THE ENVIRONMENT–ECONOMY GUIDE

KEY CONCEPTS, THEORIES AND PRINCIPLES

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FOREWORD

The goal of *The Environment–Economy Guide* is to foster debate. Its message is clear. We need better debating skills if we are to understand environment–economy interactions. We need a better debate if we are to achieve sustainability.

Progress on developing sustainable economies is mixed. There is still little consensus in society about the direction and pace of change required to make sustainable development operational. Attempts to relate environmental and economic crises are fraught with difficulties because environmental issues are often deemed to be outside the sphere of economic activity. A better understanding of the grammar of environment–economy relationships may persuade those in the economic sphere that environmental issues are not only relevant in economic decisions but absolutely vital. The environment–economy grammar set out in this guide makes the relationships clear. It may improve the quality of the debate about the direction and shape of environmental policy.

The preparation of the *Environment–Economy Guide* involved interviews and two workshops. Participants at each workshop included government officials, environmental activists, consultants, educators and academics. While the guide is not a consensus document, it reflects the general view of many workshop participants. These participants wanted a guide to help them understand basic economic arguments. They wanted a guide that could be used as a debating tool. Not all arguments are answered in the guide. But it is a start, one that can be built on over time.

The goal of this guide is to make us better environmental citizens. There is a need for the environmental community to understand economic arguments and how to debate them from an environmental and sustainability perspective. We need a type of anticipatory thinking which integrates the environment and economy. The ideas presented in the guide contribute to this new thinking.

It is a call for a more informed debate.

John Mills
Director General, Ontario Region
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PREFACE

In 1987, the Brundtland Commission estimated that the world economy could increase by up to ten times its present size by 2050. This would lead to a $130 trillion world economy. Many in the environmental community were staggered by the implications of such growth. Some argued that the proposed trajectory was still unsustainable. Others, particularly those in government and industry, found much they could agree with in the Commission's report, some even equating sustainable development with limitless growth.

Since then there has been a considerable debate about the concept of sustainable development. Governments have launched round table processes to bring different stakeholders together. Industry has met with environmental groups to seek joint resolutions to environmental problems. A great deal has been learned about each others' views. But a basic polarity remains.

Sustainable development, however, cannot be about limitless growth. Curtailing CFC production is a case in point. It is an example of how an environmental limit, the stratospheric ozone layer, changed a component of economic development. Failure to protect this layer would have direct consequences on human, animal and plant populations (increased incidences of skin cancer, cataracts, and crop damage). Yet, even given the CFC experience, the preoccupation with limitless growth continues. Perhaps one way of accounting for this is that we do not have an adequate way of relating economic and environmental issues. While concerns about the limits of conventional economics in dealing with environmental issues have been expressed for a long time, they have not been sufficiently persuasive to change the course of development. *Our dependence on the current economic system makes us reluctant to question it*. This dependence, however, is the source of many poor decisions.

We need a new way of debating economic and environmental issues. The environment–economy guide is a step in that direction. It provides arguments to tackle unsubstantiated assertions about how the economy ought to work. It provides rationales about why other factors and issues need to be considered. It is a debating tool for those who want to advance environment and sustainability arguments.

Tom Muir
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Robert J. P. Gale
Ecological Economics Inc.
Toronto, May 1996

1.0 ABOUT THIS GUIDE

The best way to protect the environment is to let the market operate freely!

Only economic growth can protect the environment!

Protecting the environment will cost jobs!

1.1 Introduction

This guide is about the environment and the economy. It is both a primer about economics and a tool kit of concepts and methods for environmental protection and sustainable development. The purpose of the guide is to show how the environment–economy relationship is debated and to provide a series of strategic responses to improve the quality of the debate in future deliberations.

Eight economic arguments are analyzed in the guide. Each argument is, in effect, a proponents' assertion about the merits of a particular economic viewpoint. This means that the assertions are prescriptive. Its proponent is insisting on an economic claim or right.

Prescriptive economic assertions occur everywhere. They appear in public policy briefs prepared by business, labour and social organizations. They exist in academic and political arguments. They are part of everyday conversation. And they prevail in the media. A review of newspaper and magazine headlines, for example, illustrates how writers can ignore or trivialize the relationship between the environment and the economy. Far too often the relationship is billed as a win–lose situation. The following headlines show how environmental issues are often portrayed:

- Manufacturers put environment low on list of concerns
- Green challenge bears a high price
- Weaker environmental laws may be the price of growth in Ontario
- Limitless growth: sustainable development is good business
- The best option [for managing Canadian fisheries]... is to expand private property rights into the oceans
- Emission standards hasty, industry says: more study needed, automakers, refiners say
- Beaufort spill warning disputed--Oil industry fires back at panel and warns of 'no activity' in area
- Saving owls could kill 100,000 jobs–study: Forest industry cites $3.8–billion cost
- Loggers vow to block road, cite job threat
- Fuel rules could cost billions: proposed new national standard for cleaner–burning gas and diesel would hit refineries
- Auto makers warn clean air costly: they say proposed new rules will add $1,260 to cost of average car
- A bleak choice: shelters or sewers

These portrayals provide a window on what many people believe about economics, the environment and sustainability. They are the product of a certain perspective with its own system of values and needs.

1.2 Debating Economic Assertions

Fortunately, a small number of economic assertions account for most of the rhetorical barriers to environmental protection and sustainable development. It is thus relatively easy to learn about the ideas behind them. The following eight economic assertions are considered in this guide:

1. **The free market assertion:** The best way to protect the environment is to let the market operate freely.
2. **The economic growth assertion:** Economic growth is required to protect the environment.
3. **The private property rights assertion:** Private property rights ensure environmental protection.
4. **The information assertion:** Environmental decisions should not be made without full scientific information.
5. **The technology assertion:** New technologies will solve environmental problems.
6. **The employment assertion:** Protecting the environment will cost jobs.
7. **The competitiveness assertion:** Higher environmental standards will make industry less competitive.
8. **The national debt assertion:** Deficit and debt reduction take priority over the environment.

Recognizing the context and perspective of an assertion is important in judging it worthy or inadequate. Assertions often illustrate the underlying inability of current development practices to assimilate the value of the environment into its discourse. These practices tend to ignore the real world existence of power, profits, pollution, public goods, natural resources and the common good--all of which may promote a false debate.

This is a guide for those who want to improve their debating skills in formulating environmental and sustainability policy. Given the formidable body of literature on economics, some guidance about how to analyze an economic assertion could help environmental practitioners in policy debates. There is a need to break down assertions and issues before analysis can begin. There is also a need to develop strategic responses that take environmental considerations into account.

The guide is organized by assertion, beginning with the free market assertion in chapter 3 and ending with an assertion about the level of government debt in chapter 10. The theories underlying each assertion are examined in the guide. A range of concepts capable of refuting each assertion and strategically defending sustainability is then considered. Chapter 11 draws together some conclusions about the concept of sustainability and how the guide can be used in policy debates.

With regard to each assertion, the report is organized as follows:

a) Each section begins with a few quotations about the assertion;

b) The assertion is discussed according to relevant concepts from neoclassical economics;

c) The assertion is analyzed for its shortcomings both within the dominant economic perspective and from the alternative and broader perspective of sustainability;

d) New sustainability concepts and alternatives are proposed to dispute the model or assumptions behind the assertion; and,

e) Finally, a summary of some key debating points are suggested as strategic responses to each assertion.

In chapter two, different approaches to economics and sustainability are explored. First, the presentation, analysis and critiques of models draws upon conventional neoclassical economic theory as it is applied to a market economy. This allows the reader to be clear about what can be contested within this theory.

Second, the emerging and alternative theory of ecological economics is introduced as part of the new discourse on the science and management of sustainability. Insights from other disciplines or critiques are used sparingly. It is worth mentioning, however, that many of the insights provided are general and abstract. While they may help readers debate issues, they are not a substitute for a familiarity with the specifics and data of a particular issue. It is clear that knowledge about the connectivity of the assertion to a given debate is required before one can decide whether to agree or disagree with it.

2.0 ENVIRONMENT, ECONOMY AND SUSTAINABILITY

Economic assertions are often based on the premise that the **environment** is like a commodity or consumer want rather than a life–support system for economic and other activities. This premise has negative implications for **sustainability.** It weighs economic values against environmental values and finds the latter wanting. This leads to conflict in policy debates. Resolving this conflict is a major public policy challenge. Ultimately, decisive government intervention may be required to protect the public interest in sustainability.

To tackle prescriptive economic assertions, it is important to be familiar with the economic discourse that produces them. A better understanding of this discourse is necessary for developing a new grammar of **environment–economy interrelationships.** A new grammar could restructure relationships and rules to integrate environmental and economical values and needs.

2.1 Neoclassical vs. Ecological Economics

Economics is often defined as the study of the allocation of scarce resources among competing ends. Yet, an economy is much more than an allocative mechanism. It is about how livelihoods, culture and the environment control or mediate the creation and exchange of goods and services. Too often, however, economics is analytically limited to exchanges of goods and services between people and firms.

