make comparisons in time and space. The type of architecture and the number of indicators (from three to sixty-nine) are also highly variable. There is however a clear trend to reduce the number of indicators or to employ a limited number of headline indicators. The types of architecture most frequently used are those based on dimensions, domains and objectives.

A number of these systems offer concrete and original solutions to the enormous challenge of measuring and monitoring sustainable development indicators. The principal means being used to this end by public administrations include the hierarchization and aggregation of indicators, indexes, and setting measurable, relevant, effective and objective targets.

This comparative analysis is neither exhaustive nor systematic. As a complement to this exercise it would be useful to analyze other characteristics that have received less study, such as the evolution of systems in time, the financial and human resources involved, the coordination of different spatial scales...

Nonetheless, it is hoped that this analysis, despite its limitations, will inspire and support the development of other indicator systems for sustainable development, and in particular Québec's, which will be submitted to the Government for adoption no later than in the year following adoption of the Government's strategy for sustainable development.

1. Certain systems (those of the European Union, France, Canada, Sweden) have been updated based on information obtained from the first phase of analysis.

INTRODUCTION

Context

The *Sustainable Development Act*, assented to on April 19, 2006, prescribes in Section 12 that “not later than one year after the end of the year in which the strategy is adopted², the Minister of Sustainable Development, Environment and Parks submits to the Government for adoption a first list of sustainable development indicators designed to monitor and measure progress in Québec in the area of sustainable development”.

To ensure its application, the *Act* defines the mandates of the Minister of Sustainable Development, Environment and Parks, which include “enhancing knowledge and analyzing experiences elsewhere in the field of sustainable development, in particular as regards the directions pursued by strategies and action plans and their implementation, and the development of indicators and other methods for measuring the progression of sustainable development and the integration of related environmental, social and economic concerns”.

The present comparative analysis of indicator systems for sustainable development all over the world comes within this dual context. Its main purpose is to provide information about what has been done by administrations other than the Government of Québec to inspire and support development of the system that will be submitted to the Cabinet in accordance with Section 12 of the *Act*. This study will also help by determining the principal trends, good practices to follow and the pitfalls to avoid in developing such a system.

Methodology

Of the many indicator systems that were examined, thirty-six were selected for this comparative analysis, which is based essentially on the content of public reports presenting them. To support the principal conclusions of this analysis and to enhance knowledge of the subject, studies and theses on sustainable development indicators were also consulted. Appendix 1 presents a list of the systems chosen for analysis.

The systems were selected according to three main criteria:

- 1- Their relevance to the social, economic, environmental, geographical, political and cultural situation of Québec³.
- 2- The methodology employed and the level of expertise⁴.
- 3- The originality of the systems and the diversity of the selection.

2. This refers to the first version of the governmental strategy for sustainable development, to be adopted by the Government in the year following the year in which the *Act* was assented to.
3. This is why the Environment Canada and Montréal systems were included, even though they are primarily environmental.
4. Systems used by international bodies and organizations for interstate regional cooperation were also included, because they have served as models for numerous systems at different scales. For example, the system adopted by Japan (Japan for Sustainability, an NGO) was chosen for its innovative method of measurement.

Certain systems were excluded from the present analysis because they were heavily based on better-known models (notably the European one) and offered little that was new.

Number of Systems Selected, by Type of Administration

Type of Administration	Number of Systems
International cooperation agencies	6
Countries	19
American states	4
Cities	4
Canadian provinces	2
Regions (in Québec)	1

Comparison of the thirty-six systems was facilitated by the use of common descriptors (see Appendix 2):

- Geographical coverage
- Origin, year of publication
- Objectives
- Development modes
- Type of architecture
- Types of indicators
- Presentation of indicators
- General information
- Comments and criticisms
- List of indicators

Cautionary Notes

This analysis compares the content of public reports on indicator systems for sustainable development. It makes no attempt to be exhaustive and systematic, and does not provide in-depth analysis of the specific experiences of each country, organization, region, city, etc. The systems discussed are not necessarily in their most recently published version, despite our efforts to obtain the latter. Comparisons between systems are sometimes difficult due to their great diversity in both form and content. Since there is no common vocabulary for dealing with the complex and multidimensional nature of our topic⁵, a glossary of the principal terms in this study is presented in Appendix 3 to facilitate comprehension.

5. Graham LOCK, "Experience in the Elaboration and Use of Sustainable Development Indicators for the European Union", p. 1. [Document submitted to the workshop on sustainable development indicators, Université Laval, June 2006].

Content

The first chapter presents elements that are common to the majority of systems, namely their objectives, modes of development, criteria for the selection of indicators, and the general mode of presenting results. The second chapter deals with structure, i.e. the principal types of architecture used for these systems, problems related to their use, and certain potential solutions. The third chapter presents other characteristics of indicators or systems that have particular interest or potential for development. Topics considered include sectoral transversality, aggregation of indicators, global indexes, and the relations between indicator systems and strategies for sustainable development. The principal characteristics and leading trends that emerge from these systems are presented in the Conclusion.

CHAPTER 1: Common Characteristics of the Majority of Systems

1.1 Objectives of the Indicator Systems Analyzed

The systems analyzed often target a number of objectives more or less directly⁶. However, in the present analysis we have only compared objectives that are named explicitly in the reports. Three principal objectives were found: to inform, to measure progress and to aid decision making.

1.1.1 *To Inform*

The importance of informing the public, elected officials and all sectors of society in a comprehensible way about the state and progress of sustainable development is often mentioned in the reports (Great Britain, Manitoba, New Jersey, Nordic Council of Ministers, Montréal, Vancouver). Leaders must act as catalysts in interpreting and promoting sustainable development (Canada 2003). Better circulation of information encourages the different stakeholders of society to think in terms of sustainable development and to join in working towards it (Australia 2002). Finally, explaining the state of the situation and the problems involved is crucial for stimulating discussion (Japan, Luxembourg, Alberta, Calgary) and for determining the effects decisions may have on resources (New Zealand).

1.1.2 *To Measure Progress*

Progress is often measured in terms of objectives defined in a sustainable development plan or strategy (Belgium, Oregon, Pennsylvania, Montréal) and in terms of precise targets (Denmark, Japan, New Jersey, Oregon, Helsinki). In measuring progress, priority is given to results rather than means. This facilitates periodic comparisons, whether internal or external, with other countries (OECD, United Nations). Moreover, measuring progress makes it possible to evaluate changes, to see them as part of a long-term evolution, and to determine the principal trends (France 2004, European Union, Mediterranean 2006).

1.1.3 *To Aid Decision Making*

A number of documents emphasize the importance of assisting national decision-making processes on sustainable development (European Union, United Nations, Helsinki, Ireland 1997, New Jersey, Nordic Council of Ministers) by providing a set of indicators to measure advances in critical sectors (Mediterranean 2005). Others express the importance of presenting priority indicators (Switzerland 2006, France 2004, European Union, Mediterranean 2006) and informing political and economic decision-makers along with civil soci-

6. Systems often target other objectives than those from sustainable development, such as presenting the methodology or a global statistical portrait.

ety. Also stressed is the need to encourage collaboration and consensus among all concerned (Saguenay–Lac–Saint–Jean, Ireland 2004). Finally, since sustainable development indicators are intended to serve as an aid to decision making, they can and must be able to evolve in harmony with knowledge and priorities (Belgium).

1.2 Development Modes of the Indicator Systems Analyzed

Analysis reveals that public administrations favour four procedures for drawing up their list of indicators: interministerial collaboration, working groups, public consultations and the lessons learned from foreign and international experience.

