

**Sustainable Development
and Environmental Assessment
in Urban Areas:
Montreal Test Case**

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1. INTRODUCTION

1.1 Sustainable development: more than a buzzword?

Sustainable development is at the heart of contemporary **society's concerns**. For a number of years, especially **in the wake of the Report of the** World Commission on Environment and Development (1987), probably better known as the **Brundtland** Report after the name of the head of the Commission, governments have embraced the objectives of sustainable development and tried to integrate them in their activities. **The issue of sustainable** development was first incorporated at the senior levels **of government (cf,** for example, at the federal level, the **Canadian Council of** Resource and Environment Ministers, 1987; at the provincial level, with the **creation in 1988 of the position** of Deputy Minister for Sustainable Development in the Quebec Department of the Environment); now the municipal level is becoming involved. This trend is of fundamental interest **since, although** there now appears to be a general awareness that we must change our style of development, without a shift at the grass-roots level, in terms of day-to-day activities, action on a small **scale,** etc, sustainable development will remain either an illusion or simply a new gloss applied over the **same** traditional approaches and policies.

The concept of sustainable development is in itself highly interesting in a number of respects. It is above all a concept which integrates. It seeks to combine aspects which have often been dealt with separately, when **they** were not simply opposed to each other: environment and economic

development. It also integrates aspects which had been neglected or pushed aside in the process of reflection, cultural integrity **for** example. This integration did not nevertheless occur by accident but is evidence of evolving concerns and, in particular, reflects the problems encountered in taking these issues into account. Thus, the shift towards sustainable development should incorporate the lessons of nearly two decades of environmental assessment.

However, an enormous effort is required to bring about this shift: we must determine what sustainable development means in an urban environment and, above all, the means by which it can be achieved, ie, how to establish a policy of sustainable development. These two, central objectives guided this exploratory research (cf Appendix 1 for the definition of the terms of reference). And, as we shall show, the changes required are considerable: the expression “paradigmatic change” used by some authors is no exaggeration (Sadler and Jacobs, 1990).

A semantic distinction should be drawn here. What is the equivalent French term for the English “sustainable development”? Three terms are commonly used: “developpement soutenu”, “developpement durable” and “developpement viable”. **The original** French-language version of this paper uses “developpement viable”, on the strength of the qualitative aspect of development to which “viable” can refer, while the other two terms could have connotations of **more** rigid development and place greater emphasis on development (Gaudreau and Hamel, 1990). All three terms nevertheless have

achieved essentially **the same accepted** meaning, which is **the subject of** this report.

1.2 Structure of the report

The following paper consists of four sections. The next chapter outlines an integrated approach to environmental management, a much broader, more demanding but also more realistic perspective than that of environmental assessment. Chapter 3 explores the parameters of sustainable development in an urban environment and proposes a list of indicators as well as a strategy of investigation which could be linked to these parameters. Chapter 4 proposes how to place the preceding considerations in context and attempts to apply them to Montreal's Central District Master Plan and to the transportation sector on Montreal Island. The fifth and final chapter discusses, on the basis of the research, a series of themes or thrusts which should, if not polarize efforts, at least serve provide material for a process of reflection and specific research over the coming months. To this effect, they may be useful to the Canadian Environmental Assessment Research Council (CEARC) in establishing its program of activities, and especially to the City of Montreal as an initial action strategy for systematically integrating the concerns and objectives of sustainable development.

2. **AN INTEGRATED APPROACH TO ENVIRONMENTAL MANAGEMENT**

2.1 The **relationship between sustainable development and environmental assessment**

It is **no longer** necessary to show that planning decisions must be supported by environmental assessments. Environmental assessment **processes** have been established in Quebec since the **mid-1970s**, involving provincial and federal procedures for analyzing and assessing environmental impacts combined with public hearings held either under the auspices of the Bureau d'audiences publiques sur l'environnement (**BAPE**) [environmental public hearings **bureau**] or the Federal Environmental Assessment Review Office. Nevertheless, there is no real tradition: the experience to date demonstrates, on the one hand, the interest in these processes and, on the other hand, the **1 limitations**, obstacles and shortcomings of the approaches followed. Thus, **a** provincial commission of inquiry, picking up on the current interest in environmental assessment, recently recommended that the scope of the Quebec process be broadened; this process has hitherto remained almost exclusively confined to major projects by the government or large Crown corporations and has furthermore been applied primarily to large infrastructure projects on the urban perimeter or in undeveloped areas (**Lacoste** et al, 1989). The commission also sought public involvement during the development phase of the directives. Furthermore, the reports of numerous commissions of inquiry of the BAPE have routinely pointed out the shortcomings of the process. Federally, the procedure is also undergoing major revision, principally in

terms of broadening its scope (cf Bill C-78 which was given first reading in the House of Commons on June 18, 1990).

The relevance of extending environmental assessment procedures to truly urban areas is thus clear: the multiplicity of activities carried on there, together with the population concentrations found there **are** determining factors in terms of overall environmental quality. In this respect, a policy of sustainable development lacking a solid basis in urban areas would, in the final analysis, be of marginal effectiveness; this point will be discussed subsequently.

What does environmental assessment contribute to the **issue of sustainable development?** Why should they be integrated? **Environmental assessment is** driven by an **approach to questioning projects** on grounds that go beyond mere cost-effectiveness: project feasibility is examined, no longer only on the basis of strict financial feasibility, **but** also in light of the **potential** impacts on the receiving environment, **that** in which the projects will take place, be it a natural or a built-up one. Environmental assessment thus requires at the outset a systematic analysis of these **impacts**. The principle of sustainable development is **thus** an extension of the concept of environment: it provides a sense of direction and comprehensiveness. It is the substantive aspect which is integrated in the environmental assessment process.

Moreover, environmental assessment was structured and defined in seeking to address a series of methodological issues which were central to the

establishment of sustainable development. Thus, environmental assessment implies:

- o taking into account and arbitrating between different, often diverging, values and interests;
- o mechanisms which provide for the participation of the parties affected by an action, complemented by scientific expertise which can often only bring partial and limited responses to **the** problems raised;
- o decision-making in a context of risk and uncertainty, etc (Sadler and Jacobs, 1990).

Nevertheless, there are many problems involved in introducing an environmental assessment approach in an urban area. On this topic, a study by Montreal's Service de planification et de consultation [planning and consultation department] presented an overview of the experience of some cities and municipalities which have already adopted policies for studying the environmental impact of some projects, in some parts of their area (City of Montreal, 1989).

A policy for systematically taking into account sustainable development in the actions initiated directly by the City of Montreal or which take place within its boundaries should thus at the outset draw on environmental assessment processes; however, the extent of the changes required, specifically in terms of the lessons which flow from these processes, leads

us to propose an integrated environmental management approach with the characteristics described below.

2.2 From **environmental** assessment to **environmental management**

Environmental assessment developed from the procedures involved in studying the environmental impact of well-defined and delineated projects. However, experience **tends to show** that the impact studies of such projects were often seen as an additional step grafted on to the project planning process and producing results after the fact. If there is one finding **that** emanates from the analyses of how the procedures operate, environmental impact studies carried out in this manner actually leave too little room for manoeuvre to allow substantial changes to be made, beyond the addition of various actions **for mitigating or attenuating the impact** (Cornford et al, 1985; Sadler, 1986; **Gariépy**, 1989; Gardner, 1989; **Lacoste et al, 1989**; Sadler and Jacobs, 1990; etc). Environmental impact studies are thus usually limited to being **static** and reactive.

Most of the analysts and authors cited above agree that it is essential that an integrated **approach to environmental management replace environmental impact studies. This report is based** on such an approach **and has the** following characteristics:

1 **Integrating the planning, decision-making and follow-up stages**

In order to examine the various options of a project and to make it possible to carry out substantial **changes**, it would seem essential that the environmental assessment be integrated **at** an early stage of the project, during the planning process itself. Furthermore, one of the assumptions which should govern all environmental **assessments** is **that, whatever the** quality of the analysis carried out, we **can** never be entirely **sure that the** environment will perform according to predictions; this observation is derived from the lessons regarding the limitations of scientific **knowledge** acquired over numerous decades of carrying out environmental assessments (**Holling, 1978**). Therefore, it is **necessary** that the environmental assessment process be extended beyond the decision-making stage in order to control the actual implementation of the proposed measures and to monitor the evolution of the project's environment. Hence, in this context, the use **of the term environmental management** which is far more comprehensive than that of environmental planning and is used to designate all the stages at which the process of questioning the environmental impact must be applied. The recent consultations on the redevelopment of the **Miron** quarry, under the auspices of the Bureau de consultation de Montreal (**BCM**) [**Montreal consultation bureau**], **provide a** concrete illustration of **the reasons for** and **the relevance of an** environmental **management** approach. **These** consultations highlighted in particular the difficulty of taking decisions on the uses and, even more so, the definitive development options in the climate of uncertainty surrounding **some** major environmental constraints:

planning and development must be accompanied by an extensive program of environmental analysis and follow-up (Denis et al, 1989).

2 Integration of projects but also of programs and policies

While environmental assessments are limited exclusively to projects, the manoeuvring room for examining and taking into account real options is very limited: it usually consists of comparing different sites **or areas, or** relatively marginal variables of the project's components. In fact, the projects **are** either components of a larger program which is already being implemented or the implementation of policies adopted previously. **For** example, it is not very realistic to examine options other **than** location variables for an energy transportation corridor to link an existing **power** plant to users with concrete needs; or again, to open the question of alternative means of transportation **or** different land uses when one is in the process of locating a bus route (cf Gariépy, 1982). We thus need to make sure that the concerns of sustainable development can be integrated, in an environmental assessment context, ie, at a stage where they can be truly taken into account, ie, at an early stage in the project, in the **programs and policies phase**.