***Environment** is used in this guide to cover all aspects of the natural environment, including conservation, resource depletion, pollution and environmental degradation.*

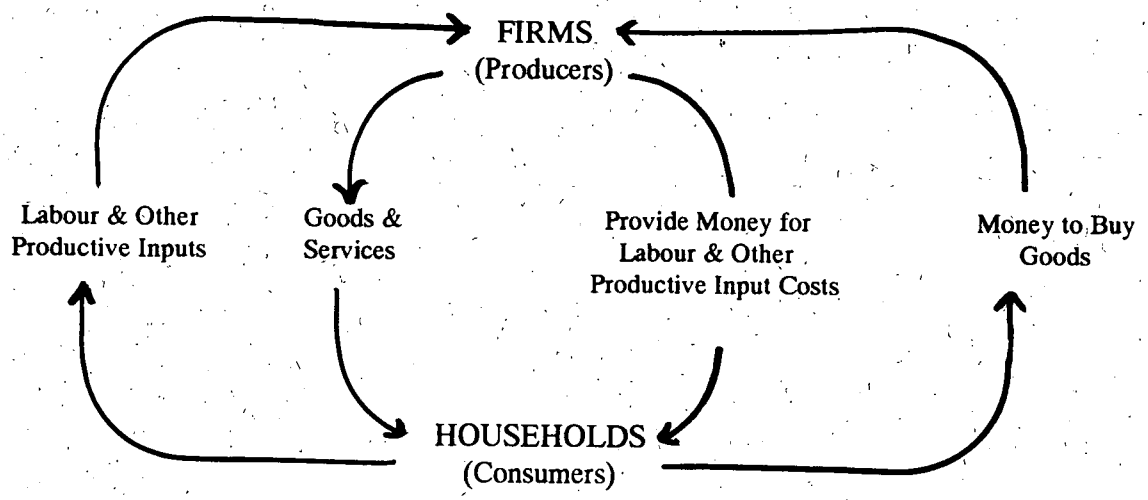
***Sustainability** is the capacity of an economy to improve the quality of peoples' lives in this and future generations by relating that quality directly to the maintenance of natural resource and ecological life–support services.*

*An **environment–economy grammar** shows the relationship between economic and environmental concepts and the established rules for applying them.*

As economics has become more quantitative and mathematically rigorous, it has also become less accessible to the non–specialist. Moreover, its relevance is often questioned by those who argue that economic theory ignores the natural environment. For those working on environmental issues, this leads to at least three positions on the value of economics.

One perspective, **neoclassical economics,** describes economic activity as a circular flow of labour, money, resources, goods and services between consumers (individuals) and producers (firms) in a market place (Figure 1). A properly functioning market is ideally one where consumer preferences are met. Neoclassical economists hold that their perspective deals best with environmental problems because the market regulates consumer preferences.

FIGURE 1 THE NEOCLASSICAL CIRCULAR FLOW MODEL OF ECONOMIC ACTIVITY



Assumptions

1. Economic activity is a self–contained and self–perpetuating circular flow of money, goods and services between the two basic categories of participants in an economy, producers and consumers.
2. Goods and services are traded among these participants through the institution of markets.
3. Markets are concerned with efficiency, that is, the efficient use of resources to produce goods and the efficient distribution of goods among consumers (allocative rather than distributional efficiency).
4. Market exchange is the only reality.
5. Scale is irrelevant. There is no upward limit on the scale (expansion) of the economy in terms of available natural resources (e.g. fish and timber), the assimilative capacity of environmental sinks (e.g., oceans and atmosphere), or the protection of life–support functions (stratospheric ozone, biodiversity, biogeochemical cycles).

This perspective is rejected by **deep ecologists** and others who argue that neoclassical economics ignores the natural environment. This school holds that believing in the validity of the neoclassical perspective is actually part of the problem. Too much effort is devoted to fixing a flawed, expansionist model of the economy when a new ecological paradigm is required, one that recognizes biogeophysical conditions and processes as the basis for all decisions. In rejecting expansionist economics, many deep ecologists reject economics altogether, arguing that economics is "the enemy of the environment."

A third school of thought advances integration of ecological, social, and biogeophysical considerations in economic decision making. This approach is transdisciplinary. It is often called **ecological economics**. As a field of inquiry, ecological economics focuses directly on the real world problems of sustainability. Ecological theorists argue that sustainability is ignored in the neoclassical approach because of its preoccupation with a form of economic growth that treats the environment as a subsystem of the economy.

Fikret Berkes (1993: 61) describes ecological economics as "more than the sum of

***Neoclassical theory** focuses only on what happens inside the sphere of market exchange. It is a theory of allocation, that is, a theory dealing with the most efficient distribution of scarce resources among the various ways in which they can be used* (Gowdy and O'Hara, 1995: 6).

***Deep ecology** is not just about pollution and resource depletion. "There are deeper concerns which touch upon principles of diversity, complexity, autonomy, decentralization, symbiosis, egalitarianism and classlessness"* (Naess, 1972: 95).

***Ecological economics** is the transdisciplinary study of sustainability based on the relationships between ecological, social, and economic systems.*

conventional economics and conventional ecology." He goes on to note the following four defining characteristics:

a) A holistic view of the environment–economy system;

b) A view of the economic system as a subset of the natural system of the earth;

c) A primary concern with natural capital, resources and environmental services as the basis of any economic activity; and,

d) A greater concern with a wider range of human values (such as health, dignity and a moral obligation toward future generations).

Whether or not neoclassical or ecological economics can or should be expected to provide answers to decisions about the environment is partly secondary to the need for a grammar to structure the debate. Since the neoclassical and ecological frameworks provide different structures, it is becoming increasingly important for proponents of either view to understand the analytical perspectives, concepts and tools of both ecological and neoclassical economics.

2.2 Weak vs. Strong Sustainability

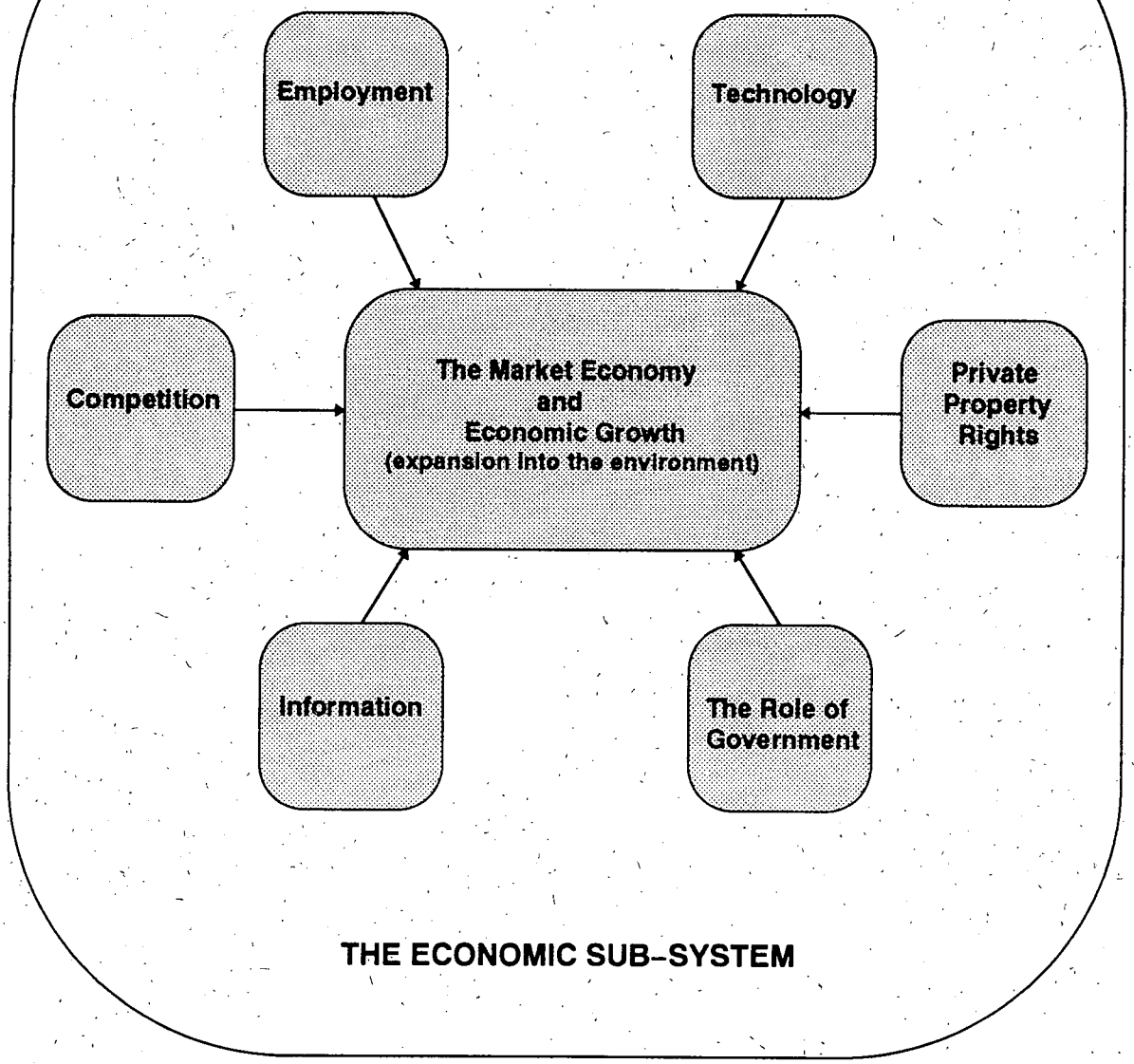
Neoclassical economics is based on economic growth. In this model, six factors contribute to both long–term growth and day–to–day operations (Figure 2). These factors are: employment, technology, private property rights, information, competition and the role of government[1].

