

## **INTEGRATION OF ENVIRONMENT AND DEVELOPMENT IN DECISION MAKING**

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### **Contents**

1. Introduction
  2. Objective
  3. Pressures
  4. State
  5. Responses
  6. Conclusion
- Glossary  
Bibliography  
Biographical Sketch

### **Summary**

This chapter examines the integration of environment and development in policy, planning and management decision-making. Because of its importance in North America, the market is examined as a mechanism for making social choices. Failures of the market and how these create environmental pressures are outlined. Economic growth as a means for improving human welfare is critiqued and the need for a more comprehensive definition of development is advocated. Strategies for responding to environmental pressures include creating a comprehensive national sustainable development strategy, improving planning and management systems and tools, increasing the use of economic instruments as part of more comprehensive reform of tax systems away from income onto consumption, placing an accurate value on natural capital, and measuring development with a more comprehensive indicator (e.g., replacing the GNP).

### **1. Introduction**

This chapter will examine the integration of the environment and development in decision-making. The pressures driving the need for this integration will be discussed, followed by a brief look at the current state of affairs. An overview of some of the current and potential responses to the pressures will be examined. Because of the interrelationship between the pressures, state and response, there will inevitably be some overlap between these sections.

### **2. Objective**

Based on Agenda 21, there is one overriding objective to the activities described in this

chapter:

- To integrate environment and development information at all decision-making steps and levels within society.

There are a number of sub-goals that arise from this objective:

- To integrate environment and development at the policy, planning and management levels;
- To provide an effective legal and regulatory framework;
- To make effective use of economic instruments and market incentive;
- To establish systems for environmental accounting.

### 3. Pressures

Environmental, biophysical and ecological issues have for much of the industrial revolution been largely ignored and neglected in decisions regarding human development. As our awareness of the limits of the earth's biophysical and ecological resources grows, environmental information becomes more important in development decisions. For economic development to be ecologically sustainable, the quality and stocks of natural resources and ecological systems must be conserved.

However, it is difficult to conserve resources when a growing population requires an ever-increasing amount of material goods and energy. Although population growth in Canada and the U.S. is fairly stable, there remains an insatiable thirst for new cars, televisions, clothes, and other consumer goods; our demand for materials and energy is growing even with a reasonably stable population. The North American economy is dependent upon the continual consumption of "things" requiring an ever-greater amount of resources – including more and more products made in the developing world. Activities that create environmental pressures in North America include urban sprawl, inefficient industrial operations, over-reliance on fossil fuels for energy production, and a lack of material conservation programs such as car-sharing, recycling, and product take-back initiatives.

Pressures on the local, regional, and global environment have manifested themselves in many ways in North America. While it is true that North Americans can feel proud of many regional accomplishments in environmental protection, there remain underlying effects that pose current and future risk to the biophysical environment. It is true that significant progress in environmental protection has been made in Canada and the US. Among these accomplishments are efforts to monitor and control persistent toxic substances, particularly those that have a direct effect on human health; efforts to reduce emission of precursors to acid rain and urban smog, efforts to improve the water quality in regional watersheds such as the great lakes and the Florida everglades; and efforts to reduce the use of ozone-depleting chlorofluorocarbons (CFCs). While work remains in each of these areas, the regulatory, institutional, and managerial capacity for dealing with them is growing. However, there remain lurking pressures such as the increased burning of fossil fuels and the climate risks associated with this, the loss of biodiversity, the unsustainable yields in forest and fish resources, and inefficient and improper use of

water resources. Initiatives such as the Model Sustainable Forests in Canada, the species at risk legislation in the US, and voluntary non-regulatory initiatives to reduce greenhouse gas emissions in both Canada and the US represent promising efforts in these areas. However, the actions to address these issues pale in comparison to the ecological and social risks posed by them. For example, many environmental experts feel that actions by Canada and the US to date in addressing climate change are inadequate.