This requirement is all **the more** relevant **in an urban area which is characterized by a series of actions that are often on a small scale** or are carried out by small **property owners who do not have the ability to carry out an environmental assessment in the normal sense**.

3 Focussing on area-wide assessments and spatial integration

Just as the questioning of projects must be linked to more “generic” or general commitments **at an early stage, so** must the environmental assessment of projects **involve the** analysis of the environmental **potential** and limitations on the scale of territorial entities, the “area-wide assessment” discussed by **Sadler (1986)**. **This analysis is used** both for assessing the **activities** that will take **place within the area** and for **analyzing the systemic interaction** between one area and another. Thus, at the neighbourhood **level, should we diagnose the** state of the environment, the specific problems which have to be resolved there (for example the **overall quality of housing conditions, or the significant presence of contaminated soils, or the poor quality of the ambient air**)? This operation provides a backdrop for assessing the projects and actions that should take place within this area.

Moreover, we must also take into account the flows, **analyze the systemic** interaction between an area and its **immediate surroundings, an area** and its environment on **a larger scale, for example between one neighbourhood and another**. The **objective is to determine the** overall contribution of a city, region, basin, etc to achieving sustainable **development**. **In this** manner we can determine the pressures on its environment emanating from **a neighbourhood in** terms of sustainable development: **for example, the waste generated by each district; energy requirements; successive migrations; contribution to overall atmospheric pollution**.

4 Taking **into account the activities of the private sector**

We have **already** touched on this aspect indirectly. In order to incorporate **the sustainable** development issue in urban **areas, particular attention** should be paid to the private sector for two **reasons. The multitudinous activities emanating** from the private sector **make it all the more** relevant **that it be taken** into account in an urban **area.** Furthermore, it is also necessary to adapt the approach to the fact that most activities are on a small scale and carried out by small developers: the approach used should be at the same time flexible, not heavy-handed, and effective. In this respect, Ontario's experience with "class assessments", where environmental assessments are carried out on the basis of categories of projects, rather than individual projects, would certainly provide **a wealth of information.**

5 **The need to transcend institutional compartmentalization**

This is probably the most basic issue, but also the most problematic. In order to examine the various options compatible with sustainable development, we need to **recognize** the inter-systemic links, not only in terms of territory, but also at the administrative level. We thus need to transcend the jurisdictional turf of departments and governments, preserves which often provide the basis for the legitimacy of these entities' existence. This is essential both horizontally, between the various departments within a government, and vertically, between the **various levels** of government.

6 Integrating public participation

One of the features of contemporary urban planning is to leave significant room for participation by the general public, the users of the environment. However, public involvement is more **than just a formality**, ritual or fashion, where the planning exercise carried out by technocrats is **rubber-stamped**: the very role they assumed in defining **the needs is at issue**. Even though one of the components of sustainable development is that it is driven by the fulfillment of essential needs, as we shall see in the next chapter, this element should not serve **as a** pretext for the technocrats to **reappropriate** or retechnicalize the development: the need to involve the parties concerned remains all the more pressing for managing the inevitable disagreements and even conflicts **in allocating** the resources **involved in** sustainable development (Comford et al., 1985; Lacoste et al., 1988; Gardner, 1989).

The recent policy of the City of Montreal on public consultations **and** particularly on setting up the Bureau de consultation de Montreal (BCM) reflects this philosophy and thus represents highly positive initiatives. Nevertheless, some reservations in this respect are in order. If this participation is to have any meaning, certain requirements must be met. Montreal's current situation where there is a proliferation of random consultation **in all directions** (if we add to the several consultations already initiated by the BCH, **those** related to the implementation of the development plans and those carried out by the other levels of government), there is **a** very clear risk, on the one hand, of **trivializing** the operation

and, on the other, of wearing out the participants. The introduction of a policy of sustainable development makes it necessary once again for Montreal, like all other administrations and governments, to provide a solid basis for the consultations:

a) Choosing the most appropriate areas and forms of public involvement

In addition to the proliferation of consultations, we should focus on what we can learn from them, to the extent that their value as learning tools may be significant both for government and the public.

b) Ensuring that consultations take place with all the technical and financial support required

The City of Montreal's new policy on consultation was modelled on the consultative process linked to the federal and, especially, provincial procedures for environmental assessment, with the difference, however, that it makes no explicit provision for the use of detailed impact studies of development proposals. While there is a certain logic to such an approach, the result, however, is to give rise to debates and positions which often lack a minimum of basic technical data on the justification, components or anticipated impacts of the projects discussed. Again, the consultations on redeveloping the Miron quarry fell victim to these conditions (cf Denis et al, 1989). A process of reflection is therefore needed to ensure that the level of analysis required and possible in terms of the timing of the public involvement is adequate.

7 An approach with substantive support from the issue of sustainable development

The initial environmental assessments ran into a fundamental obstacle: the difficulty of gaining support for the resolution of any dispute based on values which were diffuse or frequently confused with special interests. On the contrary, the issue of sustainable development involves resorting to a configuration, not of values, but of components, as we shall explain in the next chapter. The originality of the approach resides not so much in the very nature of these components, but rather in the strategy for examining them. In fact, they do not serve to sanction a project or otherwise but rather to examine the options **for planning** and development, to ensure that the potential repercussions of a project **for sustainable development are integrated in its** management. The **diagram below illustrates this examination strategy.**

Fig. 2.1:

Needs/Equity/Integrity

NEEDS

INTEGRITY

EQUITY

A significant process of reflection is nevertheless required to put this strategy into effect and, at this **stage**, this process should **deal with the following two major issues**:

a) Integrating the tire axis

Sustainable development implies a knowledge of both the current state of the environment, and the general trends at work in its evolution, in order to evaluate the repercussions of the proposed development projects. The examination strategy should thus include a series of benchmark indicators.

b) Selecting and adapting appropriate indicators

The projects should be examined in **far** greater detail than that involved in merely pulling together very general components. These should be specified by means of a series of parameters involved; which **these parameters** are in turn operationalized using various indicators. These indicators, which are

based on knowledge of the disciplines, **must meet a** number of requirements: they must, for example, be **relevant, valid, operational, etc.**

2.3 Focussing on the approach and the process: three principles for decision-makers

An analysis of the characteristics required of an **approach to** sustainable development demonstrates the scale of the reforms needed. These reforms cannot be restricted to an ad hoc limited and well-defined effort; on the contrary, they require a comprehensive, global and integrated system. This conviction **forms the** basis of this research, **that we must focus more on the** decision-making and management processes than on the results of these processes themselves, and it is one that is shared by other authors (Sadler, 1986; Gardner, **1989**). It is therefore possible to formulate three principles or rules which should be borne in mind by those decision-makers who will be responsible for bringing about this change at the **municipal** level :

Flexibility and adaptability are essential

While the perception of the stakes involved in sustainable development is well-established, the process of reflection on how to achieve it and how to put it into practice is only just beginning. We should thus avoid setting too rigid an approach and ensure that it **can be adapted both to the** specific **stakes** involved and to the particular organizational context.

2 The **approach cannot be reduced to the level** of **methods** or indicators

In light of the extent of reforms involved and the many unknowns which will crop up at each stage in the process, it is very tempting to limit the approach simply to applying a grid of indicators. The presentations we have made on the basis of the preliminary results from this research confirm, moreover, the relevance of this concern, that the potential users of such an approach rely essentially on the grid of indicators contained in the next chapter (**ie**, Seminar on Sustainable Urban Development, CEARC, March 28-29, 1990; 11th International Seminar on Environmental Impact Assessment, Centre for Environmental Management and Planning, July 14, 1990; Workshop on Sustainable Development and Area Planning, Canadian Institute of Planners, September 7-9, 1990). No single grid of indicators, no matter how perfect it may in time become, will ever be capable of solving all the issues; on the contrary, applying it strictly would sterilize the approach envisaged and replace it with a technocratic procedure which is precisely what we must transcend in order to **achieve** sustainable development.

A parallel can be established with the reliance on method which **was** prevalent in the United States during the **1970s**, following the passage of the National Environment Policy Act. While this method would have enabled some interesting tools to be used, but it quickly became apparent that to try to incorporate everything involved in environmental assessment in methods would lead to **a** dead end. The methods must form part of an overall

path; the trick is then to use the right method at the right time in **the** right place (Poullaouec-Gonidec et al., 1989).

3 Characteristics such as performance criteria

Lastly, the characteristics and **parameters which the** approach should involve, and **which** were discussed in the previous section, can **also** be used **as** performance criteria in introducing **the approach: the City of Montreal** can use **them to determine to what extent the proposed change** in direction was achieved, in **order to target the efforts** more effectively.

3. Sustainable development as the substantive basis for environmental management

3.1 The concept of sustainable development 1

Two facts should be pointed out in addressing the issue of sustainable development.

On the one hand, this concept was in the past essentially linked to the use of so-called natural resources and to land use in the **areas** where these resources are found. On the other hand, it now seems certain that we cannot aim to achieve a form of sustainable development without extensive consideration of urban **areas**.

This first section on sustainable development discusses the elements on which these facts are founded and seeks to define more clearly the extent of the challenge they pose in terms of **both** research and **action**.

3.1.1 Its origins: some points of reference

Although the **concept of sustainable development is now universal, it is nevertheless a recent one**. To be sure, in the late 19th century, the term “**sustainability**” was already prominent in the words of **advocates of integrating conservation practices** with the management of agricultural, forest **and** animal resources (Brown et al, 1987, Carpenter and Harper, 1989). **Nevertheless, the term “sustainable development” did not really appear until**

the early 1980s. More **significantly, the idea** of dealing with environment and development together really only began with the emergence of the ecodevelopment concept during the previous decade.

