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Canadian Experience in the Development of Environmental Surveys

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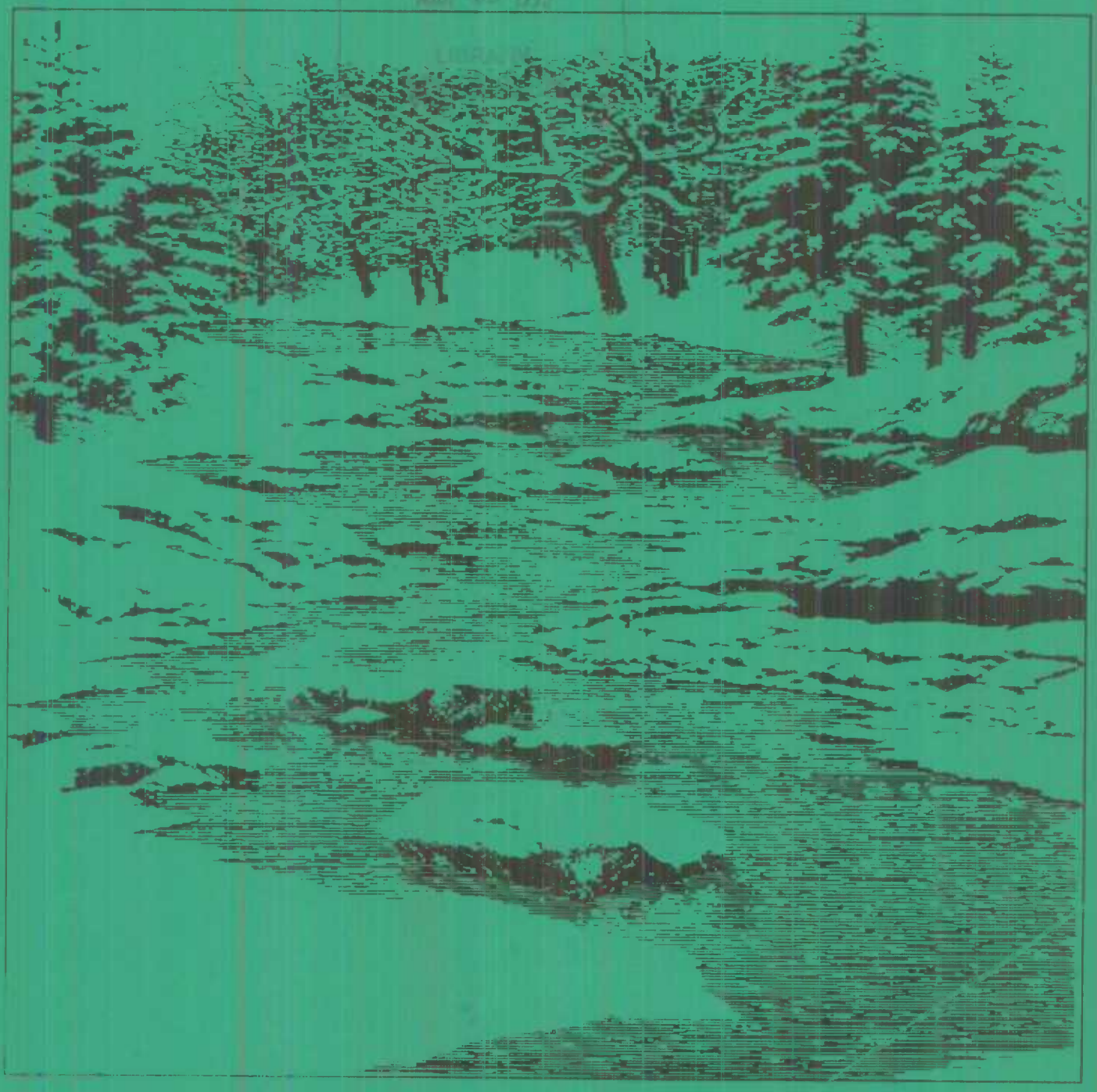

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Canadian Experience in the Development of Environmental Surveys

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This paper is one in a series of internal discussion papers produced in Statistics Canada's National Accounts and Environment Division. These papers address topics related to environmental statistics and the National Accounts components which are currently under development.