Because these factors are critical to the success of the model, they frame much of the discourse concerning public policy decisions. For example, the factors may be stated as assertions that have implications for what can be done to solve environmental problems. While any one assertion may be reasonable in an isolated context, they are all rooted in a discourse that sees the economy as more important than either the environment or sustainability. Assertions arise from a widespread perception that protecting the environment is an unwarranted cost to the economy rather than a genuine benefit. In fact, the assertions do not oblige their proponents to have an understanding of the effects of economic activity on the environment or sustainability.

I have found you an argument; but I am not obliged to find you an understanding.
Samuel Johnson, Writer (1709–1784)

[1] The role of government varies from year to year, depending on the state of the economy. In the 1970s, it was to tackle inflation; in the 1980s, stagflation and unemployment; and in the 1990s, it is the national debt.

FIGURE 2:
FACTORS AFFECTING THE MARKET ECONOMY
MODEL OF ECONOMIC GROWTH



THE ENVIRONMENT

Deterioration of the Ecological Sustainability of Basic Life Support Systems and Processes with Longer Term Economic, Social and Ecological Costs

The weakness of the neoclassical model is that it does not account for the "natural capital" used in economic production. This means that there is no way of comprehending, let alone of measuring, the sustainability of economic activity in a free market. Yet, a concept of natural capital is vital to an operational definition of sustainability, and a measure of sustainability is a critical requirement of economic performance for policymakers.

Daly and Cobb (1989: 72) have drawn attention to the missing dimension of sustainability in market economies in their statement that:

> ...neoclassical economic theory has taught that humanly–created capital is a near–perfect substitute for natural resources, and consequently for the stock of natural capital that yields the flow of these natural resources...

Because the maintenance of capital is an important consideration in economic activity, the form this capital takes has implications for sustainability. If the form it takes emphasizes manufactured capital or other humanly created capital, then the capital that is passed on from one generation to another is indifferent to the state of natural capital. This leads Daly and Cobb to argue that "weak sustainability" is based on the assumption of high substitutability between capital and natural resources in a production function.

> By contrast, "strong sustainability" would require maintaining both humanly created and natural capital intact separately, on the assumptions that they are complements rather than substitutes in most production functions (Daly and Cobb, 1989: 72).

Accordingly, they advocate the "strong sustainability" approach.

Costanza, Daly and Bartholomew (1991) make the same case. They argue that,

> A minimum necessary condition for sustainability is the maintenance of the total natural capital stock at or above the current level.

Given the uncertainty about the adequacy of the existing stock of natural capital, the only prudent course is to adopt a "constancy of total natural capital" rule as a minimum condition for assuring sustainability. Ecological economists thus seek a strong sustainability criterion to ensure that real productive wealth is maintained from one generation to the next. Much work is required to advance this approach. As Rees (1995: 351) states:

> Surprisingly few major countries meet the weak criterion and it is likely that none meet the strong criterion; nevertheless, weak sustainability is favoured explicitly by most economists and implicitly by most development planners today.

2.3 The Quest for a Decision Making Framework: Balance vs. Integration

Apart from differences in the perspective on economics (neoclassical vs. ecological) and the goal of economic policy (growth vs. sustainability), there are also important differences about how decisions should be reached.

Two competing environment–economy frameworks demonstrate important differences in the "grammar" used to debate issues and justify decisions. One framework seeks a "balance" of costs and benefits; the other, "integration" of environmental issues in economic decisions. The following general distinctions for each framework apply:

I. Attributes of the Balanced Approach to Decision Making:

- Weigh facts and opinions;
- Weigh two or more arguments against each other;
- Consider the environment as a subsystem of the economy;
- Streamline economic and environmental issues along two parallel tracks, then bring together and "balance";
- Seek trade offs between costs and benefits;
- Promote specialization and sectoral based expertise; and,
- Focus on profit maximization, economic growth, efficiency and private interests.

II. Attributes of the Integrated Approach to Decision Making:

- Combine facts and opinions;
- Coordinate policy arguments;
- Consider the economy as a subsystem of the environment;
- Merge economic and environmental issues at the front–end of development planning and at all decision points;
- Seek win–win solutions;
- Promote multidisciplinary assessment and policy cooperation; and,
- Focus on problem solving, sustainability, effectiveness and public interest.

The balanced approach is an improvement over ignoring the environment in industrial decisions. But it has its shortcomings. It continues to streamline economic and environmental objectives so that decisions are operating in parallel. For example, government budgets focus on economic objectives almost exclusively. Environmental objectives––which have been developed at the same time, i.e., in parallel––are not considered at the highest decision making level because, on balance, they are judged to be less important. The balanced approach is thus an attempt to strike a compromise between economic and environmental objectives, one that may be shortsighted. While each compromise may appear reasonable when judged on its own merits, the summation of all compromises may not protect ecosystem health and critical environmental life–support services.

*A **balanced approach** to environment–economy decisions is based on the idea that the costs and benefits of environmental pollution can be calculated, that the right level of pollution is always greater than zero, and that society is always better off permitting some level of environmental pollution to ensure that its industries are competitive, people have jobs, and that wealth is created to support welfare and other public programs.*

*An **integrated approach** to environment–economy decisions means ending the segregation of the environment in economic decision making and making environmental issues equal in importance to other social and economic issues.*

The balanced approach focuses attention on immediate economic effects rather than longer term environmental outcomes. It either fails to relate economic decisions to environmental consequences or trades off the environment for some economic gain. Environmental problems such as climate change, atmospheric pollution or resource depletion are not solved in this approach.

As a general rule of thumb, the concepts and tools for the balanced perspective are derived from neoclassical economics. Environmental

matters are either ignored in decision making or embraced in a partial manner that amounts to weak sustainability.

In contrast to the balanced approach, the integrated approach seeks the merger of ecology and economics at the front end of development.

An environment–economy grammar which clarifies the major differences between these two frameworks could provide better insights into the problematic question of sustainability.

> *...many of our so–called environmental problems stem from flaws in the prevailing expansionist paradigm that can be remedied only by a global shift toward the ecological steady state. In this light sustainability poses a far more serious challenge to many of society's most basic beliefs and analytical concepts than most mainstream planners and policymakers have been prepared to contemplate so far* (Rees, 1995: 347).

3.0 THE FREE MARKET ASSERTION

THE BEST WAY TO PROTECT THE ENVIRONMENT IS TO LET THE MARKET OPERATE FREELY

When it comes to encouraging sustainable development, the market is the most important instrument available (Business Council on National Issues, 1992).

A natural question for economists to ask is whether the greenhouse problem shouldn't simply solve itself through the market process. Specifically, before enough carbon is put into the atmosphere to cause serious damage, will not fossil fuels become so scarce that their high price will suppress further significant atmospheric buildup? (Cline, 1992: 45).

3.1 The Free Market

Neoclassical economic theory measures economic activity as the circular flow of money between firms and households (producers and consumers). Markets provide the institution through which goods and services in the economy are traded. The basic tenets of an efficient market are perfect competition, perfect information, private goods, no government intervention, and no unintended consequences.

Neoclassical economists place a great deal of emphasis on the efficiency of market transactions, hailing them as the best forum for exchange and development. Markets are usually envisioned as places where people are free to negotiate and trade as they see fit. Markets distribute goods to those who value them the most: the available goods are traded back and forth until the highest bidders have secured them. The most efficient exchange is the point at which no further reallocation of resources can make one individual better off without making at least one other person worse off. This efficiency is known as *Pareto optimality* after the economist Vilfredo Pareto (1848–1923). Allocations are sub-optimal, i.e., inefficient, if they do not meet this definition.

Key Neoclassical Economic Concepts:

- Markets
- Economic efficiency
- Pareto Optimality
- Externalities
- Market failure

Pollution is an example of an inefficient market. It is called an **externality** by neoclassical economists. It is an external cost or effect outside of a given market transaction. According to neoclassical economic theory, environmental externalities such as pollution can be dealt with by taxing the polluter. The economist Arthur C. Pigou (1877–1959) proposed the case for such taxes, that is, *externality taxes* (often called *Pigouvian taxes*). Taxing pollution encourages polluters to solve the environmental problems for which they are responsible.