1.2.1 *Interministerial Collaboration*

At the national level, in most cases, the Ministry of Environment (or equivalent) and the office or institute of statistics work together in preparing indicator systems for sustainable development and publishing documents about them (Canada 2005, Great Britain, Sweden). Occasionally, either the Ministry of Environment (Australia 2002, Ireland 1997) or the office of statistics (Australia 2006, Ireland 2004) is alone in charge of publication. Often, both collaborate with other ministries involved in sustainable development efforts (France 2004, Luxembourg), such as the ministries of health (Canada 2005) and territory (Switzerland 2003), public agencies like the Competition Authority (Ireland 2002), or non-governmental organizations (Japan).

1.2.2 *Working Groups*

Working groups and committees are among the privileged ways of developing indicator systems for sustainable development. Their composition is variable however. They may take the form of intersectoral or multidisciplinary seminars that bring together numerous participants from government, industrial circles, universities and non-governmental organizations (Sweden, Manitoba, Minnesota, Oregon, OECD, Montréal). They may also include experts (Belgium, Switzerland 2003, Canada 2003, European Union, Alberta, New Jersey), who sometimes work in close collaboration with citizens and community organizations (Calgary, Vancouver). The work may also be done by a group of regional stakeholders (Saguenay–Lac–Saint–Jean) or a body of representatives from different countries (Mediterranean 2005 and 2006, Nordic Council of Ministers, OECD, United Nations, European Union).

1.2.3 *Public Consultations*

Public consultations are often used in developing sustainable development indicators (Australia 2002, Denmark, Finland, France 2004, Great Britain, Ireland 2002, Luxembourg, Helsinki) in order to take into account the suggestions of interest groups and society's different stakeholders. Additionally, certain countries (Germany, Austria, Netherlands) have set up Internet discussion portals as a way of reaching the public and all stakeholders and nourishing debate by furnishing resources on the subject⁷.

7. EUROPEAN COMMISSION and EUROSTAT, *EU Member State experiences with sustainable development indicators*, 2004 edition, Luxembourg, Office for Official Publications of the European Communities, 2004, p. 78.

1.2.4 *Consideration of Foreign and International Experience*

A number of systems are based on the experience of foreign countries and are a response to commitments made at international events. However, few of the documents analyzed refer to this. Of the few that do, Ireland (1997) and Denmark were following up on commitments made at the Rio and Johannesburg summits. International projects by various administrations were consulted (Australia 2002, Belgium, European Union, Helsinki, Vancouver). Another way to develop an indicator system for sustainable development is to draw upon resource persons at international organizations like the United Nations, in particular the staff of the Commission on Sustainable Development (CSD), the United Nations Environment Program (UNEP) and Agenda 21 (Belgium, Ireland 2002, Switzerland 2003, European Union, Helsinki). Finally, Mediterranean experience in sustainable development was gained among the countries party to the Barcelona Convention (1975) in collaboration with the European Community.

In general, cooperation, multipartite consultation and consensus are favoured. However, when it comes time to build a system, there is a dilemma between seeking consensus and seeking results. The desire for consensus has to be balanced with considerations of time and resources. We do well to remember the example of the National Round Table on the Environment and the Economy (Canada 2003), which held discussions over several years with a great number of specialists and social stakeholders before finally arriving at a system on which everyone agreed, but which only comprised six indicators. Environment Canada had a similar experience with the interdepartmental plan for environmental sustainability, which finally delivered just three indicators.

1.3 **Indicator Selection Criteria**

1.3.1 *Most Frequent Selection Criteria*

A number of selection criteria go into the choice of indicators. Undoubtedly, the quality (credibility) and relevance to the process of sustainable development are fundamental in determining the most suitable indicators. The system must be clear and objective, while also reflecting intersectoral dependencies⁸. The criteria most frequently presented in the reports analyzed are listed in the table that follow:

8. Stephen F. MCCOOL and George H. STANKEY, "Indicators of Sustainability: Challenges and Opportunities at the Interface of Science and Policy", *Environmental Management*, vol. 33, no. 3, p. 298.

Principal Selection Criteria for Sustainable Development Indicators Used by Public Administrations

Principal Criteria	Public Administrations
Quality of data	Denmark, Ireland (1997), Luxembourg, Switzerland 2003, United Nations, European Union, Mediterranean (2006), Montréal
Relevance	Australia (2002), Belgium, France (2004), Japan, Switzerland 2006, Sweden, OECD, Mediterranean 2006, Montréal
Availability	Australia (2002 and 2006), Belgium, France (2004), Ireland (1997 and 2004), Sweden, Switzerland 2006, Mediterranean 2006, Minnesota, New Jersey, Oregon
Comprehensibility, simplicity	Australia (2002), Denmark, France (2004), Japan, Luxembourg, Switzerland 2006, Mediterranean 2006, OECD, Minnesota, New Jersey, Calgary, Vancouver
Measurement of progress in sustainable development	Australia (2006), Canada (2005), Ireland (1997), New Zealand, United Nations, New Jersey, Oregon, Calgary
Adaptability, sensitivity to change	Australia (2002), Sweden, Switzerland 2006, Mediterranean 2006, United Nations, Minnesota, New Jersey
Measurement of objectives	Australia (2002), Switzerland 2006, Oregon, Saguenay–Lac-Saint-Jean, Montréal
Comparisons in time or space	Ireland (2004), Japan, Luxembourg, Mediterranean 2006, Calgary, Vancouver, Switzerland 2006, Minnesota
Facilitation of decision making, accountability	Canada (2005), Denmark, Saguenay–Lac-Saint-Jean, Helsinki

Other Selection Criteria for Sustainable Development Indicators Used by Public Administrations

Other Criteria	Public Administrations
Emphasis on results	Australia 2006, Canada (2005), Montréal
Cost	Switzerland 2006, United Nations, Calgary
Balance between dimensions	Belgium, France 2004, Sweden
Links with existing indicators	Switzerland 2006, Mediterranean 2006
Reflection of priorities	Australia 2006, Great Britain
Explanation of data	New Zealand, Oregon
Stimulus to action	Calgary, Vancouver
International standards	Australia (2006), Mediterranean 2006
Consensus of experts	Australia (2006)
Distinction between objectives and means	France 2004
Periodicity and homogeneity	Switzerland 2006
Integrative character	Minnesota
Consideration of regional values	Vancouver

1.3.2 Data Sources and the "Dilemma" of Availability

As is often mentioned in selection criteria, those who develop systems are preoccupied by the availability and measurability of indicators. These criteria are directly linked to the costs and resources required to develop a system, while also being factors for its longevity. From the analyses in the reports, it turns out that it is preferable to opt for a modest system using available, easily measurable data that will show evolution over the long term. This is why most systems employ indicators based on the use of existing data provided by national statistics agencies. Efforts in this area by independent bodies in developed countries are inconclusive⁹. It is worth noting that certain systems (including those of Finland and Oregon) use data provided directly by the administrative levels, ministries or agencies concerned.

9. Knut H. ALFSEN and Thorvald MOE, "An International Framework for Constructing National Indicators for Policies to Enhance Sustainable Development", [article presented to the Expert Group Meeting on Indicators of Sustainable Development, New York, December 13-15, 2005, organized by the Division for Sustainable Development, United Nations], p. 13.

