Assessing Environmental Effects of the North American Free Trade Agreement (NAFTA)

An Analytic Framework (Phase II) and Issue Studies

Environment and Trade Series

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Message from the Interim Executive Director

The North American Commission for Environmental Cooperation is committed to building a better understanding of the relationship between environment and trade, with the aim of promoting sustainable development. To further these efforts, a trilateral team of independent representatives from the three countries, with guidance from a senior-level advisory group, has developed an analytic framework for considering, on an ongoing basis, the environmental effects of the North American Free Trade Agreement (NAFTA). The Secretariat has been instructed by the Council to release the framework and the three attached studies that test it on specific sectors of the North American market. The Council views the framework as an element of its mandate under Article 10(6)(d) of the North American Agreement on Environmental Cooperation.

None of the three governments have taken a position regarding the contents of the framework or its attached studies. The framework is intended to contribute to an increased understanding of the possible environmental effects of trade and related economic and institutional developments in North America. It is very important to note that any effort to determine the linkages between a trade agreement's provisions and environmental effects is an extremely difficult challenge. A careful reading of these studies will show that this challenge is even more acute in the present context, given the long history of economic integration among the countries in North America as well as the relatively recent implementation of NAFTA. The Council wishes to express its sincere appreciation to the project team and advisory group for their work, and looks forward to reviewing further the product of their labors.

The next phase in this process will be to conduct an extensive peer review of the framework, which is expected to be completed by November of this year. The reviewers will include academics, trade economists, policy analysts, and experts in other relevant fields from the three countries. Based on this assessment, a final report will be prepared for the Council summarizing the review, after which the Council will consider options for additional work in this area.

Janine Ferretti
Interim Executive Director

Preface

The North American Agreement on Environmental Cooperation (Article 10(6)(d)) directs the Commission for Environmental Cooperation (CEC) to consider on an ongoing basis the environmental effects of NAFTA. This Framework for Analysis (Phase II) is a culmination of the collective work of the NAFTA Effects Project Team assembled to assist the CEC in designing a framework to fulfil this mandate. The members of the Project Team have been carefully selected to represent a trinational, interdisciplinary team of experts.

The NAFTA Effects project has been underway since the summer of 1995, when the CEC initiated its work to design a framework to assess the effects of NAFTA on the North American environment. Before embarking on Phase I, the CEC surveyed other attempts made at assessing the effects of economic activity and trade on the environment, identified other organizations working on these issues, and examined the claims that had been made prior to NAFTA about what the public and interested parties believed its major effects (both positive and negative) might be.[1]

During Phase I, the Project Team focused heavily on understanding the trade and investment regime imposed by NAFTA in order to identify areas where changing economic relationships might be occurring and to develop the preliminary analytical approach. The framework is designed to develop an understanding of the connections between trade and the environment, to assist in anticipating important environmental impacts in the context of trade liberalization, and to develop policy tools to better mitigate negative impacts and maximize positive ones.

The current framework is the culmination of Phase II of the NAFTA Effects project. It builds on the basic approach developed in Phase I, as refined through extensive review and consultation.[2] General guidance in the design and delivery of Phase II of the Project was taken from the conclusions of the workshop held in April 1996 in La Jolla (see Appendix A). Some additional guidance was provided in the results of the consultations on trade and environment by the Joint Public Advisory Committee (JPAC) in the spring and summer of 1996. Phase II also takes into account the work done on trade-environment linkages by international organizations such as the OECD and by research and other communities in the NAFTA region and beyond.

The framework has been developed in Phase II using the analysis of four component studies:

- an examination of the operation of NAFTA's environmentally-related institutions;
- issue study on maize in Mexico;
- an issue study on cattle feedlots in Canada and the United States; and
- an issue study on electricity in Canada, Mexico, and the United States.

[1] CEC 1996c; CEC 1996d.

[2] CEC 1996a.

The first study, entitled *NAFTA's Institutions: The Environmental Potential and Performance of the NAFTA Free Trade Commission and Related Bodies*,[3] was designed to address a wide range of economic, social and government policy changes through an analysis of the work of the institutions created by NAFTA.

The subsequent three issue studies were designed to test and refine the framework, with a particular emphasis in Phase II on understanding and developing the linkages between economic activity and the environment. The rationale for the selection of the general sectors of agriculture and energy and for the specific issues examined is attached as Appendix B. In addition, in an attempt to maintain balance and test the scope of the framework, studies were chosen that considered domestic, bilateral and trilateral relationships and linkages between NAFTA and the environment. These subjects are attached to this framework as Issue Studies 1-3.

During Phase II, the CEC hosted two workshops to consider the issue studies and the general framework. The workshops were an attempt to present the research and analysis underway to an audience of experts in the specific sectors for their review and comment.[4] The workshops provoked a great deal of discussion and resulted in integrated conclusions that capture recurring themes and key points raised for incorporation into the studies.[5] The issue studies played a vital role in testing and refining this framework for analysis (Phase II) for the NAFTA Effects Project. It is hoped that it will be useful for ongoing application to particular issues and sectors of concern in the NAFTA community.

Sarah Richardson
Program Manager, NAFTA/Environment
Commission for Environmental Cooperation
February 1998

[3] CEC 1997b.

[4] CEC 1997c; CEC 1997d. A list of participants in both workshops is attached as Appendix 3.

[5] See Appendix 4 for general conclusions from the workshops.

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The Project Team and the CEC would also like to acknowledge the important contributions to various components of Phase II of the NAFTA Effects Project by Sanford Gaines of the University of Houston, Armand de Mestral of the Faculty of Law at McGill University, Rafael Ortega Paczka of the *Universidad Autónoma de Chapingo*, Antonio Turrent from the *Colegio de Posgraduados* and INIFAP, Rocío Alatorre from the *Instituto de Salud, Ambiente y Trabajo* (ISAT), Carlos Salas Páez from the Science and Technology Program at *El Colegio de México*, and Víctor Suárez of the *Asociación Nacional de Empresas Comercializadoras de Productos del Campo* (ANEC).

There are also a number of individuals from the three NAFTA governments, environmental groups, business organizations and other institutions who made themselves available to members of the Project Team for specialized interviews and informal as well as formal consultations. Their cooperation and advice is greatly appreciated. The CEC would also like to thank the individuals who took the time to participate in the expert workshops held in Montreal to discuss the issue studies and the framework. Feedback received from these consultations has been critical in the final development of this phase of the Project.

Finally, the CEC gratefully acknowledges the work of the NAFTA Effects Advisory Group whose members volunteer their time to assist the Project Team and enrich the work.

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An Analytic Framework (Phase II)

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Acronyms

APEC	Asia Pacific Economic Cooperation
BECC	Border Environment Cooperation Commission
BOD	biological oxygen demand
CEC	Commission for Environmental Cooperation
CFE	*Comisión Federal de Electricidad*
CFC	chlorofluorocarbons
CRP	Conservation Reserve Program
ENGO	environmental nongovernmental organization
EPA	US Environmental Protection Agency
EQIP	Environmental Quality Incentive Programs
FTA	Canada-United States Free Trade Agreement
FTC	Free Trade Commission
FDI	foreign direct investment
GAC	Government Advisory Committee (Canada)
GATT	General Agreement on Tariffs and Trade
GNP	gross national product
JPAC	Joint Public Advisory Committee
NAAQS	National Ambient Air Quality Standards
NAALC	North American Agreement on Labor Cooperation
NAAEC	North American Agreement on Environmental Cooperation
NADBank	North American Development Bank
NAFTA	North American Free Trade Agreement
OECD	Organization for Economic Cooperation and Development
PAHs	polycyclic aromatic hydrocarbons
PM_{10}	particulate matter (fractions with diameters measuring 10 micrometers or less)
TNCs	transnational corporations
TSP	total suspended particulates
TSS	total suspended solids
VOCs	volatile organic compounds
WTO	World Trade Organization

Executive Summary

This framework is being developed by the Commission for Environmental Cooperation (CEC) to analyze major environmental changes under NAFTA taking place within North America. It identifies and traces four major processes through which activity generated by NAFTA's rules and institutions and associated trade and investment can affect the natural environment. It also highlights areas where further analytical development, monitoring of key indicators, and policy, technical and institutional changes may be appropriate.

The major elements of the framework are as follows:

I. Introduction

This section describes the issue or sector that is the subject of investigation and the central relationships that connect NAFTA and economic change with environmental change.

II. The Issue in Context: Environmental, Economic, Social and Geographic Conditions

A. The Environmental Context

This section highlights the general environmental relevance and characteristics of the issue or sector being explored. It is designed to encourage the balanced consideration of a full range of environmental issues and changes that might be associated with a given issue.

B. The Economic Context

This section provides an inventory of the major economic factors that affect environmental and other changes in the North American economy, emphasizing that NAFTA is one of a larger set of economic forces at work.

C. The Social Context

This section considers the social context and social institutions relevant to the specific issue.

D. The Geographic Context

This section considers the influence of geographic features in North America, such as climatic factors, population density and physical characteristics that can affect economic activity and the environment.

III. The NAFTA Connection

A. NAFTA Rule Changes

NAFTA has directly changed the rules of trade and investment access for many specific products and services, while creating disciplines affecting a broad sphere of economic and commercial activities.

B. NAFTA's Institutions

NAFTA established two dozen trilateral, intergovernmental institutions and several dispute settlement mechanisms, and contributed to the creation of many more. NAFTA is thus not merely a static set of specific rules but a dynamic regime growing to address the new economic and ecological challenges and opportunities that arise.

C. Trade Flows

The level and composition of trade within North America is considered at an overall and sectoral level, including exports, market share and trade flows, in relevant technologies.

D. Transborder Investment Flows

Foreign direct investment (FDI) among the three countries is analyzed together with domestic investment by firms.

E. Other Economic Conditioning Factors

Other macroeconomic forces are highlighted in order to place the issue and its relationship to NAFTA in its proper economic context. These forces include, but are not limited to, aggregate demand, income and population growth, interest rates and exchange rates.

IV. Linkages to the Environment

The framework identifies four major areas where NAFTA-related changes in trade and investment connect to the environment: production, management and technology; physical infrastructure for transportation and related services; social organization; and government policy.

A. Production, Management and Technology

The first linkages in this area includes the inputs, processing and products of goods and services. Of particular importance are the size and geographic concentration of firms, the natural resources and other inputs they use, the technology they employ, the environmental equipment, infrastructure, and management systems they contain, and the pollution their processes and products emit. NAFTA may also affect the environment through corporate strategy and social practice. Firms oriented toward the full NAFTA market may voluntarily adopt the highest environmental standards prevailing in the region and apply them to all their operations.

B. Physical Infrastructure

This includes the transportation grid of highways, railways, and ports and public water and sewage treatment facilities. Of particular importance to improving environmental quality is the capacity of the existing corridors and border crossing facilities to handle increased traffic and of new facilities to avoid ecologically sensitive areas and relieve the stress on existing area of concentration. Shifts to more environmentally friendly forms of transportation are also relevant.

C. Social Organization

Environmental enhancement depends further upon a well-developed network of social organizations that deal with ecological concerns. These include well organized, capable and active communities; consumer, labor and environmental groups; and cooperatives and other groups that can directly demand and secure healthier practices and policies, deliver programs or engage in practices that improve the environment directly, and build multistakeholder coalitions that further environmental goals. They also include business organizations and firms engaged in pollution prevention and voluntary environmental standardization. The NAFTA institutions may serve as the center of a deepening North American community in which a sense of stewardship for the common environment, and the cooperation and capacity to enhance it, grows.

D. Government Policy

Government policy, at the national and subfederal level, plays a role in developing programs that reinforce or offset the impact of NAFTA liberalization, that create and effectively enforce environmental regulations, and that, through taxes, credit, subsidies, user-charges, set-aside and conservation programs, provide important environmental supports. The NAFTA institutions in particular may serve as a vehicle through which member governments promote high-level regulatory convergence in the three countries.

V. Environmental Impacts and Indicators

The environmental pressures and supports flowing from such processes combine with existing environmental conditions to move toward or away from sustainability in particular locations and in specific dimensions of the natural environment. Of ultimate concern is their impact on the state of the four major media of the ambient environment: air, water, land and living things (biota).

A. Air

A concern for air embraces local and regional atmospheric pollution and air quality, along with broader changes such as ozone depletion and climate change.

B. Water

This section considers water quality and quantity in inland, coastal and underground areas for purposes ranging from irrigation to ecosystem maintenance to human consumption.

C. Land

Land encompasses soil quality and patterns of land use, including forest cover and natural protected areas.

D. Biota

Biota refers to aspects of animal, plant and human populations, population fluxes, and health, and broader biological diversity.

Across all four media, environmental change is measured by selected indicators, which include both standard scientific measures and specific items of particular importance in the unfolding patterns of North American environmental change.

I. Introduction

This document represents Phase II in the development of an analytic framework to assess the environmental effects of the North American Free Trade Agreement (NAFTA).

The framework is designed to identify positive and negative environmental effects in North America that are associated with NAFTA. To do so, it examines the NAFTA regime and associated trade and investment flows and traces four major areas in which activity generated or affected by NAFTA's rules and institutions can impact the environment. It is designed to specify critical variables, identify logical linkages, report on existing information and suggest where further development, monitoring and data are needed. It does not provide a conclusive assessment of all of NAFTA's actual environmental effects. The lack of comprehensive baseline data on the relevant linkages and the short time NAFTA has been in effect mean that such a definitive assessment is not yet possible. The framework is designed to be applied to specific issues or sectors that may have strong relationships to NAFTA and that are important to the environmental concerns of its members.

The framework supplements existing computable general or partial equilibrium or related formal models for assessing NAFTA's impact. Such models require consensus on relevant and priority variables and relationships, as well as the availability of precise data, compiled over time and spanning national boundaries, that does not yet exist to an adequate degree within the NAFTA region. Formal, mathematically based models also exclude critical aspects of the NAFTA regime, emerging and future dimensions of economic and environmental activity, and the often anecdotal or qualitative evidence that at present constitutes the only data on some important processes. Moreover, the policy responsibilities and constituents of the Commission for Environmental Cooperation (CEC) suggest the development of a framework based on the concrete activity of relevant North American actors.

Where appropriate, this framework has incorporated the methodology developed by the Organization for Economic Cooperation and Development (OECD), including its key components: scale, structural, technology, product, and regulatory effects.[1] The OECD work does not have as its central purpose and starting point the assessment of specific trade and investment liberalization agreements such as NAFTA. Nor does it focus on the distinctive economic and environmental characteristics of the NAFTA region, accompanied by the unique responsibilities of the CEC.

This framework builds on and contributes to existing studies within the governments and research communities in North America. Several recently published studies provide guidance on addressing components of NAFTA's effects, notably its effects on trade.[2] Now, however, four years after NAFTA took effect, there is still no comprehensive analysis of effects that NAFTA has had on the environment in North America.

[1] OECD 1997a, OECD 1997b.

[2] DFAIT 1997, USTR 1997, US ITC 1997.

This framework has been developed in Phase II through its application to three issues. Each issue has a direct impact on the environment and crosscutting relevance for the North American economy: maize in Mexico, cattle feedlots in the United States and Canada, and electricity throughout North America. Taken together, the issue studies also allow for the testing and development of the framework with respect to concerns that are domestic, bilateral or trilateral.

The framework begins with an introduction that includes a definition of the issue or sector under consideration. An issue is an activity that relates to units (firms, government corporations, cooperatives, farms, households) producing the same product or service in an integrated market. In order to capture the life-cycle dynamics and ecological footprint of an issue or sector, analysis extends to the production of its major inputs and the production of the good or service for which it serves as a major component. For example, a study of cattle feedlotting includes the feedgrains that cattle on feedlots consume, and the beef packing and processing industries to which those cattle are sold. A study of maize production in Mexico extends to the seed varieties, fertilizers and pesticides used for producing maize, and the industrial uses and household or individual consumption to which maize is put. A study of electricity includes the coal, natural gas, hydro power and other fuels used to produce electricity, and the uses for that electricity in appliances and other products.

There are several major arguments that serve as an analytical guide in applying this framework. These are not assumptions to predispose the analysis in a particular direction. They are hypotheses that can guide the analysis in disciplined fashion, and that can be supported, refuted or modified as the evidence suggests. On a general level, six hypotheses exist to suggest possible ways in which NAFTA, through economic, social and political processes, can affect the North American environment.