Ce document fait partie d'une série de documents internes produits dans la Division des comptes nationaux et de l'environnement de Statistique Canada. Ces documents traitent de sujets reliés aux statistiques de l'environnement et composantes des comptes nationaux au stade de la recherche.

Discussion papers in this series are made available in the official languages in which they were written. Translated versions are not available in most cases.

Les documents de travail de cette série sont disponibles dans la langue officielle dans laquelle ils sont écrits. Les versions traduites ne sont pas disponibles dans la plupart des cas.

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Canadian Experience in the Development of Environmental Surveys

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Introduction

The development of environment statistics and state of environment reporting in Canada over the last decade and a half has shown that a wide variety of data are required to understand environmental change and its determinants. These data obviously include physical and biological data compiled by resource and environmental agencies, but the list of socio-economic data is lengthy as well: data on population, industry, agriculture, transportation and energy are all relevant in describing the human activities that affect the environment.

There is increasing interest in Canada in an improved delineation of the links between economic actions and environmental change. Responding to this interest in mid-1990, Statistics Canada identified four areas where new surveys could fill important data gaps: household activities, the private waste management industry, local government waste management activity, and pollution abatement and control expenditures. These surveys are summarized below:

- The Household and Environment Survey is based on three premises: that households increasingly have a choice regarding the environmental "friendliness" of products they purchase; that options exist for households to reduce waste and release of harmful materials into the environment; and that some household purchases suggest concern over declining environmental quality. The survey therefore aims to measure the extent of these efforts by Canadian households.
- Private waste management in Canada is a growing and dynamic sector. The Waste Management Industry Survey represents the first specific collection of data on the economic characteristics of this sector, as well as the fate of the materials handled.
- While Statistics Canada publishes summary information on expenditures by local government on waste management, there are no detailed data on the range of waste facilities, the quantity and type of material handled, and the fate of these materials. The Local Government Waste Management Practices Survey is designed to fill these gaps.
- The Pollution Abatement and Control Survey aims to measure the operating costs for pollution control, the distribution of expenditures over types of pollutant, and the amount of abatement achieved, for private and public institutions. This will augment existing data on capital expenditures for pollution abatement and control.

This paper describes our experience in developing these surveys and highlights methodological issues associated with their development.

The Household and Environment Survey

Background

There is a growing understanding on the part of both the public and decision-makers that solving environmental problems involves more than just stopping polluters - that the decisions we make as consumers count as well. Household products and equipment, and household practices, have implications for the use of energy, water and other resources, and the stream of wastes that occur as a by-product of consumption. Some of the motivations behind household behaviours are economic, moral, or even based on fear (of health risks, for example). Other factors influencing household choice include convenience and technology. The Household and Environment Survey, as a pilot survey, was designed to measure a spectrum of these issues.

It should be noted that some of the items measured on the household survey could be measured more directly, by asking wholesalers and retailers for sales of particular products for example. The motivation for the household survey is not so much to measure individual products, some of which may be more environment-friendly than others for instance, but rather household *behaviours* in cross-section and in association with other socio-economic data. In addition, from the point of view of environmental impact, it is often the *penetration* of a particular technology (i.e. the proportion of households employing it) rather than an individual year's sales that is the most important factor.

Method of Data Collection

The survey was administered to 10,500 respondent households of the monthly Labour Force Survey, one sixth of the survey frame, as a special supplement in September 1990. To provide information on a provincial as well as a national basis, the two smallest provinces in terms of population, Newfoundland and Prince Edward Island, were over-sampled.

The survey was conducted through telephone interviews. The questionnaire was limited to a single page to minimize cost and the opportunities for errors introduced by interviewers and during data capture.

Telephone interviewing has several well-known benefits for this type of survey. Response burden is relatively low; the respondent has the opportunity to seek clarification from the interviewer if needed and the interviewer can query the respondent if the response does not seem to make sense; the interviews can be scheduled for a limited time frame (one week) and there is seldom a need for follow-ups.

The non-response rate for this survey was low, which is typical of telephone surveys. In fact, respondents were enthusiastic about being quizzed on this topic. Because the survey was carried out as a supplement to the Labour Force Survey (LFS), interviewer costs were incremental. An additional benefit of this scheme is that other socio-economic profile information from the LFS is available.

Questionnaire Development

The following table gives an overview of the questions that were developed for the survey.