On the other hand, certain administrations (European Union, Switzerland 2003) consider it important to create or strengthen data for indicators that could give better information about the state of sustainable development, as opposed to simply using data that already exist. In their view, the absence or existence of data should not dictate the choice of indicators for obtaining objective measurements of the evolution of sustainable development. This is why these administrations retain the "best needed" indicators in their systems even in the absence of sufficient data. (The European Union designates "best available" indicators versus "best needed" indicators, the latter being "needed but facing problems of definition, data availability or data quality."¹⁰) However, in the case of Switzerland's system (MONET), the time and cost of developing new measurements led the administration in 2006 to abandon indicators for which it did not have available data in 2003. Obtaining new data renders the development of indicator systems more complex, besides increasing costs.

To get around this difficulty, the Agenda 21 program recommends "ensuring the collection and evaluation of the most cost-effective data by better identifying public and private users and their information needs at the local, provincial, national and world levels¹¹". For its part, Eurostat thinks that private-sector research in certain particular domains could facilitate this process. It also recommends that statistical, administrative and scientific sources of information be better integrated and that the necessary methodology be developed¹². Others wish to enhance their systems through close collaboration and the exchange of information between university institutions and governmental agencies (Pennsylvania). Many observatories can provide knowledge obtained from public and private partners, but they are far from being coordinated, nor their data integrated¹³.

1.4 General Mode of Presenting Results

In the reports analyzed, the presentation of indicators is one of the means of facilitating outreach and the dissemination of information to stakeholders. Most often, each indicator is presented on a methodological form of one or two pages, sometimes as many as ten. Certain reports use just a single graphic (Finland). Often, for every indicator, a definition, justification and summary of trends are provided, occasionally even for each theme, objective or dimension, depending on the type of architecture used for the system. The presentation of trends gives an overview of the evolution of sustainable development, even if no index of sustainable development exists. Some reports, like Sweden's or that of Japan for Sustainability, present a cross-reference matrix showing the links between domains and indicators. Almost all systems use one or more graphics per indicator to represent the state and evolution of the situation. Certain reports use colour codes or icons to indicate whether there has been deterioration, stagnation or improvement in sustainable development (Great Britain, Belgium, Montréal). Lastly, a few reports include a detailed list of references and sources of information.

10. Graham LOCK, *op. cit.*, p. 5.

11. Christian BRODHAG, "Gouvernance et évaluation dans le cadre du développement durable", *Agora 21*. [www.agora21.org/bibliotheque.html]. [Article presented to the symposium of the Société Française de l'Évaluation.]

12. STATISTICAL PROGRAMME COMMITTEE OF THE EUROPEAN UNION, *Final report of the Sustainable Development Indicators Task Force*, Luxembourg, Eurostat, November 2005, p. 2.

13. Christian BRODHAG, *op. cit.*

CHAPTER 2:

Principal Architectures, Problems and Potential Solutions

2.1 Architecture

In the thirty-six systems analyzed, the number of indicators varies from three to one hundred sixty-nine, for an average of about forty-five. Four systems use fewer than twenty indicators, twenty-two have from twenty to fifty, while ten comprise more than fifty.

Three types of architecture are generally used to structure indicator systems for sustainable development. First there are the systems based on the three dimensions of sustainable development, namely the economy, the environment and society. Most systems however are organized around domains, the second type of architecture. Lastly, certain indicator systems are structured in terms of objectives. The "state-pressure-response" model will also be discussed, though only Belgium has adopted it.

2.1.1 Dimensions

This approach, also called *sectoral* or by pillars, follows directly from the general definition of sustainable development, which incorporates the triptyque "economy-environment-society". According to the author of this definition, a balance between the three dimensions is sought¹⁴. Six of the thirty-six systems analyzed are structured in this manner. Regardless of architecture however, in most systems there are more or less direct links between indicators and the "economy-environment-society" triptyque.

System	Characteristics
France	15 indicators per dimension
Luxembourg	9 indicators per dimension
Alberta	51 indicators, from 12 to 22 indicators per dimension
Manitoba	42 indicators, in varying numbers per dimension
Japan	5 indicators per dimension, plus a fourth dimension: well-being
United Nations	58 indicators, in varying numbers per dimension, plus a fourth dimension: institutions

14. Paul-Marie BOULANGER, "Les indicateurs de développement durable : un défi scientifique, un enjeu démocratique", [lecture given at the seminar *Développement durable et économie de l'environnement* organized by the Institut du développement durable et des relations internationales (IDDRI)], 2004, p. 17.

This architecture has the advantage of illustrating most sustainable development questions on which there is consensus. It also allows a balanced representation of dimensions in the list of indicators¹⁵. On the other hand, in general there is no interrelation between dimensions, nor are there transverse indicators. The choice of placing an indicator in one dimension instead of another may be subjective, especially since most indicators can be found in at least two dimensions at once. Eurostat discusses precisely this problem:

"An approach which does not take these interdependencies into account, but instead deals with each dimension separately, is simply a "bundling" of the three broad sectoral policy fields under an artificial and misleading "umbrella" of something falsely described as sustainable development. [...] This is because in all member states policies enacted by a ministry with specific sectoral responsibilities can have potentially significant effects in terms of sustainability across many different policy fields¹⁶."

Therefore, despite appearances, a balance between the three dimensions is not necessarily proof of sustainable development, since there is a risk of indicators failing to inform about the objectives and issues that are genuinely associated with sustainable development¹⁷. This is one of the reasons why most indicator systems for sustainable development base their architecture on domains or objectives.

2.1.2 Domains

Domains are seen as priority fields of sustainable development, whether at the national or any other level. Sixteen systems are built around this architecture, the number of domains varying from four to twenty-six. Most have from five to ten domains. There is great variation in the number of indicators (per domain and in total) and in what they are called, other terms being *themes*, *spheres of progress* (Australia 2006) or indeed *strategic sectors* (Ireland 1997)¹⁸. The domains most frequently encountered include equity, natural resources, agriculture, culture, education, air and water quality, etc.

System	Designation	System	Designation
Australia 2006	4 spheres of progress	European Union 2005	10 themes
Ireland 1997	8 strategic sectors	Oregon 1997 (2002)	7 categories
Ireland 2004	10 domains	OECD 2006	11 themes
France – IFEN 2003	10 modules	Pennsylvania 2002	3 themes
Switzerland 2003 and 2006	26 themes	Calgary 2004	6 themes
Sweden 2001	4 themes	Vancouver 2006	8 themes
New Zealand 2006	6 themes	Saguenay–Lac–Saint–Jean 2003	7 domains
Helsinki 2002	5 themes		

15. Idem, p. 15-20.

16. EUROPEAN COMMISSION and EUROSTAT, *op. cit.*, p. 70.

17. Paul-Marie BOULANGER, *op. cit.*, p. 17.

18. According to the 2002 study by the European Commission (updated in 2004), out of its fifteen member countries in 2002, Germany, Austria, Italy and Spain had also chosen an architecture by domains (EUROPEAN COMMISSION and EUROSTAT, *op. cit.*, p. 7). These architectures were not analyzed in the present study.

This approach makes it easier for stakeholders to comprehend the issues, and aids decision making about sustainable development¹⁹. At the same time, it does not prevent the linking of indicators (Sweden, European Union) or domains (Ireland 2002) to the three dimensions of sustainable development. The limitation of dimension-based architecture, in contrast, is emphasized in Sweden's report:

"Sustainability indicators are generally designed to illustrate the economic, environmental and social dimensions of sustainable development. There is a danger in categorizing a set of indicators strictly by these dimensions since the same phenomena can often be viewed from several perspectives²⁰."