The challenge with taxing externalities is that it is often difficult to measure the social cost involved. For many environmentalists, there is also an ethical concern: it is argued that pollution taxes create a "license to pollute." Some consider such a "license" unethical.

*An **externality** is an unintended consequence of a market transaction that may have costs or benefits to the welfare of others.*

*Ideally, the end result of unhindered economic exchanges is **Pareto Optimality**, a concept central to neoclassical theory... When Pareto optimality is achieved in the goods market, no further trading of consumer goods can make one individual better off without making another individual worse off. Pareto optimality in production means that no further trading of inputs between firms can increase the production of one good without decreasing the production of another good. This condition is what neoclassical economics means by efficiency* (Gowdy and O'Hara, 1995: 6).

Others argue that regulating the amount of pollution allowed into the environment is also a "license to pollute" and that society would be better off with a stringent polluter pay principle. Doing nothing grants a free right to pollute.

3.2 Analyzing the Assertion

The assertion that the market will solve environmental problems is often made because market–based decisions are considered more efficient and, hence, less costly than government regulation. The historical basis of the assertion goes back to Adam Smith (1723–1790) who argued that allowing people to make decisions *in their own self interest* has the paradoxical value of serving the common good. The implication of this is that the role of government in the economy should be kept to a minimum.

The strongest promoters of the free market often compare it to other systems of organizing economic activity. They argue that although there has been a lot of abuse with the free market, the experience with directed economies (central planning) is even worse. They point to the failure of the collectivist approach, those countries which adopted communism as a way of organizing economic activity. Compared to communism they argue, capitalism––the free market production and distribution of goods––is superior in social, environmental and economic outcomes.

But the fall of communism does not represent the total victory of capitalism. It is merely the end of a system that, as practiced in Eastern Europe and in the Soviet Union, reflected neither economic nor environmental truths. This should encourage those of us who believe in the efficiency of the marketplace to eliminate its failures and weaknesses and to build on its strengths. Market economies must now rise to the challenge and prove that they can adequately reflect environmental truth and incorporate the goals of sustainable development (Schmidheiny, 1992: 15).

Advocates of the free market often fear government intervention in the economy. Many believe that such intervention is inefficient since it imposes costs on business activities that will make them less competitive. As a consequence, they tend to oppose advocates of direct regulation that could lead to stiff fines and imprisonment of polluters and perpetrators of other forms of environmental harm.

For policy makers, the question has to be less polemic. A good combination of policy instruments from both the market and regulatory approaches––as well as voluntary initiatives––is capable of addressing ***market failure*** by changing market conditions. Sustainability will only be possible when the best way to protect the environment is to make such protection a value. If there are incentives to protect the environment, people will respond in their own self–interest.

> *The market does not tell us where to go, but it provides the most efficient means of getting there* (Schmidheiny, 1992: 16).

Economic instruments that rearrange the market will become increasingly important. They may be more effective than fines or imprisonment, which can lead to lengthy and costly court battles, but regulation is still required to set minimum standards and enforce certain environmental protection measures.

There is a need to get environmental tools right to align self–interest with public interest.

It is evident from current environment and sustainability problems that the market cannot determine the appropriate level of environmental protection. This can be argued within the neoclassical framework by reference to:

(a) unrealistic assumptions of the free market; and, even more explicitly,

(b) by demonstrations of market failure.

(a) Free Market Assumptions are Unrealistic

One way to contest the market assertion is to focus on the underlying assumptions of the model which are not met in the real world. The free market assertion implies that markets do not fail to allocate resources efficiently, nor do they fail to protect the environment or sustainability.

First, there is no such thing as perfect competition. Monopolies, oligopolies, power, profits and government regulation all affect competitive forces. It is well–known that markets require regulation and institutional

> *Too many present government interventions distort the market and drive development that is unsustainable, notably, certain subsidies for agriculture, energy and transportation. It is vital that they be reformed and that a level playing field be established at both ends of the development cycle* (Business Council on National Issues, 1995).

frameworks to make them work: they do not operate in a vacuum.

Second, the requirement for perfect information cannot be fulfilled. Perfect information does not exist even in simple markets, let alone in markets where facts about complex scientific, ethical, and sustainability questions are in dispute.

Third, there is no accounting in private markets for public goods. The assumption that no public goods are involved in market transactions ignores pollution and the depletion of natural resources. Ecosystems and resources such as fisheries and forests, are public goods, requiring some form of public interest protection.

Fourth, the absence of government intervention is unrealistic. Markets are mediated by institutions whose legitimacy is assigned by government. The reality is that markets only operate within constraints. Land and other property markets, for example, are highly regulated. There are many restrictions including building regulations and zoning.

Fifth, externalities like air and water pollution are not accounted for in a free market. Pollution is an unintended consequence of market transactions that constitutes market failure. This means that businesses and individuals who pollute are receiving an environmental subsidy.

> *Invoking the sanctity of the free market to prove that present business practices are sound and constructive, and using it to rebut every charge of ecological malfeasance is, at its heart, dishonest* (Hawken, 1993: 7).

These five categories of market failure indicate that the market economy model is highly simplified. Ecological economists hold that the simplicity of the market model is actually misleading (Daly and Cobb, 1989; Rees, 1990). For these proponents and others, demonstrating market failure provides one of the strongest arguments against the assertion. Not only is this straightforward in the case of most environmental problems, but it is fundamental.

(b) Market Failure

If the existence of market failure can be demonstrated, the assertion that markets should be left to themselves is false. In other words, demonstrating the existence of an externality is sufficient to prove market failure and the need for public policy intervention in a given market. Environmental pollution is the classic example of an undesirable externality. It is the social cost of production and consumption that is external to both industry and government balance sheets and accounts.

3.3 Sustainability Concepts

Apart from challenging neoclassical economic growth advocates on their own ground, environmental advocates are promoting new ideas and tools in support of sustainability. These include natural capital, eco–efficiency, environmental and natural resource accounting, sustainability planning and ecological fiscal reform.

Key Sustainability Concepts:

- Natural capital
- Eco–efficiency and the factor 10 economy
- Environmental and natural resource accounting
- Sustainability planning
- Ecological fiscal reform

(a) Natural Capital

The concept of a market economy in neoclassical economics is based on a definition of capital which excludes natural capital. Although some privately owned natural capital stocks are considered, such as cattle and plantation forests, the focus remains on valuing and protecting humanly created capital. As Daly and Cobb (1989: 72) note, this means that natural capital, "the nonproduced means of producing a flow of natural resources and services," are ignored.

As the market ignores the running down of natural capital (i.e., stratospheric ozone depletion and threats to climatic stability), it fails to take into account whether its actions are sustainable over the longer term. The solution that is often offered to overcome this shortcoming is "to get the prices right." But price theory runs into the problem of attempting to commodify all of nature even though many peoples' interest in nature and certainly nature's own interest in nature, cannot be expressed in market activities. Valuation schemes such as willingness–to–pay or willingness–to–be–compensated are techniques to substitute for the lack of market prices. They may be poorly correlated with sustainability criteria.

To protect the market from its own logic, it is necessary to establish some operational principles about economic activities. Daly and Cobb [noted by Berkes, 1993: 61] have identified three principles to protect biophysical systems:

a) not to use renewable resources at rates that exceed their capacity to renew;

b) not to use nonrenewable resources at rates that exceed the capacity to substitute for them; and,

c) not to use any resources beyond Earth's capacity to assimilate the wastes associated with their use.

(b) Eco–Efficiency and the Factor 10 Economy

Eco–efficiency is about reducing energy and material throughput in the economy. It has at least two components. First, there is a need to reduce the energy and materials required to produce goods and services. For example, by reducing the amount of energy and materials required to build a car, one can reduce the overall impact of the manufacturing processes on the environment. This is a micro level eco–efficiency.

But reducing per unit impacts is only eco–efficient if in aggregate the total amount of energy and material use does not increase. This leads to the second component, eco–efficiency at the macro level. Energy and material throughput has to be eco–efficient in aggregate. Considering car production, for example, an eco–efficiency measure is self defeating if the reduction achieved at the plant level is negated by a global increase in energy and material use for car production. It is negated because, in aggregate, resource use and environmental impacts may still not be eco–efficient. Schmidheiny (1992: 10)

> ***If the free market is so efficient, why, as it affects the environment, is the overall economy so inefficient? The answer is simple: Markets are superb at setting prices, but incapable of recognizing costs. Today we have free markets that cause harm and suffering to both natural and human communities because the market does not reflect the true costs of products and services*** (Hawken, 1993: 75).

understands the implications:

> ...eco–efficiency is not achieved by technological change alone. It is achieved only by profound changes in the daily practices and tools used to reach them. This means a break with business–as–usual mentalities and conventional wisdom that sidelines environmental and human concerns.