### **3.1. Development and Economic Growth**

Development should be distinguished from economic growth. While economic growth considers primarily the material expansion of the economy, development includes more comprehensive attributes and qualitative improvement of the human condition. Clearly the two are strongly related, but it is wrong to assume they are the same.

The “development” era is generally traced back to 1949 when U.S. President Harry Truman, while describing conditions in poorer countries, labeled them as “underdeveloped.” The implications of being underdeveloped were clear: countries that were not like northern nations were substandard and should work toward the material comforts of the north. All countries were thought to be moving along the same track of economic growth and material accumulation, although some were moving more slowly. The northern countries were setting the standard for others to aspire to. In essence, a country’s level of development became related to its Gross National Product (GNP) and levels of material production. Development was not related to the level of civility, kindness, institutional resiliency, or personal growth.

Development, as defined by economic and material expansion, has pushed us closer to the planet’s biophysical and ecological limits. The earth’s carrying capacity is finite and cannot continually accommodate exponential growth in resource consumption. Redefining the concept of development is a fundamental aspect of integrating the environment into development decisions. Societies throughout the world will need to arrive at their own understanding of development – to what collective and individual goals they aspire. This is particularly true for the United States and Canada where development has long been associated with economic growth. Although material comfort will undoubtedly remain a central aspect of human development, North Americans are slowly recognizing that quality of life depends on much more. Shifting the notion of development from quantitative accumulation to qualitative improvement will be essential to integrating the environment and development in decision-making. Part of guiding and measuring this shift will be an expansion or modification of the System of National Accounts that is the basis for the Gross National Product (GNP) and Gross Domestic Product (GDP).

Although economic growth may not accurately or sufficiently represent human development, the market and the field of economics have much to contribute to understanding the means and methods for improving human welfare. Further, the market is emerging as a key mechanism for societal decision making, particularly in Canada and the U.S.

### 3.2. Mechanisms of Social Choice

Societies have many ways of making collective choices. These mechanisms are the means through which a society (local, national, supranational, and global) makes collective choices in a particular area or domain. In the areas of development and environment, there are a number of social choice mechanisms including:

- the market,
- administered systems,
- legal and regulatory frameworks,
- moral persuasion,
- bargaining and negotiation, and
- armed conflict.

In essence, a social choice mechanism is society's means for coping with or solving problems. In Canada and the United States, the free market has emerged as the dominant social choice mechanism in the last part of the twentieth century, creating both opportunities and difficulties in arriving at a rational outcome for environment and development decisions. If the market is to continue to be such an important mechanism for making collective choices in Canada and the U.S., we must carefully examine its adequacy and shortcomings for creating ecological and social sustainability.

#### 3.2.1. The Market as a Social Choice Mechanism

The market is defined by free and open exchange among its participants. Markets exist throughout the world to varying degrees of freedom and openness. In Canada and the United States, markets are generally considered "free" although government intervention and regulation for the "public good" is common. Markets make collective decisions for society, not through any grand scheme or plan, but through the aggregation of many individual decisions to buy and sell services and products. Individuals are assumed to act in their own rational self-interest (an assumption that has been challenged by behavioral economists such as Daniel Kahneman and Amos Tversky and will be discussed in section 5.1.2) and the market is guided by "an invisible hand." That is, markets are much like ecosystems; they are self-organizing, self-correcting, complex systems that function and operate at different levels. The aggregation of rational and self-interested decisions leads, in theory, to collective choices for the betterment of society as a whole. When working effectively, the market will allow society to make collective choices that create maximum utility for everyone involved in the market, continuous incentive to innovate and improve (which is a critical aspect of environmental management -- see the section Improved Planning and Management Systems in this chapter), and reasonably low administrative and transaction costs.

Despite the advantages of the market, ecological and environmental economists have repeatedly described shortcomings of the market system for making rational decisions about the natural environment. Critics of the market system describe a number of ways in which the market makes it very difficult for firms and individuals to behave in an ecologically sustainable manner (that is, one that conserves natural resources and

preserves ecological systems).