Household and Environment Survey Summary of Questions
Energy conservation: use of double glazing, programmable thermostats
Water conservation: use of low-flow showerheads
Purchase of products: recycled paper, disposable diapers, zero-phosphate detergents, yard and garden chemicals
Use of disposal depots for hazardous products: household chemicals, used automotive oil and batteries
Reducing waste: use of compost heaps, bringing own shopping bag
Perceived environmental risk: use of water filter, purchase of bottled drinking water

Several problems were encountered in the course of question selection. A major problem was that most environmental actions are acts by individuals and, while the actions may be made for a household, there is no reason to assume that everyone in the household would behave in the same way. For example, one member of a household may purchase "environmentally friendly" products, another may not. Questions covering environmental actions had to be worded in such a way that they typically reflected the actions of at least one individual in the household. As a result, some of the responses are higher than they would be if individuals in the household had been surveyed.

In formulating the questions about household equipment such as double glazed windows, programmable thermostats, and water filters, the probability arose that there would be some homes with combinations of these items; for example, some windows with double panes of glass and some only with single panes; some water taps with filters, others without them. Sometimes it was possible to word questions to cover both possibilities (for example, respondents were asked if there were any double glazed windows and then if most of the windows were double glazed). In other cases it was necessary to choose wording that identified if any of the devices were present in the household (for example, "Does this household have a filter or purifier for drinking water?"). This had the benefit of indicating the diffusion of "environmentally friendly" technology, but provided no information on pervasiveness within the household or the extent of the item's use.

Another problem arose from the regional differences in availability of the various environmental goods and services. Originally, the plan was to ask about the use of recycling facilities for goods such as newspapers and glass bottles. In the course of early research, it was determined that most parts of the country did not have access to these services and that the question results would simply reflect availability rather than use.

It was also discovered that goods widely available in some regions were not easily obtainable in others. Paper products made from recycled paper were one of the items heavily promoted by a grocery firm in Ontario in an effort to promote the sale of "environmentally friendly" products. In other areas these goods were more difficult to find on store shelves and an awareness of the products had not been built up through the extensive advertising that took place in Ontario.

Problems Arising from the Survey Process

The interviewers were required to study a manual that provided basic information about the questions and the issues they addressed, however respondents frequently asked more detailed questions that went beyond the scope of the material in the manual. In fact, as an indication of the public interest in the topic, interviewers were frequently asked for advice on other actions households could take to protect the environment!

Space limitations on the survey form, combined with the desire to test a large variety questions, limited the number of screening questions that could be employed. This had deleterious results on a couple of questions. Local language usage was another source of problems; for example, the term "compost heap" often had to be explained in areas where it was not commonly employed - this no doubt affected the accuracy of responses.

In the debriefing of interviewers after the survey, the important issue of "green bias" was raised. Interviewers felt that in some instances respondents were searching for the "environmentally correct" response rather than saying what their behaviour really was.

The Waste Management Industry Survey

Background

In Canada, much of the solid waste produced by commercial establishments and industries is collected, and disposed of, by private firms. A substantial portion of household waste is also collected by these firms, usually acting under contract to municipalities or large residential complexes such as apartment buildings. Waste management firms also have the expertise and equipment necessary to handle hazardous wastes. As a result, these firms collect and dispose of most of the hazardous wastes produced in Canada.

This is a large and rapidly growing industrial sector and one that, until now, has not been the subject of a specific survey by Statistics Canada. At present, little is known about the revenues of these industries, their expenditures, and the numbers of people they employ. Most important from an environmental perspective, there is only limited information on the amounts and kinds of wastes these firms collect, manage, dispose of and recycle. The Waste Management Industry Survey was designed to answer these questions.

Survey Frame Development

The Statistics Canada Central Frame Data Base, consisting of business names, addresses and limited profile information such as nature of business, gross revenue and number of employees, provided the starting point for the development of the survey frame. The source of much of this material is business tax returns.

Because there had been no specific survey to waste management firms in the past, it was anticipated that building the survey frame would be problematic. The lack of previous surveys meant that Central Frame coding for nature of business had never been tested. There were several related Standard Industrial Classification (SIC) categories into which waste firms might have been coded. Lack of specialization by some firms, e.g. running a trucking operation as well as waste management, was also a problem.

The information from the Central Frame was updated by several means. A listing of firms in the sector was obtained from Industry, Science and Technology Canada (the federal ministry of

industry) and matched to firm names in the Central Frame. Telephone books were also consulted, as were industry associations. To verify nature of business for firms whose name as listed in the Central Frame did not obviously imply waste management as one of their services, a quick telephone survey was carried out.