1. First, NAFTA-induced liberalization can reinforce existing patterns of comparative advantage and specialization, concentrating production and transportation where it takes place most efficiently. New economic activity may be concentrated in a few large firms operating in locales where environmental conditions are most favorable and regulatory oversight the strongest. For example, in the feedlot/feed grains/beef processing sector, NAFTA tariff reductions have further concentrated the industry at epicenters in Kansas and southern Alberta, and in a few large feedlots and four US beef packing and processing firms. Because of their size, multinational trade and production, profitability and visibility, such firms can be expected to develop, incorporate and diffuse state-of-the-art technology and adopt high environmental standards both on a voluntary basis and in anticipation of government inspection-enforcement action. Additional environmental pressures may thus be limited to particular locales where production is concentrated or at transborder locations and in transportation corridors along which trade takes place. Yet these sites also may be well developed, highly visible and well regulated. Conversely, patterns of production accelerated by trade liberalization may concentrate economic activity in areas unsupported by adequate physical infrastructure or institutional capacity to handle that growth.

2. Second, economy-wide liberalization associated with NAFTA can intensify competitive pressures throughout the region. In some cases this might lead firms to lower input costs, in part by reducing environmental protections or pressuring governments to lower environmental standards. Some firms might even consider moving production to jurisdictions with lower standards or shifting to less costly and environmentally friendly sources of supply. For example, in the case of electricity, firms might switch to cheaper fuel sources such as coal and generation that operates without expensive environmental protections imposed by local regulatory authorities. A regulatory or enforcement-related "race to the bottom" can, absent offsetting policy intervention, create an economy-wide incentive to more highly polluting production throughout the region.

3. Third, liberalization could lead to economic growth that promotes industrial modernization and reduces environmental stress. Competitive market pressures generated by liberalization can hasten processes of capital and technological modernization. Favoring producers with new, efficient and clean plants and equipment, accelerated capital turnover can encourage the development and adoption of new technology or lead to an intensified use of efficient and environmentally-friendly traditional methods (such as those employed in rain-fed maize production in Mexico). Government policy may enhance this process or impede it (by protecting less efficient producers). In the case of electricity, modernization comes from the greater market advantage and use of newer technologies, such as combined cycle turbines, and the potential reform of US rules exempting older coal-fired generating plants from modern environmental regulations.

4. Fourth, NAFTA liberalization in specific sectors and for specific products can lead to the greater use and substitution of imported environmentally superior products for domestic alternatives. NAFTA's rules can reduce barriers disproportionately on clean products and services and/or on the clean inputs (equipment and natural resources) used to produce them. In the case of electricity, the procurement rules covering *Comisión Federal de Electricidad* (CFE) electricity and electricity generation equipment purchases, combined with government policies and available physical infrastructure for transmission, encourage Mexico to buy more cleanly produced Canadian and US electricity, or to generate electricity in Mexico with cleaner, imported combined cycle turbines. NAFTA-mandated tariff reductions on imports of coal have led Mexico to use more imported US coal with low sulfur content as a substitute for domestic high sulfur oil. Conversely, some liberalization, as on the importation of corn into Mexico, may lead to a surge in imports that could displace domestic production, employment, traditional technologies, and the social institutions required to maintain environmental infrastructure. At an economy-wide level, over time, such substitution can lead to a shift of production and consumption to those sectors and products with lower tariffs and greater environmental stresses. On the whole, the environmental impact of liberalization may be a path-dependent process whose ultimate outcomes depend on the choices initially made and the policies subsequently pursued.

5. Fifth, NAFTA-associated liberalization can affect corporate practice and government policy by creating an upward movement of environmental standards and regulations toward a common regional norm. Such a dynamic may arise on an *ad hoc* individual or collective, voluntary, private-sector basis. Here, NAFTA liberalization and resulting competitiveness can intensify the need for Canadian and Mexican companies, in particular, to access the much larger US market and to operate production systems that are integrated region-wide. Industry leaders may build and operate to meet the highest standards in any of the three countries and create a single industry-wide and supplier-wide set of environmental standards covering their operations in all three jurisdictions. The US Council for International Business, its Canadian counterpart, and a Mexican business association have, for example, developed a memorandum of understanding to promote the dissemination of best environmental management practices.[3] In the field of electricity, minimum US 1987 efficiency standards for refrigerators and freezers, room and central air conditioners, electric and water heating and residential furnaces could have an environmentally-enhancing effect if adopted throughout the region. This approach has long been in effect in the automotive industry. Similar moves may also be evident in the 1996 trilateral industry association agreement to export North American cattle to third-party markets, a 1996 US-Mexican cattle information-sharing agreement, and a recent Canadian-northwestern US project on animal disease.

[3] CEC 1996a.

6. Finally, upward regulatory convergence may be led by the state, through individual adjustment, on an intergovernmentally negotiated basis or through NAFTA's trilateral institutions. Such processes allow the three NAFTA governments to engage in communication, capacity building, regional regulatory convergence, and cooperation as a region in wider international forums.[4] By involving other stakeholders, they may over time create transnational coalitions and a sense of regional community that supports the creation of regional and multilateral standards and practices appropriate to the particular environmental requirements of North America. As part of this process, the NAFTA regime's dispute settlement and surveillance mechanisms may encourage and assist governments to engage in stronger environmental performance.[5] Most broadly, the NAFTA institutions, including the CEC, with their many provisions and incentives for the participation of stakeholders could engender a regional awareness and sense of responsibility that reduces the possibility that poor environmental performance would go unrecognized and untreated.

This framework is constructed in a linear fashion that begins with a contextualization of the issue under consideration. It considers NAFTA's rules and institutions and their trade and transborder investment effects and then addresses "linkages to the environment"—formed by processes of production, physical infrastructure, social organization and government policy—that might be affected by the NAFTA-induced change and affect how such change impacts the ambient environment. Finally, the framework examines the resulting environmental pressures, supports and changes to air, water, land and living things.

[4] CEC 1997b.

[5] NAFTA Chapters 11, 19, 20 and NAAEC Articles 14, 15 and 24.

II. The Issue in Context:
Environmental, Economic, Social and Geographic Context

Only part of the environmental change of concern to North Americans may be associated with NAFTA. It is thus necessary, before considering the particular relevance of NAFTA to such changes, to consider the many environmental, economic, social and geographic factors that characterize and affect the dynamics of a particular issue or sector. This contextual analysis will provide a baseline from which NAFTA-associated change can be identified. It indicates forces that might have an independent impact on a sector.

A. The Environmental Context

In analyzing a specific issue or sector, it is first necessary to consider the full range of environmental impacts of activity in that sector. Such consideration confirms the environmental relevance of the issue. It also helps clarify the difference between the environmental effects of the activity itself and any deriving from NAFTA. The environmental impact of an issue will often be determined by a broad range of forces, many unaffected by NAFTA. This framework uses a pressure-state-response model, which describes pressures exerted on the environment, the latter's responses to them, supports, and analyzes the state of the ambient environment.

Environmental pressures include the wastes, byproducts and emissions of economic activities as products and services are produced and consumed and as natural resources (particularly nonrenewable ones) are used in production. Environmental supports include the provision of environmental goods and services, such as the creation of natural protected areas or restoration of wilderness areas, and waste management practices, or indirect processes such as the reduction of stress on marginal lands, or activities resulting from lower subsidies for heavily polluting fuels. The state of the ambient environment includes the condition of the major media: air, water, land and biota.

Issues of air quality include outdoor urban and rural air quality and the ambient concentration of common pollutants and toxic pollutants (both inorganic and organic), acid rain formed by emissions of sulfur dioxide and nitrogen oxide, and global climate change and ozone depletion caused by emissions of carbon dioxide and other compounds. They also include the long-range transport of air pollutants, and the atmospheric transmission of pesticides.

Issues of water quality and quantity include basic dimensions of surface and ground water quality, such as the levels of biological oxygen demand (BOD), total suspended solids (TSS), nitrates, phosphorous, ammonium, fecal coliform, organic toxics (such as PCB's and dioxins) and heavy metals. Also of concern is the effect of displaced sediment, manure, and pesticides on water quality. Water quantity includes withdrawal and replenishment and treatment of surface and groundwater, and the efficiency of its use for activities such as irrigation and electricity generation.

Impacts on land include overall patterns of land use (as among urban, residential, commercial and industrial uses), agriculture, forests, natural protected areas, and wilderness). It includes issues of soil quality such as organic matter, soil structure, salinization, desertification, erosion and contamination.

Impacts on biota (living things) includes species depletion, the number of threatened or endangered species, introduction of exotic species, loss and fragmentation of habitat, rural to urban conversion of land, and the health of forests and grasslands. Impacts on biota also include issues of human health.

Environmental change in these media can have an autonomous effect on economic activity, whether NAFTA-related or not. Factors such as weather patterns, including temperature and rainfall, affect production, distribution and trade. The dynamic complexity of ecological systems as natural phenomenon mean that they respond only partially to human-created change, and to the economic, social and political forces that a trade agreement creates. Yet they can exert a powerful independent effect on such economic processes as the levels of crop production, or the generation of electricity.

B. The Economic Context

The economic character of any issue will often be largely or even wholly determined by a range of forces unaffected by NAFTA. This is particularly the case for large economies such as the United States. The impact of NAFTA takes place in a context where economic issues are heavily determined by international and domestic economic forces. Thus some impacts on an issue or a sector may be based on long-established patterns of economic activity, notably overall economic growth, changes in technology, fiscal and monetary policy, other trade and exchange rate factors, and domestic policy unrelated to trade. There are several ways to categorize and analyze such factors. This framework deals with domestic macroeconomic factors, international macroeconomic factors, and domestic microeconomic factors.

Domestic macroeconomic forces are the key economic trends that impact an issue or a sector. These include growth and production, demand and consumption, population and income, and prices of a product or service, as these change over time and in relation to goods and services in the economy. Also relevant are inflation, interest rates, and credit as affected by government policy and savings rates, and fiscal policy, including deficits and debt.

International macroeconomic factors may also be relevant. These include exchange rates that determine the relative prices of domestic and international goods, and the current account balances that can lead to macroeconomic adjustment.

Domestic microeconomic factors may also be relevant. These include systems for banking and credit, the size and concentration of firms in an industry and sector, and labor market dynamics.

In exploring the operation of these processes, it is important to recall the differences in the overall size and structure of the US, Canadian and Mexican economies. In overall economic size, the US$8 trillion GNP of the United States

is about ten times larger than that of Canada and 20 times larger than that of Mexico. The three countries thus rank, respectively, as the world's first, eighth and fifteenth largest economies. Another difference is in average income levels, where the average per capita incomes in the United States and Canada substantially exceed those in Mexico.

There are further important differences in the structure of the economies. Canada is a highly open economy, where exports of goods and services account for almost 38 percent of GDP—three times the level in the United States. Canada is also heavily reliant on inward foreign direct investment, having a larger share of its business sector owned by foreigners than any other major advanced country.

C. The Social Context

The dynamics associated with a specific issue can be influenced by the social context in which it exists and the social institutions that support it. The individuals that produce and consume do so not only in response to rational market and price incentives, but also as social beings equipped with a wide variety of preferences, embedded in family and community networks replete with cultural values.

One important social factor is the quantity, quality and mobility of the labor force, and its responsiveness to incentives other than purely market ones. Of potential relevance is the organization of the workforce into labor unions, and the role that they, and others, play in pressing for high health, safety and environmental standards, among other social improvements.

A related factor is migration, as workers and their families move, temporarily or permanently, within a country, or to other countries within the region, in search of employment opportunities. Migration, domestically and internationally, can be both a cause and result of environmental change.

A further factor is the presence and strength of cooperatives, community groups and civil organizations, notably environmental, consumer and other nongovernmental organizations. Their impact depends also on their resources and the property and other rights they possess. Of particular relevance are the associations and networks through which industry engages in environmental standardization on a sector- or economy-wide basis. These associations may involve a broad range of stakeholders.

A final factor is culture, a dimension of relevance to sectors that are, for historical and other reasons, highly valued by a population as an integral part of national life. For example, some Canadians may retain an attachment to publicly produced and distributed electric power, and Mexicans to domestic maize production and consumption for historical reasons not reducible to current economic calculations.

These social and cultural differences are expressed within political systems that also exhibit diversity. Politically, while all three countries have federal and democratic systems, the centralized and state-dominated Mexican polity contrasts with stronger subfederal units in Canada and the United States. This is particularly notable in policy areas related to the environment, where an estimated 70 percent of constitutional responsibility rests with the provinces in Canada. It is also apparent in national regulatory and standards-setting systems. Mexico's reliance on central government regulation, for instance, contrasts with Canada, where provinces and five major multistakeholder standards-setting bodies have an important role, and with the United States, where states and many hundreds of private standard-setting associations play a major part.

D. The Geographic Context

The dynamics associated with a particular issue can also be heavily influenced by the variety of geographic features throughout North America, and within each of the three NAFTA countries. The region features extraordinary diversity in geology, climate and hydrology.

Territorially, both Canada and the United States are large transcontinental countries bordering on three oceans, with a varied climate that includes Arctic regions. Mexico includes important tropical areas. Environmentally-relevant geographic conditions vary within each country and can influence the nature, location and extent of economic activity. Demographically, the 275 million consumers in the United States provide a much larger market than the 85 million in Mexico and the 30 million in Canada. Mexico's population is also, on average, younger than that of the United States or Canada.

III. The NAFTA Connection

This section of the framework details the way in which an issue may be connected to NAFTA. NAFTA is one of the world's most far reaching and innovative trade agreements. The NAFTA text deals with trade, investment, and other aspects of economic life. It contains extensive changes to the rules governing North American commerce and related activities. Theses rule often go beyond those of previous bilateral agreements such as the FTA and multilateral agreements such as the GATT/WTO. To apply, interpret and extend NAFTA, the agreement also created or catalyzed about fifty trilateral intergovernmental institutions that together represent a new network of North American governance.

Moreover, NAFTA was accompanied by side agreements for the environment and labor: the North American Agreement on Environmental Cooperation (NAAEC), and the North American Agreement on Labor Cooperation (NAALC). Each established new institutions, the Commission for Environmental Cooperation (CEC) and the Commission for Labor Cooperation (CLC) respectively.

This framework must distinguish between environmental processes that are associated with NAFTA and those that are not. In order to do this, it is essential to begin with a clear conception of what "NAFTA" is, both to avoid falsely attributing to it changes whose causes lie elsewhere and also to capture the full range of effects it may have on the North American environment.

NAFTA is not only a fixed set of rules taking effect on 1 January 1994. It is a dynamic regime that began to influence economic life in the region from the time it first emerged as a possibility in 1990, and one whose institutions are steadily expanding the content and force of the initial rules.

NAFTA may be associated with economic, social, political and environmental change in several ways. While some of NAFTA's provisions might affect the environment directly, much of NAFTA's impact will arise indirectly, as its rules and institutions alter trade and transborder investment flows, and influence and interact with production, infrastructure, social and governmental processes. NAFTA's rules and institutions have also equipped North American governments and, in some cases, citizens with instruments for improving the environment more directly.

In some cases, NAFTA may have little impact upon economic or ecological activity, given processes already underway in the private sector, in the national economies of the parties, and in other trade liberalization arenas. Here NAFTA had its effect as it codified existing or emerging practices, representing a governmental and intergovernmental response to, and reflection of, economic and corporate activity already underway.

Where NAFTA put a "seal of approval" on emerging North American trends, this very act stabilizes and reinforces them. Moreover, there are grounds for believing that the ongoing process of trade liberalization, economic integration

and community formation underway in North America was not an inevitable trend. The vigor of the NAFTA debate both before and after the passage of the agreement shows that something very important was, and is, at stake.

NAFTA had already acquired an identity and begun having an important impact on the consciousness of the North American public well before the agreements themselves were negotiated and came into force. This began in the United States and Mexico as early as 1990 and extended to Canada in a major way after it joined the negotiations in February 1991. The intergovernmental negotiations and political debates over NAFTA had a further impact through the adjustment of national policies, based in large part on domestic considerations, but also inspired by the prospect of NAFTA, and by the desire to take maximum advantage of the opportunities it offered.

It is in the spirit of environmental enhancement and the precautionary principle—both of which are integral to the principle of sustainable development that NAFTA promotes—that this broad conception of NAFTA is adopted.