Initially proposed by Dorney (**Dansereau, 1985**) and taken up again by **Maurice Strong** at the United Nations Conference on the Environment held at Stockholm in 1972 (Sachs, **1980a**), ecodevelopment requires **harmonizing[translation]** “the social and economic objectives of development with ecologically prudent management of resources and the environment” (Sachs, **1980b**). It not only **recognizes** that economic development and healthy environmental management are not incompatible, but also that it is necessary to integrate the objectives of these two concerns. In placing the emphasis on local autonomy, on taking care of everyone’s needs in an equitable manner and on research into means of developing natural resources which are **[translation]** “both socially useful and ecologically prudent” (Sachs, **1980a**), ecodevelopment appears to constitute a shift towards reconciling two historically opposing major approaches, ie, **ecocentric** and technocentric. In order to try to delve further into the origins of sustainable development, we should probably look at the **characterization** of these approaches, as defined by **O’Riordan (1977)** and by **O’Riordan and Turner (1983)**, and also at the dynamics of the **process** leading to their reconciliation.

Although it has never been clearly defined, the concept of sustainable development really came into its own with the publication of the World Conservation Strategy (WCS; IUCN, **1980**). The WCS contribution took two

forms. **On** the one hand, it proposes an ultimate objective (**[translation]** “the achievement of sustainable development based on resource conservation”) founded on certain explicit values. On the other hand, it lays **out and** describes three conditions required to achieve this objective. While the first two of these conditions **are** more directly aimed at resource protection (**[translation]** ‘maintaining the essential ecological **processes and** life sustaining systems’ ; ‘preservation of genetic diversity’), the third one links conservation to the development of these resources in terms of **Ctranslationl** “sustainable utilization **of ecosystems and** species”.

While the concept of conservation is defined and explained at length, the text contains little in the way of precision on sustainable development and merely specifies the necessity of **[translation]** “subordinating the satisfaction of short-term needs to the possibility of obtaining long-term benefits” .

The WCS is a proponent of a more physical vision of development and brushes over somewhat the political dimension which marked ecodevelopment in terms of the emphasis on local autonomy, responding equitably to the needs of everyone and seeking socially useful ways of developing natural resources. **The** idea nevertheless comes through in some places of a link between the problems of natural resource conservation and broader issues related to the human environment. The authors thus discuss the necessity of ensuring **Ctranslationl** “the perennial nature of **l i f e**”, to “**suppor** t the needs of **humani ty**” , to “take into account the needs of future generations” and question the fairness with which resources are distributed.

3.1.2 Current view

During the first half of the 1980s, the concepts of “sustainable use” and “sustainable development” thus appear in the literature on resource “conservation”. The publication in 1987 of the Report of the World Commission on Environment and Development (WCED) established, however, the use of the expression “sustainable development”* by crystallizing its meaning and acting as a catalyst for its use.

Thus, in reasserting the objectives of the WCS and integrating them with those associated with traditional forms of development, the WCED used the expression “sustainable development” to designate the form of [translation] “development which meets the needs of the present without compromising the ability of future generations to meet theirs”. At a minimum, this means not endangering the natural systems on which mankind depends: the atmosphere, water, the soil, living things. In a broader sense, it also involves [translation] “promoting a state of harmony among human beings and between man and nature” (WCED, 1987)

In the abundant literature which, in the wake of the WCED report, aims either to define with greater precision the meaning of this concept, or to pinpoint its implications more accurately in practical terms, or to identify the conditions for putting this type of development into effect, it is possible today to make out a convergence of views on the general meaning attributed to this expression. The convergence may be direct where, in

cases such as Rees (1988), Richardson (1989), planning (1990) or Nelson and Eidsvik (1990), to cite but a few examples, the definition of the WCEO is reproduced verbatim to form the basis for the research. It may also be more indirect, as in the case of the various authors who proposed their own formulation. Thus, for **example, the expression “sustainable development”** may refer to:

- o the idea **that [translation] “our economic systems should be managed in such a way as to maintain or improve our resource base and environment, in order that future generations may live as well or better” (National Task Force on Environment and Economy, 1987);**
- o the concept that “~~(the)~~ current decisions should not **damage prospects** for maintaining or improve **[sic]** living standards in the future” (Pearson, 1985);
- o the **goal** “(of) ensuring that the **poor have access to sustainable and secure livelihoods” (Barbier, 1987).**

Whether direct or indirect, this convergence enables us to **gain an overall** idea of sustainable development, ie, to meet the **needs of current and future generations** and, in order to do so, ensure that the necessary ecological, social and economic conditions are maintained.

3. 1. 3 **A necessary concept for urban areas**

The current state of knowledge and practices pertaining to sustainable development remains deeply marked by two of the elements which have shaped its history.

First, as we have seen, published works on the **concept of “sustainability”** originate generally in the fields of agronomy, forestry and ecology. For several decades, the concept was essentially limited to these specific fields (Simon, 1989).

Secondly, the vast **majority** of the works which contributed to the emergence of the concept of “sustainable development” itself **also** focussed **essentially** on the issues of managing natural resources or land use in the **so-called** developing countries (**Colnett, 1990**). This orientation was equally evident in the WCS, which avoided almost entirely the issue of cities in industrialized countries and in the report of the WCED where it was discussed only summarily. It also appeared briefly in a number of works such as those of **Barbier (1987)**, which limits its analysis of the concept of “sustainable economic development” to developing countries and Redclift (**1987**) whose book on sustainable development is limited almost exclusively to rural and agricultural areas.

In the past, the concept of sustainable development was thus linked very closely to areas where natural resources played a central role. Under **such**

circumstances, the **transposition and use of** this concept in urban areas poses considerable problems **for** a variety **of** reasons.

Thus, the knowledge acquired regarding the sustainable use of agricultural, forest or natural environment are certainly rarely transposable to the built environment. It is also certain that in urban areas the relationships between individuals **and** the problems **posed by sustainable** resource use are essentially indirect. For example, it is undoubtedly more difficult to deal with the issue of ecological integrity² when one is located in downtown Montreal than **when one is** in a tropical forest which is in the process of being fragmented.

However, various factors lead us to postulate that it is **impossible to think in terms of sustainable development without extensive consideration** of urban areas.

In this respect we should first note that following the exodus from the countryside, today's population is now primarily urban. It follows by virtue of the intensity of the activities which take place there, that urban centres should be seen as rapacious consumers of resources whose needs are supplied entirely from external sources. Finally, because they **are** supplied entirely from outside urban areas find themselves directly upstream of the pressures exerted **on** the resource areas. Thus, for example, urban transportation policies, like the types of development they fostered, are factors which will **govern entirely** the **energy resources and pressures**

exercised on the **areas** where the resources **are** concentrated. Urban areas and resource areas can thus not be dissociated.

Taking urban areas into account in sustainable development poses a considerable challenge. **On the one hand, the** diversity of the various physical, social and economic factors present means that the concept of environment takes on its full complexity in urban **areas**. On the other hand, a certain “historical bias” means that the foundations required to take urban areas into account remain to be established.

The following **pages** are devoted to a discussion of precisely how they can be established.

3.2 Sustainable **development**: **primary components**

While a consensus exists on the general meaning of the expression “sustainable development”, we should point out the trap inherent in the term. The recent explosion in its use, closely linked to the apparent simplicity of the term, and the undeniable attraction make it run the risk of becoming so accepted and generalized that all real meaning disappears (O’Riordan, 1988 in Dunster, 1990).

In light of recent trends, we should **recognize** the danger that the concept of sustainable development may become trivialized. This danger lies mainly in the **very** broad nature of the general definition accorded it, which means that every action may, taken to the extreme, claim to fall within it.

Inasmuch as we **recognize the need for the** term “sustainable development” to be more than the “**ubiquitous** buzzword” deplored by Simon (1989), it is thus absolutely essential **to go** beyond this general definition to specify its major components. This task was begun by the WCED in its report. It pointed out, for example, that this concept **[translation]** “presupposes a concern **for social** equity between generations and within the same generation” and suggested “effective participation by local communities in **the** decision-making process” in order to help them to “better define and better respect common interests”. More recently, Jacobs et al (1988), Gardner (1988), Sadler and Jacobs (1990) and Gardner (1989) have continued this **work** and described the three components which cannot be dissociated from the concept of sustainable development, ie:

- o fulfilling the needs of current and future generations;
- o equity, social justice and maintaining cultural diversity and,
- o maintaining ecological integrity.

These elements **are** almost always present, although in a less systematic manner, in the recent **works on sustainable** development. Simon (1989), for example, first stresses that even the most narrow concepts support a principle of equity among generations, a principle which should logically be extended to equity within the **same** generation, then indicates that experience **clearly** shows the need to take into consideration the aspirations

of the population affected by development activities (“bottom up development” vs “**top down** development”).

Since the foundations and aims of the three components cited above have been explored further by other authors (see Jacobs et al, 1988; Gardner, 1990), we will confine ourselves **here to discussing the very close linkages between each one.**

While the first element is part of the emergence of a new ethic founded on a principle of responsibility within and between generations, its **materialization** is closely linked to the two other components. Thus, as **early as the** late 19th century, precursors such as G.P. Harsh (Harsh, 1868) and G. Pinchot (**Pinchot, 1890**) drew attention to the need to take into account an area’s ecological characteristics in order to meet these needs, it **was not** until much more recently that **such a** need was more widely **recognized.** **It was** still more recently, however--primarily with the publication of the WCED--that the close links between the ability to meet needs, equity and social justice began to be better understood. On the one hand, we are beginning to improve **our ability to observe** that inequity is at the root of the over-exploitation of certain resources and, as a result, of difficulties in fulfilling the **essential needs of current or future generations.** **On the other hand, we are also better** able to realize that “externally imposed systems of development, conservation and knowledge have **greatly hindered sustainable development**” (Jacobs et al, 1988).