For the purposes of the survey, all waste management establishments with five or more employees and/or gross revenues equal to or greater than $500,000 were included in the frame - making this, in effect, a census of medium-to-large establishments in the sector.

Questionnaire Development

The objective of the survey was to profile the waste mangement industry and to gather information on the amounts of wastes, hazardous and non-hazardous, that the industry is handling. The questionnaire summary is in the following table.

Waste Management Industry Survey Summary of Questions
Financial information on revenues, costs of materials, supplies and fuel, and wages and salaries
Percentage of revenue from: disposal, collection, recycling, other sales
Capital expenditures
Number of employees
Quantities of waste hauled and disposed of, by disposal method
Quantities of material recycled, by type of material
Quantities of waste imports and exports

A draft questionnaire was circulated to other government departments, an industry association, and several large waste management firms for comments.

The emphasis in the questionnaire was on profiling the sector rather than gathering a great deal of detail on the wastes handled. For example, rather than a detailed classification of wastes, a simple breakdown into hazardous and non-hazardous categories was requested - many firms could not provide more detail on composition of waste, and the distinction regarding the hazardous nature of the waste was felt to be important. In contrast, more detail on the fate of material handled (land fill, incineration, chemical or biological treatment) was available, as was the composition of recycled materials.

The definition of recycling for use on the questionnaire required careful thought. The activity we wished to measure was the management of *recyclable* material up to the point where it is smelted or otherwise re-manufactured. Therefore our definition concentrated on the collection and sorting of recyclable material and excluded re-manufacture.

As a result of the consultations, several changes were made to the questionnaire: fees paid for access to disposal facilities (tipping fees) were separated out in the costs section; the number of employees was identified by broad functions; the waste import/export question was expanded to include quantities.

Local Government Waste Management Practices Survey

Background

Most of the solid wastes generated by households in Canada are collected and/or disposed of by local governments or their agents acting under contract. Local governments are also heavily involved in programmes to divert domestic waste streams, usually through the introduction of programmes to collect recyclable materials and to sell them to recyclers.

At present there are no comprehensive and comparable information available on a national basis on the waste management and recycling expenditures and practices of local governments in Canada. Summary expenditure figures are collected and published by the Public Institutions Division of Statistics Canada. By combining a survey of local government waste management practices with data being collected through the Survey of Waste Management Industries, a picture will be available of most of the non-industrial waste generation activity in Canada, the amounts of wastes generated, and the money spent in managing the collection and disposal of wastes. By extension this information will offer a means to estimate waste generation for the residential sector and some of the non-residential sectors as well.

Survey Frame Development

Approximately 900 local government entities are being surveyed. These range in size from the largest cities to small rural townships. All municipalities equal to/greater than 10,000 population will receive the questionnaire as will a sample of smaller municipalities.

The starting point in building the frame is the Survey of Local Government Revenues and Expenditures carried out by Public Institutions Division. The number of entities in this frame has been augmented by expanding the sample of small municipalities, by including regional government bodies as appropriate, and by adding many local government entities whose primary function is waste management and disposal.

Questionnaire Development

The objective of this survey is to collect information on local government activities in the collection and disposal of waste materials and on municipal waste reduction efforts through the establishment and operation of material recycling programmes. Local governments collect the bulk of residential wastes in Canada while the disposal facilities they operate take in most of the commercial, institutional, and residential waste generated in Canada. The survey addresses waste collection, waste disposal, and recycling/waste reduction practices in separate sections. It further distinguishes between services conducted by employees of the municipality and persons/firms providing services on a contract basis.

Which waste services a particular municipality provides and how they deliver these services is subject to great variation, which argued for considerable detail on the breakdown of services. The questionnaire is summarized in the following table.

The structure and content of the survey was developed through extensive consultations with municipalities, the provinces, and Environment Canada. The consultations suggested that the survey will provide sufficient detail to meet the research, planning, and policy needs of the various client groups. At the same time, the survey is seen to be a credible and competent vehicle by the respondents we interviewed. The questionnaire is lengthy; however, much of this is devoted to simple profiling questions providing information on the programmes offered. These profiling

Local Government Waste Management Practices Summary of Questions
Expenditures on waste management by activity
Quantity of waste collected and disposed of
Expenditures on contracting out of services
Characteristics of waste management facilities
Hazardous waste management programmes
Recycling programmes: quantity and type of material diverted
Inter-municipal movement of wastes

questions are necessary to put the economic statistics in context.