A. NAFTA Rule Changes

NAFTA's rules are those specified in the agreement itself and its tariff annexes. At the heart of NAFTA are the rules explicitly dealing with a specific product or sector (including both goods and services). Of key interest are rules that change those of the FTA, the GATT or other agreements in which the three countries participate, although instances where NAFTA confirms existing rules are also relevant. The specific rules of greatest general relevance are the following:

Reductions in tariffs and other border measures on a specific product. These can include tariffs, quotas, quantitative restrictions, and rules of origin. These NAFTA-specified reductions should be assessed according to:

- the base level tariff among the three countries prior to NAFTA;
- the degree and timing of liberalization already scheduled to take place according to other trade agreements and unilateral national action;
- the particular NAFTA tariff phase-out schedule; and,
- the tariffs that NAFTA parties maintain with respect to non-NAFTA countries.

Changes in domestic rules that may affect trade flows. These can include changes in product standards and government procurement rules. For example, NAFTA's procurement rules require Mexico's *Comisión Federal de Electricidad* (CFE) to consider bids from suppliers in the United States and Canada in addition to Mexico.

Reductions in tariffs, other border measures and changes to domestic regulation that affect major inputs to relevant products and goods for which it is a major input. These include rules relating to the major inputs that compose the product and the downstream product for which it is a major input.

Reductions in tariffs, other border measures, and changes to domestic regulation to "like" or substitute products. The case of maize in Mexico demonstrates that rule changes affecting a particular product or sector must be considered relative to changes in related products and sectors (such as yellow corn in the United States or grain in Mexico). Full account must be taken of the possibility of substitutions encouraged by the differential reduction of tariffs and other trade barriers across individual items and sectors.

NAFTA also includes general rules which, while not explicitly applying to a product (such as generation equipment) or sector (such as electricity or energy), disciplines the means or processes by which products and services (and their inputs) in all sectors across the economy are produced, sold or purchased. They include NAFTA's rules which discipline behavior laterally on an economy-wide basis (e.g., government procurement, risk assessment methodologies) and temporally through anticipatory or deterrent effects. They include the following:

- *Norms for particular processes.* Such norms include as Article 1114; risk assessment, sanitary and phytosanitary standards; health and safety standards; procurement policies; and investment guarantees.
- *Preambular principles.* These include NAFTA's stated objectives, such as the promotion of sustainable development.
- *National implementing legislation.* This refers to legislation required in the three countries for NAFTA and its related agreements to take force, including agreements subsequent to the NAFTA itself like the Canadian intergovernmental agreement governing provincial participation and the operation of Canada's Government Advisory Committee (GAC) to the NAAEC.
- *Subsequent accelerated tariff reduction.* Those rules subsequently generated by the NAFTA institutions or intergovernmentally, and the cumulative overall reduction of tariffs and trade and investment barriers, including future specified liberalization that actors can anticipate and adjust to in advance, are referred to by this item. This overall liberalization and opening of markets creates new competitive pressures that differentially affect specific sectors and products, depending on the height of previous trade barriers and the underlying level of North American competitiveness

In general, the rules contained in the NAFTA agreements can be taken as a fixed baseline for the purposes of analysis. Evidence suggests that the three governments have generally complied with NAFTA to implement intended trade liberalization in accordance with the phase-out schedules specified.[6]

B. NAFTA's Institutions

NAFTA institutions refers to the 26 trilateral intergovernmental bodies created directly by NAFTA and its related agreements, and the 24 or so catalyzed by them in the four years since they came into force.[7] These institutions are designed to implement, interpret, and extend the agreements and their specific principles, norms and rules.

At the core are three ministerial-level Councils: the Council of the Free Trade Commission (FTC), the Council of the Commission for Environmental Cooperation (CEC); and the Council of the Commission for Labor Cooperation (CLC). Also integral are the committees created to serve the Free Trade Commission, and the single Secretariats for environment and labor. NAFTA's institutions also include other regular trilateral processes that have emerged, such as those at the ministerial level for Transportation, Health and Agriculture.[8]

The operation of these institutions affects the application and result of NAFTA rules, even when the latter come with very precise targets and timetables. The cases of trucking access to Mexico for US and Canadian carriers and trilaterally-mandated work on automotive emissions show how large the difference between rules on paper and results in practice can be.

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[6] Weintraub 1997, USTR 1997.

[7] Weintraub 1997, CEC 1996b, CEC 1997b.

[8] CEC 1997b.

The most relevant institutions, for an assessment of NAFTA's environmental effects at present, are as follows:

- Institutions created by NAFTA with mandatory environmental responsibility, especially if they have a target and timetable related to a particular product or sector or process, such as the Automotive Standards Council on emissions.
- Institutions created by NAFTA whose subject matter has an inherent environmental relevance, such as those dealing with agriculture.
- NAFTA's dispute settlement, avoidance and surveillance mechanisms (NAFTA Chapters 11, 19, 20, and most broadly NAAEC's Articles 14, 15, 23 and 24), with a focus on their operation in those cases with a clear environmental dimensions.

It will be useful in the future to consider a broader array of NAFTA institutions, especially those that do not merely implement the agreements according to specified rules but that interpret and extend them, or that further the process of trilateral cooperation. It is the possibility of autonomous interpretation and extension that makes NAFTA a living regime. These extensions and interpretations arise in several ways, as follows:

- They may act on the discretionary, environmentally-related mandates set forth in NAFTA or its related agreements (i.e., those where the Parties "may" rather than "shall" act on environmental issues such as off-road vehicle emissions).
- They may include within the trilateral process additional subjects and issue areas (such as accelerated tariff reductions for environmental products and services) beyond those specified in the initial agreements.
- They may have arisen through the work of those NAFTA-catalyzed bodies subsequently created as part of the NAFTA structure of institutions (such as the Technical Working Group on Pesticides).
- They may have arisen through the work of those NAFTA-catalyzed bodies subsequently created outside the NAFTA structure itself (such as the prospective energy efficiency group).
- They may be extending the geographic relevance of NAFTA's work by considering its impact on outsiders (including use as a model) and developing complementary North American positions and consultations in outside forums.
- They may arise as a sense of regional community develops through consciousness-raising or concern about the full region (through a rational calculation of anticipated benefits or a psychological sense of attachment and identity as "North Americans").

To assess the impact of these institutions, it is important to focus first on their development as trilateral institutions: their specified purposes, programs and agendas, decision-making procedures, including those for the composition, organizational structure, resources, mandate, meeting frequency, rules of procedures, workplans, and decision-rules. Their effect can be judged primarily according to how they perform the following five functions:

- fostering communication through an open exchange of information and learning;
- capacity-building by sharing resources;
- constraining the unilateral use of discretionary national regulatory and compliance behavior;
- fostering a high level of regional convergence in environmental regulations; and,
- strengthening cooperation among the three North American countries as they participate in broader multilateral forums.

Of central interest is how the performance of such functions deepens the NAFTA regime by producing additional liberalization, and broadens it to include other issues. Of ultimate interest is their impact, in behavioral process and substantive outcome, in integrating and balancing the interests of the three countries, and the trade and environment communities, and creating or privileging regional interests and sustainable development objectives. In all cases, it is important to consider the relationship of these institutions with national regulatory and government authorities, which retain significant capacity and whose intergovernmental cooperation outside NAFTA institutions has substantial effects.

Preliminary evidence suggests six major conclusions about the operation of the NAFTA institutions thus far.[9] Most of the NAFTA institutions with specific environmental responsibilities or relevance have moved into operation, with a takeoff in activity in 1996. There is considerable cooperation, openness and trust emerging on a trilateral basis. There is a notable institutional proliferation, with the original 26 institutions doubling to about 50 and the new additions being at least as environmentally-oriented as the originals. There have been concrete environmental achievements in some cases, notably the transportation of dangerous goods and pesticides. Yet performance varies. In some areas, such as automotive emissions, slow progress has been made in meeting mandatory targets and timetables. Above all, there has been limited movement to integrate and balance trade and environment values, in the interaction between the NAFTA institutions primarily responsible for each, and in the outcomes of the work of the NAFTA institutions as a whole.

In considering the long-term economic and environmental impact of NAFTA, it is vital to view these rules and institutions as making up a dynamic, expanding regime. Most basically, they will evolve as tariff reductions take effect in stages and as institutions come to full operation. Moreover, the rules and institutions will change, as those charged with applying them acquire experience, or react to numerous economic forces and outside pressures. Most broadly, the rules and institutions will change in response to NAFTA-related and external environmental effects, as particular problems or successes engender new rules and concentrate institutional activity in certain areas rather than others. Through the work of its institutions and in other ways, NAFTA can have an important environmental impact.

C. Trade Flows

NAFTA is a trade agreement aimed at liberalizing trade among its members. Thus it is essential to address its impacts on actual trade flows. Isolating a "NAFTA effect" in such flows, however, is a complex and challenging task. But there are now a host of studies employing different methodologies that conclusively demonstrate the existence of an independent NAFTA effect on trade at the general, economy-wide level and in specific sectors in the United States, Mexico and Canada.[10]

The majority of these studies suggest that the economic effects of NAFTA are broadly positive or neutral on major indicators such as trade growth, GDP, income, and employment. A few allege specific negative effects on such selected indicators as income equality and trade diversion.[11] Several studies also detail beneficial-to-neutral trade effects in specific sectors.[12] For example, in the case of feedgrains, the NAFTA provisions replacing Mexico's protection with a tariff-rate quota system have led to increased Mexican imports of the liberalized products or close substitutes from the United States.[13] In the case of energy, NAFTA reductions in the tariff on coal have had the same effect.

[9] CEC 1997b.

[10] USTR 1997, DFAIT 1997, Weintraub 1997, US Congress 1997, Mexican Government 1997, Kouparitsas 1996, DeJanvry 1996 cF. Hinojosa-Ojeda 1996.

[11] See Council of Hemispheric Affairs (1997) and Economic Policy Institute (1997).

[12] USTR 1997.

[13] Runge et al 1997.

The sectoral composition of trade can impact the environment, in both positive and negative ways. There is some evidence to suggest that the sectoral composition of post-NAFTA trade, and the dynamic changes in the share of such trade among sectors, is not having a negative effect on environmental quality.[14]

For this framework, trade flows will be assessed for an individual product, its major inputs and the good for which it is a major input, between the NAFTA members, and during the pre-NAFTA, NAFTA-transition and post-NAFTA periods. This analysis examines:

- The value and volume of exports and imports of each NAFTA country with its other NAFTA partners and with non-NAFTA countries;
- The market share of a product (overall and for imports) that each NAFTA partner's exports represent in each of the other NAFTA countries, and what other countries are being affected by this changing market share. This market-share analysis allows for the control of a number of conditions in the importing economy, as many such conditions should equally apply to imports from NAFTA countries, imports from non-NAFTA countries, and domestic production alike.
- How differences over time and across countries are associated with NAFTA liberalization as specified in its rules and implemented by its institutions.
- Ways of controlling for macroeconomic and microeconomic forces and other liberalization agreements that affect trade among the three NAFTA partners.
- The changing structure, or sectoral composition, of trade that liberalization has brought about on an overtime and cross-country basis, as substitution of one product for another takes effect.
- Trade creation and diversion effects with regard to non-NAFTA countries.

It is possible to move beyond aggregate statistics to firm-level behavior and direct in more detail "process tracing" methodologies that connect the NAFTA regime to the trade that results from it. Through specialized interviews with corporate officials and other stakeholders, public data and other methods (such as NAFTA certificates of origin on goods or the qualification of firms for NAFTA adjustment assistance in the United States), it is possible to explore how NAFTA was relevant in creating new trade flows among firms, and the distinctive production characteristics this NAFTA-associated trade has. This is a manageable task as North American trade, both overall and in most sectors in all three countries, is heavily concentrated in a few large companies. For example, 63 percent of all US exports globally are made by transnational corporations (TNCs), many of them very large firms. A full 50 percent of Canada's exports come from only 50 firms, many of them foreign-controlled.[15] Regular survey research could assist in assessing their trade and investment performance and intentions, the importance of NAFTA in their corporate strategies, and the production characteristics of their NAFTA-related trade and investment.

D. Transborder Investment Flows

Transborder flows of foreign direct investment (FDI) are closely associated with trade. In important respects NAFTA was an investment agreement as well as a trade agreement. Many of its most innovative provisions came in the new protection it provided for transborder investment. Moreover, North American trade is integrally tied to such investment.

[14] Weintraub 1996, Runge et al 1997.

[15] CEC 1996a:123.

About 65 percent of Canada's, and almost as high a percent of Mexico's manufactured exports to the United States are intra-firm transactions.[16] With free market forces heavily internalized within firms and business alliances, the corporate strategy of leading multinational firms assumes considerable relevance.

As NAFTA took effect, there were already strong FDI ties among the three NAFTA countries (with the exception of Mexico-Canada). US-sourced FDI played a significant role in the Canadian and Mexican economies. In 1995, over 2,000 US-owned companies operating in Canada produced 9 percent of Canada's GDP. The United States was also Mexico's leading foreign direct investor, with the amount of the investment tripling from 1989 to 1996. While the United States was far less dependent on FDI, almost 1,300 Canadian-owned subsidiaries in the United States employed 704,000 Americans, a number second only to Japan.[17]

In assessing changes among the three North American countries, it is important to focus on direct rather than portfolio investment. The former carries with it a powerful package of capital, management, technology, distribution systems, reputation and markets. It also makes it more likely, with the integrated production systems of TNC's, that advanced technology will be diffused, and that a corporate-wide set of high-level environmental standards will be followed. Attention should be given to both "greenfield" investment, and acquisitions or expansions, and include both fully-owned investment, joint ventures and North American business alliances. Although it is useful to assess the annual flows of direct investment, the focus should be placed where possible on changes in stocks of foreign investment, as the latter data incorporate the fullest range of investment alterations.

In assessing changes several dimensions are central:

1. The first is regional investment concentration—how post-NAFTA FDI stocks (and, secondarily, flows) among the three NAFTA countries, relative to pre-NAFTA periods and non-NAFTA partners, have changed overall, and in particular sectors, for each of the three countries. In all cases, transborder investment should be considered in the context of:

   a. domestic investment (including the percentage of an industry that is foreign-owned, by firms headquartered and owned in NAFTA and non-NAFTA countries);
   b. how investment from NAFTA countries and non-NAFTA countries is concentrating in, as opposed to out side, North America; and
   c. the concentration of new investment in particular countries and locations within each NAFTA country, including such transborder clusters as the San Diego-Tijuana area or the US-Canadian Pacific Northwest.[18]

2. The second dimension is investment differentiation and migration—whether this investment is expanding most rapidly in relatively polluting or relatively clean sectors. Of particular interest is whether NAFTA-associated FDI constitutes a transfer of industries and plants with heavy environmental costs (including those for environmental regulatory compliance) from one country or locale in the NAFTA region to another and how the standards and subsidies compare in those locales. An analysis of investment migration should also include an analysis of whether plant reductions and closures, and plant openings and expansions in another country, are taking place in ecologically stressed locations. The need to consider the government policy of direct subsidization (including tax credits) to attract investment is important, given its ability to generate environmental gains from investment migration, and the lesser capacity of smaller and poorer governments in North America to compete for industry on this basis. Such transfers of investment can take the form of a physical move of an existing plant or an expansion or placement of new investment in one area at the expense of another.

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[16] Zeile 1997, Weintraub 1994, Alcerreca-Joaquin 1997.

[17] Fry 1997.

[18] Ibid.

3. The third aspect concerns technology transfer and diffusion—the degree and speed of the spread of advanced technology from one firm to a related enterprise in the other NAFTA countries. Such a trend is promoted by regional production systems. It increases both technology transfer and diffusion to competing firms in the same industry, to related and non-related firms in the sector, and throughout the economy. Of particular relevance are technologies that improve overall efficiency and those directed at enhancing environmental quality.

4. A fourth is intracorporate integration in production and standards—whether and how the NAFTA regime is increasing intracorporate trade and affiliated trade between and among the members. Such a process can be expected to encourage integrated production systems that make it more likely that plants operating in all three countries will adopt and follow a common set of standards and practices.

5. A fifth is how FDI may be encouraging a trend toward concentration within industrial sectors by creating a smaller number of larger firms servicing the NAFTA marketplace.

Only inconclusive data currently exist for examining these topics. Information is most complete with regard to flows and stock of FDI, although the differences in measurement criteria between the United States and Canada on the one hand (who examine actual transfers) and Mexico on the other (which measures approvals) makes direct comparison difficult.