Although the goods and services provided within the market ultimately depend upon natural systems and ecological services, they are more often than not ignored in business decision-making. Throughout most of human history, this has not presented a serious problem, and certainly not on a global scale. As long as human activities were much smaller than the biosphere's ecological capacity, the potential to impair the planet's ecological integrity was small and not worth being concerned about. Many scientists now feel that we may be approaching ecological limits and question the logic of continued material expansion within the global economy. Still, these critics are typically dismissed as “neo-Malthusian” radicals and their ideas, although debated by ecologically concerned people, effectively remain outside of conventional economic decision-making and analysis. Economist Herman Daly has proposed a simple schematic to demonstrate the growing economy within a finite biosphere (Figure 1), pointing to the difference between what he called “empty world” and “full world” economics. Daly argues that the human economy has evolved from a point where man-made capital was the limiting factor in economic development to one where natural capital is the limiting factor. Despite its intuitive appeal, this schematic was widely rejected by traditional economists because it shows the economy to be dependent upon natural ecosystems and services, something that ecologists and environmental scientists would likely take for granted.

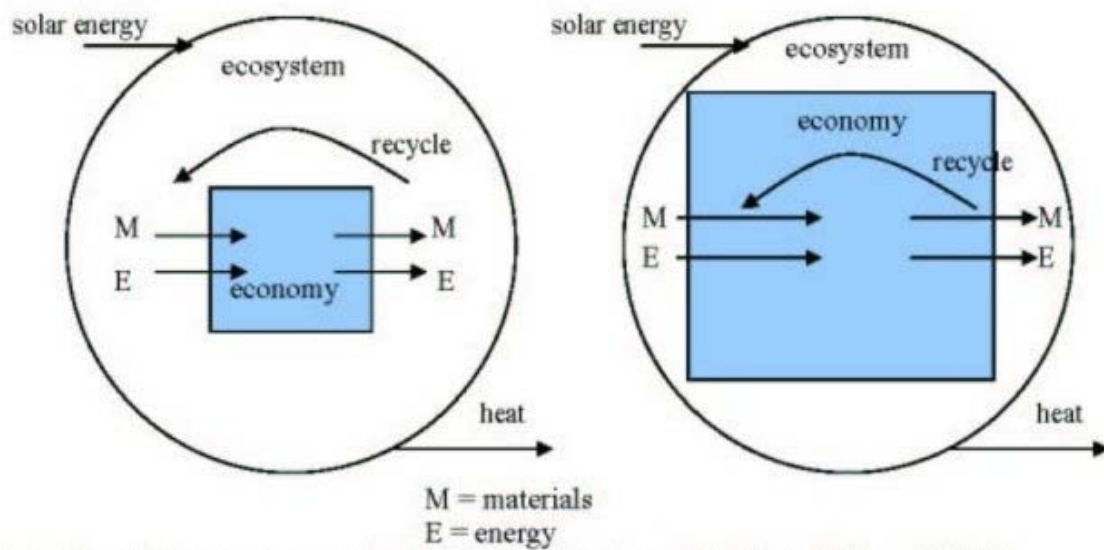


Figure 1: Showing the economy as a subset of nature, with “empty world” (left) and “full world” (right) schematics. The shaded box represents manufactured capital while the circle represents natural capital.

Simply put, our current situation is characterized by a growing population and growing material and energy consumption within the confines of a finite planet. In North America, population growth is effectively stable although energy and material consumption continue to grow exponentially. Biophysical problems arising as we approach ecological limits include, among others, climate change, ozone depletion, loss of biodiversity, acid rain, and soil erosion.

Failures of the market are often discussed in terms of externalities: unintended and uncompensated consequences resulting from actions by one group or individual that affect another group. Externalities, as their name suggests, are things that happen outside of the market and can be both positive and negative. By their nature, environment externalities tend to be negative impacts. The classic example is that of pollution caused by a local factory – the community members (both current and future generations) suffer, as a result of the factory's actions, but are not compensated within the market. If the factory were required to pay for the injury suffered by the community, they would reduce the amount of pollution they produced. One definition, taken from an environmental economics textbook, provides a clear definition of externalities.