Pollution Abatement and Control Survey

Background

Industrial pollution and the extent to which it is abated and controlled have significant consequences for the environment. Many industries are putting in place mechanisms to reduce pollution emissions and are spending large sums of money in the process. This spending represents an important market for other industries supplying products and services.

Survey Frame

Statistics Canada's annual Capital Expenditures Survey has a provision for the respondent establishment to indicate total capital expenditures on pollution abatement and control equipment. However, no information is collected on the detailed purpose of those expenditures, operating expenditures, or the amounts of pollution abated by the investment.

The survey frame for the Pollution Abatement and Control Survey consists of those establishments that have indicated capital expenditures on pollution abatement and control equipment in any of their responses to the Capital Expenditures Survey since 1985 (when the question was first asked). This survey frame can be updated in future years as new establishments indicate pollution abatement capital expenditures.

Questionnaire Development

The objective of the Survey is to provide data on capital and operating expenditures on pollution abatement equipment by type of material controlled. It is also intended to give estimates of the weight of substances abated as a result of these investments, and therefore of the marginal cost per unit of abatement. In addition, the data will be used to estimate the size of the market for pollution abatement and control equipment in Canada. A summary of the questionnaire appears in the following table.

Respondent burden and the ability of respondents to provide answers to some of the questions was a concern. Therefore, several consultations with major industries were conducted.

Pollution Abatement and Control (PAC) Survey Summary of Questions
Distribution of PAC capital expenditures by nature of substance controlled: emissions to air, emissions to water, contained liquid wastes, solid wastes
Distribution of operating expenditures for PAC facilities by nature of substance controlled
Quantity of abatement achieved, by substance, resulting from PAC investments *according to design specifications*
Quantity of abatement achieved, by substance, resulting from investments in process change
Sales and own use of recovered materials
Description of equipment purchased for pollution abatement and control

One issue raised by potential respondents was that, while it is possible to cut emissions by retrofitting scrubbers and other technology to existing equipment, it is also possible to reduce pollution output by replacing old, highly polluting production facilities with new ones that emit less pollution. Typically, these modifications produce cost savings through operating efficiencies - pollution reduction may not have been the motivation behind the decision to upgrade or replace plant facilities. Because this sort of investment has several benefits yet carries only a single cost, it is impossible for the respondent to calculate what portion of the capital expenditure was only to achieve pollution reductions. The resolution of this problem was to have the questionnaire ask for capital and operating costs for retrofit-type equipment (scrubbers, etc.) and to ask separately for any abatement of pollution achieved as a result of investments in new production technology.

Experience in the United States with questions on abatement achieved indicated poor response rates and statistical reliability. We have therefore experimented with a question on expected abatement *as per design specifications*.

The questionnaire asks for a description of the types of equipment purchased for pollution abatement and control - this will feed into a process to improve classifications of machinery and equipment. Similarly, respondents are asked to write in the names of pollutants abated as well as the quantity. This could be used to build a standard classification of pollutants for use in future surveys.

Summary and Conclusions

All four of these surveys should be viewed as pilot projects - the first time out with any survey instrument is a learning experience. The household survey went into the field in September 1990; data were released in February 1991, and an improved design is ready for use later in 1991 (pending the availability of funding). The waste management industry survey was mailed late January 1991, the pollution abatement survey late February, and the local government survey will be mailed mid-Spring. Data will not be released from the latter three until the Fall of 1991, but enough experience will have been gained that a re-design can occur over the Summer.

There is a wealth of useful experience that we have gained in designing and implementing these surveys. The highlights of this experience are summarized below:

- *Household and Environment Survey.* The most striking lesson from our experience with the 1990 edition of this survey is the wide variation across Canada in the availability of products and services related to protecting the environment, which in turn profoundly affected some of the results. A survey design should at least allow for such variability by including appropriate screening questions. The most significant concern regarding the survey results is the so-called "green bias". A more complete survey design would allow for extensive probing of responses to questions for a significant sub-sample of the survey population, at the cost of expense, complexity and response burden.