NAFTA's investment rules were expected to result in NAFTA and non-NAFTA FDI in the United States (particularly in capital-intensive industries) as the center of the new NAFTA region and in Mexico (in employment-intensive industries) due to the effect NAFTA's Chapter 11 and other factors had in opening the latter's economy. Less impact was expected in Canada, already more integrated into US-based production systems. Such increases in FDI were expected to be strongest in sectors that were not exempted from the disciplines of Chapter 11. Increases in direct portfolio investment into Mexico and domestic investment (primarily in export-oriented industries) were also considered likely.

Evidence from 1994 suggested these investment flows were taking place. In the post- NAFTA period, the United States gave a rising share of its outward FDI to Mexico (and a diminishing share to Canada), Canada increased its FDI stock in Mexico (while holding steady in the United States), and Mexican FDI in the United States rose between 1993 and 1994 (while remaining negligible in Canada).

After this initial concentration in Mexico (and the United States), the trend slackened. Mexico's share of US FDI outflows, which had risen from 3.3 percent in 1993 to 5.3 percent in 1994, dropped in 1995 to 3.4 percent (US$3.0 billion) and again to 3.1 percent (US$2.7 billion) in 1996. Canadian FDI flows into the United States rose steadily from US$1.3 billion in 1992 to US$7.1 billion in 1995, but dropped to US$5.7 billion in 1996. The stock of Mexican FDI in the United States, which had risen from US$1.0 billion in 1993 to US$2.3 billion in 1994 fell to US$2.0 billion in 1995 and again to US$1.0 billion in 1996. Mexican FDI in Canada remained very low, although there were signs of a sharp increase at the end of 1997 with the purchase of the Nova Scotia steel producer Sysco. There is thus no absolute movement of FDI from the United States and Canada to Mexico.

At a sectoral level, from 1993 to 1996 US FDI flows into Mexico were low in the automotive sectors, steady in computers, household appliances, and textiles apparel, but negative in chemicals (where total US investment declined 47 percent over the period) and printed products. In processed food and beverages, where more than 25 percent of total US FDI into Mexico is concentrated, US FDI stock rose from US$2.3 billion in 1993 to US$2.8 billion in 1994 but declined to US$2.3 billion in 1995. There is thus no general tendency for US investment to flow into sectors that are relatively high polluting.

There is only partial evidence on the geographic concentration of such investment. There is some limited and contested evidence that Canada is losing its attraction as a destination for US investment as Mexican locations become more attractive and as US locations appear the best from which to service the entire NAFTA marketplace. Yet Canadian and Mexican levels remain higher than their share of the regional economy. Moreover, Canada's decline in the North American region is less than that in its world share and its G-7 share, pointing to an independent effect of NAFTA in enhancing Canada's desirability as an investment location.

There is limited evidence on concentration in particular sectors, in a few large firms whose resources and visibility enable and encourage them to perform at a high environmental standard. In the cattle feedlotting sector, the industry is concentrating in the United States, while four large US firms have come to dominate a Canadian beefpacking industry increasingly centered in southern Alberta. In areas where NAFTA is reinforcing the geographic concentration of investment, as with cattle feedlots, processing, and packaging plants in Kansas and Alberta, it is doing so where the available technology and resources, and capacity for government regulatory oversight is relatively advanced.

In general, there is no evidence of strong concentration of FDI or NAFTA-associated domestic investment in particular regions such as north-south transportation corridors, or environmentally-sensitive areas. In particular, NAFTA generated FDI does not appear to be geographically concentrating in already stressed locales such as the *maquiladora* region in northern Mexico. However, the increasing scale of locally-sourced raw materials, greater use of packaging and plastics, and intensification of transport in intracorporate trade may increase environmental stress.

The evidence on investment migration or differential expansion and the environmental motives and consequences of such shifts is partial. The best developed of several studies demonstrates a trend of US FDI into Mexico in industries characterized as lower polluting.[19] A recent study of the Canadian automotive parts industry indicates that necessity for environmental regulatory compliance was negligible as a factor influencing corporate strategy and production location decisions.[20]

The sectoral pattern of new US FDI into Mexico in the post-NAFTA period appears to be avoiding or declining in those sectors with a large ecological footprint (basic metals, industrial chemicals, and non-metal products) and concentrating in those with a smaller ecological footprint (textiles, metal products, food products). Such a pattern suggests that US industry is not moving its heavily polluting production to Mexico. This is consistent with the pattern of initial post-NAFTA investment in Mexico.[21] With US FDI flows to Mexico in 1996 representing only 0.2 percent of US gross private domestic fixed investment that year, there has been no general migration of US firms.[22]

There is little known about the effect of subsidies offered to offset environmental compliance costs in attracting investment to particular jurisdictions. Anecdotal evidence, however, suggests such a subsidy was employed to attract a US-owned beef packing plant to Alberta.

Little is known either about how NAFTA-associated FDI transfers environmentally-enhancing technology from one NAFTA country to another, or how that technology moves within countries to other firms, sectors and the economy as a whole. There is some evidence that FDI is a contributing source of technology transfer and diffusion.[23] However, there are no studies dealing with these processes in environmental technologies or impacts specifically. The outflows of US and Canadian FDI into Mexico, reinforced by Mexican FDI into the United States, should improve environmental performance in the recipient countries, through capital modernization, technology transfer among affiliates, and investments in

[19] Cole and Ensign 1997.

[20] Eden at al. 1997.

[21] Ramirez de la O. 1996a.

[22] USTR 1997, US ITC 1997.

[23] Kirton 1998.

environmental equipment, infrastructure and management systems. This should be especially true as the surge of new investment took place in 1994 when environmental consciousness in North America was at its peak. Preliminary evidence from the 1995 interview program conducted for the NAFTA Effects Project suggests that the anticipation and advent of NAFTA led to environmental investments in foreign-owned and domestically-owned firms in Mexico.[24]

There is no systematic evidence about how FDI and resulting intracorporate trade has led to uniform, high-level, region-wide industrial practices and standards. NAFTA has encouraged coordinated production in the automotive, telecommunications equipment, computer, electronic products, and textiles-apparel sectors, thereby increasing the export of high-value US component and services to firms in Mexico, and allowing Mexican firms to displace extra-NAFTA competitors.[25] This increases the incentive of such firms to adopt the generally high levels of environmental regulations followed by parent corporations in the US.

E. Other Economic Conditioning Factors

To demonstrate the presence of a NAFTA connection in trade and transborder investment, it is important to take into account the other macroeconomic and microeconomic conditions that affect trade and FDI flows. Among the most important are macro- and micro-economic processes within the three countries' domestic economies. A further set consists of the major fluctuations from various international open economies, particularly as the post-NAFTA period has witnessed wide swings in exchange rates and balance of payments. Also relevant is the volume and direction of portfolio capital, which can substitute in some respects for FDI. A final factor consists of changes in weather and climatic conditions.

Relevant domestic macroeconomic forces include aggregate growth, income levels, demand, and consumption in the economy, as distinct from the scale effect of growth and production (and consumption) generated by trade liberalization itself. They also include inflation and interest rates arising from and affecting growth, transborder trade, and investment directly. A third is the rate of national savings, the size of government deficits and debts, all of which affect the demand for foreign capital. Together, these factors influence cyclic changes in price that can affect some sectors.

Of increasing importance are the microeconomic changes in each economy, as they adjust to the liberalization brought about by the GATT/WTO and other trade agreements, ongoing changes in the global economy, and the opportunities and challenges of new technologies. The microeconomic process of deregulation and privatization is evident, for example, in the case of electricity in all three countries. In the maize industry in Mexico, an important factor is the condition of the domestic financial and banking system, and the availability of credit and insurance to small producers. Further factors include employment levels, the structure of the labor market, and the structure and profitability of firms.

The most important macroeconomic forces in the international domain are exchange rates, and the balance of payments deficits, and surpluses among the NAFTA countries.

It is also important to take account of autonomous ecological conditions occurring in the region that can affect patterns of production in trade and investment. Of immediate relevance are changes in weather patterns. A severe drought in northern Mexico is said to have led to a sharp decline in the number of cattle from 1992 to 1996. Diminished rainfall lowers the level of reservoirs and results in less hydroelectric production in the three countries. Changes in temperature can also be important in affecting growing seasons and volume.

[24] CEC 1996a, Ramirez de la O. 1996a.

[25] USTR 1997:40.

Although these macro- and micro-economic forces can and do exert a powerful independent effect on the economy and ecology of North America, the available evidence suggests that post-NAFTA North American trade often remains insulated from the impact of such changes. Indeed, the existence of an autonomous NAFTA effect is evident at times of change in direction of the macroeconomic forces most affecting trade and the failure of observed trade patterns to conform to the patterns they direct but instead to respond to the patterns directed by the provisions of NAFTA. For example, in 1995 when the Mexican peso lost 45 percent of its value against the US (and Canadian) dollar, Mexican GDP contracted almost 7 percent, Mexican domestic demand fell 22 percent and Mexican imports from non-NAFTA countries dropped by 25 percent. However, the overall value of Mexican imports from the United States fell by only 2 percent and Mexican imports from Canada rose by 5.4 percent.

Some of these economic anomalies may be explained as pre-existing integration between US and Mexican firms—Mexican firms importing intermediate and capital goods from the United States in order to increase their exports of finished goods to the US market. Yet the results in the Mexican-Canadian case, where the NAFTA effect is likely to be largest (given the lower levels of pre-NAFTA integration and trade and investment flows) indicate the presence of a powerful NAFTA-generated trade effect. Such results, consistent with the new institutional economics and the results of the FTA liberalization, point to the centrality of institutional rather than economic market forces in determining the direction and shape of post-NAFTA trade flows.[26] They also point to the need to supplement general and partial equilibrium modeling techniques to account for some important changes.[27]

Finally, the high concentration of NAFTA-associated trade and transborder investment in a few large firms, often TNCs in which market forces have been internalized and thus controlled, suggest that NAFTA's economic effects flow not only from macroeconomic market forces but from microeconomic organization and the corporate strategy of individual firms, business alliances, and households as production units.

This suggests that the way NAFTA-associated trade and investment affects the environment can best be assessed for current purposes, not at a broad macro level through quantitative modeling, but through an examination of the operations of individual plants and firms, the physical infrastructure that services them, the social organization that surrounds them, and the government policy that regulates their behavior and that of their stakeholders.

[26] CEC 1996a.

[27] Ramirez de la O. 1996a, Stanford 1992.

IV. Linkages to the Environment

The NAFTA regime and its economic forces may be transformed into environmental impacts in a number of ways. This framework identifies four critical areas in which NAFTA's rules, institutions, trade and investment will have impacts on the natural environment: production, management and technology; physical infrastructure; social organization; and government policy. These areas where NAFTA can have an effect on the environment are the primary foci for transmiting NAFTA-related economic forces into environmental pressures, supports and changes. Policies and structures in these areas can determine the force, timing, and even direction of NAFTA's effect on the environment.

Even where a NAFTA rule is relatively clear, its ultimate effect on the physical environment often depends on how social organizations and governments react to and implement it. Moreover, the environmental effects of NAFTA-associated trade and investment depend on the operation of the firms and plants that lie behind them, and the physical infrastructure that supports the plants, brings their inputs and workers to them, and transports their goods to market. To understand NAFTA's environmental effects, it is thus necessary to examine the operation of these linkages in some detail.

These intervening processes, or "linkages to the environment," are logically related to NAFTA in several ways. Some may be a direct, immediate result of NAFTA's legal, political, and economic forces. Others may be affected by NAFTA but nonetheless operate with sufficient autonomy to exert their own independent impact on how NAFTA affects the environment. Others may be an indirect or delayed result of NAFTA but also exert a mediating effect. Still others may be unrelated factors that operate independently but in doing so intersect with NAFTA-generated forces to affect the environment in different ways. And some, such as national government policy measures, may, in a reverse flow of influence, be sufficiently strong to offset the impact of NAFTA and determine the shape the NAFTA regime itself takes over time.

A. Production, Management and Technology

The first linkage to the environment is the production unit that carries out NAFTA-associated trade and investment, or is otherwise affected by it, and the technology and management employed in its production process. An analysis of the production unit at this micro level allows an examination of a broad range of NAFTA connections, and complex environmental impacts as well. It also permits a detailed tracing of the specific process by which NAFTA affects the environment. In so doing, it enables policymakers to target potential interventions with precision, ensuring maximum effectiveness.

In considering how NAFTA may effect the environment, it is important to begin with production for several reasons. All NAFTA-associated trade, transborder investment and other economic activity is based on the specific production units—the firms, government corporations, cooperatives, farms or households—that serve the marketplace. NAFTA-associated production, compared to pre-NAFTA and non-NAFTA production, can employ natural resources and other inputs that constitute a drain on ecological capital. They can employ production processes and technologies that require fewer inputs per unit of output and that reduce environmentally stressful emissions, wastes and byproducts, employ management systems based on an environmentally-respectful culture, and produce products or services that are more durable, recyclable, reusable and biodegradable. The environmental stresses and supports of NAFTA-associated production can thus be affected by at least five dimensions of the production process.

One is the raw material and other inputs used in production, the sources from which they come and the ecological capital, renewable or non-renewable they represent. In all cases, they may consume natural resources, or lead to greater emissions than would alternative inputs. For example, it is of environmental importance whether North America's electricity is generated by high-sulfur coal as opposed to wind or geothermal sources, whether maize or the feedgrains for cattle feedlots is produced using high levels of pesticides, and whether the gasoline in North America's automobiles is produced with or without lead, sulfur or benzene.

A second dimension is the production process itself. This includes the efficiency of the process, as well as such additional factors as the location, scale, and profitability of the producing units. Particular harvesting methods in the fishing and forestry industries (such as selective rather than clear-cutting) can minimize associated environmental damage. Clustering of production in a few large firms in a single location may increase economies of supply and distribution, or lead to an accumulation of environmental stresses or supports. For example, in feedlots and beef packaging this concentration increases not only air pollution and waste management problems but also opportunities for recycling and regulatory oversight. Although small-scale production is often more environmentally friendly, as aspects of traditional production methods for maize in Mexico suggest, large production units can offer economies of scale that have the potential to be more efficient and thus less environmentally degrading. Profitable enterprises are better able to invest in environmentally friendly production methods, or provide more direct environmental supports.

A third dimension is the physical technology employed in the production. This includes technology that can increase overall efficiency (greater production with lower inputs, emissions and waste) and technology devoted specifically to environmental purposes (such as pollution prevention technologies). Increased efficiencies in production generally impose less environmental pressure, allowing aggregate environmental impacts to be held constant with increasing levels of production. There are cases, however, as in the fishing and forestry industries, where technical improvements can lead to the depletion of a renewable resource. Of greatest general relevance is the modernity and transferability of the technology, such as the use in corn production of high-precision farming, soil management techniques, integrated pest management methods, and the use in cattle feedlotting of waste and water recycling and biotechnology to control methane emissions. Technology is a critical factor in increasing the overall productivity of the firm or sector, and such productivity increases can bring significant environmental benefits. The static yields and low level of investment and technology in maize in Mexico in the 1990s point to the difficulties that low technology and poor productivity bring about. It is thus important to examine the investment in and use of general and environmentally-specific technologies, their price, cost and effectiveness, the ability of the workforce to effectively employ them, and the speed of the innovation, development, adoption and diffusion of state-of-the-art technologies.

A fourth dimension is the dominant strategic management systems for production units, in both their economic and environmental dimensions. The strategy adopted or devised to respond to NAFTA-affected and other incentives is important, such as modernizing to compete in the international marketplace, substituting into other products or other markets, or producing a greater volume through traditional technologies in the face of declining prices in order to maintain an aggregate level of income. Also important is the presence and use of a high standards environmental management system or industry-wide environmental code, and the way in which an "environmental culture" permeates management and the firm as a whole. Also relevant is the presence of outside stakeholders in the operation of the environmental management systems.

A fifth dimension is the relative price and other characteristics of the product and the environmental emissions and supports flowing directly from this product and its production process. As the case of Mexican maize illustrates, relatively high prices for a product (traditionally-cultivated maize) may sustain activity and prevent strategic or market-driven substitution of alternative products with different environmental impacts. Also important are the performance, use and ultimate disposal and reuse of the products. For example, the energy efficiency of electrical appliances, and the reuse of newsprint has important environmental consequences. Attention should be placed on major emissions of industrial processes whose effects are not yet fully known, such as mercury emissions stemming from electricity production.