For the German Wuppertal Institute, the break with business–as–usual practices means reducing the material intensity of industrial countries' consumption by a factor of ten––"which equates with a 90 percent reduction in the industrialized world's material and energy throughput by 2040."[2] As the Pembina Institute (1995: 2–3) notes, "This scenario has been coined the dematerialization of the economy." It means, they argue, that the characteristics of eco–efficiency include:

- continuously improving the unit efficiency of material and energy inputs;
- ensuring that total aggregated environmental impacts and cumulative effects stay within the ecological limits of carrying capacity;
- focusing on end–use human needs and quality of life; and,
- taking a life–cycle approach, accounting for upstream and downstream impacts.

[2] As cited by the Pembina Institute for Appropriate Development, 1995.

(c) Environmental and Natural Resource Accounting

Governments ignore environmental and natural resource accounting in their System of Natural Accounts (SNA). This means that the SNA does not include the services of environmental assets and their deterioration. This omission means that the connection between environmental degradation and economic development is invisible. But this failure is not confined to government alone: it indicates that the market economy is also not able to make the connection between environmental data and economic activity. Governments at both the national and international level are now developing environmental and natural resource accounting frameworks to address this shortcoming.

(d) Sustainability Planning

The market economy omits natural capital, strong and even weak sustainability, as well as environmental and natural resource accounting from its operating principles. These omissions among others have led to concerted, albeit inadequate, action on the part of governments to address sustainability and environmental accounting. What then can be done to expand the framework of traditional economic development to include the non–market value of environmental goods and services?

One obvious and increasingly compelling approach is to constrain the economy within environmental limits. Jacobs' (1991: 79–80) view is instructive:

> Sustainability means that the environment should be protected in such a condition and to such a degree that environmental capacities (the ability of the environment to perform its various functions) are maintained over time: at least at levels sufficient to avoid future catastrophe, and at most at levels which give future generations the opportunity to enjoy an equal measure of environmental consumption.

By transforming the traditional economic development framework into a two–stage environmental–economic policy making framework, the level of environmental capacity to be protected would be defined by targets set for key indicators (stage 1), and economic activity would be influenced by a mix of instruments to constrain the activity within these targets (stage 2) (Jacobs, 1991: 119). The setting of environmental targets and the choice of policy instrument would be part of an interdisciplinary sustainability planning approach to economic development. This approach recognizes that the market economy cannot determine the appropriate level of environmental protection because it cannot capture all values.

(e) Ecological Fiscal Reform

Ecological fiscal reform brings together three interrelated environment–economy issues: the need to discourage polluting and resource depleting activities, to improve economic development, and to minimize the impact of taxes on positive attributes of the economy such as investment and labour.

The primary focus of EFR is the government budget. The budget defines:

- Expenditures (i.e., "who gets what" in public funds)
- Revenues (i.e., "who pays what costs")
- Policy and program management (i.e., what is going to happen to existing government programs and policies, specifically, whether they are to be

increased, decreased, canceled, or renewed), and

- New policy and program initiatives (i.e., what new programs and policies will be created or considered).

These factors are critical in EFR because:

> The single most important instrument of power over environment and development that government policy makers can state and give effect to is contained in the government's annual budget (Gale and Barg, 1995: 2).

EFR provides a way to make the taxation and expenditure system of government consonant with either weak or strong sustainability. EFR shifts the application of taxes on income and employment ("economic goods") towards taxes on pollution and/or unsustainable practices ("environmental bads"). It also involves cutting environmentally–detrimental subsidies.

Budgets mediate the market economy. They provide incentives and penalties for corporate and individual performance on social, economic and environmental issues. They also provide targets for economic growth, job growth, inflation, deficit reduction, and a host of other factors which contribute to economic activity. This makes the budget a key forum for sustainability planning. EFR would require the Environment and Finance Ministries to announce both the environmental targets necessary to constrain the economy and the mix of instruments, regulatory, voluntary, and market–based, which would be applied to ensure that the targets are achieved.

3.4 Commentary

This chapter has debated the assertion that the best way to protect the environment is to let the market operate freely. A free market is based on the assumptions that there is perfect competition and perfect information, that all goods are private goods, that the market can operate without government intervention, and that only beneficial outcomes arise. Because these assumptions are unrealistic, the market fails to account for critical environmental and sustainability issues.

Many ecological theorists argue against the free market assertion because of its failure to distinguish between weak and strong sustainability, and its preference for a "balanced" rather that an "integrated" approach to environment–economy decisions.

Five key points are presented in order to debate the implications of the assertion from a sustainability perspective:

1. **Examine the assertion in terms of unrealistic assumptions**. If it can be demonstrated that the environmental problem is a result of imperfect competition, imperfect information, the prevalence of public rather than private goods, or market failure (discussed below), then the assumptions about the superiority of the market mechanism are wrong. Intervention of some sort will be required to address an unrealistic assumption.
2. **Examine the assertion in terms of market failure**. If external costs are evident, for example, pollution or resource depletion, then the market has failed. The more ecosystem or human health is harmed by this failure, the greater the need for government intervention through regulation or taxes.

3. **Discuss the failure of the market economy model to consider natural capital, "weak" and "strong" sustainability, and environmental and natural resource accounts.** Given these omissions, how can the market become informed about the results of economic activities? The onus of the debate must be shifted from justifying the need for sustainability to justifying industrial practices that are unsustainable. The market needs feedback from environmental and natural resource accounts and it must respond to this feedback to be efficient.

4. **Discuss sustainability planning – the need to constrain the economy within environmental limits.** What are the implications of constraining economic activity within the limits of the environment, for example, the stratospheric ozone layer, so that we are protected from skin cancer and cataracts? This is current practice. What barriers and impediments prevent the constraining of economic activity within the limits of the biosphere to absorb human–made sources of carbon to prevent global warming? What strategies are required to eliminate persistent toxic substances that do not break down in the environment and lead to cancer and reproductive failure in bird and fish populations?

5. **Discuss the need for ecological fiscal reform.** The freedom of the market to grow unremittingly, without regard to the environment or society, is unsustainable. Markets have to reflect the full cost of goods and services. Market principles must change so that resources are available on a sustainable basis. This generation's use of resources should not compromise the ability of future generations to meet their own needs. Government, as the legitimate democratic voice of the citizenry, must intervene in the economy to ensure that the market reflects the real costs of goods and services. This can be done through the ecological reform of fiscal planning. The government's budget is its key statement of environmental and sustainability policy. If it fails to set environmental targets and constrain the direction and pace of certain types of economic activity, it fails to appreciate the nature of the problem.

4.0 THE ECONOMIC GROWTH ASSERTION

ECONOMIC GROWTH IS REQUIRED TO PROTECT THE ENVIRONMENT

There are no...limits to carrying capacity of the Earth that are likely to bind at any time in the foreseeable future. There isn't a risk of an apocalypse due to global warming or anything else. The idea that the world is headed over an abyss is profoundly wrong. The idea that we should put limits on growth because of some natural limit is a profound error (Summers, cited in George, 1994).

In the end, faster growth will do more to improve environmental quality than the dead hand of government (Bartlett 1994).

4.1 Economic Growth

The ways in which **wealth** is created, lost, conserved, exploited or destroyed, tells us a great deal about a society's beliefs and goals. These change with time, ideas and technology. History bears witness to subsistence, agricultural and industrial economies, each with their own patterns of production and consumption.

Key Neoclassical Economic Concepts:

- Wealth creation
- Economic expansion
- Preferences
- Luxury goods
- Cost–benefit analysis
- Distributive equity

Neoclassical economists argue that they seek to increase wealth, that is, whatever people value. But neoclassical economists define value as "exchange value." They focus largely on what can be measured with relative ease: our "wealth" is then considered synonymous with our assets and income. The preeminent objective thus becomes one of increasing the monetary value of goods and services exchanged in an ever expanding economy.

To this end, politicians and economists seek increases in the rate of growth. An expanding economy represents progress; a contracting economy failure. However, even a slow growth or static economy is equated with failure. If the growth rate is not consistent with their expectations, they point to the performance of other economies to argue for policy decisions more consistent with the needs of a growth economy. But the argument is circular: even when the growth rate is higher than other countries, they will still argue the need for more growth. Baseline considerations about the relative size of an economy are never considered (Table 1).

The claim that economic growth will protect the environment is based on two reinforcing assumptions. The first is that the environment is a commodity which can be bought and sold. The second assumption is that people are only willing to pay for environmental protection when they have secured a certain income or satisfied other material desires. In the poorest of developing countries this may mean that the environment is immediately degraded (e.g., through mining) or that resources (e.g., forests) are immediately depleted. Yet, a degraded or depleted environment may not be restored later: no

TABLE 1: HOW THE G7 COMPARE FOR 1996

	Growth Rate	Unemployment Rate	Price % Change	Budget deficit as % of GDP	Debt as % of GDP
United States	+2.7%	5.7%	+1.7%	–1.5%	63%
Canada	+3.0	9.2	+2.0	–3.1	97
Japan	+2.0	3.4	–0.4	–4.8	90
Germany	+2.4	9.3	+2.0	–3.0	60
France	+2.2	11.3	+2.1	–3.9	59
Britain	+2.4	11.6	+2.0	–3.8	58
Italy	+2.7	8.2	+4.4	–6.0	124

* GDP deflator is price measure

Source OECD outlook, Dec. 1995

funds will be available. And people may not be better off after the change has taken place.