With rare exceptions (Oregon), indicators organized by domains do not have a clear connection with the sustainable development objectives of a given government or organization. Moreover, domain-based systems are not used only for sustainable development indicators. Several systems with this architecture (Australia 2006, Minnesota, Oregon) were developed to measure the general progress of society, not sustainable development. This reminds us that it is still difficult to give a particular meaning, a plus-value, to sustainable development indicators as compared to indicators of progress.

2.1.3 Objectives

In this architecture, which was adopted for ten of the systems analyzed, indicators measure the achievement of objectives either for general sustainability in a given territory, or of a plan or strategy for sustainable development. As with domain-based architecture, there is considerable variation from one system to another, both in the number of indicators and the formulation of objectives, which are sometimes called *priorities*, *problematics*, etc.

System	Designation	System	Designation
Australia 2002	4 objectives	Minnesota 2000	14 objectives
Ireland 2002	8 visions (objectives)	New Jersey 2004	11 objectives
Great Britain 2005	4 objectives	Mediterranean 2005	7 objectives
Denmark 2003	8 objectives	Mediterranean 2006	9 objectives
Finland 2005	8 objectives	Montréal 2005	4 orientations

19. Graham LOCK, *op. cit.*, p. 1-5.

20. STATISTICS SWEDEN and SWEDISH ENVIRONMENTAL PROTECTION AGENCY, *Sustainable Development Indicators for Sweden: A First Set 2001*, Stockholm, Statistics Sweden and Swedish Environmental Protection Agency, 2001, p. 7.

This architecture permits more concrete measurement of sustainable development and can have greater impact on stakeholders and decision makers, especially if the objectives are tied to a formal strategy for sustainable development. According to the New Jersey Sustainable State Institute, "goals give us a more precise destination than simply 'sustainability,' which can be hard to pinpoint clearly. Indicators tell us whether we are moving towards our destination or heading the opposite way²¹". This architecture is thus more results-oriented than the others, though that doesn't necessarily imply the use of specific goals, whether qualitative or quantitative²².

However, the definitions of objectives are at times vague and can lead to confusion. They are presented in different ways:

- in the form of generalities, visions or broad aspirations (Finland: "Adapt to the future");
- by referring to programs that directly involve institutions (Australia 2002: "Ensure intergenerational equity");
- in the form of precise objectives (Oregon: "Reduce crime by 4% by 2010").

As the following table shows, the distinction between *objective* and domain is not always clear when it comes to classifying or grouping sustainable development indicators.

Some Examples of Domains and Objectives

DOMAINS (Ireland 2004)	OBJECTIVES (Finland 2005)
Economic indicators (23)*	Intergenerational equity (12)
Innovation and technology (8)	Human health and well-being (12)
Employment and under-employment (12)	Distributional equity (income) (6)
Social cohesion (12)	Adaptation for the future (8)
Education (12)	Global responsibility (5)
Health (4)	Environmental pressure (7)
Population (12)	Conservation of natural resources (6)
Housing (4)	Eco-efficiency and community structure (10)
Crime (5)	
Environment (16)	

* The figure in parentheses indicates the number of indicators.

21. NEW JERSEY SUSTAINABLE STATE INSTITUTE, *Living With the Future in Mind: Goals and Indicators for New Jersey's Quality of Life*, 3rd Edition, New Brunswick (New Jersey), New Jersey Sustainable State Institute, 2004, p. 8.
22. UNITED STATES GOVERNMENT ACCOUNTABILITY OFFICE, *Informing our Nation: Improving How to Understand and Assess the USA's Position and Progress*, Washington, United States Government Accountability Office, 2004, p. 95 and 110.

For example, in the British system indicators are presented under "themes" but the latter are in fact formulated as objectives²³. In its comparative study, the U. S. Government Accountability Office gives a good description of the problem of formulating objectives:

"Whether outcomes are stated in general or specific terms is not necessarily a reflection on their utility or legitimacy. An unrealistic goal that is very specific can create problems in contrast to a vague, general aspiration that has broad support and builds common ground"²⁴.

2.1.4 The "Driving Forces, Pressure, State, Response" Model

The "pressure-state-response" model has long been used to evaluate the state of the environment (Canada, United Nations). This model, applied by several administrations to the concept of sustainable development, has the advantage of both identifying the causes and effects of the problems studied and presenting solutions to them. However, the model loses its value if these interrelations are undemonstrable or overly simplified. Cause-and-effect relations are often debatable²⁵. It was in fact for this reason that the United Nations, which had adopted this architecture in the 1990s, abandoned it in 2001²⁶. Although some reports (European Union, Saguenay-Lac-Saint-Jean, France 2004) stress the usefulness of this framework for selecting the most relevant indicators, of all the systems analyzed only the Belgian one adopts it. It must also be noted that the distinctive feature of this system, compared to the others we analyzed, is its indicators of political "responses" or "governance", three of which are linked to the federal strategy for sustainable development, six to the budget and public finances. The only other place such indicators are found, and to a lesser degree, is in the Mediterranean system (2005 and 2006²⁷).

Despite their respective advantages and drawbacks, it is hard to say which architecture is truly the best at providing information about the progress of sustainable development, or that gives the strongest impetus for actions in its favour. Architecture by dimensions is the least common, and perhaps the least advantageous due to the inherently compartmental nature of dimensions themselves, which indicators cannot easily measure. Architecture by domains, the most commonly used, is the most easily understood by stakeholders and especially by the general public. As for architecture by objectives, found in the fewest systems, it is more oriented toward actions and results than are the other two.

24. UNITED STATES GOVERNMENT ACCOUNTABILITY OFFICE, *op. cit.*, p. 111.

25. Thomas M. PARRIS and Robert W. KATES, "Characterizing and Measuring Sustainable Development", *Annual Review of Environment and Resources*, July 2003, p. 574.

26. Laszlo PINTER, Peter HARDI and Peter BARTELMUS, "Sustainable Development Indicators: Proposals for the Way Forward", [s. l.], International Institute of Sustainable Development (IISD), 2005, p. 6. [Document prepared for the Expert Group Meeting on Indicators of Sustainable Development, New York, December 13-15, 2005, organized by the Division for Sustainable Development of the United Nations].

27. Though the names of the strategy's monitoring indicators change from year to year.

2.2 Problems Related to the Structure of Systems

Comparison of the different architectures reveals that there are problems with a number of indicator systems. The two main problems are: meeting the objectives of sustainable development, and overcoming terminological and methodological ambiguity.

2.2.1 Meeting the Objectives of Sustainable Development

Indicator systems must meet the objectives of sustainability. To achieve this, what counts is apparently not so much the model of architecture, but rather that the system be able to respond as effectively as possible to the challenges of sustainable development at different scales. In the systems analyzed, objectives are linked at times to domains or themes, at times to dimensions, and at times to both. In the end, no matter which architecture is chosen, an indicator system must be aimed at the three grand objectives identified in the first chapter, namely to inform, to measure progress and to aid decision making.

A system whose indicators are seen as too accommodating, or whose targets are too easily achieved, will lose credibility in the eyes of the public. The confidence of public opinion is crucial to a system's longevity²⁸.

2.2.2. Overcoming Terminological and Methodological Ambiguity

Great variability in structure, number of indicators and methodology was observed in the systems analyzed. These marked differences illustrate the terminological and methodological ambiguity around both the objectives and the indicators of sustainable development. The terms *indicators*, *data*, *units of measurement* and the various terms for "domains" are used or interpreted in many different ways. The same indicators may be used at different levels. For example, in Environment Canada's system, "air quality" is an indicator, while in Switzerland's (2003 and 2006) it is a domain, with six indicators for it.