While needs, equity and integrity are three closely linked objectives, their simultaneous pursuit poses certain difficulties as they are rarely completely convergent. The establishment of a form of sustainable development thus implies a continual process of compromise among the priorities resulting from each one³ (Sadler and Jacobs, 1990). Nevertheless, it is only to the extent that conservation and development practices are integrated that it will eventually be possible to achieve and maintain these three objectives.

In this respect, integration constitutes an objective which both encompasses the other three and transcends the traditional objectives of conservation and development.

Figure 3.1 synthesizes the major components of sustainable development. It enables us to see that, in terms of activities, a framework of environmental management using this concept as a substantive basis presupposes, relative to current frameworks, the introduction of two new axes of analysis.

Thus, the desire to **satisfy** the needs of the current and future generations presupposes the introduction of a time axis within the decision mechanisms. We should not only seek to meet immediate demands but also ensure **that these do not really affect the ability** to meet future needs.

Similarly, the desire to maintain ecological integrity presupposes the introduction of **a horizontal axis of analysis.** In that urban areas usually originate the pressures exerted on the resources found **in regions, it is not**

is **simply a matter of determining** the impact of the activity envisaged on the area developed but also of taking into account the consequences of these **activities for the other** areas affected. The introduction of **such a horizontal axis of analysis thus** forces us to go beyond administrative boundaries which **usually have no real significance** in ecological terms.

3.3 Parameters **and potential indicators**

The exercise of identifying the components of the sustainable development concept represents a preliminary effort to define their meaning and scope. The components themselves, however, need to be identified. With a view to establishing a framework that can be operationalized, measurable parameters specifically need to be identified. These parameters will **enable us to** grasp the true scope of the practical implications of sustainable development. With this in mind, this section attempts to identify what we shall call the parameters of each one of the components identified. It **also** seeks to define the indicators which might serve to illustrate each one of these parameters.

3.3.1 Research procedure

We therefore need to begin by specifying the meaning of each component and attempting to define with greater precision what is meant **by, for example,** the concept of **the needs of future generations or** those of equity and social justice. Secondly, we **should also identify some** elements which may enable **us to take** these components into **account in** practice. This dual task of

identifying the parameters of **sustainable development** was undertaken on the **basis** of two primary groups of elements.

Fig. 3.1 The components of **sustainable development**

- i) **fulfilling needs by integrating conservation and development.**
- ii) **Ensuring equity, social justice and the preservation of diversity.**
- iii) **maintaining the ecological integrity** of:
 - a) **the ecosystem to be developed**
 - b) **other ecosystems affected.**

On the one hand, based on the literature reviewed **in the course of this** research, certain constants could be identified with respect to the scope of each of the components. For **example, the works consulted⁴ enabled us to observe that the “ecological integrity” component referred** almost always to the sustainable use of ecosystems, to maintaining essential ecological processes and genetic diversity. **They also enabled us to identify those parameters of the environment which relate specifically to this component: water, energy, climate, etc.**

On the **other hand, the approach drew its inspiration from an earlier research project on urban environmental indicators carried out at the Institut d'urbanisme** (urban studies institute) for the Quebec **Department of**

the Environment (Blanc et al, 1988). **Its** results made it possible both to establish **a** general frame of reference for environmental indicators in urban areas and to draw up a preliminary list of indicators.

The analysis **and** synthesis that **was** carried out on the basis of these two groups of elements was eventually to lead to the development of an analytical grid encompassing, for each of the three components cited above, the identification of the principal parameters involved **and** potential indicators which might enable each of these to be considered.

3.3.2 **Results grid**

The grid which resulted from this procedure is shown in Table 3.1. Considering the exploratory nature of this research, this **grid makes no claim to being exhaustive**. **It** basically sets out the bases of a strategy for questioning and examining projects supported by sustainable development. In terms of the parameters covered, the strategy restricts itself, **for** example, to identifying what could be termed “minimum parameters of sustainable development in urban areas”. In the same manner, while it invariably specifies **at least** one indicator for illustrating each parameter, the number of potential indicators can be substantially increased at a later stage.

Once again, the list of indicators selected is **based** on the principle of identifying **measurable elements**. **Thus, the** presence and relative importance **of** contaminated soils or waste **dumps** constitute health indicators which

could **actually be applied**⁵. The table does not specify, however, the units of measurement (**eg**, number of sites, area, relative concentration of contaminants, **etc**) for each of the indicators since these will **also** be specified at **a later stage**.

3.3.3 Parameter5 and indicators: major findings

Listing the parameters and indicators involved in sustainable development first highlights the inherent principle of integrating conservation **and** development. A set of indicators **derived from** traditionally **compartmentalized** perspectives are viewed side by side (**eg**, “Level of economic activity” vs “Rare and threatened environments”).

This list shows, furthermore, the extent of the challenge posed by components which often conflict in practice, at least at a specific moment. Thus, **for** example, the indicator “Level of economic activity”, which results from the desire to fulfill the needs of the current generation, can quickly come into conflict with both the equity component (**eg**, “equitable” distribution of the value of housing) and that of ecological integrity (**eg**, taking into account the presence of rare environments). Under the circumstances, as shown above, only a continual process of compromise among components can result in the possible introduction of a form of sustainable development. Under the circumstances also, although shown in linear fashion *in* Table 3.1, the indicators listed should be applied, not as exclusive components, but by taking into consideration the interaction among all three components. As Figure 3.3 shows, each indicator should be placed inside a

triangle with each component of sustainable development represented by one corner. In this sense, the list of parameters and indicators provides both a framework for questioning development projects and for dealing with the various implications of these projects.

An examination of Table 3.1, moreover, reveals that the quantity and quality of indicators available varies considerably with the components considered. While we now have a considerable number of relatively specific indicators for illustrating the “ecological integrity” component, the tools available for measuring the **“social equity”** of an activity remain relatively fragmentary. Moreover, the concept of need, which emerges from the proposed indicators, remains closely linked to “essential needs” which do not really encompass the complete picture of urban reality in **industrialized** countries. In this respect, the list of proposed indicators provides a fairly clear illustration that sustainable development has historically **been** closely linked to the development and management of natural resources and to developing countries. **In this sense we** also see the extent of the task begun here to describe with precision the concepts of equity, social justice and fulfilment of the needs of city dwellers.

Figure 3.2 **Sustainable development in urban areas**

Historical factors (the concept of sustainable development originated in agronomy, forestry and natural resource management).

+

Indirect nature of the relationships between people and the problems posed in urban areas by resource use.

▼

Problem of transposing the concept of sustainable development to urban areas.

also:

Size of the urban population.

+

Dependence of urban areas on resource regions.

▼

Amount of pressure exerted by urban areas on resource regions.

▼

Impossibility of considering sustainable development without extensive consideration of urban areas.

Lastly, the list of components **and indicators** shows **that**, in terms of activities, the concept of sustainable development involves **taking** into consideration a set of relatively new elements: the essential needs of future generations, the presence of elements which hold a symbolic meaning for people, the consequences of the activity for the ecosystems indirectly affected, etc. The first consequence of this finding: in presupposing

that a set of elements, which are normally ignored in traditional **practice**, are **taken into consideration**, sustainable development, **used as a substantive** basis for environmental management, enriches the management process but also makes it **more** complex. The second consequence is even more fundamental: in terms of land use and occupation, sustainable development is not completely neutral. In itself it has clear implications for the type of development **to be** encouraged. Thus, simply taking into consideration certain components such as those relating to “Energy” and “Biogeochemical cycles” encourages certain types of development (**eg**, higher density development), modes of transportation (**eg**, public transit) and patterns of application (**eg**, proximity of **home to work**).

Figure 3.3 Using triangulation to **put** indicators into perspective



The ecological integrity component is illustrated by taking into account the indicator “Presence of rare environments” which can have an impact on the “**Needs**” and “Equity” components.

NEEDS

LEVEL OF ECONOMIC ACTIVITY

INTEGRITY

EQUITY

The needs component is illustrated by taking into account the indicator “Level of economic **activity**” which can have implications for the “Integrity” and “Equity” components.