*Externalities are unintended side effects of an activity in which two conditions hold. First, the full impact of the side effect is not experienced by the person responsible for it. Second, no compensation is provided to those who endure the side effects. Since the person causing the side effect does not fully experience its impacts, the perpetrator tends to ignore all or part of the consequences, and treats such impacts as external to his assessment of the benefits and costs associated with their activities.*

The market assumes that, where externalities exist, they can be corrected through regulation or economic instruments such as taxes and tradable permits. However, this assumption requires that the economic value of external damages can be accurately evaluated, something that is inherently difficult.

As the market does not actively recognize and value natural systems, it is usually only a fortuitous coincidence that allows economic goals to support ecological ones. Where this does occur, much progress can be, and has been, made. For instance, the market encourages efficient use of resources, as long as there is some cost for extraction or disposal. Where the cost is small or non-existent, the market will fail to use material and energy efficiently. Improved resource efficiency will require the market to place a higher price on natural resources, perhaps through taxes or other economic instruments. This type of incentive encourages activities that prevent pollution at its source rather than dealing with it after it has been created.

A second and less obvious difficulty that the market poses to the environment is its inherent requirement for economic growth. While economic growth is not unique to market systems (centrally planned economies can also grow), the market has three features that create the conditions for continual growth.

- Without growth, inequity and issues of fair distribution need to be more seriously addressed. The idea that the “rising tide raises all ships” does not hold true unless the economy is growing. As long as the market grows, the absolute income of the poor also increases, reducing the need to redistribute income.
- If the market is not growing, there will be low investment rates, which can lead to higher unemployment.
- The desire and need for profit creates the need to buy and sell products in ever-increasing quantities, causing a cycle of continued growth.

As a result of these features, it is generally felt in North America that a growing economy benefits all members of society. Over the past decade, Canadian and U.S. governments have made significant efforts to reduce spending, usually in areas such as welfare, housing allowances, education, and health care – spending that redistributes income from the rich to the poor. Reduced government spending and taxes are thought to stimulate economic growth and enhance competitiveness in international markets, thereby making everyone – poor and rich alike – better off.

Economist Herman Daly has eloquently described the need for what he terms a “steady-state economy.” Daly’s steady-state economy is not static but, instead, focuses on qualitative development rather than quantitative growth.

*“It is necessary to define what is meant by the terms ‘steady-state economy’ (SSE) and ‘growth economy.’ Growth, as here used, refers to an increase in the physical scale of the matter/energy throughput that sustains the economic activities of production and consumption of commodities. In a SSE the aggregate throughput is constant, though its allocation among competing uses is free to vary in response to the market... Growth is quantitative increase in the physical scale of throughput. Qualitative improvement in the use made of a given scale, resulting either from improved technical knowledge or from a deeper understanding of purpose, is called ‘development.’ A SSE therefore can develop, but cannot grow, just as the planet earth, of which it is a subsystem, can develop without growing.*

Strategies for correcting some of these failures of the market include ecological tax reform: shifting the tax base away from labor onto material and energy consumption. Details of this strategy will be examined in a later section of this chapter “Making Effective Use of Economic Instruments.”

Environmental economists distinguish between three types of capital: natural, manufactured, and human. Natural capital provides a range of ecosystem services such as climate and water regulation, water supply, soil formation and retention, waste treatment and nutrient cycling among many others. The capacity of natural capital to continue to provide these services is dependent on the resiliency of the ecosystem and the pressures that are brought to bear on it. Whereas traditional economists treat natural capital as being substitutable with manufactured capital, ecologists and environmental scientists would feel that there exists some natural capital that is *critical* to ecological integrity.

The time scale of market decisions is often not appropriate for longer-term biophysical decisions. Economists suggest internalizing these externalities to correct the market’s failure surrounding natural capital, although uncertainty surrounding future human-induced biophysical impacts can make this difficult. It is difficult to compensate for irreversible damages within the market. If a product or service causes long-term damage to the environment, the mechanisms for compensation are poorly developed.