Furthermore, one of the most important problems related to methodology has to do with the subjective choices that determine whether a given indicator, domain or objective is assigned to one dimension or another. This problem is compounded by the difficulty of choosing what to measure and in relation to what. These choices can have both political and practical repercussions.

2.3 Possible Solutions

Potential solutions exist for resolving these problems. In the systems analyzed, the hierarchization of indicators and the use of quantitative targets are concrete examples of ways to overcome these difficulties.

28. Stephen F. MCCOOL and George H. STANKEY, *op. cit.*, p. 295.

29. Thomas M. PARRIS and Robert W. KATES, *op. cit.*, p. 582.

2.3.1 Hierarchization

Several systems solve the problem of different levels of indicators by ordering them in a hierarchy. Hierarchizing indicators facilitates comprehension and better reflects the priorities of leaders or other stakeholders. Since long lists of indicators are also problematic, some systems use a list of headline indicators. These latter turn out to be of little use however and are often set aside, for priorities tend to get lost with this sort of attempt at being exhaustive³⁰. On the other hand, headline indicators are often directly linked to the principal concerns of the public agenda, and reflect a certain pragmatism. However, though they facilitate communication, headline indicators are no guarantee of relevance and reliability.

Here are some examples of hierarchized indicator systems:

- The European Union revised its sustainable development strategy in 2006, designing a hierarchized structure with three levels. At the top of the pyramid, the first level comprises twelve headline indicators for monitoring political objectives; they are addressed to strategists, decision makers and the general public. The second level presents forty-five indicators related to priority action domains. The third level comprises ninety-eight indicators that permit intensive analysis of policies while shedding light on the evolution and complexity of the situation.
- In the 2006 revision of its national strategy, France selected twelve "first-level" or headline indicators, of which eleven are directly derived from the "first-level" indicators of the European Union. An indicator of good governance replaces a Eurostat indicator covering the territory as a whole. For the eleven other indicators, only the order was changed. This choice facilitates comparison with the systems of other European countries and favours the achievement of EU objectives. Sweden, which also revised its sustainable development strategy in 2006, has also designated twelve headline indicators out of its list of ninety-four indicators. These headline indicators are however different from those of both Eurostat and France.
- Germany³¹, Denmark, Ireland (2002), Switzerland (2006) and Great Britain have each produced a list of headline indicators to accompany their overall list of indicators, seeking thereby to facilitate comprehension and accessibility for decision makers and the general public. The list of headline indicators generally contains between ten and fifteen indicators that are directly linked with the principal objectives of sustainable development, while the overall list comprises more precise indicators, which are much more numerous and measure a wide variety of actions and states. Finally, the NGO Japan for Sustainability chose twenty headline indicators to which are attached some two hundred different data sets.
- In 2006 the Mediterranean system added a distinction between priority indicators and complementary indicators. Australia (2006) also divided its themes according to their priority: *headline dimensions*, *supplementary dimensions*.

30. Laszlo PINTER, Peter HARDI and Peter BARTELMUS, *op. cit.*, p. 7.

31. EUROPEAN COMMISSION and EUROSTAT, *op. cit.*, p. 7.

2.3.2 Quantifiable Targets

Some systems use quantifiable targets³² for each indicator (Denmark, Oregon), but it is the systems developed by Japan for Sustainability and New Jersey that really stand apart. In New Jersey the creation of targets for each indicator is not yet complete, but its report explains the reasons for using such targets and how they are developed. As for Japan for Sustainability, not only has it defined quantifiable targets for each indicator, it has developed a procedure for calculating the global achievement of targets for every dimension of sustainable development. The choice of targets can emerge from a process of negotiation and/or scientific research³³. These two systems are described in greater detail below.

a) The Case of New Jersey

New Jersey designates two types of targets: *sustainability targets* and operational targets. The first represent, by a complex and precise process, that to which the government aspires in terms of sustainable development. The process must reflect both the consensus in the rest of the world regarding sustainable development and what each city, industry or region of the state must do to be more "sustainable". Less ambitious and easier to accomplish, *operational targets* aim at some particular aspect of sustainable development that with the right policies can be achieved in the medium term.

In 2004, the New Jersey Sustainable State Institute formulated targets for thirteen of its forty-one indicators. Since then, it has been working to develop operational targets and also intends to create targets for sustainability. Over the next few years, various stakeholders will be called upon to first redefine the existing objectives and indicators and then to define the targets³⁴.

Finally, according to the Institute, it is crucial that targets be used with a genuine political will to advance toward sustainable development³⁵. While they must be attainable, they must not be too easy to attain nor serve partisan ends.

b) The Case of Japan (Japan for Sustainability)

Twenty indicators with targets are grouped according to the three dimensions of sustainable development, along with that of well-being and that of five "values". They were developed based on two hundred data sets. Measurement of progress toward targets is done in terms of a perfect score of one hundred, to be achieved by 2050. To evaluate the evolution of trends, scores were measured in 1990 and 2005. This model makes it possible to know in a quantified way whether Japan is approaching sustainability. For each indicator, the organization presents its current absolute value, its score out of a hundred, an explanation of it, the target for 2050 and the ideal for the future. A score is also calculated for each dimension by adding up the scores of the indicators associated with it. A national score is calculated in the same way by adding up the scores by dimension.

32. Indicators with quantifiable targets are comparable to performance indicators in the sense that they permit the measurement of results.

33. Thomas M. PARRIS and Robert W. KATES, *op. cit.*, p. 574.

34. NEW JERSEY SUSTAINABLE STATE INSTITUTE, *op. cit.*, p. 8-11.

35. *Idem.*

As an example, Japan for Sustainability developed a quantitative environmental target for the "greenhouse gas emissions" indicator. This target, the result of research by Japan's National Institute for Environmental Studies and the Tokyo Institute of Technology, goes well beyond Kyoto objectives. It was developed by taking into account Japan's per-capita participation in a 50% reduction of emissions worldwide, which would maintain temperature increases below two degrees Celsius and stabilize emissions at 1.3 times their current level. Other targets, such as the rate of criminality, were set on the basis of improved performance observed among countries of the OECD.

CHAPTER 3: Other Characteristics of Systems or Indicators

Comparative analysis of the systems revealed certain characteristics that have not been discussed in previous chapters, but which deserve attention. Directly linked to the different types of indicators (one of the common descriptors used on analysis forms), the first three characteristics are: the search for sectoral transversality, aggregation, and the use of global indexes. Since several systems are more or less directly tied to national strategies for sustainable development, these relationships will be discussed in detail so as to distinguish sustainable development indicators from performance indicators and strategy-monitoring indicators.

3.1 Search for Transversality

Since 1992, the Agenda 21 program that emerged from the Rio conference has encouraged governments to adopt transverse indicators (also called interface indicators) which connect at least two dimensions of sustainable development³⁶. While the search for transversality is generally presented in the literature as an essential characteristic of sustainable development indicators, it is found in very few systems. In effect, the indicators used in the systems studied are predominantly sectoral. Nevertheless, regardless of architecture, systems generally account for the three dimensions in one way or another³⁷.