- *Waste Management Industry Survey.* By far the greatest effort in preparing this survey involved building the sample frame. This should not be surprising, given that no specific surveys had been sent to this industry previously. Consultation with potential respondents revealed a fact not previously suspected: that waste imports and exports were sizable in Canada, and that there was widespread interest both within and outside the sector in knowing quantitative figures on this trade. The most problematic element of the survey to define was *recycling* - the distinction between collection, sorting and management of recyclables and their re-manufacture had to be made clear.

- *Local Government Waste Management Practices.* The development of this survey highlighted the value of thorough consultations with potential respondents. The wide variety of management practices was therefore recognized early on in the design phase of the survey. In terms of building the frame, the consultations flagged a similar complexity in the variety of administrative units responsible for waste management at the local level.

- *Pollution Abatement and Control Survey.* If a comprehensive measure of the costs of environmental protection is to be developed, a prerequisite will be a classification of the categories of environmental expenditures. Respondents indicated that pollution abatement is often only a portion of the total cost they face for environmental protection; examples included monitoring, compliance audits, and site reclamation. While we decided that for a first attempt a well-focused survey of pollution abatement costs was most valuable, the broader question needs to be addressed in future surveys. Many respondents also noted that they expect process change rather than retrofit of pollution abatement equipment to be the dominant means of reducing emissions in the future, which will emphasize the importance of asking for abatement achieved as a result of process change. Some respondents have told us that, while they could provide data for the survey, it would require substantial changes in their company accounting; they are willing to do this if the survey is to be ongoing but not if it is one-time-only.

An obvious question that arises, having described these four surveys, is what other environmental surveys are required? Thinking is farthest advanced on a survey of district health offices - in Canada these are the institutions that deal with health-related environmental problems at the local level. A survey could ask for valuable information on instances of drinking water quality problems, beach closings from deteriorating water quality, and soil contamination.

The results of these surveys will have many uses: to inform the general public and decision-makers on important environmental issues; to provide data to feed into a Satellite Account to the System of National Accounts; to monitor progress toward environmental goals; and to provide information for the policy formulation process.

ENVIRONMENTAL DISCUSSION PAPERS

The National Accounts and Environment Division has a series of environmental discussion papers, which are available to national accounts users without charge. A list of these papers currently available is presented below. For copies of any of these papers, contact the NAED client services representative, Mitzi Ross, at 613-951-3819 or write to her at Statistics Canada, 22nd Floor, R.H. Coats Building, Tunney's Pasture, Ottawa, Ontario, K1A 0T6.

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1. Hamilton, Kirk (July 1989): ***Natural Resources and National Wealth.***

2. Hamilton, Kirk and Douglas Trant (December 1989): ***Statistical Aspects of the Application of Geographic Information Systems in Canadian Environment Statistics***; Journal of Official Statistics 1989, vol. 5, no. 4, pp. 337-348.

3. Smith, Robert (September 1990): ***An Annotated Bibliography of the Resource and Environmental Accounting and Valuation Literature.***

4. Gervais, Yvan (October 1990): ***Some Issues in the Development of Natural Resources Satellite Accounts: Valuation of Non-renewable Resources.***

5. Mitchell, Bruce and Kirk Hamilton (December 1990): ***Environmental Statistics at Statistics Canada***, also available in translated version: ***La statistique environnementale à Statistique Canada.***

6. Mitchell, Bruce and Kirk Hamilton (May 1991): ***Canadian Experience in the Development of Environmental Surveys.***

7. Hamilton, Kirk (August 1991): ***Proposed Treatments of the Environment and Natural Resources in the National Accounts: A Critical Assessment.***

8. Hamilton, Kirk (September 1991): ***Organizing Principles for Environment Statistics.***

9. Smith, Robert (September 1991): ***The Linkage of Greenhouse Gas Emissions to Economic Activity Using an Augmented Input/Output Model.***

10. Trant, Douglas (February 1992): ***The Changing Rural Environment: A Look at Eastern Ontario's Jock River Basin.***

11. Born, Alice (May 1992): ***Development of Natural Resource Accounts: Physical and Monetary Accounts for Crude Oil and Natural Gas Reserves in Alberta, Canada.***

12. Trant, Douglas (May 1992): ***Land Use Change Around Riding Mountain National Park.***

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1. "Laspeyres, Paasche and Chain Price Indexes in the Income and Expenditure Accounts", reprinted from ***National Income and Expenditure Accounts***, fourth quarter 1988.