Table 3.1: Parameters and potential indicators for an environmental management framework based on the concept of sustainable development

<u>COMPONENTS</u>	<u>PARAMETERS</u>	<u>POTENTIAL INDICATORS</u>
I Fulfilling needs		
a) of the current generation	Health of the population	Population in areas where pollutants are concentrated
		Presence of generators of environmental problems (Statistics Canada)
		Presence of waste dumps or treatment sites
		Presence of contaminated soils
	Safety of the population (natural or social risk)	Housing units or places of work in an environmentally endangered area

Unhealthy or

abandoned homes

Transportation-
related accidents

Crime/type of
development

Providing **for**
development

Level **of** economic
activity

Level of employment

Tax structure

b) future
generations

Providing for
essential needs

Energy balances of
the plan

Agricultural land
destined for
development

Forests destined for
development

Ecologically
valuable areas
destined for
development

**II Equity, social
justice and cultural
diversity**

Access to housing by
the various socio-
economic groups

Number of units

Distribution of the
value of units

Physical access by
all groups to goods
and services

Infrastructure vs
diversity of modes

Services to specific
groups

Access of the
overall population
and of its sectors
to education, health
care and other
services

Distribution of
services within the
area

Regularity of flows
within the **various**
networks throughout
an area

Capacity of
transportation
networks by sector

Capacity of the
energy network by
sector

Capacity of the
water and sewer
network by sector

Presence of
identifying
characteristics for
the community

Presence and spatial
distribution of
heritage elements

Presence and spatial
-distribution of
topographical
elements

Presence of elements
or' events with a
symbolic meaning for
the population

Historical events

Presence of identifying **characteristics for the various cultural** groups within the community

Particular heritage elements

Presence of activities designed for particular cultural groups

III Ecological integrity

i) Maintaining essential ecological processes

ii) Maintaining genetic diversity

iii) Sustainable use of species and ecosystems

a) Developed ecosystem

Water

Needs/supply capacity

Water from storm
sewers and
sewers/absorption
and treatment
capacity

C l i m a t e
(microclimate)

Strength/direction
of winds

Temperature vs
mineralization

Maintaining genetic
diversity

Environments and
species considered
rare or threatened

Reliability of
sources of supply

Types and origin of
sources of energy
supply

Energy balance of
the plan

Potential growth in
supply

b) other ecosystems

Water

Quantity of waste
water/capacity of
treatment systems

Quantity of waste
water/capacity of
treatment systems

Energy

Level of demand

Anticipated
residential and
commercial
growth

Type and form
of development

Additional
transportation
needs

Distribution of
modes

Relative cost
of **types and**
modes

Type of demand
(electricity,
petrochemicals, **etc**)

Location of sources
of supply

Additional equipment
needs (production
and transportation>

Resource regions:
anticipated changes
- land use

Additional emissions
(nitrogen oxide,
sulphur dioxide)

Biogeochemical
cycles

Anticipated
growth

Type and form
of development

Additional
transportation
needs

Modal
distribution

Relative
emission
levels/types
and modes

Dispersion pattern
of the emissions

Climate
(macroclimate)

Additional emissions
(CO₂)

Dispersion pattern
of the emissions

Wastes

Additional
production

Anticipated
growth

Type of
development

Average
production by
type

Distribution pattern

Additional treatment
equipment needs

Location of
equipment

Agricultural land,
forests, etc

Space requirements
based on the plan vs
type of development
(density)

Space **requirements**
vs **location** of land
with potential
(locally,
regionally,
nationally)

Possibilities and
rate of
recuperation-
recycling/
development
orientations

4. Environmental management in urban areas: test application of the proposed grid

..

To achieve a clearer understanding of the nature of the repercussions of the analytical grid derived from the exercise of defining sustainable development in greater detail, and to expose the grid to the demands of actual practice, this chapter proposes a test application of the grid.

4.1 Justifying the research areas selected

A number of research options might be considered with a view to ensuring that an environmental management framework, which draws on the sustainable development concept, is incorporated into the urban development planning process.

The first possibility would be to extend the framework to all activities in urban areas. This option would involve considering the environmental impact of each project (eg, construction of individual housing units, change in the purpose served by a building) so as to take into account the fact that, in urban areas, the problems linked to environmental changes are most often caused by the cumulative impact of a series of actions of little individual significance. Although it may offer definite advantages in terms of obtaining a grasp of environmental parameters, such an approach nevertheless poses considerable problems in practice. The analyses and studies which it

presupposes are in fact so **numerous that they** would inevitably cause a bottleneck in every planning **and development process**.

In order to overcome this difficulty, a second option, one used by the City of Ottawa for example, would be to apply this environmental management framework only to projects carried out in specific areas, acknowledged for their environmental significance or vulnerability (**eg, contaminated** sites, ecologically sensitive areas), historical (**eg, historic** sites) or social. This approach, however, has one major flaw in that it **does not take** into account either the overall nature of the urban environment or the fact that, as a result, we cannot restrict ourselves to considering only **certain specific areas**. Since most of the population lives outside these areas, many actions which might affect the living environment or health of individuals are consequently left out of such an approach.

A third option would be to extrapolate to urban areas the logic used in the current Quebec regulations for environmental assessment and thus extend the environmental management framework to specific projects above a predetermined size. For example, New York City has a list which requires that large projects (detention centres, hospitals, **etc**) be submitted to the environmental assessment process. However, this approach does not take into account the need mentioned above to consider the cumulative impact of **small-scale** projects.

These first three options, we believe, all extend the environmental management framework to activities themselves, in other words to the results

of a planning process which consists in particular of defining in succession development objectives, planning directions **and** the control methods (**eg, zoning**) by which these directions might be achieved. Nevertheless, the inherent deficiencies in the three options considered are revealed in the necessity to go back to the decision-making process and **attempt** to insert environmental assessment into the structures which provide the framework for the activity. Once again, various possibilities should be envisaged.

It would thus be possible to graft the environmental management framework onto the decision-making mechanisms for municipal investments. **Due** to the decisive role they play in the nature, scope and location of public infrastructures, property development programs (five-year or three-year programs such as those of the City of Montreal) exercise a degree of control over future urban development projects. However great its influence, such control is nonetheless exercised in line with the directions resulting **from** previous decisions. The allocation of funds for building the necessary infrastructure **for** commercial developments would be, for example, the result of an earlier decision to create or consolidate a development focus at a given location. In these circumstances, while the insertion of the management framework in the three-year planning process appears highly desirable, it does not in itself provide any guarantee of true environmental management.

Similarly, another option, envisaged on the basis of this research, would be to insert a management framework based on sustainable development in the mechanisms for developing and revising municipal regulations (**eg, zoning**

regulations). Nevertheless, as in the previous example, this planning **process phase is very** largely governed by a series of decisions taken earlier, since regulations usually merely articulate policies or programs established previously.

To the extent that, as shown by these few examples, **the need to** integrate the environmental dimension in the initial stages of the decision-making process is acknowledged, development master plans appear particularly relevant. Such plans, by definition, represent a key stage in identifying development objectives and **in translating these objectives into spatial terms**. More than just a map, they should be the overview documents **on the** basis of which policies on specific components (housing, transport, green spaces) should be derived. Such policies will eventually determine the nature of physical facilities encouraged or approved. Figure 4.1 **shows** the relationships between the various states of the action process.

In the circumstances, **and** given the multitude of elements involved in the implementation strategy defined **above**, we tend to consider a structural implementation approach which moves from the general to the specific. Within this structure, the integration of environmental assessment in the master plan appears as the first point where environmental concerns can be integrated: from this stage on the various parameters of sustainable development identified in the previous chapter will be taken into consideration. The assessment of **sectoral** policies will subsequently ensure that these parameters are integrated in the various sectors of activity (transportation, housing, **etc**), while integrating the assessment in the

three-year investment program will enable the **impact of more specific** projects to be determined. In this respect, the proposed structure thus **recognizes** both the importance and inadequacy of taking environmental aspects into consideration at only one stage of specific activities.

In order to define better the requirements of integrating environmental considerations in the initial **stages of** this structure, we attempted as part of this project a dual application of the analytical grid described in the previous chapter. The City of Montreal's Central District **Master Plan**, tabled in the winter of **1990**, was thus used as the basis for exploring the implications of this grid for the process of drawing up development **plans** and the transportation sector was selected to explore these implications within specific sectors of activity.

The results of this attempt at dual application are **shown** in the following **two** sections.

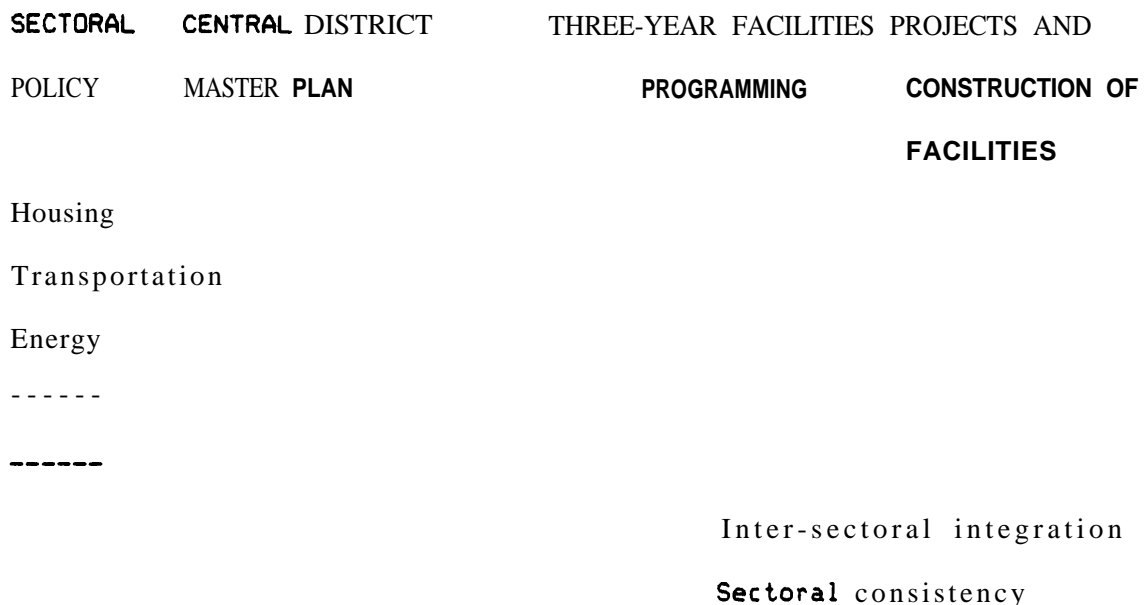
4.2 Case study: **the City of Montreal's Central District Master Plan**

4.2.1 Introduction

The Central District Master Plan for the **downtown** area (City of Montreal, 1990) is a key component in defining **the future** activities and uses of Montreal's downtown core. It thus states explicitly that **[translation]** "the plans for land use, height and density must **be respected**" and that "any future modification of the zoning **regulations**, as well as occupation and

construction projects (“overall **plan**”) must also **conform to** the master plan” (City of Montreal, 1990). In this way, as stated above, this document comes to constitute an element which will determine the future environment of Montreal and thus a particularly appropriate place for incorporating a management framework supported by the sustainable development concept. **In this sense also, the application** of the proposed grid in the Central District Master Plan, the intrinsic quality of which goes beyond the scope of this **paper**, enables us **to see more clearly the implications** and requirements of the concept of sustainable development in terms of environmental management in **urban areas**.