According to Eurostat³⁸, administrations using a domain-based approach have a greater tendency to seek transverse indicators. Of the systems analyzed, those of Ireland (2002), Sweden, Switzerland (2003), Minnesota and the European Union are examples of domain-based architectures that seek transversality. In the Swedish system, whose domains actually correspond to principles like equity or efficiency, transverse relationships are achieved by considering the qualitative improvement of each dimension in each domain. However, transversality is not exclusive to this type of architecture, since certain systems, particularly those organized by dimensions, demonstrate that their indicators can refer to more than one dimension (France provides a graphic demonstration of this)³⁹. Though the number of systems using these types of indicators remains small, the search for sectoral transversality expresses a certain trend.

36. CENTRE D'ÉCONOMIE REGIONALE DE L'EMPLOI ET DES FIRMES INTERNATIONALES, *Indicateurs territoriaux du développement durable* (territorial indicators of sustainable development), [document presented at an international symposium at the Maison Méditerranéenne des Sciences de l'Homme, December 1 and 2, 2005, Aix-en-Provence], Aix-en-Provence, Le Centre, p. 2. [<http://www.mediaterre.org/international/redirect/2274,1.html>].

37. However, some systems have only a limited selection of non-environmental indicators (Denmark, Canada 2005, Montréal).

38. EUROPEAN COMMISSION and EUROSTAT, *op. cit.*, p. 8.

39. *Idem*.

3.2 Aggregation of Indicators

The attention given to aggregate indicators (also called *synthetic*) has increased in recent years. This interest has developed in parallel to an interest in evaluating the quality of life in a sustainable development approach⁴⁰. Aggregation is most often used to condense the information supplied by indicators into a single item: the index. The main problem with this approach is the weighting of the different components: dimensions, indicators, criteria and data. This difficulty tends to limit the use of such indexes⁴¹.

The decision to aggregate indicators into indexes can be rife with consequences both in the short and long term⁴². According to the Environmental Planning Quality Board of Minnesota, the principal advantage of an aggregate indicator rests in the fact that a simple index is easier for the public to understand and draws more attention. However, the same agency (which developed the Minnesota Progress Indicator) points out that there is no perfect method of developing indicators, and the choice to aggregate certain indicators into indexes depends on the public being addressed. Furthermore, aggregation may conceal or sacrifice important details⁴³. As is made clear by the Pembina Institute of Alberta⁴⁴, which developed the first Genuine Progress Indicator (GPI), it is impossible to develop such a system in an objective manner. Aggregation is therefore a challenge for the future, and further research should both extend our knowledge and nourish debate on the subject.

3.3 Global or Sectoral Indexes

Very few systems use the global indexes developed over the last few decades by international organizations or research institutions⁴⁵ for comparison with other countries. The best known include the Environmental Sustainability Index, the Genuine Progress Indicator, the economic and social well-being index, the index of human development and the Globalization Index. The index most often used, though not always calculated in the same way, is the ecological footprint (Manitoba, Network of Regional Governments of Sustainable Development⁴⁶). The United Nations also uses the Gini index as an indicator of the "poverty" sub-theme in the social dimension ("equity" theme). Appendix 4 describes in greater detail the principal global indexes used for measuring sustainable development.

40. STATISTICAL PROGRAMME COMMITTEE OF THE EUROPEAN UNION, *op. cit.*, p. 3.

41. Knut H. ALFSEN and Thorvald MOE, *op. cit.*, p. 10.

42. CENTRE D'ÉCONOMIE REGIONALE DE L'EMPLOI ET DES FIRMES INTERNATIONALES, *op. cit.*, p. 2.

43. MINNESOTA PLANNING ENVIRONMENTAL QUALITY BOARD, *Smart Signals: An Assessment of Progress Indicators*, St. Paul, Minnesota Planning Environmental Quality Board, 2000, p. 2.

44. Mark ANIELSKI *et al.*, *Alberta Sustainability Trends 2000: The Genuine Progress Indicators Report 1961-1999*, Drayton Valley, Pembina Institute, April 2001, p. 5-10.

45. See Appendix 4 concerning the principal global indexes.

46. NETWORK OF REGIONAL GOVERNMENTS FOR SUSTAINABLE DEVELOPMENT, *Regional Sustainable Development Indicators*. [<http://www.nrg4sd.net/ENG/Resources/Consultation/indicDSoste.htm>].

In the same vein, certain systems use "sectoral" indicators or indexes. The most common are the GDP and the level of greenhouse gas emissions⁴⁷. These sectoral indicators have the advantage of a broad international consensus on how they are calculated and their social acceptability. The development of such indexes demands an enormous amount of time and resources. This is why few systems develop new composite indicators, particularly since their acceptance is not assured.

3.4 Links Between Indicator Systems and Strategies for Sustainable Development

Though the links between indicators and strategies for sustainable development are not the primary subject of our analysis, this section is nonetheless useful, since a number of systems are intrinsically tied to such strategies. Since the World Summit on sustainable development in Johannesburg in 2002, many governments have committed to developing a sustainable development strategy.

According to the OECD, "strategies [for sustainable development] should make use of structured systems of indicators [...] to facilitate the monitoring of progress and serve as quantitative objectives⁴⁸". This type of indicator makes it possible to avoid a dichotomy between strategy and practice while favouring transparency and accountability among public authorities⁴⁹. For some administrations, global indicators of sustainable development must reflect the objectives, priorities and activities set out in their strategies. However, the development of an indicator system for sustainable development can certainly be accomplished without any prior strategy (Portugal, Sweden)⁵⁰.

According to Eurostat, there are two grand categories of indicator systems for sustainable development: *policy-driven* systems, where the indicators reflect a strategy, and *statistics-driven* systems, which are developed to maximize the availability and quality of data⁵¹. For example, the report published by Montréal is alone among the systems studied in presenting two parallel systems: one for measuring actions and the other for measuring states. The indicators to measure actions are directly linked to the strategy.

While indicators are often chosen in terms of a national strategy, our analysis reveals that there is not necessarily any clear connection between such indicators and the evaluation of policies and actions. Reports dealing with strategies and indicators are for the most part distinct. In the present study, the Belgian and Mediterranean systems stand out with their adoption of strategy-monitoring indicators, particularly regarding governance. A few *policy-driven* indicators were included in their respective lists.

48. OECD, *Stratégies nationales de développement durable: bonnes pratiques dans les pays de l'OCDE*, Paris, Éditions OCDE, 2006, p. 6.

49. *Ibid.*, p. 27.

50. EUROPEAN COMMISSION and EUROSTAT, *op. cit.*, p. 63-64.

51. *Ibid.*, p. 76.

Other studies prove this trend. The OECD, in a document entitled *Stratégies nationales de développement durable: bonnes pratiques dans les pays de l'OCDE*⁵² (national strategies for sustainable development: good practices in countries of the OECD), presents the systems of Austria, the Czech Republic and Ireland as examples of "good practice in terms of indicators and objectives". Austria's strategy presents fifty-two indicators associated with twenty key objectives divided into four domains: quality of life, dynamic territory for business, living space and global responsibility. The objectives are quantified and have deadlines attached. For its part, the Czech system is based on two sets of objectives: the first (with a hundred sixteen indicators) is for monitoring the evolution of particular aspects, while the second (with twenty-four) is for communicating with decision makers and the public. The indicators are organized in six categories. As for Ireland, it stands apart with its national green accounting and a method that uses satellite accounts to complete the economic accounts. According to Eurostat, the indicator system of the European Union, like virtually all national or local systems, is linked to the objectives in numerous treaties ratified by member states. Most of the latter have developed their own indicator systems for their national sustainable development strategies, to facilitate the measurement of progress toward national objectives⁵³.

52. *Op. cit.*, p. 26.