A key assumption of economics is that humans are rational decision makers and have complete information. Even if this assumption does not hold, economists argue that

conventional models adequately represent the system. However, there is a growing literature in behavioral economics that suggests serious shortcomings in human choice and decision-making. People use a set of simplifying heuristics in complex, risky, and ambiguous situations. While these heuristics can be beneficial in most circumstances, they create systematic biases that lead to irrational decisions. Some have argued that these biases may also be ultimately responsible for the environmental problems we currently face.

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### Bibliography

Barron, W.F., R.D. Perlack and J.J. Boland. (1998). *Fundamentals of Economics for Environmental Managers*. Westport, CT.,USA: Quorum Books.

Bell, D.E., H. Raiffa, and A. Tversky (eds.). (1998). *Decision Making*. Cambridge, UK: Cambridge University Press. [This volume presents a series of articles discussing the psychology of human decision making, in particular related to the heuristics and biases that arise around judgment of future, uncertainty events].

Canadian Federal Government Commissioner of the Environment and Sustainable Development. Web site: [www.oag-bvg.gc.ca](http://www.oag-bvg.gc.ca) [This office contains information about the sustainable development strategies of federal departments and agencies].

Constanza, R., R. d'Arge, R. deGroot, S. Farber, M. Grasso, B. Hannon, K. Limburg, S. Naeem, R.V. O'Heill, J. Paruelo, R.G. Raskin, P. Sutton and M. van den Belt. (1997) The value of the world's ecosystem services and natural capital. *Nature*. 387: 253-260.

Daly, Herman (1996). *Beyond Growth: The Economics of Sustainable Development*. Boston, MA, USA: Beacon Press Books. [This book presents a series of writings on ecological economics and how macroeconomics have been, to date, disconnected from ecology. Daly is a well-known author and scholar in this area].

Gunderson, L.H., C.S. Holling, and S.S. Light (eds.) 1995. *Barriers to Bridges to the Renewal of Ecosystems and Institutions*. New York, NY, USA: Columbia University Press. [This volume presents a series of case studies examining adaptive management of ecosystems and discusses the notion of resiliency within ecosystems].

Hahn, R. and G. Hester. (1989). Where did all the markets go? An analysis of EPA's emissions trading program. *Yale Journal of Regulation*. 6(1): 109-53. Winter.

Hawken, P.A. Lovins, and L.H. Lovins. (1999). *Natural Capitalism: creating the next industrial revolution*. New York, NY, USA: Little Brown and Company. [This book presents a thoughtful analysis of resource productivity and how it might be achieved].

Meadows, Donella H., Dennis L. Meadows, Jorgen Randers (1992). *Beyond the Limits: Confronting Global Collapse, Envisioning a Sustainable Future*. Post Mills, Vermont, USA: Chelsea Green Publications. [This book represents an update of the 1972 Club of Rome report that examined the



ecological limits to economic growth].

Myers, N. and J. Kent. 1998. *Perverse subsidies: Tax money undercutting our economies and environments alike*. International Institute for Sustainable Development, Winnipeg, Canada. [This is an excellent study into how economic subsidies can have a perverse effect on the environment].

Schmidheiny, S. (1992). *Changing course: A Global Business Perspective on Development and the Environment*. Geneva: World Business Council for Sustainable Development. [A key book in the thinking around the role of business in achieving sustainable development. Explores the concept of “eco-efficiency”].

### **Biographical Sketch**

**Stephen D. Hill** is a post-doctoral fellow with the NSERC/SSHRC Chair Program in Risk Communication and Public Policy in the University of Calgary’s Haskayne School of Business. He holds a PhD in environmental science from the University of Calgary’s Faculty of Environmental Design. Dr. Hill is a professional engineer and has degrees in chemical engineering and biology from Queen’s University in Kingston, Canada. His research interests include climate change policy and management, sustainable development, and corporate environmental management. He has taught courses in sustainable development and environmental management at the University of Calgary.