The emissions associated with particular firms, industrial plants and sites can be assessed by reviewing the data of such sources as the US government's Toxic Release Inventory and the Canadian National Pollutant Release Inventory. Over time, as these two inventories achieve greater data harmonization and the Mexican inventory begins generating data, they can assist in assessing NAFTA's environmental effects. Such assessments, and those from national enforcement records, can provide a useful indication of which NAFTA-associated firms and industries are generating the greatest environmental stresses and fewest supports, and the particular geographical areas associated with the greatest environmental stress. In time, such data could contribute to computable general equilibrium models to help assess NAFTA's environmental effects.

To consider the overall environmental impact of a sector, it is important to look, in a more aggregate fashion, at two factors. The first is the number, size and geographic concentration of production units in the sector. As it does in the cattle feedlot and beef packing sectors, NAFTA may reinforce comparative advantage and produce a geographic concentration of production in a few large firms. These firms have the size, profitability, visibility, and international marketing power to induce the wider adoption of state-of-the-art production methods, technologies and management systems, and in turn ease the task of regulatory oversight. In some cases, economic and geographic concentration may diminish the diversity of inputs, such as seeds and genetic resources, and the array of technologies, in favor of a monoculture less able to withstand environmental shocks and more dependent on environmentally demanding production methods such as irrigation and pesticides. In the electricity sector, concentration of production in older coal-fired units can compound environmental stress, while numerous smaller enterprises engaged in co-generation or adopting new technology turbines can exhibit improved environmental performance.

Concentration is thus in itself not an environmentally predisposing factor. It is a precondition for a process of strategic calculation and adaptation by those managing production units, that enables those directing large units to invest in greater environmental controls. It is thus important to consider in detail the particular incentives managers of large and small production units respond to, the strategies they adopt, and the role environmental values play in this process.

B. Physical Infrastructure

Much of the environmental impact of NAFTA-associated production comes from activity spread throughout North America as inputs are transported to plants and products to markets; as plants rely on water, wastewater and power generation infrastructure; and as irrigation systems or other public works operate to sustain logistical and economic systems. It is thus important to consider the character and environmental impact of the physical infrastructure that supports, sustains and connects the site-specific production units. Attention should be paid to the overall public and private investment in such infrastructure, the unused capacity of existing systems available for additional throughput, and the creation of, and need for, new systems to handle additional demand.

Physical infrastructure includes facilities in the public or private sector required to transport and transmit inputs and outputs of NAFTA-related production between suppliers, production sites, and markets, and to service production sites with basic inputs such as water, wastewater treatment, energy, and communications. Transportation/ transmission infrastructure includes, among other things, roads, railways, ports, aircraft and airports, electrical transmission corridors, telecommunication grids, pipelines, irrigation canals, locks, dams, trucks, railcars, bridges, grain elevators and warehouses. Service infrastructure includes such items as water and sewage plants and the local production and distribution of electricity, telephone and telecommunications networks, and irrigation systems.

To a large degree, the provision and operation of such infrastructure is regulated by local and national authorities in their planning, siting, and environmental assessment activities. However, the NAFTA agreements place importance on physical infrastructure in several ways. The region's transportation and transmission infrastructure was, in cases such as the Land Transportation Standards Subcommittee and its mandate for the transportation of dangerous goods, made the responsibility of the NAFTA institutions. Responsibility for service infrastructure in the high impact area immediately adjacent to the US-Mexican border was assigned to the Border Environment Cooperation Commission (BECC) and the North American Development Bank (NADBank).

Physical infrastructure plays a critical role linking trade and investment flows to the environment in several ways. In general, transportation patterns will vary with differential environmental effects, due to NAFTA-associated economic growth, privatization, logistical efficiencies and mode shift, or import substitution and changes in transportation distances. Especially in an era of regionally rationalized production systems and just-in-time inventory, the absence of adequate or appropriate infrastructure can impede NAFTA's liberalization from creating the new trade volumes or flows they otherwise might. For example, the absence of interconnection capacity on the US-Mexican border has led to less US-Mexican electricity trade than the NAFTA regime encourages. Transportation and service infrastructure affects the location and volume of production (including transborder investment flows), and the location and quality of life enjoyed by the local communities that provide the workforce and supporting infrastructure for plants. In the agriculture sector, investment in hydro-agricultural infrastructure is critical to reaping the efficiency gains promised by NAFTA. Governments have an important role to play in providing and regulating the creation and operation of physical infrastructure throughout the region.

Physical infrastructure can also ensure that such production and its distribution and consumption is more or less environmentally friendly. Three such forms of direct environmental impact stand out.

NAFTA may direct trade toward products and services, and toward geographic locations, where the existing infrastructure can absorb the new traffic and demands, thereby obviating the need for new investments, new routes, and associated impacts on the environment. This appears to be the most likely short-term scenario in the case of electricity, where technological solutions for interconnection and wheeling power appear able to provide a much more intensively used integrated regional grid with few new transmission corridors or even twinning of existing transmission lines required. However, a different path appears to be underway in Mexican maize production where the transition from traditional to modern cultivation methods is weakening supports for traditional terracing techniques, and generating increased demands for mechanical irrigation systems and water.

Second, NAFTA-generated comparative advantage and specialization may concentrate new production activity at locations with a well-developed transportation/ transmission and local environmental infrastructure. While there will be additional environmental impacts from increased use, incremental additions to a well-developed and regulated network can minimize environmental stress. They may even result in environmental improvement by diverting activity from less efficient and more ecologically stressed regions. This appears to be the case with cattle feedlotting, which in the United States has come to be heavily concentrated along Interstate 35. That highway, running from Duluth to Laredo, has its epicenter in Kansas City, where more than 300 motor freight carriers are headquartered. It carries 74 percent of all goods traded between the United States and Mexico by truck. Such locations also feature advanced service infrastructure and waste management facilities.

Along the US-Mexican border, since NAFTA came into effect, increases in production designed for export to the United States and accompanying production and population concentrations continue to overwhelm the capacity of local infrastructure. However, these concentrations and resulting environmental stresses are not the result of NAFTA but of the 1995 peso devaluation that generated a need for Mexico to increase exports and sheer proximity to the US market. Indeed, NAFTA may well engender the geographic diffusion of production by giving, over time, to all of Mexico the special trade privileges long enjoyed by only the border region. Moreover, the negative environmental effects, due overwhelmingly to the lack of local environmental infrastructure, may be substantially diminished as the BECC and NADBank move into full-scale operation.

NAFTA-generated trade may create choke points that generate local environmental stress should trade increase or concentrate more rapidly than new transportation/transmission infrastructure can be constructed to service it. Texas alone accounts for over half the 3,326 kilometer US-Mexican border, and 40 percent of total US exports to Mexico move south along Texas highways and railways.[28] This has raised concerns about the fumes and emissions from the heavy road traffic and idling trucks at border crossing such as Laredo, and the entry of substandard trucks from one jurisdiction into another.

There are additional potential environmental impacts from transportation and transmission infrastructure that warrant attention and perhaps systematic monitoring in the future.

One is the competition on the part of coalitions of subfederal governments and private sector actors to create new north-south corridors from Canada to Mexico, to service new NAFTA trade in ways that will benefit their local jurisdictions. For example, the CANAMEX project runs from Edmonton to Mexico along US Interstate 15 and involves Alberta,

[28] Fry 1997:8.

Idaho, Arizona, California, Montana, Utah and Nevada. A parallel Rocky Mountain corridor currently contains extensive two-lane roads in southern Utah and northern Arizona. Government cooperation may not keep pace with the new transportation demands. In the most recent comprehensive survey of subfederal linkages among Canadian provinces, US states, and Mexican states, there were very few involving both transportation and environmental authorities.[29]

A second issue is the volume of NAFTA-generated transportation and the increase in fuel consumption, emissions, and accidents involving dangerous goods that it brings.

A third issue is the intermodal shifting from one form of transportation to another. European evidence suggests that regional integration induces a shift from environmentally-friendly sea and rail transport to less environmentally-friendly road and air transport. There is a need to confirm the applicability of these findings to North America, particularly as partial data for Canada suggest a different pattern of environmental impact.[30] At present, trucks transport about 80 percent of freight shipments between the United States and Mexico and 60 percent between the United States and Canada. Bottlenecks appear more extensive in regard to rail and air than to road transport, as parts of the southwestern United States and northern Mexico lack modern or standardized railroads, and the United States and Mexico are far from having an "Open Skies" regime. It would be useful to monitor whether the portion of truck transport increases in the future, and study the changing environmental impacts that trucks, especially under NAFTA-wide regulations relative to rail, sea and air, have in the North American setting.

A further consequence of trade and investment-related transportation is that it distances the ecological footprint of production far from the awareness and sense of responsibility of the producer, as well as from the ultimate consumer and his/her political jurisdiction. Thus far, NAFTA institutions have had a variable record in producing high-level, region-wide, environmental regulations to govern transportation. Work in transportation of dangerous goods is proceeding rapidly and that regarding automotive emissions, slowly.

C. Social Organization

The environmental impacts of NAFTA-associated production further depend on the way stakeholders operate collectively in networks of social organization. Environmental enhancement flows from a well-developed network of social organizations that can add to economic and market logic important environmental, cultural and public values. Conversely, ecological stress can arise when a rapid inflow of migrant workers to new production locations overwhelms the environmental infrastructure and community supports that exist, or when outwards migration leaves institutions and communities unable to carry out the traditional roles involved in supporting the environment.

Social organization consists of well-organized and influential business, labor, community, consumer, and environmental groups, other cooperatives, and aboriginal communities. The balance among these groups is important. Some business associations are engaged in pollution prevention and voluntary environmental standard-setting. An important component of social organizations are the voluntary environmental and other standards created, administered and accepted by the members of industry or professional associations. These can be created as needed in response to, in anticipation of, or as an alternative to, government regulation. They can also serve as the basis for regulation, as government-owned firms or departments adopt them or as they are referenced in government legislation. Also relevant

[29] Munton and Kirton, 1996.

[30] CEC 1996a.

is the impact of production activities on traditional social units such as the family farm or *ejido*. This includes the development of trilateral transnational networks of civil society actors, and the involvement of societal actors in the work of the NAFTA institutions.

Voluntary standardization can be assisted by the NAFTA institutions, as they stimulate the work of such societal equivalents on a trinational basis. The intensification of integrated production systems on a regional wide basis through trade and investment can have a similar effect, particularly if the NAFTA institutions or *ad hoc* intergovernmental harmonization are unable, for other reasons, to move with sufficient speed or effectiveness. Evidence suggests that few of NAFTA's environmentally-relevant institutions involve civil society actors, and that those institutions insulted from concentrated industry involvement by multistakeholder participation or government-only operation are more likely to rapidly generate high-level regional environmental regulatory convergence.[31]

There is evidence of the emergence of ultimately trinational cooperative networks and resulting environmentally-relevant voluntary standards-setting within the business community. For example, in 1996, Mexico's National Livestock Council reached an agreement with the US National Cattlemen's Association to exchange information and promote beef consumption in Mexico. In 1996 they reached a trilateral agreement to pursue joint cattle export opportunities in Asia and Europe. Less in evidence are influential trilateral organizations of ENGOs and consumers.

Social organization consists secondly of property rights regimes that can provide resources for environmental supports or respect values other than short-term profitability. The recent changes to the *ejido* sector in Mexico are of particular importance in this respect. Conversely, even within the market-based economy, NAFTA-related price changes can make relatively low-priced products such as beef more affordable to low-income consumers, and thus reduce lifestyle differences based on socio-economic class.

A third element of social organization is culture. The cultural meanings shared by local and national communities give daily activities significance and render them relatively immune from rational economic incentives. For example, the central place that maize occupies in the culture of Mexico makes it less likely that traditional production methods will drastically altered by new market forces. Explanations for patterns of migration themselves are not fully reducible to the rational structure of economic incentives but also reflect family and group networks that have arisen over time.[32]

An additional element of social organization is migration and associated demographic changes. This consists broadly of community formation and change as workers and their families migrate from one location in the NAFTA region to another to take advantage of employment opportunities or to avoid unemployment. Sudden clustering of populations in ecologically sensitive areas, or ones without adequate environmental infrastructure can cause environmental stress. It can also lead over time to the community organizations that demand environmental supports.

Similarly, outmigration can relieve environmental stress (as when it leads to reduced farming on marginal lands). However, it can also reduce the availability of labor for social institutions that provide low-cost, community-based environmental supports (as with *ejido* labor in maintaining terraces and other labor-intensive supports for environmentally adapted rain-fed maize production in Mexico). NAFTA-induced concentration can place pressures on the family farm as the dominant production unit, and thus on the many rural communities which such farms sustain. Also of relevance here is the direct impact NAFTA's rules may have on the temporary migration of business professionals, including those involved in the environmental services industries, migrant workers and tourists.

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[31] CEC 1997b.

[32] Marichal 1998.

Migration to, and population concentration in, border areas and crossings and along new NAFTA transportation corridors and production centers, are of interest as is NAFTA-associated rural to urban migration, and the resultant impact on traditional units such as the family farm. Electricity restructuring, for example, facilitating the delivery of low-cost electricity to any location in North America, should reduce undue pressures for industrial and migratory concentration. In the case of electricity restructuring, consumer and environmental groups in the United States and Canada are pressing, with some effect, for new regulatory regimes that allow consumers to purchase electricity generated from renewable sources, and that promote energy efficiency and national environmental objectives.

D. Government Policy

A fourth process that determines how NAFTA-associated economic change might affect the environment is government policy. At the national and subfederal levels these play a major role in forwarding programs that can reinforce, offset or otherwise alter the impact of NAFTA liberalization. Through direct expenditures, tax regimes, credit, subsidies, user-charges, set-asides and conservation programs, targeted to environmental purposes, to a particular sector, or to the economy as a whole, governments can provide important environmental supports at a level and with a focus tailored to the new environmental pressures NAFTA-associated production might bring. Governments also impose and enforce environmental regulations that respond to new developments in production and technology, and that can encourage a move to a high level of general and environmental regulatory convergence in North America. It is important to assess whether NAFTA is geographically concentrating production activity in jurisdictions with the highest government regulatory and other policy capacity, and whether it is facilitating the move to extend such high capacity through regulatory convergence and other forms of international cooperation.

The environmental effects of government policy depend broadly on the balance of resources and linkages between state and society. In general, the responsiveness of the state to the social organizations and the transparency and meaningfully balanced involvement of civil society in decision-making should strengthen the demand and capacity for environmental enhancement. Moreover, a strong, resource-rich state is often required to protect the public good that the environment represents, as in the creation of national parks, the preservation of biodiversity, and the exercise of regulatory oversight over non-renewable resources.

Of relevance here is the degree of government intervention in the market (or society), especially through the presence of state-owned enterprises. Although the three North American countries began the NAFTA era with different mixes of state-society relations, there has been a general move in all three countries to less governmental intervention, with varying environmental consequences. The current move toward restructuring in the North American electricity sector, for example, may lead to a lessening of public utilities' previous demand-side management programs, and their traditional role as an employer of last resort. At the same time, as in Mexico's opening of gas distribution, it can prompt the inflow of a whole range of environmentally enhancing technologies and practices. In the case of agriculture in Mexico, the 1991 amendment to Article 27 of the Constitution, allowing private sector participation in *ejidos*, has had varied consequences for their adjustment under NAFTA.

A second factor is the division of responsibility for environmental policy between federal and subfederal governments. In addition to the three national governments, the North American region contains 91 states and provinces, 2 federal districts, 5 major territories, and tens of thousands of counties and municipalities.[33] Of relevance is the degree

[33] Fry 1997.

of centralization within the three federal systems of the member countries, and the number, diversity and capacity of subfederal governments within each. The relatively highly centralized Mexican government contrasts with the extensive powers of the provinces within the Canadian federation, where an estimated 70 percent of the responsibility for environmental matters rests with provincial governments. The large number of states within the United States creates greater scope for diversity and challenges of coordination. As the case of cattle feedlotting suggests, environmental enhancement is increased when the standards mandated by environmental regulations are high in those jurisdictions where production activity is being concentrated geographically by NAFTA's dynamics of comparative advantage and other forces.