53. UNITED STATES GOVERNMENT ACCOUNTABILITY OFFICE, *op. cit.*, p. 228; EUROPEAN COMMISSION and EUROSTAT, *op. cit.*, p. 76.

CONCLUSION

Comparative analysis of the indicator systems for sustainable development that are being used or are in development in various public administrations reveals the trends, strengths and weaknesses characterizing many of these systems. This analysis has brought to light the common characteristics of a number of these systems:

- Besides the existence of general indicator systems that are both known and recognized, like those of the United Nations, the OECD and the European Union, one notes the emergence of a large number of unique systems developed at all levels. They are a response to specific needs and conditions, including those of social, economic, political and territorial structures.
- Analysis reveals a certain terminological ambiguity that is in large part engendered by the great variability of systems, the near absence of standards and the notion of sustainable development which is in itself subject to interpretation.
- The choice of indicators is strongly influenced by the priority objectives of administrations. The three principal objectives are: to inform stakeholders, to measure progress and to aid decision making.
- The principal consultative and participative mechanisms or procedures are: interministerial collaboration, joint committees or working groups, public consultation and the analysis of foreign and international experience.
- The principal criteria for the selection of indicators are: the quality and relevance of data, availability, simplicity, the ability to measure progress, adaptability, and the ability to measure objectives and to make comparisons in time and space.
- The type of architecture varies considerably. The architectures used most frequently are those structured by: dimensions, domains and objectives.
- The number of indicators is also highly variable. In administrations that are at their second or even third generation of indicators, one notices a clear trend to reduce the number of indicators or to employ a limited number of headline indicators.
- The hierarchization and aggregation of indicators, the use of composite or synthetic indexes, and the development of quantitative and qualitative targets that are not only relevant but effective and objective are among the means used by many public administrations to respond to particular needs.
- Indicator systems are often presented, in periodic fashion, in a section of a report or else published in an independent report. Each indicator is analyzed in detail and given a graphic representation.

Other conclusions and comments from the reports analyzed:

- Having a limited number of indicators facilitates management of the indicator system and comprehension of the results (Great Britain, Sweden, Mediterranean 2005 and 2006). Some governments have in fact reduced their number of indicators (France 2004, Sweden, Switzerland 2006, Oregon).
- Indicators must be read in their entirety, for while each contributes significant results, no one indicator on its own can reveal the state of sustainable development (Australia 2002).
- It is important to improve the circulation of information and results, and to present reports in synthetic form (Germany, Austria, Netherlands, Montréal).

- A hierarchical approach facilitates taking account of priorities and makes it possible to visualize the different levels of indicators (Denmark, Great Britain, Ireland 2002, Mediterranean 2006, Switzerland 2006, European Union).
- An organization (commission, agency, ministry, etc.) should keep an updated list of indicators as society evolves (Finland).
- Regional distinctions in the national territory must be accounted for (Belgium, Ireland 2002).
- The frequency of periodic updates of the list of indicators should be prescribed by the strategy or at least be regular (Denmark, Switzerland 2006, Montréal).
- There is a need to improve and encourage more international comparisons (Australia 2006, Ireland 2002, Minnesota, Nordic Council of Ministers, European Union, OECD, Vancouver).
- Quantifiable targets make it easier to measure and account for the achievement of objectives. They also allow data to be aggregated in terms of domains, dimensions or the territory as a whole (Japan, New Jersey Oregon, Denmark).
- Assumptions of a transverse nature must be made to facilitate the aggregation of indicators by qualitative and quantitative objectives (Switzerland 2006).
- The users of sustainable development indicators must be targeted: decision makers, interest groups, citizens, etc. (Helsinki).
- Preference should be given to coupled and transverse indicators.

This comparative analysis is neither exhaustive nor systematic. Nonetheless, it is hoped that despite its limitations, it will inspire and support the development of other indicator systems for sustainable development, most particularly Québec's, which will be submitted to the Government for adoption no later than in the year following adoption of the governmental strategy for sustainable development.

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APPENDIX 1

List of Systems Analyzed

	Origin	Title	Year
1	Australia – Bureau of Statistics	<i>Measures of Australia's Progress 2006</i>	2006
2	Australia – Department of the Environment and Heritage	<i>Are We Sustaining Australia? Report Against Headline Sustainability Indicators</i>	2002
3	Belgium – Federal Planning Bureau	<i>Tableau d'indicateurs de développement durable</i>	2005
4	Canada – Alberta – Pembina Institute	<i>Sustainability Indicator Frameworks in Alberta</i>	2006
5	Canada – Alberta – Calgary	<i>State of Our City Report 2004</i>	2004
6	Canada – British Columbia – Vancouver	<i>Counting on Vancouver: Our View of the Region</i>	2006
7	Canada – Environnement Canada, Statistics Canada, Health Canada	<i>Indicateurs canadiens de durabilité de l'environnement</i>	2005 and 2006
8	Canada – Manitoba – Department of Conservation	<i>Provincial Sustainability Report for Manitoba</i>	2005
9	Québec – Centre québécois de développement durable	<i>Tableau de bord du Saguenay–Lac–Saint–Jean</i>	2003
10	Québec – Montréal	<i>Indicateurs de l'état de l'environnement</i>	2005
11	Canada – National Round Table on the Environment and the Economy	<i>Environment and Sustainable Development Indicators for Canada</i>	2003
12	Denmark	<i>Key indicators 2004 – Denmark's National Strategy for Sustainable Development. A shared future – balanced development</i>	2005
13	Finland – Ministry of the Environment	<i>Sustainable Development Indicators</i>	2005
14	Finland – Helsinki – Urban Facts Office	<i>The Core Indicators for Sustainable Development in Helsinki</i>	2002
15	France – Institut français de l'environnement	<i>Développement durable et disparités régionales : Monitoring du développement durable</i>	2003
16	France – Ministère de l'Écologie et du Développement durable	<i>Indicateurs nationaux de développement durable (mis à jour en 2006)</i>	2004
17	Ireland – Department of the Environment and Heritage	<i>Sustainable development – A Strategy for Ireland</i>	1997
18	Ireland – National Economic and Social Council and Environmental Development	<i>National Progress Indicators for Sustainable Economic, Social and Environmental Development</i>	2002
19	Ireland – Central Statistics Office	<i>Measuring Ireland's Progress</i>	2004

List of Systems Analyzed (cont.)

Origin	Title	Year
20 Japan – Japan for Sustainability	<i>Japan for Sustainability Indicators</i>	2005
21 Luxembourg – Ministère de l'Environnement	<i>Indicateurs de développement durable pour le Luxembourg</i>	2002
22 Mediterranean – Plan bleu	<i>Première proposition d'indicateurs de suivi de la SMDD</i>	2005
23 Mediterranean – Plan bleu	<i>Indicateurs prioritaires pour le suivi de la SMDD</i>	2006
24 Norden – Nordic Council of Ministers	<i>Focus on Sustainable Development: Nordic Key Indicators 2006</i>	2006
25 New Zealand – Statistics New Zealand	<i>Monitoring Progress Towards a Sustainable New Zealand</i>	2006
26 OECD	<i>Factbook 2006: Economic, Environment and Social Statistics</i>	2006
27 United Nations – DESA-DSD	<i>Indicators of Sustainable Development</i>	2001
28 Sweden – Statistics Sweden and Swedish Environmental Agency	<i>Sustainable Development Indicators for Sweden</i>	2001 and 2006
29 Switzerland – Federal Statistical Office	<i>MONET – Monitoring du développement durable</i>	2003
30 Switzerland – Federal Statistical Office	<i>MONET – 17 indicateurs-clés pour mesurer le progrès</i>	2006
31 Great Britain – Department for Environment, Food and Rural Affairs and National Statistics	<i>Sustainable Development Indicators in Your Pocket 2005</i>	2005
32 European Union – Eurostat	<i>Sustainable Development Indicators</i>	2005 and 2006
33 United States – Minnesota – Minnesota Planning Environmental Quality Board	<i>An Assessment of Progress Indicators</i>	2000
34 United States – New Jersey – New Jersey Sustainable State Institute	<i>Living With the Future in Mind: Goals and Indicators for New Jersey's Quality of Life</i>	2004
35 United States – Oregon – Oregon Sustainability Board	<i>Oregon Shines II</i>	1997
36 United States – Pennsylvania – Pennsylvania Consortium for Interdisciplinary Environmental Policy	<i>The State of the Commonwealth: Is Pennsylvania Moving Towards a Sustainable Development?</i>	2002