The two assumptions lead to the argument that until that level of income has been reached, the state of the environment will decline giving rise to a U–shaped relation between the state of the environment and income (Bartlett, 1994). A frequent explanation for the U–shaped relation is that poorer people view the environmental degradation accompanying economic growth as preferable to no growth at all. This view begs the question of how preferences arise, what control people have in decision making, and the initial distribution of wealth in a society. The assumptions ignore the argument that 'clean' eco–efficient mining and resource harvesting practices are more economic than the "mine–and–leave" or "cut–and–run" practices of many conventional approaches to resource development.

Part of the difficulty with the economic growth approach is that it considers the environment as a luxury item, a qualitative good that is amenable to being traded off against other goods. Because "consumers" in the market place indicate their preferences for one good or the other in purchasing decisions, it is argued that there is a trade–off between a higher "quality" environment and more goods and services. Just how participants in the marketplace are reconciled to this trade–off is not always clear. In the developed world the argument is even more problematic. Just what level of income does a society have to reach before environmental protection is no longer considered a luxury?

EXAMPLE

The consensus economic forecast for 1996 is for Canadian growth, of 2.3 per cent. The more optimistic OECD forecast with government input, is for a 3 per cent increase in economic activity.

This is growth? Does anybody remember what real growth used to look like? And can anything be done to bring us back to those days of genuine economic expansion, when incomes rose and jobs were plentiful, when real growth meant real growth rather than the half–real statistics we see today?

Most Canadians have forgotten what real growth can be, many have never experienced it, and some are being led to believe they will never enjoy a period of prosperity to match the booms of the past. We have now come to the point where many think there is only so much growth in an economy, and that Canada has used up its share. We must now learn to live with less.

This is a false and dangerous assumption. Increasing growth, expanding employment and rising production are natural economic conditions. ***There are no natural limits or barriers to economic development.*** *There is no reason Canada cannot return to a period of expansion to match or even exceed the past.*

Terrence Corcoran, Globe and Mail, January 3, 1996 [Emphasis added].

4.2 Analyzing the Assertion

It is important to distinguish between growth, development and economic growth. Growth involves the expansion of a subsystem, usually at the expense of other subsystems[3]. Development involves an increase in the complexity of a subsystem, improving it without an increase in its size (i.e., ecosystems and brains). In mature organisms, growth of subsystems is dangerous while their development is not.

Economic growth is a statistical measurement. As such, it may be redefined as the needs for new indicators evolve. Currently, measures of economic growth are unable to distinguish between growth, which is ultimately unsustainable in a finite system, and development, which may be indefinitely sustainable.

Daly (1973: 151), in a critique of the pathology of economic growth, uses the term "growthmania" to describe the paradigm of growth in economic theory. The growthmania pathology,

> ...begins with the theological assumptions of infinite wants, and then with infinite hubris goes on to presume that the original sin of infinite wants has its redemption vouchsafed by the omnipotent saviour of technology, and that the first commandment is to produce more and more goods for more and more people, world without end. And that is not only possible, but desirable.

Few economists, however, have explored the effects of growth on sustainability--the ability of the environment to perform its various functions. Many believe that environmental problems can be solved through cost–benefit analysis, that is, through a balanced rather than an integrated approach to problem solving. The omission of sustainability in economics is puzzling. On the one hand, it can be attributed to an aversion neoclassical economists have for value judgments, presuming that advice on the effects of growth have normative

[3] As a medical analogy, this is the *modus operandi* of cancer.

> *...sustainability sometimes seems a simple business from the expansionist perspective. If there are no general environmental constraints on the economy and we can find technological substitutes for particular resources, then the shortest route to sustainability is to stay on our present course. If we continue freeing up markets, privatizing resources and government services, and eliminating barriers to trade, a new round of growth in both rich and poor countries will provide the wealth needed both to redress poverty and inequity and to generate the economic surpluses needed, particularly in the natural world, better to husband the natural environment* (Rees, 1995: 347).

implications that other economists would dispute. On the other hand, these same economists have explored the effects of growth on every other "facet" of the economy in order to examine the ability of that "facet" to perform its functions over time--for example, technology, labour, capital and competitiveness. Findings in each of these areas have normative implications. Economics is full of value judgments.

4.3 Sustainability Concepts

There is extensive literature on environmental concerns about economic growth (see, for example, O'Riordan, 1981; Daly and Cobb, 1989; Rees, 1990). The worship of growth is so pervasive it leads to irrational thinking, notably, that the solution to problems created by economic growth is "more economic growth." This means that the logic of unfettered economic growth in a finite system has to be examined systematically. Five sustainability concepts are explored here to challenge this logic:

(a) thermodynamics;

(b) carrying capacity;

(c) ecological footprints and appropriated carrying capacity;

Key Sustainability Concepts:

- Thermodynamics
- Carrying capacity
- Ecological footprints and appropriated carrying capacity
- Hicksian income
- Intergenerational equity

(d) Hicksian income; and,

(e) intergenerational equity.

(a) Thermodynamics: Laws of Energy Conservation and Mass Balance

There is a physical dimension to the idea of exponential economic growth which is ignored in neoclassical economics. Because the economy is not considered to be a subsystem of the environment, economic analysis ignores the biogeophysical processes of the biosphere. In practice, this means that economists use money as the measure of exchange rather than the physical measures of stocks and flows which provide more information on the true state of the environment. Focusing on money as the metric of value means that conventional economists are blind to the real biogeophysical constraints of material throughput growth in the economy. As Rees has noted, "There is no connection in the money flows to biophysical reality" (Rees, 1995: 347).

Although conventional economists recognize that there are practical carrying capacity limits to population growth, they deny any constraints on material growth that would limit the expansion of the economy. For sustainability ecologists and economists, this means that conventional economics denies the scientific laws of physics, that is, the two

> *... ecological analysis concentrates not on monetary flows, but on the physical transformations of matter and energy in the economy. Like all such transformations in nature, these flows are subject to the Second Law of Thermodynamics: every material transformation produces an increase in net entropy, a permanent degradation of available energy, and the dissipation of matter (i.e. resource depletion and pollution). Thus, in thermodynamics terms, the ecologically–relevant material and energy flows through the economy are unidirectional and irreversible, and* ***all economic "production" is actually consumption*** (Rees, 1990) [Emphasis added].

laws of thermodynamics that have over–arching implications for economic activity. The first implication is that all economic activity, all so–called economic production, amounts to a transformation of materials and energy from one state into another. But since matter can neither be created nor destroyed (the first law of thermodynamics), "what goes into the economic process must come out of it. It can't just disappear" (Jacobs 1991: 11). Jacobs states:

> The more resources are used, the more wastes need to be assimilated. Resource depletion and pollution are essentially the *same* problem, two sides of one coin.

The second implication of thermodynamics for economic activity has to do with the status of matter or energy in the economic system. This status changes as resources are transformed from one form to another, for example coal (to heat) to ashes, or iron ore to steel to scrap waste. As Jacobs (1991: 12) points out, "In economic terms, it means that wastes are always more dispersed and useless than resources." There is a hint of a paradox here: it may also mean that more effort has to be spent on preventing or managing wastes than on developing resources.

> *This [thermodynamic] reality is crucial to any attempt to account for the ecological effects of economic process. Without reference to* ***entropic throughput****, "it is virtually impossible to relate the economy to the environment," yet the concept is "virtually absent from economics today"* (Daly and Cobb, 1989)/ (Rees, 1992: 44) [Emphasis added].

> *Ecologists define "carrying capacity" as the population of a given species that can be supported indefinitely in a defined habitat without permanently damaging the ecosystem upon which it is dependent. For human beings, carrying capacity can be interpreted as the maximum rate of resource consumption and waste discharge that can be sustained indefinitely in a defined area without progressively impairing the functional integrity and productivity of essential ecosystems. The corresponding human population is a function of per capita rates of resource consumption and waste production (i.e., sustainable production divided by per capita demand)* (Rees, 1990). *This formulation is a simple restatement of Hardin's "Third Law of Human Ecology": (Total human impact on the ecosphere) = (Population) x (Per Capita impact)"* (Hardin, 1991)/ (Rees, 1993: 48).

By limiting **throughput** growth, that is, the growth of energy and material consumption, and increasing the environmental efficiency of new goods and services, it may be possible to work within biogeophysical limits and still increase incomes and quality of life.

(b) Carrying Capacity

Environmental resources are not luxury goods. They are life–support services which contribute to the carrying capacity of a given environment. Although carrying capacity is a more dynamic concept for human rather than non–human populations, being mediated by lifestyles and technology, an economy cannot expand indefinitely at the expense of the

environment. Indeed, the human appropriation of the products of photosynthesis, that is, plant life, may already be at the critical level: "Nearly 40% of potential terrestrial net primary productivity is used directly, co–opted, or foregone because of human activities" (Vitousek *et al*, 1986). What this means is that the carrying capacity challenge is very real. As Cleveland (1992: 38) argues:

> *The human species is currently living off the natural capital rather than off the natural income of Earth*. We are drawing down the stocks and flows of the natural capital that sustain our lives and those of the other species we share the planet with. Common sense tells us that an activity that sustains itself by liquidating its capital base has a finite lifetime [Emphasis added].