An important issue is the degree of federal-provincial cooperation in matters relating to the environment, including enforcement. For example, the scope of Canada's full participation in the NAAEC depends in part on an Intergovernmental Agreement among the federal and provincial authorities that governs the role of each.

Also important is the effect of decentralization, a large number of subfederal units, and diversity in the environmental conditions and regulations among each in enhancing the competitive pressures stemming from NAFTA's liberalization. These may intensify incentives to lower or at least not raise environmental standards to seek competitive advantage. This may be particularly true where subfederal jurisdictions are contiguous (and thus exposed by low transportation costs) to those in partner countries, especially where such jurisdictions have an economy dominated by natural resource-based industries or relatively polluting industries. However, such diversity can also allow subfederal jurisdictions, some of whose environmental regulations are more stringent than those of federal authorities, to pioneer new and higher environmental standards that may become more widely adopted. Examples of such policy leadership include the "California effect" in automotive emission controls, the initiatives of Alberta and California in 1993 and 1994, respectively, to move to electricity restructuring, and policies to promote "green" electricity in some New England states.

In general, however, diversity can complicate the process of setting common nationwide standards, as the case of standard-setting among Canadian provinces for the transportation of dangerous goods. It may also raise the cost of trade and even impede it by requiring industry to produce products to meet different standards for several different jurisdictions, some of which contain a small market. At the same time, NAFTA's institutions can help overcome federal-subfederal differences to generate single, high-level regional standards.

A third factor is the balance within governments among the executive, legislative and judicial branches. In general, the coordinated or convergent involvement of all three branches in environmental policy is likely to promote environmental enhancement. Also relevant within the executive branch is the balance and relationship among environment, trade, foreign, finance and industrial-sector ministries, and the role of central government in coordinating them, including the involvement of the head of state or government. An equal and integrated role for environment ministries is likely to promote environmental enhancement.

A fourth factor is the strength of government polices to ensure freely functioning markets, rather than monopolistic or oligopolistic concentrations, asymmetrical in their policies of access, information and accountability. This includes government policies and interventions to affect the macroeconomic and microeconomics forces discussed above. The most environmentally relevant policies include unilateral or accelerated tariff reductions, the provision of export credits, and regulations on FDI. An example of the latter is Mexico's 1995 opening of gas distribution to foreign investors.

There are also more specific government policies relevant to how NAFTA and its trade and investment flows affect the environment. Within the government itself, these include procurement practices and the environmental management systems used by state-owned enterprises. Vis à vis society, they translate into several different types of policies.

One such set includes financial instruments like taxes, credits, subsidies, and user fees. Examples could include targeted financial incentives for customers to buy efficient appliances, subsidized water for irrigation for corn production in the United States, programs targeted to sustainability rather than income transfer or production of particular crops to agricultural producers, and the US 1996 Environmental Quality Incentive Programs (EQIP) for small livestock facilities to construct lagoons. Government research and development and the provision of technical assistance are also important, as is the assessment of the level of and targets for such supports, as against the environmental stresses generated by NAFTA-associated production. The use of these programs by already affluent producers, or by those seeking to invest in particular production techniques (such as highly irrigated and pesticide intensive agriculture) with high environment stress) is also relevant.

A second set of policies includes regulation, such as allowing access for producers and consumers to transportation networks/transmission grids, or imposing uniform charges for electricity efficiency. Also relevant are regulations for environmental assessment, which affect the siting decisions for, and environmental quality of, electricity generation plants. Domestic and international regimes for intellectual property rights can be an important factor.

A third set is direct environmental regulation of producers (such as emission levels on old and new plants, US and Canadian regulations on beef processing and packaging), their inputs (such as minimum content requirements in electricity), their products (including disclosure requirements and ecolabels) and their consumers (such as automotive inspection and maintenance and end use regulation of electrical appliances). Also relevant are environmental rules, such as the US NAAQS on SO_X substances and Mexico's 1994 regulations on SO_X and NO_X, which diminish harmful air emissions from electricity generation plants.

A fourth set of policies include direct conservation programs, such as the US Soil Bank, CRP and Seedbank Programs.

Two additional dimensions are worthy of consideration. The first is the capacity and performance of governments in environmental surveillance and enforcement. The second is the move towards increased trilateral cooperation at the federal and subfederal level on environmental issues. This can take the form of communication, capacity building and resource sharing, the upward convergence of standards and co-operation in multilateral forums. Thus far, such cooperation appears to be limited at the subfederal level. At the federal level, the NAFTA institutions appear to be the central forums for fostering such exchanges. Such cooperation could include far reaching innovations, such as a region-wide emissions permit trading system to assist the three countries meet climate change targets.

V. Environmental Impacts and Indicators

This section addresses the possible environmental impacts of changes from these four linking processes, as a basis for identifying indicators that would be most useful at this stage to measure NAFTA-induced or associated effects. Of ultimate interest is how NAFTA-associated forces can or do create movement toward sustainability in each of the four major components of the ambient environment: air; water; land and living things. The measurement and monitoring of indicators will require different techniques according to the particular problem under analysis. In most cases, heavy reliance will be made on data already being collected by other environmental agencies.

Environmental pressures are processes that increase the stress on the environment in its existing condition by providing a further load on its absorptive capacity. Example of such stresses are pollution and emissions that flow from industrial and human activity. In the agriculture sector, in activities such as maize production and cattle feedlotting, beef processing and packaging, and associated feedgrains production, environmental pressures can take several forms. These include dams and diversions for irrigation; overgrazing which causes soil erosion; water consumption in the feedlot; pesticide and agricultural chemical use; and management, food residues, and the heath of agricultural workers.

The impact of such pressures must be considered together with environmental supports, which can be created by the same processes. Supports include waste management practices, such as animal and nutrient management and manure disposal in cattle feedlotting. The social organization of maize production in Mexico, with its emphasis on communal terracing and the use of a wide variety of seeds as an insurance policy against natural conditions, creates important environmental supports for improving water quantity, preventing soil erosion and maintaining genetic diversity. Creating such supports may be the deliberate target of government policies, such as the establishment of natural protected areas.

The impact of such mixtures of pressures and supports will vary according to the existing state of the natural environment in the geographic area they affect. Although it is very difficult to establish precise stability thresholds for specific ecosystems, of particular concern are those instances in which small net increases in pressures over supports can have a major catalytic and potentially irreversible effect on the ambient environment, or where a small amount of environmentally-enhancing intervention can generate large gains.

Also of particular interest are high impact locales—places where environment pressures concentrate to overwhelm the available supports. One such area may be the large hypoxic zone in the Gulf of Mexico at the mouth of the Mississippi, resulting from the contamination of surface water from pesticide-fertilizer applications in the US Corn Belt.

Of ultimate interest is the cumulative impact of such pressures and supports on the air, water, land and livings things that constitute the ambient environment. These major components of the ambient environment are interrelated in complex ways, and it is the overall state of the entire ecosystem that is of essential concern. Changes in human health can serve as an indicator of change in the ambient environment. However, at present, it is appropriate to focus individually on the major aspects of each separate component of the ambient environment, as a foundation for identifying critical indicators, and working toward reliable, cross-national data on them. These selected indicators should cover both standard scientific measures and items of particular importance in patterns of North American environmental change.

The first component of the ambient environment is the atmosphere. It includes local and regional air quality, pollution levels, and broader processes such as stratospheric ozone depletion and climate change (see Table 1).

There is a standard list of indicators of atmospheric quality generally accepted by the scientific community.[34] Many of these are employed by federal governments of the NAFTA countries in their overall and sector-specific environmental monitoring programs. For example, US livestock facilities are subject to the National Ambient Air Quality Standards (NAAQs) under the Clean Air Act for six compounds: carbon monoxide, ozone, particulates, sulfur dioxide, nitrogen oxides, and hydrocarbons.

Table 1 Some Environmental Indicators for Air

Issue	Indicators
Outdoor Urban Air Quality	Ambient concentrations and emissions of common air pollutants: TSP (PM_{10}), CO, SO_2, O_3, (ambient only), NO_x Ambient concentrations and emissions of toxic air pollutants: inorganic toxics (Pb, Mn, etc.), organic toxics (VOCs, PAHs, dioxins, furans)
Acid Rain	Emissions of SO_2, NO_x
Climate Change and Ozone Depletion	Emissions of CO_2, CFCs, N_2O, CH_4

In such cases, further development and use of a general framework should concentrate on establishing the cross-national comparability of such scientifically and governmentally accepted core indicators. This process could begin with those dimensions currently in the forefront of scientific interest and closely associated with economy-wide practices such as electricity generation and automobile transportation—notably particulate matter, ground-level ozone and sulfur dioxide. It might also include dimensions of air quality which arise in particular industries of interest and which are not currently subject to widespread or full federal and subfederal monitoring. In the case of cattle feedlots, these items could include dust, ammonia emissions from manure and dust, particulates, methane, and reactive organic compounds. It could also focus on emissions not yet widely monitored but considered important, such as mercury emissions from electricity generation, or ensuring that such national monitoring programs and regulations are introduced on a comparable, region-wide basis.

The second component, water, includes its quality and quantity in inland, coastal and underground areas, its use for purposes ranging from irrigation to drinking, and its subjection to the discharge of effluents and compounds such as pesticides and fertilizers. Water is both an essential part of ecosystem and human health and a basic resource for most economic activities and processes (see Table 2).

Water quality is directly affected by the activities in specific sectors. For example, agriculture is the primary cause of surface water impairment nationwide in the United States. Groundwater, which supplies half the US population with drinking water, and is the sole source for most rural communities, is subject to contamination from substances such as nitrates in fertilizers and from pesticides. There is also concern in some locations regarding water quantity such as that supplied by the Ogallala acquifer.

[34] Masera and Maclaren 1996, CEC 1996a:114.

There are standard indicators of water quality and quantity generally accepted by the scientific community.[35] Further development of the framework could usefully concentrate on reliable cross-national information gathering and monitoring of that subset which is critical in environmentally salient sectors such as agriculture. Such a list would include five indicators: (1) nitrates in groundwater at threshold of less than the EPA drinking water standard of 10mg/L; (2) atrazine (a corn herbicide, the most frequently detected pesticide, a possible carcinogen) in ground and surface water; (3) phosphorous, which causes oxygen depletion in water, eutrophication, and algae growth, in concentrations of as little as 0.05 mg/L; (4) Biological Oxygen Demand (BOD)—which the EPA uses as a standard measure; and (5) and Total Suspended Solids (TSS)—a measure also used by the EPA.[36]

Table 2 Some Environmental Indicators for Water

Category	Indicators
Water Quality	BOD, TSS, nitrates, phosphates, ammonium, fecal coliform, organic toxics (PCBs, dioxins, etc.), heavy metals
Water Supply	Withdrawal rates, use (groundwater and surface water, treated and untreated, by sector), replenishment rates

The third component is land, which includes soil quality and patterns of land use, including agriculture, forest cover and natural protected areas. Soil degradation is the most serious threat to the agricultural industry over the long term. Agricultural pesticides, acid rain from fossil fuel burning, deforestation from over-harvesting of timber, and poor waste management practices can adversely affect soil health. In certain parts of North America, soil erosion due to deforestation already contributes to pollution of local streams and lakes. On other parts of the continent, valuable agricultural land is lost each year from poor cultivation practices. Shifting trade patterns under NAFTA, particularly those involving timber harvesting, agriculture or mining operations, could affect soil health by advancing or slowing the rate of erosion, the level of salinity, or chemical contaminants contained in soil. Urban development spawned by NAFTA-associated investment may also encroach on agricultural lands, affecting productive capacities. Finally, hazardous and solid waste disposal arising from industrial activities can lead to widespread soil contamination.

Here attention should focus on indicators of soil erosion, conservation and other tillage methods, soil runoff (of substances such as nitrates), fertilizer and pesticide buildup from over-application, the overuse of marginal land from expanded agricultural production, land set-asides, and land conversion. The spread of highly mechanized irrigation in agriculture suggests itself as a priority indicator. Table 3 presents a preliminary list of soil indicators that includes indicators for the chemical, biological and physical properties of soils.

[35] Masera and Maclaren 1996, CEC 1996a 114.

[36] Runge *et al* 1997:82.

Table 3 Some Environmental Indicators for Land

Category	Indicators
Soil Quantity	Consumption of land for hazardous and non-hazardous waste disposal, land conversion, erosion, conservation and set-aside programs, tillage methods
Soil Quality	Impact of chemicals applications, soil organic matter levels, changes in soil structure, overuse of marginal land, irrigation, salinization, desertification, erosion, soil contamination (by hazardous and non-hazardous wastes)

The fourth component is biota, or living things. Biota refers to overall biodiversity, including all forms of living organisms, including animals, plants and micro-organisms. Flora and fauna are adversely affected by the pollution of soils, water and atmosphere that result from industrial activities and intensive agriculture and forestry. The loss and fragmentation of forests and wildlands (either through non-sustainable harvesting or conversion to other land uses) also results in the loss of biodiversity. Animals and plants are an essential part of the environment and also serve as economic resources for human activities. Indicators should therefore reflect both aspects.

Table 4 presents the preliminary list of biotic indicators. Priority parameters appear to be the size and diversity of forest habitat, conversion of grasslands (prairie) and wetlands, impact on wildlife habitat, loss of or the endangering of grassland and other wildlife species, plant diversity and a narrowed genetic base.

Table 4 Some Environmental Indicators for Biota

Category	Indicators
General	Species depletion (including flora and animals) Endemic species Number of species at risk (threatened and endangered) Loss and fragmentation of habitat (forests, wetlands, other wildlands) Rural to urban conversion of land Natural protected areas (area, quality, % by ecoregion type)
Forests	For each major forest type: amount of forest cover, rate of deforestation, rate of afforestation, successful regeneration, standing volume, mean annual increment versus harvesting rates

Considerable work remains in determining the extent to which the general indicators will need to be supplemented by additional sector-specific indicators for individual issue studies. There may also be a need for further study concerning the development of a systematic approach for reporting on the positive and negative effects on human health. In all cases information gathering and monitoring should rely to the maximum extent on indicators and information being developed under parallel CEC programs. It should in particular be consistent with, and use the contribution of the CEC's work on the state of the North American environment (forthcoming).

Conclusions

Notwithstanding the need for expanded analytical development of Section IV of the framework and its further refinement and application on a pilot basis, at present some general observations can be made:

As the case of maize in Mexico demonstrates, the differential pace and degree of reduction and elimination of tariffs and other trade barriers under NAFTA can have major impacts on production and consumption substitution in ways that are not optimal for economic efficiency or environmental enhancement. It would be useful to conduct a broader review of NAFTA's tariff regime from this perspective, with a view to identifying opportunities for accelerated tariff reduction with environmental benefits (beyond those of April 1998), beginning with environmental products and services themselves. In the latter case, such work would reinforce that now beginning by the three countries in the APEC process.

It is useful to encourage consultation and regulatory designs that exploit opportunities for harmonization (as in animal health, meat and plant inspection, grading standards, mercury emissions). At present there appear to be opportunities for major gains in the convergence of national and introduction of region-wide standards in several areas, such as electricity. Even where the NAFTA institutions currently provide the capacity for such convergence, as in agriculture, there is relatively little environmentally enhancing activity in evidence. It would be most useful for the CEC to review the current record of, and ways to encourage high level region-wide regulatory convergence in environmentally relevant ways throughout the North American economy. Such an exercise could begin with a focus on key sectors common to all three countries, such as the automotive and electrical appliance industries.

Because the complex processes that transform NAFTA-associated forces into environmental effects include a wide array of functional communities and government departments, it will be important to continue to mobilize their resources in an ongoing monitoring effort.

Improvements can come through the rapid and wide transfer and diffusion of environmentally enhancing technologies. There is a need to examine the unexplored area of technology transfer and diffusion among the three countries within multinational corporations investing and operating in the three countries and the environmental impact such processes have.

Finally, in many cases, no uniquely trilateral policy responses, either through the NAFTA institutions or intergovernmentally, will be needed to address environmentally negative consequences or to reinforce positive ones. National and subfederal governments or civil society and private sector actors, equipped with the proper information, can adjust on their own. Expanded monitoring of key indicators, on a reliable, cross-national, overtime basis, together with timely publication of the results will represent an important contribution.