APPENDIX 2

Principal Descriptors Used for Comparative Analysis of Indicator Systems for Sustainable Development

Geographical coverage:	International organization, regional cooperation, country, province, state (American) or region
Origin:	Name of the body (or bodies) that developed and/or published the indicator system
Year of publication:	Date of publication of the document and/or placing of the system online
Objective:	Objectives of the indicator system
Mode of development:	Information on the development of the indicator system: organizations that participated, mechanisms, duration...
Mode of distribution:	Mode of distribution (document) and/or consultation of the indicator system (Internet) – Internet links, number of pages of the document...
Architecture:	<ul style="list-style-type: none"> • Total number of indicators in the system • Dimensions or themes used (number of indicators per dimension or theme)
Types of indicators:	Types of indicators used in the system (sectoral, coupled, aggregate...)
Selection criteria of indicators:	Criteria used in the choice of indicators
Presentation of indicators:	Information presented for each indicator (fact sheet...)
General information:	Other relevant information about the indicator system

APPENDIX 3

Glossary

This glossary defines the meaning assigned by the authors of the present document to certain terms in the text.

Aggregation (or aggregate indicators):

The aggregation of data or indicators into composite (or "synthetic") indexes is intended to simplify the presentation and interpretation of a large number of variables. This exercise requires a prior stage, that of weighting the data or indicators, which is still a significant challenge.

Domain (architecture by domains):

Generic term used by the authors to represent the various modes of grouping indicators into priority areas. Sometimes called themes, spheres, dimensions, sectors, etc., domains vary both conceptually and in number.

Hierarchization (of indicators):

Hierarchization consists of selecting headline indicators that best reflect the priorities that have been established. Certain administrations use this procedure to get around the difficulty of managing a large number of indicators.

Indicator of sustainable development:

Statistical data that describes a condition associated with sustainable development or one of its components, in a given territory and over a set period of time.

Indexes, global or sectoral:

The major existing indexes, recognized internationally and used in various indicator systems for sustainable development: ecological footprint, Environmental Sustainability Index (ESI), Gini index, GDP, etc.

Objective:

Many of the systems analyzed determine the choice of indicators in terms of objectives. These objectives may be general or specific and linked or not to a strategy. It is important to distinguish between different levels of objectives.

Dimension:

This term refers to the three dimensions of sustainable development: environment, society and economy. A number of indicator systems add a fourth dimension: institutions, ethics, governance, etc. The importance accorded to each dimension varies depending on the country and organization⁵⁴.

54. MAISON MÉDITERRANÉENNE DES SCIENCES DE L'HOMME, *Indicateurs territoriaux de développement durable : colloque international*, Aix-en-Provence, December 2005. [<http://www.mmsh.univ-aix.fr>].

System of sustainable development indicators:

A set of data statistics linked to the various components of sustainable development, and which serve to quantify or qualify progress, inform stakeholders and aid decision making in a given territory.

Transversality:

Sometimes also called an *interface* or *coupled indicator*, an indicator is said to be transversal when it is related to more than one dimension, domain or objective of sustainable development. Recent efforts toward transversality observed in a number of indicator systems indicate growing interest in this type of indicator.

APPENDIX 4

Principal Indicators or Global Indexes Used in Sustainable Development

a) Ecological footprint

The ecological footprint corresponds to the productive surface area necessary for a person or population to meet its needs in consumption of resources and disposal of waste. On a global scale, the ecological footprint of humanity is an estimate of the biologically productive terrestrial or marine area that is necessary to meet all of our needs⁵⁵. There are several different ways of calculating it. For example, Manitoba uses its official provincial statistics on consumption and translates them into biologically productive surface areas.

b) Environmental Sustainability Index (ESI)⁵⁶

Created by the World Economic Forum and its partners (Yale and Columbia Universities), the Environmental Sustainability Index primarily uses indicators on the state of the environment from the United Nations Commission on Sustainable Development to express the interactions between environmental and economic performance. The ESI provides a quantitative measurement of the success or failure of policies and programs.

c) Human Development Index (HDI)⁵⁷

Created by the United Nations Development Program (UNEP), this is one of the most frequently used indexes. It was created to give a more accurate vision of the quality of life relative to GDP. At present it combines just three base indicators: life expectancy at birth, income and level of education. Others are likely to be added progressively.

d) Gini Index (Gini Index of Income Inequality)⁵⁸

The Gini index is often used to illustrate disparities in distribution of wealth between rich and poor. It measures the distribution of income or consumer expenditures relative to a hypothetical distribution by which every person would receive an equal share of wealth. The unit of measurement is represented on a scale from zero to one, zero representing no inequality, one the maximum possible inequality.

55. www.globalfootprint.org.

56. Robert BLINC, Aleksander ZIDAN_EK and Ivo _LAUS, "Sustainable development after Johannesburg and Iraq: The global situation and the cases of Slovenia and Croatia", *Energy*, vol. 31, no. 13, October 2005, p. 1923-1932.

57. Paul-Marie BOULANGER, *op. cit.*, p. 7.

58. UNITED NATIONS DEVELOPMENT PROGRAMME, "Human Development Indicators 2003", *Human Development Report 2003*. [Online]. http://hdr.undp.org/reports/global/2003/indicator/indic_126_1_1.html].

e) Genuine Progress Indicator (GPI)⁵⁹

The Genuine Progress Indicator offers an alternative to traditional measurements of development like the GDP as the first indicator of a nation's well-being. For each of the three dimensions of sustainable development, it calculates an index and combines them to form the Genuine Progress Indicator. The composition of the indexes is similar to that of the Dow Jones Index or the UN's Human Development Index. The indexes are quantified monetarily and compared to the GDP. They are compared against a perfect target and to the worst result recorded during the period covered.

f) Human Well-Being Index (HWI)⁶⁰

This index, developed in British Columbia by a group of engineers, is composed of base indicators in the following domains: health and family life, income and degree of satisfaction of basic needs, economic health, level of education and means of communication, political and civil rights, state of peace or armed conflict, criminality and equality.

g) Economic and Social Well-Being Index⁶¹

Developed by Canadian researchers, this index consists of a weighted average of four indicators that are themselves synthetic: consumption flows, stocks of productive resources (economic, human, environmental), inequalities and poverty, and economic insecurity. The authors, Osberg and Sharpe, use the index to compare different countries of the OECD and help establish priorities.

59. Mark ANIELSKI *et al.*, *op. cit.*

60. *Idem.*

61. Paul-Marie BOULANGER, *op. cit.*, p. 7.