(c) Ecological Footprints and Appropriated Carrying Capacity

An "ecological footprint" is an estimate,

> ...of an entire population or economy, defined as the aggregate area of land required continuously to produce the resource inputs and to assimilate the waste outputs of that population or economy wherever the land may be located (Rees, 1995: 351).

Land (ecosystem) area is thus a proxy for natural capital. Underlying this concept is a new investigative methodology because ecological footprint analysis is an accounting tool (Wackernagel and Rees, 1996: 9). The objective of the analysis is,

> ...to estimate the resource consumption and waste assimilation requirements of a defined population or economy in terms of a corresponding productive land area.

Typical questions asked with this tool include: how dependent is our study population on resource imports from "elsewhere" and on the waste assimilation capacity of the global commons? Will nature's productivity be adequate to satisfy the rising material expectations of a growing human population into the next century?

The analysis shows that the ecological footprint of an urban region is augmented by appropriated carrying capacity from distant "elsewheres." This augmentation indicates that "wealthy nations appropriate more than their fair share of the planet's carrying capacity" (Rees, 1992: 121).

(d) Hicksian Income

Daly and Cobb (1989: 69) have argued that GNP is a poor measure of welfare and income. In focusing on how to produce a better measure of income, they make reference to the work of Sir John Hicks in *Value and Capital* (1948). Hicks (1948: 172) stated that:

> The purpose of income calculations in practical affairs is to give people an indication of the amount which they can consume without impoverishing themselves. Following out this idea, it would seem that we ought to define a man's income as the maximum value which he can consume during a week, and still expect to be as well off at the end of the week as he was at the beginning. Thus when a person saves he plans to be better off in the future; when he lives beyond his income he plans to be worse off. Remembering that the practical purpose of income is to serve as a guide for prudent conduct. I think it is fairly clear that this is what the central meaning must be.

To determine what this means at the national level, Daly and Cobb assess the adequacy of GNP as a measure of income. First, they note the need to subtract annual depreciation to derive a net national product (NNP) figure. They then ask if we as a society could consume NNP without impoverishing ourselves.

> No we could not, for two reasons: first, because the production of NNP at the present scale requires supporting biophysical transformations (environmental extractions and insertions) that are not ecologically sustainable. Second, NNP overestimates net product available for consumption by counting many defensive expenditures (expenditures necessary to defend ourselves from the unwanted side effects of production) as final products rather than as intermediate costs of production. Consequently, NNP increasingly fails as a general guide to prudent conduct by nations (Daly and Cobb, 1989: 70).

Two adjustments to NNP are thus required, the depreciation of natural capital (DNC) and the subtraction of defensive expenditures (DE). An additional depreciation adjustment is required for the stocks of natural capital that have been depleted in the production of goods but are not considered in our system of national accounts. Defensive expenditures are those "regrettably necessary" expenditures that an economy incurs to protect people from the unwanted side effects of pollution or social malaise. This leads Daly and Cobb to define Hicksian income (HI) as the net national product minus both the cost of defensive expenditures and the depreciation of natural capital:

$$HI = NNP - DE - DNC$$

Sustainability can be guaranteed if economic activity is operationally defined as an increase in Hicksian income because it keeps capital, both natural and humanly created, intact. Economic activity is unsustainable when development is defined solely as an increase in GNP because this increase does not ensure that natural capital is maintained intact.

(e) Intergenerational Equity

Most neoclassical economists focus on efficiency when considering environmental policy. But because the market mechanism typically fails when it comes to the prevention or management of pollution or resource depletion, the equity implications of environmental change need special consideration.

This is particularly true for unborn generations who cannot voice their preference in current decisions. Because today's generation may be exporting environmental costs into the future, they may reduce the quality of life of future generations. Many ecological theorists judge this to be an inequitable treatment of people, species and ecosystems, one that needs to be addressed by focusing on sustainability rather than efficiency.

The problem of unfairly treating future generations is exacerbated by the process of discounting. Discounting is part of consumer theory and the commodification of the environment. Consumer theory argues that people would rather have something they want now than in the future, giving it a higher value in the immediate present. This leads neoclassical economists to place low values on future environments. This is clearly an untenable proposition from a sustainability perspective. The environment cannot be

reduced to the status of a commodity: governments must intervene with sustainability criteria to protect the public interest in intergenerational equity.

4.4 Commentary

The assertion that economic growth is required to protect the environment is analyzed in this chapter. Neoclassical economists argue that people will only protect the environment when they can afford it. In this view, economic growth is required to increase peoples' incomes and spending. The environment is seen as a luxury and the cost of environmental protection is seen as a tradeoff (balance) against other goods. Ecological theorists challenge the demand for undifferentiated economic growth (i.e., growth which does not distinguish between positive and negative environmental consequences). Problems created by economic growth cannot be solved by more of the same. The environment is not a luxury good nor a subsystem of the economy.

Four points are presented here that discuss the implications of the assertion from a sustainability perspective:

1. **There is a need to distinguish between economic growth and development.** Because economic growth measures the expansion of an economy without accounting for depreciation or defensive expenditures, it ignores the negative feedback of environmental pollution and resource depletion. As the Brundtland Commission (1987: 37–38) has argued, economic growth ignores the fact that environmental stresses are linked to each other and that environmental stresses and patterns of economic development are linked to each other. The Commission also stated that environmental and economic problems are connected to social and political factors. A new form of economic development requires decision making that integrates the economy and the environment, lawmaking processes that protect and promote development, and programs of social development that link environmental and economic problems to social and political factors.

   Environmental protection should not be separated from the cost of doing business. Although it can be argued that people will only be willing to pay for environment protection once they have secured a certain income, this may be a biased rationalization for the industrial economic model. If industry does not clean up the environment it is polluting, it is passing on the costs of this pollution to others. Consumers cannot then meet their needs for a healthy environment by purchasing them at the store. It is not a market commodity. We need to recognize that the environment is not factored into economist's production or utility functions.

2. **The exponential character of GNP growth is unsustainable.** Designing policies to increase economic growth for its own sake will make environment and sustainability problems worse. The onus of this debate has to be shifted from justifying the need for sustainability to justifying the need for unsustainable economic growth. The notion that economic growth is the solution to sustainability is short–sighted and superficial. Indiscriminate growth is part of the problem, not the solution. GNP is a misleading measure of the real health of the economy.

3. **The circular flow of money between firms and households which constitutes the orthodox model of the economy ignores the physical aspects of economic activity**. In physical terms the economy is fueled by a flow of energy from the sun and other sources and not by a flow of money. This leads ecological economists to focus on the physical rules of the laws of thermodynamics concerning the behaviour of energy and matter. Physical measures of the state of the environment are required as feedback on the environmental performance of the economy and guidance about the type of economic activity which will have to be phased out. Pollution and resource depletion provide feedback which indicates that the economy is unhealthy from a sustainability perspective.

4. **Arguments have to be focused on developing a sustainable economy**. In a free market economy, economists have traditionally treated environmental protection as an added cost of economic activity. They have focused on the downstream end of this activity, that is, its impacts and the ways and means to control or reduce them. In a sustainable economy, environmental concerns are part of the front–end policy concerns of economic activity and performance. This means that market forces and ecological integrity are often in conflict and that this conflict will continue so long as there are disputes about the relative importance of environmental and sustainability goals with regard to economic or industry goals.

5.0 THE PRIVATE PROPERTY RIGHTS ASSERTION

PRIVATE PROPERTY RIGHTS ENSURE ENVIRONMENTAL PROTECTION

The best option [for managing Canadian fisheries]... is to expand private property rights into the oceans (Corcoran, 1995).

5.1 Private Property Rights

The idea that private control of environmental resources will solve environmental problems is an extension of the notion that a free market can correct all environmental ills. It is based on the assumption that private ownership provides better incentives to conserve resources than public or common property ownership. In other words, as Ronald Coase (1960) has asserted, the market can solve externality problems such as pollution, by itself, through strict property rights. This approach views government intervention and Pigouvian taxation as subject to a degree of error that is avoided with a property right.

Some argue that Garrett Hardin's classic example of common property mismanagement could be solved by the Coasian theorem of property rights. In his "tragedy of the commons" argument, Hardin (1968) states that when cattle owners have equal access to a common grazing ground, the shared resource will be overgrazed. Because an owner's income increases with additional cattle, it is only rational to add new stock to the herd. However, when every owner does this, the land is overgrazed to the detriment and impoverishment of all. It is a "tragedy," Hardin argues, because it is inevitable. Other examples abound: over fishing, cottage pollution of a lake, and industrial pollution of air and water bodies.