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Appendix A

Building a Framework for Assessing NAFTA Environmental Effects: Major Issues and Themes

Conclusions of 29–30 April 1996 workshop[37]

Major Issues and Themes

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The following is a summary of ten key themes that emerged from the Commission for Environmental Cooperation's (CEC) workshop "Building a Framework for Assessing NAFTA Effects."

1. Importance

A number of individuals supported the CEC's role in undertaking the NAFTA Effects Project and designing a study by which to assess these effects. Participants noted that the CEC has a clear mandate to do so. Many expressed that it was, and continues to be, a legitimate source of concern for governments and others who want to know exactly what the implications of NAFTA and the processes and institutions that it established actually, are on the environment.

To that end, this study presents a unique opportunity to gather empirical evidence to test the many and varied theories advanced with respect to NAFTA and to attempt to respond to the questions that were raised during the

[37] Taken from Commission for Environmental Cooperation (1996). *Building a Framework For Assessing NAFTA Environmental Effects: Report of a Workshop held in La Jolla California, on April 29 and 30, 1996.* CEC Environment and Trade Series Number 4. (Montreal: Commission for Environmental Cooperation).

negotiations. The study of the environmental effects of NAFTA demonstrates not only that this trilateral agreement can bring about new forms of international cooperation. But it provides an opportunity to use the North American region as a case study to examine issues that are extremely complex and often outside the mandates or workplans of other international organizations.

The study will be closely scrutinized by a number of constituencies in all three NAFTA countries and beyond North America. The CEC was reminded that there is a great deal of interest in NAFTA internationally and in its environmental implications. For example, NAFTA is currently the subject of review in the WTO. Therefore, the NAFTA Effects Project will not go unnoticed internationally and the CEC should regard this attention as an opportunity to advance important work. The work should be credible and systematic. Indeed, the NAFTA Effects Project presents the opportunity to develop new and important findings that may be applicable to other regional arrangements such as *Mercosur* and the European Union.

2. Balance

The effects of NAFTA will be felt throughout North America. There were a number of general comments suggesting that the discussion paper and the presentations at the workshop tended to focus too heavily on Mexico. Although Mexico is important, it should not become a case study for this project and there are important environmental issues, as well as significant and important effects in Canada and the United States in relation to NAFTA.

The US-Mexico border region was highlighted as a critical area for consideration as a separate geographic entity along with the three NAFTA countries. The implications on the environment of the shifts in the structure of the border economy and the *maquiladoras* since NAFTA was recommended as one area for study. For example, in 1995, 465 new *maquiladoras* were established and 59 percent of them were not along the border but in the interior of Mexico. Also, increased sales of goods from *maquiladoras* are remaining in Mexico as opposed to being shipped back to the United States. This could have impacts on cross-border traffic as might increasing *maquiladora* exports to Europe and Latin America.

3. Causation

A number of participants raised the difficulty of showing clear cause-and effect relationships in this study. For a variety of reasons, some expressed a concern that strict scientific causation would be almost impossible to prove. First, the data does not support strong findings of causality. Second, there are a number of impacts of trade liberalisation beyond NAFTA and it is difficult to separate the impact of NAFTA from the impacts of the GATT and from general globalization and competitiveness issues. Third, as the North American economy becomes more integrated, it becomes increasingly difficult to isolate individual events and factors as causes of environmental degradation or improvement, particularly as governments attempt to integrate environmental concerns into policy formulation. In particular, in determining how firms and individuals respond to the economic incentives of NAFTA, there may be some logic to attributing some level of causality to those changes in economic incentives. But it makes less sense to talk about how governments respond to the NAFTA and attempting to make links of causality with respect to policy changes.

There was a suggestion that, instead of attempting to prove strict causality, the Project team(s) should look for “causal relationships”, patterns and directions that make sense with respect to linkages between trade and the environment.

4. Policy Relevance

A number of participants suggested that it would be useful for the study to focus very squarely on the policy matters that were of concern to the negotiators and policy makers at the time that the NAFTA was negotiated. That is, the study would be doing a service if it attempted to answer questions such as: Is the pollution haven hypothesis valid? Do dirty industries migrate? Are maquiladoras moving away from the border? Has the NAFTA improved access to a "clean field" and state-of -the art environmental technologies?

The recent publication by Public Citizen entitle *NAFTA's Broken Promises: The Border Betrayed NAFTA's Environmental Effects* (January 1996), indicates that there is continuing and sustained interest in NAFTA's environmental effects. Thus, it is important that the NAFTA Effects Project carefully consider the questions posed above and produce an objective and balanced study, in order to contribute to the policy debate in the future.

NAFTA is a dynamic process. It has changed the organization of social, economic and environmental boundaries in North America. Thus, it is natural for the governments to assess the consequences of the process. Indeed, the exercise of assessment is an important one, not only for the governments. Assessment is also an essential element for building public constituencies.

5. Breadth

Another issue that was raised repeatedly at the workshop was the issue of breadth and scope of the project, not only in terms of issues, but within issues. In an attempt to be comprehensive, it was suggested that the study pose questions and test theories designed to assess the environmental implications of NAFTA as rigorously as possible.

A focus on the mechanics of change, as opposed to a snapshot of indicators, was proposed. Also requested was the consideration of a life-cycle analysis to understand how different effects take place at different states throughout the life cycle. A balance between potentially positive and negative effects was stressed. A number of individuals also suggested that the study include issues such as NAFTA's impact on efficiency as it affects the environment, technological improvements, diversification and investment location, and the resources available for environmental protection. A number of individuals also suggested that the study include indicators of human health.

6. Importance of Rule Changes and the Institutional Context

The importance of institutions and their future role in NAFTA was a recurring theme throughout the workshop. Participants considered the institutional framework of NAFTA as the element likely to have the most influence in terms of its environmental effects, as well as for the management by the three countries of those environmental effects both individually and collectively.

Because the importance of the US-Mexico border region was highlighted as critical for this study, a number of participants suggested that the CEC consider the BECC and the NADBank as being within the scope of the project, even though they are not formally linked to NAFTA but are indirect outgrowths of the NAFTA process. A number of participants suggested that the BECC and the NADBank, along with the CEC, are integral part of the NAFTA process. This is because without that process they would not have been created, and without the environmental institutions, NAFTA

may not have been passed when it was. Therefore, the border institutions are linked integrally to the NAFTA regime. They are an essential element of the environmental rule changes and for consideration of new procedures and processes when making environmental decisions among the three countries of North America. The creation of the CEC, the BECC and the NADBank was put forward as perhaps the most immediate environmental benefit from the NAFTA, certainly in their ability to improve communications and encourage the three countries to work together to protect the North American environment. Taken together, the CEC, the BECC and the NADBank are considered to have the potential to make substantive contributions to the mitigation of environmental effects in the three NAFTA countries.

7. Focus/Environment First

A number of participants at the workshop suggested that the starting point for analysis under the NAFTA Effects Project should be the environmental dimensions of the relationships between the three NAFTA countries. That is, while the economic analysis is very important for the study, it would be valuable to determine first what the state of the environment is, determine what the effects of NAFTA may be, and then incorporate the economic analysis into the study, rather than use the economic analysis as a point of departure.

However, there were also cautionary voices urging the CEC not to lose sight of the trade element of the project. NAFTA is a trade agreement, not an environmental agreement, and in order to ensure that the study is a manageable undertaking some people emphasized the need for it to have clear parameters. The point was made that there is a lot of independent work being done on the environment in North America by the CEC and others that could overshadow the trade analysis, whereas there is little if any work being done on the impact of NAFTA on the environment.

8. Migration and Land Degradation

Some individuals at the workshop noted the importance of the relationship between land degradation and NAFTA. This would include, for example, the link between land degradation and new agricultural practices which may have been induced by NAFTA and migration from the rural dryland areas into urban centres. There are projections that this migration will increase under NAFTA putting tremendous pressure on the urban infrastructure, particularly in Mexico. The environmental impacts of population growth, consumption, enforced migration, the abandonment of rural areas and increased poverty may well be significant.

9. Communities and Social Actors

There were a number of concerns raised about the need to focus on specific social groups, not only on economic sectors to determine in particular whether specific groups that interact in sensitive ways with the environment have been affected by NAFTA. This is related to the issues stimulated by rural dislocation as there may be environmental implications by the dislocation of communities that have provided environmental stewardship on a given piece of land for hundreds of years. In this context, it was suggested that be some discussion of the role of indigenous communities. Other groups considered by the NAFTA Effects Project should extend beyond environmental NGO's to include local authorities, parliamentarians and the business communities in the three NAFTA countries.

10. Sectors

There was strong general support for the study to move quickly to consider selected sectors for more detailed examination. Many participants noted that an analysis of specific sectors and issues would be very useful and would produce interesting results. Given the difficulty of establishing clear cause and effect relationships, the analysis of specific environmental issues within the context of economic sectors that have been affected by NAFTA will assist in tracing patterns and developing relationships between trade and the environment. A cautionary note was expressed warning that the NAFTA Effects Project should not look only at manufacturing sectors, for that might risk biasing the study towards negative findings.

In selecting sectors, a number of participants suggested that the CEC should not simply pick those sectors that have experienced the largest changes in trade or investment as a result of NAFTA. Rather, participants suggested that sectors could be selected based upon their potential impact on the environment. For example, transportation equipment should not be selected unless it included emissions, because the production of automobiles is not a major source of pollutants. Similarly, sectors such as trade in environmental technologies and services and trade in hazardous wastes and chemicals were noted as having the potential for significant environmental effects.

Given the focus on land degradation, a number of participants who suggested that agriculture and rural development would be a rich sector for study. Other sectors that were highlighted were refining, energy and electricity generation, and petrochemicals, all of which are perceived to have important implications for the environment.

Transportation and transportation infrastructure was considered to be an essential issue for examination and analysis. It was cited as a major contributor to air quality, with direct linkages to trade through the movement of goods, as well as indirect linkages through the effects of privatizations in the transportation sectors. Transportation mode shifts have the potential to create significant environmental effects. Depending on which forms of transportation are adopted, it can have positive or environmental effects. A sector study could focus on transportation infrastructure and the way that services are delivered. The automotive sector was considered important from the perspective of emissions as well as by virtue of the dramatic increases in trade from Mexico to the United States in automobiles and automotive parts.

Appendix B
Rationale for Sector and Issue Selection

I. General Sectoral Rationale

The criteria used to identify general sectoral areas are as follows:

1. The sector relates directly to the major environmental media and natural resources
2. The sector has been the subject of public environmental concern in all three countries
3. The sector has been the subject of changes in the economic rules set by NAFTA
4. The sector has experienced increased in trade in the post-NAFTA period
5. The sector has been the source of new direct foreign investment from and to all NAFTA parties since 1994.

A. Agricultural Sector

A study of the agriculture sector, including the major crops and livestock produced and traded within the NAFTA region and focused on the priority environmental issues arising from possible impacts on the Canadian dairy and poultry, and grains and oilseeds industry from NAFTA enhanced trade and expanded US production and competition, Mexican imports of US corn and exports of fruits and vegetables, and water use.

The agriculture sector represents a central public policy concern and much intergovernmental activity throughout the NAFTA area. Among some of the major public policy issues raised by in the agricultural sector in North America include the implications of recent major reforms in Mexican agricultural law, the increasing incidence of agriculture non-tariff barriers throughout the NAFTA region, and the dismantling of Canada's supply-managed milk, dairy, egg and poultry industries.

1. Relationship to Major Environmental Media and Natural Resources

- The use of arable land.
- Agricultural activity impacts on water scarcity.
- Environmental impacts of pesticide and fertilizer use.
- Impacts of migration and emigration related to agriculture.

2. Issues of Public Concern

- Reduced subsidies will lower environmental impact in that there is a lesser incentive to cultivate marginal lands, reducing potential for erosion deforestation and loss of biodiversity.
- Environmental impacts may be intensified to make the same land more productive, resulting in increased tillage, irrigation and pesticide application to certain crops and conservation practices will be abandoned.

3. NAFTA Environmental and/or Economic Rule Changes

- Tariffication of all protection between the United States and Mexico.
- Elimination of over quota tariff rates over a period of several years between the United States and Mexico.
- Half of US farm exports to Mexico dropped to zero tariff on the first day of NAFTA.
- Reduction in Mexican subsidies to workers who grow rain-fed corn.
- Creation of Committees and working groups to resolve issues relating to sanitary and phytosanitary standards (SPS).

4. Importance of Trade

- Agriculture and food products sector count for 3percent of GDP in the United States, 3.5percent of GDP in Canada and 9 percent of GDP in Mexico.
- There are large trade flows of agricultural products throughout the NAFTA region: The US accounts for over 90 percent of Mexico's agricultural exports and over 70 percent of its agricultural imports; Mexico takes 7 percent of US agricultural exports and provides 10 percent of its imports; the US is the largest agricultural trade partner of Canada, taking in 1990 one-third of Canadian agricultural exports and supplying two-thirds of its agricultural imports.
- Major exports between Canada and Mexico increase— grains and oil seeds, fruits and vegetable, dairy.

5. Importance of Investment

- US FDI to Mexico increased from an annual average of US$0.6 billion in the pre-NAFTA period (1989-90) to an average of US$1.0 billion in the post-NAFTA period (1991-94).
- According to investor interviews, the processed food industry has been a sector where new NAFTA induced investment has resulted in a reduced rate of emissions.

B. Energy Sector

1. Relationship to Major Environmental Media and Natural Resources

- The petroleum sector has major environmental impacts at all stages of the production process: exploration, development and production; oil refining, ancillary activities such as transport (by pipeline, sea tankers, rail and road), marketing, storage, petrochemical production; and usage in major areas, notably the automotive industry.
- Potential for environmental impacts of NAFTA-induced substitution effect of natural gas for more highly polluting fuels/oil.
- New infrastructure development will create environmental impacts throughout the NAFTA region.
- Re-concentration of refining operations as a result of the agreement.
- Environmental impacts of auto emissions throughout the NAFTA region.

2. Issues of Public Concern

- Reduction of air pollution due to greater use of natural gas.
- Increased trade in energy (particularly US exports) may increase exploration and extraction in the United States with environmental impacts.
- Impact on natural resources due to expansion of the petrochemical sector.
- Affect on incentives for energy conservation in the United States due to more secure access to Mexican oil reserves and Canadian hydroelectric power.

3. NAFTA Environmental and/or Economic Rule Changes

- Ending of Mexican policy restricting hydrocarbon exports to any one country to no more than 50 percent of Mexico's total petroleum exports.
- Gradual opening of Mexican petrochemical sector to foreign investment.
- Liberalization of gas distribution to foreign investors.
- Confirmation of FTA's Chapter Nine provisions including the proportionality requirement for the quantity and price of transborder oil and natural gas sales.
- The Land Transportation Standards Subcommittee is responsible for making compatible the Parties' relevant standard-related measures on bus, truck and rail operations, and transportation of dangerous goods. The Land Transportation Standards Subcommittee operates within the scope of the Committee on Standards-Related Measures and its legal authority is found in Article 913(5)(a)(i) and Annex 913.5.a-1 of NAFTA. It is charged with implementing a work program within 3 years of the entry into force of NAFTA to make compatible the Parties' relevant standard related measures respecting vehicles including measures relating to emissions and environmental/pollution levels not covered by the Automotive work program established under Annex 913-C.
- The Automotive Standards Council established under Article 913(5)(a)(iii) and Annex 913.5.a-3 of NAFTA is responsible for facilitating the attainment of compatibility among, and review the implementation of national standards-related measures of the Parties that apply to automotive goods, and to address other related matters. In developing its work program, the Council may address other related matters, including emissions from on-road and non-road mobile sources. (No specific dates are given)

4. Importance of Trade

- Energy accounts for a substantial amount of North American trade.
- NAFTA opens up trade and investment in autos in a significant way.
- Gradual opening up of Mexican petrochemical sector to foreign investment.
- Petroleum accounts for more than 80 percent of the production of primary energy in Mexico, 32 percent in Canada, and 27 percent in the United States. Petroleum production accounts for 63 percent of final energy demand in Mexico, 40 percent in the United States, and 31 percent in Canada.
- Planned expansion of natural gas production in Mexico will have major impacts in the structure of the Mexican internal energy demand and in the patterns of energy trade between Mexico and the United States (there are a number of natural gas exploration and infrastructure projects planned in the immediate future).
- Automobile sector extremely important to North American economy and the auto sector is an important driver of NAFTA.
- The effect of tariff reduction on cars and trucks and parts.
- The liberalization of car imports (including used cars) into Mexico.
- Possible effects from the homogenization of standards.