2. "Technical Paper on the Treatment of Grain Production in the Quarterly Income and Expenditure Accounts", reprinted from ***National Income and Expenditure Accounts***, first quarter 1989.

3. "Data Revisions for the Period 1985-1988 in the National Income and Expenditure Accounts", reprinted from ***National Income and Expenditure Accounts***, first quarter 1989.

4. "Incorporation in the Income and Expenditure Accounts of a Breakdown of Investment in Machinery and Equipment", reprinted from ***National Income and Expenditure Accounts***, third quarter 1989.

5. "New Provincial Estimates of Final Domestic Demand at Constant Prices", reprinted from ***National Income and Expenditure Accounts***, fourth quarter 1989.

6. "Real Gross Domestic Product: Sensitivity to the Choice of Base Year", reprinted from ***Canadian Economic Observer***, May 1990

7. "Data Revisions for the Period 1986-1989 in the National Income and Expenditure Accounts", reprinted from ***National Income and Expenditure Accounts***, first quarter 1990.

8. "Volume Indexes in the Income and Expenditure Accounts", reprinted from ***National Income and Expenditure Accounts***, first quarter 1990.

9. "A New Indicator of Trends in Wage Inflation", reprinted from ***Canadian Economic Observer***, September 1989.

10. "Recent Trends in Wages", reprinted from ***Perspectives on Labour and Income***, winter 1990.

11. "The Canadian System of National Accounts Vis-à-Vis The U.N. System of National Accounts", reprinted from ***National Income and Expenditure Accounts***, third quarter 1990.

12. "The Allocation of Indirect Taxes and Subsidies to Components of Final Expenditure", reprinted from ***National Income and Expenditure Accounts***, third quarter 1990.

Série technique

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1. "Les indices de prix Laspeyres, Paasche et en chaîne dans les comptes des revenus et dépenses", tiré à part de ***Comptes nationaux des revenus et dépenses***, quatrième trimestre 1988.

2. "Document technique sur le traitement de la production de céréales dans les comptes trimestriels des revenus et dépenses", tiré à part de ***Comptes nationaux des revenus et dépenses***, premier trimestre 1989.

3. "Révision des données de la période 1985-1988 dans les comptes nationaux des revenus et dépenses", tiré à part de ***Comptes nationaux des revenus et dépenses***, premier trimestre 1989.

4. "Incorporation dans les comptes des revenus et dépenses d'une décomposition de l'investissement en machines et matériel", tiré à part de ***Comptes nationaux des revenus et dépenses***, troisième trimestre 1989.

5. "Les nouvelles estimations provinciales de la demande intérieure finale en prix constants", tiré à part de ***Comptes nationaux des revenus et dépenses***, quatrième trimestre 1989.

6. "Produit intérieur brut en termes réels: sensibilité au choix de l'année de base", tiré à part de ***l'Observateur économique canadien***, mai 1990.

7. "Révisions des données de la période 1986-1989 dans les comptes nationaux des revenus et dépenses", tiré à part de ***Comptes nationaux des revenus et dépenses***, premier trimestre 1990.

8. "Les indices de volume dans les comptes des revenus et dépenses", tiré à part de ***Comptes des revenus et dépenses***, premier trimestre 1990.

9. "Un nouvel indicateur des tendances de l'inflation par les salaires", tiré à part de ***l'Observateur économique canadien***, septembre 1989.

10. "Tendances récentes des salaires", tiré à part de ***l'Emploi et le revenu en perspective***, hiver 1990.

11. "Le système de comptabilité nationale du Canada et le système de comptabilité nationale des Nations Unies", tiré à part de ***Comptes nationaux des revenus et dépenses***, troisième trimestre 1990.

12. "La répartition des impôts indirects et des subventions aux composantes de la dépense finale", tiré à part de ***Comptes nationaux des revenus et dépenses***, troisième trimestre

Technical Series - concluded

13. "The Treatment of the GST in the Income and Expenditure Accounts", reprinted from ***National Income and Expenditure Accounts***, first quarter 1991.

14. "The Introduction of Chain Volume Indexes in the Income and Expenditure Accounts", reprinted from ***National Income and Expenditure Accounts***, first quarter 1991.

15. "Data Revisions for the Period 1987-1990 in the National Income and Expenditure Accounts", reprinted from ***National Income and Expenditure Accounts***, second quarter 1991.