Figure 4.1 : Relationships between the master development plan, **sectoral policies**, three-year development programming and facilities constructed.



4.2.2 Analytical method

To define these requirements more **clearly**, we measured qualitatively in two ways the existence of concerns relating to each parameter and indicator included in the grid shown in section 3.3.3. The results of this exploratory exercise are shown in Table 4.1.

At one level, this exercise was designed to review the presence of objectives relating to these parameters and indicators. There are three options for consideration here:

i) The plan explicitly states one or more objectives relating to the parameters and indicators (this option is represented by the symbol **0** in Table 4.1) For example, safety of movement in one of the explicit goals of the plan (City of Montreal, 1990, pg **69**).

ii) The plan indirectly sets an objective relating to the parameters and indicators (this option is represented by the symbol "**>**" in table 4.1). **For** example, by promoting public transit, the plan indirectly touches on the "Energy" parameter.

iii) **The** plan does not set objectives, directly or indirectly, relating to the parameters and indicators marked with the symbol "**●**" on Table 4.1)

At a second level, the exploratory exercise focussed not only on the mere presence of objectives relating to **the parameters and indicators** but also on performance criteria for carrying them out. Thus, **for example**, seeking to ensure access to housing **for the various socio-economic groups and** selecting for this purpose the indicators “Number of housing units” and “Distribution of the value of housing units” we can either set criteria **for** evaluating the performance **and** application of this parameter (**eg, construction** of a set number of housing units below a given cost) or restricting ourselves to stating that ‘we shall seek to ensure the presence of affordable housing **for the various socio-economic classes**’. The objectives for which the master plan provides for specific performance criteria are identified by the symbol "▲" in Table 4.1 .

Lastly, we identified the parameters and indicators which are not taken into account, perhaps because they were not relevant in light of the area's characteristics⁷

4.2.3 **Some** preliminary findings

In comparison with traditional practices, the Central District Master Plan shows that a clear effort has been made to include certain environmental considerations. Thus, even though the intervention mechanisms remain to be specified, the document discusses extensive maintaining cultural integrity, the desire to protect the heritage aspects of the built environment and elements of symbolic importance (**eg**, natural topography). Similarly, stressing methods of transportation other than the personal automobile and

the proximity of home **to work** imply **that** environmental costs (pollution, energy demand) related to transportation have been taken into account to some extent. **It is** moreover interesting to note that the document lays great stress, with **respect to** these parameters, on the importance of the repercussions of taking them into consideration, both in economic and environmental terms. For example, the objectives relating to historical parameters are based both on a desire to protect Montreal's heritage (**p. 58**) and to increase the attractiveness of the downtown area to tourists (**p. 41**). In this respect, the document illustrates that, as the concept of sustainable development postulates, economic development **and** environmental protection can be not only compatible but complementary.

Despite this effort to incorporate certain environmental considerations, numerous concerns inherent in the concept of sustainable development are missing from the plan, as Table 4.1 shows. **The exploratory** exercise illustrates, in this respect, another of the observations made above, that introducing the concept of sustainable development involves taking into account a series of new parameters which entail enriching the framework of questions on development activities but which also, at the same time, **make the management process more complex.**

While the detailed analysis of the various parameters missing **from the** plan exceed the context and scope of an exploratory research project, we can nevertheless see in Table 4.1 **that these parameters fall into three main groups**

o A first set of parameters relate to the health and safety of the existing population. The issues of contaminated soil, **waste** treatment and unhealthy or abandoned housing are not addressed at all in the **plan**. Their absence is surprising, in light of the importance of this issue in **many projects** carried out in **the downtown area**.

o **The second group of parameters which are largely absent from the plan relate to the time axis which** the sustainable development concept seeks to introduce. To **be sure, the plan sets out a series of** goals for economic **growth** and projects, in this **respect, a view of what the Central District** will be like in **the future. Nevertheless, it does not address at all, at least explicitly,** the issue **of the needs - for energy, food, etc - of future generations.** There is for example no projection of or reference to the strategies employed **for maintaining the necessary resource base for** satisfying these needs. Thus, it gives, whether purposely or not, the impression that economic growth alone can enable the needs of future generations to be met **and** articulates an unlimited vision of environmental **resources. For example, no direct reference is made to "power" resources** (water, energy) nor to putting **energy** needs into perspective in terms of **reserves or sources of supply.**

This being **said, we** should note that the perspective of consolidation (increased density in land use) which underlies the plan, as well as the attention accorded to modes of transportation other than the personal automobile appear, on the whole, fully compatible with the aims of sustainable development, whether intentionally or not. There is thus **a**

degree of convergence between the directions of the master plan and those favoured by **sustainable development**.

o Thirdly, the parameters relating to the **horizontal axis** of the plan are **also largely** absent. With the exception of the parameter “**economic growth**”, the whole issue of the exchanges between Montreal and the other sub-systems is missing. **Thus, no reference is made to the input of resources (energy) necessary in order for the sub-system to function; to the output of used up resources (waste); to the supply networks (eg, hydroelectric network) or the impacts (environmental stress) of the plan on the resource regions.** Also, except for the transportation issue, the ways in which resources from outside are used are also not discussed in the **plan**. For **example**, recycling, which could result in a decrease in the pressure exerted by urban areas on resource **regions**, is completely missing. This absence of a spatial perspective also extends to the relationships with the **other Montreal “sub-systems”**. Overall, the Central District is thus considered in isolation with no real discussion of the **exchanges that take place with the other systems and sub-systems**. The plan also articulates the idea that only positive (economic) impacts **on** the entire community emerge from the downtown **area**.

4.2.4 **Conclusion**

Oespite the effort **made** in the plan to incorporate certain environmental dimensions, it appears primarily to be a marshalling of objectives **aimed** directly **or** indirectly **towards** economic **growth**. In this context, it

proposes a spatial framework for achieving **these** objectives and a set of general directions in terms of land use.

In addition to the deficiencies observed in examining one specific document, the exercise that was done actually shows **a** dual partitioning which may be encountered in applying such a view of sustainable development.

This compartmentalization is first of all a spatial one. The view promoted in the Central District Master Plan focusses mainly on the built environment and illustrates the absence of a structure truly adapted to the entire nature of environmental issues. This perspective shows **clearly that**, in so far as the impacts of their decisions are felt outside the limits of its jurisdiction, administrative bodies continue to derive no **real** advantage in taking these consequences into account. Under such circumstances, which are by no means limited to the Central District Master Plan, the comments made at the time of the test application of the proposed grid would appear to be generalized.

The compartmentalization is also sectoral. We must thus conclude that the master plan is not an overview document which incorporates the policies on the specific components (housing, transportation, green space). **In** this respect we should note that certain parameters which are not included in the plan still figure among the concerns of the City and tend to be considered **by** a set of "complementary policies". Waste treatment, water and transportation are, for example, **covered** in specific policies **whether they** are explicit or not. This lack of one place, **where the** various policies

affecting the environment **are placed side by side** for **purposes** of **comparison and adjusted** accordingly, **may clearly cause problems**, inasmuch as the components of some of **them may conflict**.

The dual **compartmentalization**, noted during the exploratory **analysis of the** master plan, therefore results in additional **demands of each of the** policies. It presupposes, for **example, that the parameters relating to the horizontal axis, just as the potential conflicts and interactions between sectoral policies, are considered individually**. In order to better describe the nature of the demands, the next section **examines one individual sector, that of transportation**.

4.3 Case study: the transportation sector

4.3.1 Introduction

The method projected for the transportation sector includes initially four principal **stages, ie:**

- i) **to explain the division** of responsibilities in the transportation sector **for the Montreal region: identification of the responsibilities at the various levels (provincial vs municipal)** and within the same level (**eg, various services of the City of Montreal**);
- ii) to identify the principal stages in the decision-making process, the parties involved at each stage and their policies;

iii) to identify, for each stage, the principal indicators which should be considered in the context of sustainable development;

iv) to application the indicator grid to the policies and guideline documents in order to define in greater detail the requirements of sustainable development with respect to this individual sector.