5. Importance of Investment

- There is a gradual scheduled liberalization in Mexico to allow foreign investment in the auto parts industry and the quality of parts will have a significant environmental effects. This is associated with the quality of fuels required for use in the new car models and the efficiency in the use of fuels.
- There may well be effects of the relocation of manufacturing facilities for parts across the NAFTA region.
- The relocation and possible increase of car plants in the three countries including the attraction of third-party investment into the NAFTA region as a result of greater market size and competition.

II. Rationale for Selection of Specific Issues

The criteria used to identify specific issues are as follows:

1. General/Sectoral *(Does this issue fall within a primary economic sector identified in the framework of importance in North America?)*
2. Environmental Importance *(Is this issue significant from an environmental perspective?)*
3. Contribution to the General Framework *(Does this issue study contribute in at least one important way to the framework and taken as a whole, will the issue studies cover all of the environmental media and linkages to the environment that need elaboration in the framework and for which other work is not available?)*

4. The NAFTA Context *(Does the issue bear some significant relationship to the integration of the North American economy through NAFTA rule changes, government policy changes, institutional changes, investment changes or direct trade impacts?)*

5. Broad Policy Implications *(Will this analysis contribute to other issues of importance in North America at the Commission and among our constituents and how?)*

A. Maize in Mexico

This issue study would examine the impacts of liberalization in the Mexican white corn sector and its environmental effects. NAFTA made significant changes to the US-Mexican agricultural trading relationship. At the same time, Mexico reformed its agricultural and subsidy policy relating to maize. NAFTA-induced policy changes and rule changes could generate both positive and negative environmental effects impacting environmental variables such as land, water and biodiversity.

1. General/Sectoral

This issue falls within the agricultural sector which has been identified in the general framework as a primary sector of importance to North America.

2. Environmental Importance

Farming communities can utilize unsustainable farming techniques (no alternating of crops, environmentally degrading fertilizers), which can have negative impacts on soil, water, forests and related biodiversity. Given the scarcity of arable land, and without the technology to substitute crops, some land could be abandoned as farmers migrate to more fertile, forested land, the stability of which could be disrupted. A shift to commercial, irrigated maize products could impact water supplies. Changes in maize production could also alter the genetic diversity of Mexico's indigenous seed strains.

There could also be environmental benefits from the structural changes in maize production. Accompanied by policy changes, these shifts could lead to a more efficient market. These include the more efficient use of input subsidies and increases in public and private investment in agriculture that will encourage new technological developments.

3. Contribution to the General Framework

This study develops the general framework by addressing the environmental media of soil, water and biodiversity. More specifically, it focuses on soil degradation, land use, and crop diversity. This study deals with the social dimension of sustainability, through the linkage of social organization and migration. It also examines, the impacts of the changing grain production sector, together with related adjustments in national government policy.

4. The NAFTA Context

The changes made in NAFTA affected Mexican-US trade in agriculture substantially. Its provisions tariffied all protection between the two countries, and eliminated over-quota tariff rates over a period of several years. Prior to NAFTA, several national agricultural policy changes were introduced, notably the reform of Mexico's agriculture law permitting the ownership and sale of communal lands and the reduction of government subsidies for corn production. Mexico subsequently adopted in NAFTA a tariff-rate quota designed to eliminate protection against imports of lower-priced US corn over 15 years, and recently decided reduce the period of protection.

5. Broad Policy Implications

This is a rich issue from an environmental perspective. Through the exploration of the complex environmental variables related to it and an examination of the NAFTA rule changes and NAFTA induced policy changes surrounding this issue, it is one that promises to serve as a useful model to clarify some of the linkages between trade liberalization and processes that affect the natural environment. An important contribution will come from a careful identification of ecologically beneficial effects of NAFTA induced changes in the maize economy.

B. Concentrated Feedlot Production of Cattle in the United States and Canada

NAFTA rule changes have altered trade and investment flows in the agricultural industry, with many of the most significant changes taking place in the US-Mexican agricultural trading relationship. In an effort to take advantage of the new trading environment, firms are rationalizing cattle production in North America. Environmental impacts and regulatory changes have occurred as a result of more concentrated feedlotting of cattle in particular areas of the United States and possibly in Canada. This study will examine the environmental impacts of the altered structures of this industry, and its implications for cross-border trade in livestock and feed grains.

1. General/Sectoral

This issue falls within the agricultural sector which has been identified in the general framework as a primary sector of importance to North America.

2. Environmental Importance

Concentrated feedlot production of cattle will have local and direct impacts in the United States in the areas of waste disposal, water quantity and quality in adjacent areas and aquifers, air quality and odors, soils, and animal welfare. Less direct impacts including those on public health will also be examined. For example the intensive production of feed grains for cattle (maize, sorghum and feed wheat) pose challenges to the maintenance of soil and water quality. Likewise, cattle production, especially prior to feedlot-fattening, is linked to range management, and the ecological interactions between cattle and range quality and wildlife habitat. Additional indirect impacts concern transportation infrastructure and energy use as large volumes of grain are moved from their points of origin to concentrated livestock feeding centers, and cattle to processing and production locations.

3. Contribution to the General Framework

This study will address the environmental media of soil, water and air. It develops the linkages to the environment of production activity by examining the links between cattle feeding and production of inputs (feedgrains) and outputs (livestock products), including the overall organization of this production flow. This study also develops the identified in the general framework by examining the infrastructure supporting the production patterns (waste treatment facilities, water use and availability and transportation) and the social and governmental context of livestock feeding (impacts on local communities, land use and labor migration). Government policy links include recent shifts in US agricultural policies, environmental policy changes affecting both feed and livestock, and their impacts and the shape of the future regulatory environment.

4. The NAFTA Context

The increase in trade in this portion of the agricultural sector is driven by a NAFTA-specific trade along the US-Mexican border. This has encouraged American producers to purchase cattle from Mexico, ship them to the United States to fatten them in concentrated feed lots with lower-priced US grain and then subsequently ship processed meat back to Mexico as well as throughout the United States. This study will further examine the relevance of the NAFTA regime in explaining various changes in the investment and trade, with specific attention to NAFTA rules and tariff reductions.

5. Broad Policy Implications

The concentrated feedlot production of both cattle and hogs is an emerging problem in Canada as well as the United States, as Canadian meat producers seek to take advantage of a more favorable post-NAFTA regulatory structure. In Mexico, imports of US feed grains are posing challenges for producers of more traditional grains, notably maize. This makes this study especially important not only for the livestock sector, but as it relates to the feed grain and food grain needs of North America.

C. Electricity Trade in North America

This issue study would examine the environmental implications of the increasing potential for trade in electricity, fuels and related technologies. Electricity sectors in North America are undergoing a process of significant structural change. Traditional industry structures are being exposed to new types of competition, which are being introduced largely as a result of gradual easing of restriction on who can generate, transmit, distribute and sell electricity. There is also increasing interest in the potential for cross-border trade in electricity both between Canada and the United States, and Mexico and the United States. In Canada and the United States, this trend is towards deregulating the transmission access of sub-federal public utilities.

1. General/Sectoral

This issue falls within the energy sector which has been identified in the general framework as a primary sector of importance to North America.

2. Environmental Importance

A trend towards deregulation could impact energy efficiency, renewable energy use and fuel diversity investments by regulated utilities. Environmental impacts related to air quality standards and climate change could be both local and transboundary. There are potential impacts from increasing electricity trade on the release of the major atmospheric pollutants (SO_x, NO_x, and CO_2). However, there are also a number of opportunities for positive environmental effects brought about as a result of the increased use of new technologies such as combined cycle gas turbines that will encourage changing patterns of fuel use to incorporate a greater reliance on natural gas.

3. Contribution to the General Framework

This study will address the environmental media of air, land, and water, and will also touch on biodiversity. The study will examine the connecting process of government policy by addressing conservation and consumption policies. This is important particularly because it will address the role of public utilities at the sub-federal level (provinces and states). It will also explore the connecting process of infrastructure in the context of transmission methods. From the perspective of NAFTA rules, this study contributes to the general framework through the examination of national treatment provisions and proportional energy access provisions of the NAFTA text. Also of relevance are NAFTA's rules for government procurement.

4. The NAFTA Context

NAFTA has resulted in a greater consciousness of the movement toward integration and foreign investment in North America and a general increase in competitive pressures and an awareness of the advantages of a more continental market. Although significant levels of such trade have long existed between the United States and Canada, the volume is expected to increase between 1994 and 1997, and growth rates in Mexico are expected to increase more rapidly. Restructuring in the industry may also allow large users to seek an advantage in a new competitive market by accessing cheaper sources of power previously unavailable to them.

As the electricity market is deregulated to facilitate open competition and free trade among Canada, Mexico and the United States, this trade will be governed by NAFTA. New mechanisms could be required to substitute for the traditional mechanisms for regulating the environmental consequences of this trade. Any new instruments could be challenged as non-tariff trade barriers between the trading jurisdictions. A coordinated approach to addressing these issues does not exist.

NAFTA's procurement policies have opened up markets for new technologies that can encourage fuel-switching from relatively polluting fuels to cleaner ones.

5. Broad Policy Implications

This is an important public policy issue which is generating a great deal of interest in North America. As well, if impacts can be ascertained in the Canada-United States relationship, they may emerge in the Mexico-United States relationship where trade is likely to increase at a much faster rate as the Mexican electricity sector undergoes similar forms of liberalization. A Canada-United States analysis could tend to point to policy implications that might be expected in the Mexico-United States relationship and even in a prospective Canada-Mexico relationship.

Appendix C

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Appendix D

Expert Consultations on NAFTA Effects General Framework and Agriculture and Energy Issues Studies

16–17 October 1997: Conclusions for the General Framework

On 16–17 October, the Commission for Environmental Cooperation held two consultations at its offices in Montreal. Both were designed to consider issue studies that are being undertaken under the auspices of the CEC's NAFTA Effects Project. On 16 October, invited participants (see attached list) considered issue studies undertaken in the agriculture a sector and on October 17th, a second group of participants considered an issue study undertaken in the electricity sector (see attached list). These issue studies are being carried out in order to test and enrich the design of a framework to assess the affects of NAFTA on the environment. The consultations were an effort to put the work before a broader audience of experts in order to consider the linkages that the CEC has drawn between the economy and the environment. They also served to assess whether the empirical studies which are being used to test and refine these linkages are accurate, balanced, relevant, and whether the framework is allowing for the consideration of the correct issues.

Specifically, within the discussion that followed presentations from the authors of the studies, the participants were asked to consider the following four questions in order to assist the project team in the final stages of its work.

- What elements of the framework are most important for analysing and informing the case studies?
- What additional environmental issues should be addressed and what are the appropriate indicators of additional existing issues?
- Are there specific statistical or analytical data sources that should be consulted?
- What are the linkages or sequence of events that should be given further amplification in the issue studies or the general framework?

The major conclusions that were drawn from the discussions on both the 16th and 17th of October for the application of the general framework are the following.

General Comments

1. The Framework as a Solid Analytical Tool

There was general consensus that the framework as presented in the consultations and as being applied in the issue studies is a solid tool for assessing effects of NAFTA. There was some discussion about elements that could be added to the framework, as well as some discussion about clarifications that could be made, but the general framework was accepted as an important tool for problem identification in a complicated set of commercial, social and political relations. The framework captures and describes issues that are most salient and relevant to the question of NAFTA effects. Further, the predictive power of the framework is very important and the framework's capacity to identify trends and project them outwards is key, particularly in order to mitigate any negative effects that might occur in the future.

The CEC's application of this framework was applauded in that it is the only organization undertaking this kind of work, and in a privileged and unique position to do so. In addition to the interest in the framework, there was also interest in the individual issue studies, the data being analyzed, and the treatment of specific sectors. A number of participants asked whether they could see the larger studies and when they would be published.

2. Description versus Prescription

There was some discussion about whether the framework, and thus the studies, should be prescriptive. Some participants were of the view that it was not the analytic role of the studies or the CEC to prescribe policy or even present policy options. Rather it is the role of the CEC to provide information that could lead to prescription. This might include an analysis of barriers and constraints to sustainable development or the exploration of successful models, programs or initiatives which would lead to further policy analysis. Some participants felt that it would be appropriate for the CEC to influence policy, while others felt that the CEC's role is to observe and report as opposed to attempting to cause a certain type of behavior. Nevertheless, the general consensus that emerged was that the framework, at least as it is applied by the CEC in the issue studies, would not take issues beyond the descriptive and analytical stage into policy making. Rather, it should identify issue areas and provide decisionmakers with the raw materials to make policy. Finally, if the team's analysis is inconclusive with respect to a NAFTA effect, the studies should acknowledge that.

3. Define Scope, Focus and Purpose of the Study

There was general agreement that the framework should include, in its introduction, provision for the clear definition of the scope and focus of the issue to which it is being applied. This should include a definition of the sector as it will be considered, including the geographic scope of the study, identification of the parameters of the work, and expectations of what the work is attempting to do so that it can be reflected in the results. This is particularly important given that the studies under the framework are designed to assist policy makers to make decisions and focus their work in order to improve the environment.

In the discussion on electricity, for example, the study should identify whether it includes hydro and if not, how the study has been narrowed. Similarly, in the cattle study, the scope of the study to examine feed grains and processing but not other linkages either forward or backward should be clearly explained. In the maize sector, the study should define maize and in so doing make the distinction between yellow corn and white corn.

The need for clarity in scope includes the comprehensive framing of any assumptions that a particular study will make. The framework should insist that assumptions that may be inherent in the study are identified and discussed.

4. Place the Subject in its Geographical Context

The framework is designed to be applied to one sector in one of three NAFTA countries as in the maize study, to apply to a sector in the context of two of the NAFTA countries, as in the cattle study or, as is the case in the electricity study, to apply to a sector that crosses all three countries. It is critical that when there are multiple jurisdictions involved in a study, that provision is made in the framework that will allow for the sector to be considered within its proper geographical context(s). This was generally agreed upon by all participants considering all of the studies.

Such a contextual introduction should highlight the diversity of experience and expectation across the countries considered in any specific study. It should include an explanation of the differences within a specific sector in each country. It would highlight their different priorities, stages of development and thus, the different points from which the analysis begins. In the electricity study, for example, this was highlighted in the discussion of the difference between state owned monopoly utilities and privately owned utilities. These use very different mixes of fuel depending in which of the three countries they are located and NAFTA will effect these entities in very different ways. By highlighting the differences between national jurisdictions in the same industry, the studies will be forced to consider that the results of the analysis may differ as well. When necessary, the framework should also be able to accommodate differences between sub-federal jurisdictions. Thus, any study carried out under the framework should reflect the great differences within and across jurisdictions from the perspective of resources, technology, law, regulations and culture.

5. Place the Subject in its Social Context

Just as it was stressed that the major differences among jurisdictions must be considered when appropriate, there was some discussion at the meetings of the social context of a particular issue. It was recognized that in some cases the social context of an issue can be very important for that issues environmental footprint, there were also participants who considered the issue of sustainable development as one that should be infused in the framework. Thus, as the framework requires that an issue under examination be placed in its environmental and economic context, it was suggested that it should also be considered in its social context. Examples were raised specifically with regard to agriculture where the importance of maize to society and culture in Mexico was highlighted, but also in relation to the importance farm level effects stemming from the analysis of the cattle sector in the United States.

6. Balance between Historical and Prospective Analysis

There was considerable discussion over the course of both meetings about the issue of whether the framework should be backward-looking and focus on analyzing effects that have occurred, or be forward-looking in an attempt to identify trends. There was a general consensus that a blend of both approaches was necessary.

The retrospective perspective is considered important for a number of reasons. First, where data exists, the application of the framework to events that have occurred within the dynamic of NAFTA will assist the team and others to identify and understand better the links between environment and trade in areas where empirical data is absent from much of the literature. Second, the "historical" element is important in order the frame the issue in a way that can guide future policy including the identification of obstacles to environmental protection. Finally, it is a relationship that the CEC is mandated to look at.

On the other hand, there is an important prospective role for the framework. This is true in order to identify trends and take into account activity that may include long lag times for capital investment, such as electricity generation. It also responds to some concern from industry and government, in particular, that a prospective approach would allow the framework to consider recent and current activities, policies and proposed standards that have been undertaken in order to ameliorate some practices that might have been detrimental in the past.