16. "Volume Estimates of International Trade in Business Services", reprinted from ***National Income and Expenditure Accounts***, third quarter 1991.

17. "The Challenge of Measurement in the National Accounts", reprinted from ***National Income and Expenditure Accounts***, fourth quarter 1991.

18. "A Study of the Flow of Consumption Services from the Stock of Consumer Goods", reprinted from ***National Income and Expenditure Accounts***, fourth quarter 1991.

19. "The Value of Household Work in Canada, 1986", reprinted from ***National Income and Expenditure Accounts***, first quarter 1992.

20. "Data Revisions for the Period 1988-1991 in the National Income and Expenditure Accounts", reprinted from ***National Income and Expenditure Accounts***, Annual Estimates, 1980-1991.

21. "Cross-border Shopping - Trends and Measurement Issues", reprinted from ***National Income and Expenditure Accounts***, third quarter 1992.

22. "Reading Government Statistics: A User's Guide", reprinted from ***Policy Options***, Vol. 14, No. 3, April 1993.

23. "The Timeliness of Quarterly Income and Expenditure Accounts: An International Comparison", reprinted from ***National Income and Expenditure Accounts***, first quarter 1993.

24. "National Income and Expenditure Accounts: Revised Estimates for the period from 1989 to 1992", reprinted from ***National Income and Expenditure Accounts***, Annual Estimates, 1981-1992.

25. "International Price and Quantity Comparisons: Purchasing Power Parities and Real Expenditures, Canada and the United States", reprinted from ***National Income and Expenditure Accounts***, Annual Estimates, 1981-1992.

26. "The Distribution of GDP at Factor Cost by Sector", reprinted from ***National Income and Expenditure Accounts***, third quarter 1993.

Série technique - fin

13. "Le traitement de la TPS dans les comptes des revenus et dépenses", tiré à part de ***Comptes nationaux des revenus et dépenses***, premier trimestre 1991.

14. "L'introduction des indices de volume en chaîne dans les comptes des revenus et dépenses", tiré à part de ***Comptes nationaux des revenus et dépenses***, premier trimestre 1991.

15. "Révisions des données de la période 1987-1990 dans les comptes nationaux des revenus et dépenses", tiré à part de ***Comptes nationaux des revenus et dépenses***, deuxième trimestre 1991.

16. "Estimations en volume du commerce international des services commerciaux", tiré à part de ***Comptes nationaux des revenus et dépenses***, troisième trimestre 1991.

17. "Le défi de la mesure dans les comptes nationaux", tiré à part de ***Comptes nationaux des revenus et dépenses***, quatrième trimestre 1991.

18. "Étude sur le flux des services de consommation générés par le stock de biens de consommation", tiré à part de ***Comptes nationaux des revenus et dépenses***, quatrième trimestre 1991.

19. "La valeur du travail ménager au Canada, 1986", tiré à part de ***Comptes nationaux des revenus et dépenses***, premier trimestre 1992.

20. "Révisions des données de la période 1988-1991 dans les comptes nationaux des revenus et dépenses", tiré à part de ***Comptes nationaux des revenus et dépenses***, estimations annuelles, 1980-1991.

21. "Achats outre-frontière - Tendances et mesure", tiré à part de ***Comptes nationaux des revenus et dépenses***, troisième trimestre 1992.

22. "Comment "lire" les statistiques produites par le gouvernement: un guide pratique", tiré à part de ***Options Politiques***, Vol. 14, N° 3, Avril 1993.

23. "L'Actualité des comptes des revenus et dépenses trimestriels: une comparaison à l'échelle internationale", tiré à part de ***Comptes nationaux des revenus et dépenses***, premier trimestre 1993.

24. "Comptes nationaux des revenus et dépenses: Estimations révisées pour la période de 1989 à 1992", tiré à part de ***Comptes nationaux des revenus et dépenses***, estimations annuelles, 1981-1992.

25. "Comparaisons internationales des quantités et des prix: parités de pouvoir d'achat et dépenses réelles, Canada et États-Unis", tiré à part de ***Comptes nationaux des revenus et dépenses***, estimations annuelles, 1981-1992.

26. "La ventilation par secteur du PIB au coût des facteurs", tiré à part de ***Comptes nationaux des revenus et dépenses***, troisième trimestre 1993.