A series of factors should, however, soon made it necessary to revise these stages. First, transportation is **an** extremely complex sector, in which **a** considerable number of parties are involved and **where considerable effort** is required just to explain the division of responsibilities. Furthermore, although not exclusively, this sector is **also characterised by the absence** of explicit policies. This absence makes it difficult, even impossible, to **carry out** the fourth **stage** cited above and has considerable implications for the strategy for implementing environmental management that is proposed in chapter **two**. Finally, **a** brief review of the literature should reveal the existence for this sector of a body of environmental indicators which are relatively well defined and whose adaptation, in **terms of the parameters of sustainable** development identified above, it is possible to **achieve** without major difficulties. In light of the foregoing, this section aims primarily, first, to identify the main elements involved in the current problems in the transportation sector **and**, secondly, on the **basis of these** elements, to define the principal factors involved in applying a concept of sustainable development to this **specific sector**

A.3.2 The transportation sector: the issues involved

The analysis carried out illustrates that the problems in the transportation sector of the City of Montreal, are marked by the five following main elements:

I) A profusion of **agencies are** involved in the same field, for reasons that are rooted in two main factors: first, the transportation field involves the three major administrative levels (provincial, intermunicipal and municipal). Second, more than one agency is active at each level in the transportation field. At the municipal level, for example, transportation management is, in the City of Montreal, shared among several departments which, in some **cases, have** more than one division: the Service d'habitation et de **développement** urban [housing and urban development department³ (area planning, **sectoral** policies and strategic planning divisions and urban planning module) ; Service des travaux publics [**public** works department]; CIDEM [economic development department³ and the Service de la planification et de la concertation [planning and coordination department³ (development and exchange of experience division; extra-municipal relations **division**)¹³;

II) It is often difficult to distinguish between **the** responsibilities of these bodies. Thus, in the Montreal area, the **CUM** [Montreal urban community³ has, at least theoretically, exclusive power over planning and building the subway (MTQ [**Quebec Department of Transport** 1987, p.6). **In practice**, however, by subsidizing the entire debt servicing costs of the metro **and** all regional transportation infrastructure elements built **after**

1980, the provincial **department can**, in practice, exert a preeminent influence on the configuration of these facilities.

The agencies' responsibilities become all the more difficult to distinguish as there is a parallel structure through which politics can influence directly or indirectly the "technical" definition of responsibilities. **For** example, through its representation on the CUR Council, Montreal can exert within the Council a direct influence on certain projects. Similarly, it can use its political weight to make a series of representations to the Government of **Quebec**.

In **short**, identifying the real responsibilities of each agency **necessitates** comparing the "theoretical" definition of these responsibilities with **an** empirical examination of the various projects.

III) Coordination problems, **both among** the various agencies and within **any** given agency, occur frequently in the transportation field. **They have** been particularly apparent in recent **years in the** course of discussions arising out of the tabling of the "1988-98 action plan" **for the Montreal area** (MTQ, 1988). **Furthermore, a start was recently made on efforts to attenuate these problems. The setting up of an Organisme régional de transport (ORT)** [regional transportation organization] including the elected **members of the CUM, Laval and the South Shore** and involving the City of Montreal's planning and coordination department in the transportation field, needs to be viewed in this perspective, **both at** the **intermunicipal** and municipal levels.

IV) In terms of policies and programs, there is a dual problem of consistency. On the one hand, there is a general absence of explicit policies at the various levels. On the other hand, the agencies use different analytical grids for their activities and these give rise to conflicts. In this respect, furthermore, the discussions ensuing from the tabling of the 1988-98 action plan were particularly revealing. The plan thus **specified** clearly that the municipalities were not able to situate the transportation issue in a regional **perspective** (MTQ, 1988 p.10) while the municipalities themselves insisted on the need to consider, in addition to issues involved in the “movement and people and goods” those relating to the environment, urban development and the economy.

The content of the ensuing debate gives us an opportunity to refer at last to a highly delicate but nonetheless important problem in the concept of environmental management, that of the difficult interface between the technical side, which is responsible for substantiating the files and formulating the thrust and its impacts, and the political side, which is responsible for taking decisions and selecting the directions.

4.3.3 **Transportation and sustainable development: preliminary findings**

Our overview of the transportation sector in the Montreal area, albeit exploratory, enables us to **see** the major obstacles that need to be overcome in order **to** achieve sustainable development, as well as the

relevance of the approach to environmental management proposed **in chapter 2**.
Three observations can be made

1) The application of an **environmental 'management** approach based on sustainable development first comes up against the absence of explicit policies which could be subjected to proper assessment; each of the authorities appears to continue to operate using **sectoral** projects, whose links with the programs are, to say the least, tenuous.

2) The approach would perhaps most of all come up against the dual compartmentalization discussed above, and first against a **compartmentalization** in spatial terms. The agencies involved act according to different terms of reference which are often difficult to reconcile: **for** example, the provincial department (**MTQ**) acts on the basis of a regional perspective, the CUM on an inter-municipal one. **The** approach will also encounter the obstacle of compartmentalization by sector. Horizontal interactions, that is both intersectoral relations, **such** as the impact of transportation decisions on urban sprawl and even on the intermodal distribution of movements are therefore **not taken** into account. The **MTQ** seems to act from a single perspective, that of transporting people and goods, although the municipalities **would** like the multiple parameters to be integrated (economic, planning, etc).

3) This application does not really clash with "technical" parameters. Many indicators are now available and would, in fact,

enable significant progress to be made, provided they are applied as part of an explicit **and** consistent management **approach** and a **strategy** for questioning activities; **and** “there’s the rub”.

In light of these circumstances, priority should not be accorded to the manner in which the substance is considered, **as we already have** some tools, but rather to the institutional aspect: how to ensure that the dual compartmentalisation thus identified can be broken down?

Table 4.1: **The environmental** management framework based on the concept of sustainable development: Test application to the Central District Master Plan

<u>COMPONENTS</u>	<u>PARAMETERS</u>	<u>POTENTIAL INDICATORS</u>	<u>CENTRAL DISTRICT MASTER PLAN</u>		
			Objectives	Performance criteria	
1 Fulfilling needs a) of the current generation	Health of the population	Population in areas where pollutants are concentrated	●	▲	
		Presence of generators of environmental problems (Statistics Canada)	○	△	
		Presence of waste dumps or treatment sites	●	▲	
			Presence of contaminated soils	●	▲
		Safety of the population (natural or social risk)	Housing units or places of work in an environmentally endangered area	●	▲

		Unhealthy or abandoned homes	●	▲
		Transportation- related accidents	○	▲
		Crime/type of development	●	▲
	Providing for development	Level of economic activity	○	A
		Level of employment	○	A
		Tax structure	○	▲
b) future generations	Providing for essential needs	Energy balances of the plan	○	▲
		/Agricultural land destined for development	●	▲
		Forests destined for development	●	▲

Ecologically ● ▲
valuable areas
 destined for
 development

**II Equity, social
 justice and cultural
 diversity**

Access to housing by
 the **various socio-**
economic groups

Number of units ○ A
 Distribution of the 3 A
 value of units

Physical **access by**
 all groups to goods
and services

Infrastructure vs ○ ▲
 diversity **of modes**

Services to specific ☞ ▲
 groups

Access of the
 overall population
 and of its sectors
 to education, health
 care and other
 services

Distribution of ● ▲
 services within the
 area

Regularity of flows within the various **networks throughout an area**

Capacity of transportation **networks by sector**

0

A

Capacity of the **energy network by sector**

●

▲

Capacity of the **water and sewer network by sector**

●

▲

Presence of identifying characteristics for the community

Presence and spatial distribution of heritage elements

0

△

Presence and spatial distribution of topographical element5

○

△

Presence of elements **or events** with a symbolic meaning for the **population**

Historical events

●

▲

Presence of identifying characteristics for the various cultural groups within the community

Particular heritage elements

☺ Δ

Presence of activities designed for particular cultural groups

● ▲

III Ecological integrity

i) Maintaining essential ecological processes

ii) Maintaining genetic diversity

iii) Sustainable use of species and ecosystems

a) Developed ecosystem

Water

Needs/supply capacity

● A

0.01-0.05

Water from storm ● A
sewers and
sewers/absorption
and treatment
caprc i ty

Climate Strength/direction ● A
(microclimate) of winds

Temperature vs ● ▲
mineralization

Maintaining genetic Environments and ● A
diversity species considered
rare or threatened

Reliability of Types and origin of ● ▲
sources of supply sources of energy
supply



Energy balance of ● ▲
the plan

Potential growth in ● ▲
supply

b) other ecosystems

Water

Quantity of waste water/capacity of treatment systems ● ▲

Quantity of waste water/capacity of treatment systems ● ▲

Energy

Level of demand ∩ ▲

Anticipated residential and commercial growth ○ ▲

Type and form of development ∩ A

Additional transportation needs ∩ A

Distribution of modes ∩ ▲



Relative cost
of types and
modes



Type of demand
(electricity,
petrochemicals, etc)



Location of sources
of supply



Additional equipment
needs (production
and transportation)



Resource regions:
anticipated changes
- land use



Biogeochemical
cycles

Additional emissions
(nitrogen oxide,
sulphur dioxide)



	Anticipated growth	●	▲
	Type and form of development	●	▲
	Additional transportation needs	●	▲
	Modal distribution	●	▲
	Relative emission levels/types and modes	●	▲
	Dispersion pattern of the emissions	●	▲
Climate (macroclimate)	Additional emissions (CO ₂)	●	▲
	Dispersion pattern of the emissions	●	▲

Waste5

Additional
production

● ▲

Anticipated
growth

● ▲

Type of
development

● ▲

Average
production by
type

● ▲

Distribution pattern

● ▲

Additional treatment
equipment needs

● ▲

Location of
equipment

● ▲

Agricultural land,
forests, etc

Space requirements
based on the plan vs
type of development
(density)

3

Space requirements
vs location of land
with potential
(locally,
regionally,
nationally)

Possibilities and
rate of
recuperation-
recycling/
development
orientations

Symbols

- 0** Objective **explicitly** present
- 2** Objective **indirectly** present
- Objective missing
- A** Performance criteria present
- ▲** Performance criteria **missing**

5. Research thrusts and strategy for action

In this **report we have** attempted to define **what the characteristics** would be of the integrated environmental management approach that is required to manage urban development in the context of sustainable development. Our overview of two types of activity in the City of Montreal illustrates the complexity of the approach and the enormous gap to be closed between it and current practice, **as** well the extent of the changes it would require.

Nevertheless, even if the political will to do so existed, it would be out of the question to change overnight all the ways in which an administration operates: these practices are the expression of **an** administration's culture, a research field which focusses increasing attention on the studies of how organisations and institutions operate (**cf** for example Abravanel et al, 1988). This culture is shaped by a long learning period and also by the broader social and political context within which the administration operates. It is thus by definition specific and unique to Montreal. This city's administrative culture is **a t issue** in introducing a policy of sustainable development, just as would **be** the **case for** any other **administration**. **A great amount of** work would thus be required, doubtless with a **commensurate time frame**.

On the other hand, the characteristics of the approach presented remain broad principles; and the grid of indicators formulated to define the aspect of sustainable development constitutes merely a preliminary approximation

On the basis of these findings, it is possible to identify a series of research projects which are needed in order to operationalize or, **at the very least, to** explore the ways in which a policy of sustainable development can be operationalized **and** implemented. **At** this stage, for the reasons touched on earlier, these **research thrusts could** merge with an action strategy for the City of Montreal

The following appear to us to be the most obvious research thrusts.

1 **Defining a configuration of essential needs in the Montreal context**

The very concept of **basic** needs, one **of the aspects** of sustainable development, poses a problem. In this **research, we kept to the concept of essential needs used** in the World Conservation **Strategy (IUCN, 1980)** a concept used in most texts on sustainable development **and one** that focusses mainly on the primary needs of people in developing countries: food, housing, health and safety.

Does this concept **apply,** however, in the same manner to urban **areas of** Western countries? **Also,** how much room does it leave for the specificity of each of the different ethnic and cultural groups which together make up Montreal's population mosaic? How should we deal with this difference, **recognizing** that this ethnic **and** cultural diversity in one of the city's major assets? Finally, **is** the concept of "needs" itself relevant, bearing in mind the criticism levelled at a planning approach based on this concept,

as we saw earlier? These are the kind of questions which **need to be** examined in greater **depth** in the course of research.

2 In-depth **analysis of the organizational structure of the transportation sector and process followed by the policies and projects**

It **was** not possible **for us**, given our restricted terms of reference, to highlight the complexity of this sector; the ambiguity in the division of jurisdictions and responsibilities among the various levels of government and their departments; the nebulous **way** in which policies are developed, or, conversely, the narrow options open to planners and decision-makers. It will be impossible to determine how the integrated environmental management approach could be introduced in this sector until its organizational structure is defined precisely and the functions and role of each of the players clarified. An empirical examination of the process followed **for** various transportation projects would undoubtedly be productive. This approach should enable us to understand better how to break down the triple **compartmentalization (ie, functional, spatial and institutional)** revealed in the exploratory exercise carried out in the **course of this research.**

3 **Defining urban indicators**

Once again, the grid of indicators **shown is** not an **exhaustive list** of **the** indicators needed to ensure sustainable development, but an illustration of the kind of questions involved.

It thus appears necessary to continue the process of reflection in order to select the most relevant indicators for every dimension. This approach should lead to identifying parameters and, strictly speaking, methods of analysis for measuring performance in a flexible manner. Specialists from the various disciplines should be involved, in close cooperation, in this process of reflection.

4 Area-wide **environmental** assessments

Among the characteristics or parameters of the integrated approach proposed, we mentioned the interest in carrying out area-wide environmental assessments; such assessments would serve to define reference situations, in terms of environmental potential and constraints, for managing specific activities and projects. A pilot project should be carried out for at least one neighbourhood in the City of Montreal. In this respect, an analytical look at some experiences outside Canada would be very useful; among other analyses that should be carried out is one of the French experience with environmental assessment of urban planning documents (Cf Atelier central de l'environnement [central environmental **workshop**], 1984)

5 Spatial integration strategy

As discussed in a number of places in this report, neither one neighbourhood nor the city itself can be regarded as a closed system **within** the sustainable development context. The effects of overflow, the **cumulative** impact which each area has on surrounding and contiguous areas, in short,

the interaction between systems, should be taken into account. This would be a complex operation in terms of the methodology and simulations **required** to develop a strategy

The thrust of previous research involved **analyzing** the potential **and** limitations within one area; the "spatial integration strategy" deals with the interdependence and interaction between various entities, whether contiguous (**for** example, the neighbouring areas) or parts of **a** larger system (for example, a river basin).

6 **Review of certain experiences outside the Province of Quebec**

Numerous experiences outside the Province of Quebec may contain a great deal of information and thereby enable Montreal to introduce its approach **more** readily. Some of those which are highly relevant and should be included in a review are:

- the system of **class** assessments **used** in Ontario's environmental assessment procedure;
- the impact study procedures adopted by various cities (**cf** City of Montreal, 1989);
- the French experience with environmental assessment of urban planning documents;
- etc.

7 Pilot project on one neighbourhood

One unquestionably productive and constructive, yet also effective, method of exploring what would be required to implement an Integrated approach, identify the inevitable institutional obstacles and identify the many problems involved, would be for Montreal to commit itself very soon to a pilot project designed to formulate a sustainable development strategy for one neighbourhood.

With this aim, we believe it would be interesting to follow a research-action strategy coordinated by a team consisting of representatives of Montreal's city administration, from the planning and consultation department, the housing and urban development department, the new environment committee in particular, and perhaps the BCM, Montreal's consultation office, as well as of researchers and experts drawn from local universities, and perhaps CEARC, in an advisory capacity. While this is an area where a research-action method should be used, it is certainly appropriate for carrying out a sustainable development policy, in view of the problems to be overcome and the innovations that will be required.

Notes

- 1 Note that the terms "**développement durable**", used in some of the French-language works cited in this section and "**développement viable**", used in this study, are more or less synonymous.
- 2 Objectives proposed by the WCS, see section 3.1.1.
- 3 See section 3.3 for a concrete example of non-convergence among objectives.
- 4 See especially IUCN, 1980; Carpenter and Harper, 1988; Brown et al., 1978; Clark, 1986; Ehrenfield, 1987; Lowe, 1986; **Planing, 1998**.
- 5 An interesting fact which emerges clearly from this example is that, based on existing knowledge, it is often easier to measure the absence of a parameter than its presence. This situation is particularly true with respect to the "Health of the population" parameter, on which all the indicators listed refer to factors which may have a negative effect.
- 6 See chapter 2 of this report.
- 7 For example, it is clearly not relevant that the Central District Master Plan specifies that an effort will be made to protect existing agricultural land.

- 8 Note, however, that the exercise carried out in the course of this research does not take into account the various documents used to support the plan's development.
- 9 We would thus note once again (see section 3.3) that considering these aspects may encourage some forms of development and influence the spatial distribution of the activities.
- 10 In other words: relations between the Central District and other neighbourhoods in the City of Montreal, and relations between Montreal (as a whole) and other geographic entities (neighbouring municipalities and regions; those elsewhere in the province or the country, and abroad.
-
- 11 See, for example, the references to the downtown area as a regional retailing centre or Montreal's cultural influence on the rest of the province.
- 12 These implications are discussed in section 4 3.3
- 13 Personal correspondence, Corinne Brunelle, February 1998.

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Appendix 1: Terms of reference

1.1 Terms of reference

Last January, the Canadian Environmental Assessment Review Council (CEARC) entrusted a group of researchers at the Faculty of Planning and Development **at the** University of Montreal with the **terms of reference for a** study which involved outlining the issue of environmental assessment in **urban areas, one** which would be subordinated to the principle of sustainable development. **It** involved:

- o exploring the methodological bases **for environmental assessment in** urban **areas;**
- o examining how environmental assessment fits into the project planning and implementation processes in urban planning; **and,**
- o finally, to discuss the issues encountered at the various **stages.**

The study that was carried out was, consequently, essentially an exploratory one, **and** served first **as** material for discussion **at a** roundtable on urban sustainable development held in Montreal on **March 28-29, 1990.**

This report contains the results of the study, in light of the comments made at the roundtable in order to define the principal research thrusts **which** emerged.

1.2 Request from the City of Montreal and target sectors

Although CEARC was the sponsor of this project, the terms Of reference were developed in response to an explicit request from the City of Montreal's planning and coordination department. The City has made sustainable development one of its major concerns; the planning and coordination department initially hoped that a sustainable development concept would be applied to the transportation sector and that the legal scope of existing environmental regulation applying to Montreal would be determined.

However, the preliminary analyses conducted as part of the project quickly showed that it would be premature to focus on the legal scope of the regulations. In fact, for a policy of sustainable development to go beyond mere words and really mean something, substantial changes are needed in the way all administrations operate, and how they design and implement projects. From this perspective, we need to define the framework and conditions for integrating environmental assessment and sustainable development, two components which cannot be dealt with separately, as we shall show subsequently.

Preliminary discussions between the research group and the department thus highlighted this problem and, as a result, the terms of reference and research were restructured. The central focus then became to define the meaning of the concept of sustainable urban development and the means by which it might be integrated in the management of activities with a

positive potential for influencing this kind of development. Subsequently, the **results** were applied, in **an exploratory** manner and for purposes of illustration, to the City of Montreal's Central District **Master Plan** and to the transportation **sector**.

Appendix 2: List of interviews conducted

Mrs Corinne Brunelle

Planning Advisor

Development and exchange of experience division

Planning and coordination department

City of **Montreal**

Mr Pierre Giard

Director

Development and coordination division

Montreal Urban Community Transit Corporation

(telephone interview)

Mr Guy Lafontaine

Director of network planning

Montreal Urban Community Transit Corporation

Mrs Andrée Lehman

Chief

Policy development division

Quebec Department of Transport

Mrs Marie-Josée Lessard

Planning Officer

Transportation division

Housing and urban development department

City of Montreal

Appendix 3: List of official documents consult&

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