Key Neoclassical Economic Concepts:

- Tragedy of the commons
- Coase theorem
- Private ownership

The Coasian solution to this tragedy is to assign property rights to the shared land. If each cattle owner owned the land his or her stock grazed on, they would have a powerful incentive to protect it.

In Coases' view, the externality problem of overgrazing can be solved if the parties involved divide the common grazing ground into privately owned land. By extension, private property rights can be assigned to other public goods such as air, water and the oceans. If private owners could coordinate market activities among themselves, government intervention would not be required. Market transactions between private owners of environmental assets will then determine the "optimal" level of environmental protection.

5.2 Analyzing the Assertion

The private property rights assertion is founded on the market model and its values of efficiency, short–term financial gain, increased production of human–made goods, and private ownership of the means of production. But given market failures, this

approach is inadequate. Where will the incentive for conservation and protection of environmental resources come from if the benefit of overuse leads to immediate financial gain. This is a problem many farmers face. Although they are private owners of agricultural land, if the price they receive for their produce is not a sufficient incentive to protect the long term capacity of the soil to sustain a similar yield, they may deplete soil fertility for short term benefits.

The Coase theorem that private ownership will automatically resolve externality problems is questionable on two accounts:

i) it assumes perfect information about environmental costs, and,

ii) it assumes that there are negligible costs in exchanging property or resources between private owners.

Most environmental issues, however, make these conditions difficult to fulfill. Private owners do not have full information and transaction costs are often formidable. Moreover, the theorem could lead to a perverse outcome. For example, mathematician Colin Clark (1976) has demonstrated that managers of whale resources who are interested in maximizing their incomes should cull all slow–growing whales immediately and place the proceeds in the bank. Depending on the interest earned, the money could grow more quickly in the bank than through future whale harvests. In this case, the whale has an "owner" who ascribes a very low existence value to whales --i.e., the owner is able to do away with the need for whales because the owner's values do not pre–require the existence of whales. This means that the market can exterminate a species even though societies may want to see the species survive. This type of market failure indicates that the Coase theorem does not fully apply to the issue at hand: privatization of the resource in question will not necessarily lead to its protection.

The topic of private property rights often leads to the issue of valuation. There is a need in neoclassical economics to assign prices to the environment and to use proxies when valuation according to prices is not possible. This need can be disputed by critically appraising the neoclassical approach to valuation. In this approach, economic choices are made by comparing the costs and benefits of protecting the environment. This is done by deciding how much the public values the environment and how much it is willing to pay for that value. The willingness to pay is determined from benefit–cost analysis. Jacobs (1991: 204) makes the following statement:

> There are two approaches to determine what people would be willing to pay for the environment if a market for it exists. The first is **revealed preference approach** where consumer behaviour with respect to goods associated with the environment is analyzed and the value of the environment is inferred from it. The second is the **hypothetical preference approach** where consumers express their environmental valuations directly, but not in the real situation, but rather in a hypothetical situation, i.e., How much is a particular environmental feature worth? [Emphasis added].

Contingent valuation, which stems from the hypothetical preference approach, uses surveys to ask people how much they would be willing to pay in order to protect the environment. The problem with this approach is that aesthetic biases may undervalue certain environmental resources, e.g., beaches may have a higher value than wetlands. A second method of hypothetical preference, **stated preference valuation**, uses a

questionnaire that describes possible alternative situations, each having a different combination of attributes. The quest to reflect the costs and benefits of environmental and natural resource services requires estimates of the economic value of each one. The problem is that not all services have a market value and therefore the economic value cannot be determined. If a valuation of these services cannot be determined, development and conversion options which have a market value (e.g., buildings and parking lots) will be favoured.

5.3 Sustainability Concepts

Many economists recognize that the protection of common property resources does not depend on private ownership. Protection of the resource depends on institutional considerations and valuation.

(a) Sustainability Institutions: Defending the Commons Against Enclosure

When resource depletion occurs in a common–property resource such as the North Atlantic fishery off Newfoundland, depletion may be attributed to the lack of private ownership of the resource. The belief that the resource would be better managed under private ownership than as common property is, however, questionable.

As Clark (1991: 320) states, "The belief that privatization will automatically resolve problems of over–exploitation cannot be supported on either theoretical or empirical grounds." He argues that it is simply not feasible to privatize vital resources such as the atmosphere, oceans, groundwater, migratory birds, fish and animals. Indeed, it is the fragmentation of resource ownership through privatization, that is leading increasingly to problematic externalities.

Key Sustainability Concepts:

- Sustainable institutions
- Valuation for strong sustainability

> The political realities are that exploiters of large resource stocks have every incentive to impose major external costs on the public at large, and these externalized costs can add to nonsustainability (Clark, 1991: 320).

Because it is not practical to privatize some vital resources, other management approaches are essential. First, it has become clear that all forms of subsidy which encourage resource exploitation or lead to pollution should be eliminated. Second, the sustainability of a common–property resource will likely require a regulatory process based on the economics of common–property resources and the assignment of ownership rights in a way that protects the natural capital stock from overuse or contamination.

Hawken (1993: 191) has proposed the creation of an institution––a pasture utility in the case of common land, for example. The institution would operate independently of vested interests to prevent the overuse of an open access resource. It may be that a fishery utility is required to protect fish stocks, a forestry utility––forest stocks, and so on.

> *By the **public domain** I mean all land not held in private ownership (freehold or fee simple) by someone. The public domain includes land administered by national/ state/ provincial governments, it includes land administered by villages as true common property, and it includes land that is managed by no one and hence properly called **open access*** (Bromely, 1991: 108).

> *To argue today that the free market should control the extraction and sale of natural resources ignores the state of the commons and the free market. The market works to the benefit of the whole of society when it includes all the costs and benefits. Only when the market accurately reflects the replacement costs of a resource (a virgin forest or salmon or Arctic oil) and the social costs of its consumption (tobacco being the most obvious) will society begin to respond to the market in a rational way* (Hawken, 1993: 197).

(b) Valuation for Strong Sustainability

A distinction Michael Jacobs makes between two paradigms of sustainable development can be adapted to the issue of valuation (Jacobs, 1993: 9). The policy making focus for valuation in the weak sustainable development model is based on trade–offs, cost–benefit analysis, industry–sector analysis, environmental assessments of projects and a focus on methods and processes. Valuation in the strong sustainable development model has a different policy focus. It is based on environmental limits, policy assessment within constraints, environmental issues, environmental assessment of policies and programs and a focus on outcomes. Sustainable Futures *et al* (1996) suggest four approaches to valuation to capture some environmental benefits missed in conventional economic valuation techniques. These are described as follows:

1. Replacement cost approach––This approach relies on estimating the expenditures of maintaining, enhancing or restoring a natural resource. For example, the value of a wetland is estimated based on the cost of replacing it with a constructed one.

2. Avoided cost approach––This approach estimates the potential savings from improving, or the increased social costs resulting from a degraded environment. For example, the benefit of the wetland is the potential savings in water or sewage treatment costs.

3. Energy analysis––The objective of this approach is to maximize the net energy of society rather than its net (monetary) welfare. For example, the value of wetlands is its gross primary production of biomass measured in energy (joules). Once the GPP is estimated for a wetland system, it is then assigned the equivalent monetary value for conventional energy sources such as fossil fuels. This approach assumes that all net energy gains (i.e., primary production) are important to human life even though some is not directly valued in economic terms.

   This approach complements the replacement and avoided costs approaches described above since energy analysis neglects the benefits of wetlands for flood control and groundwater recharge because they do not embody energy.

4. Actions for preservation––This approach examines the expenditures and activities of resource management agencies, government officials and environmental advocacy organizations to determine the implicit value society places on the natural environment.

5.4 Commentary

The assertion that private property rights ensure environmental protection was debated in this chapter. Many neoclassical economists favour private ownership over public or common property ownership in conserving

A discussion took place regarding what difference Ecological Economics would make to the appraisal if a hotel corporation applied to build a hotel complex in a coastal mangrove area. The following was generally suggested. An orthodox approach to appraisal would be to compare the construction, set–up, and operating costs, plus the original market value of the land, with expected earnings from clients over a period of time and the subsequent market value of the land. An Ecological Economics framework would, in addition, compare selected indicators of ecosystem functions performed in this area of mangrove prior to the hotel complex, with the ecosystem's expected performance subsequently. Any function loss would need to be offset through compensating enhancement activities negotiated on behalf of society as a whole. If legislated market–based instruments were to apply the Polluter Pays Principle, the costs of the negotiated enhancement activities would then be added as part of the initial project investment. If, as a result, the hotel complex is determined to be uneconomic, then other activities should be sought that offer a better return (Potvin, 1993).

and protecting natural resources and solving externality problems. They argue that a common property resource runs the risk of overuse and exploitation whereas private owners could manage the property and resources efficiently without government intervention.

However, if economic gains and profits can be made from selling a resource, private owners will benefit from exploiting their resources more than public owners. If there are no incentives or regulations for the private owner to conserve his or her resources or protect the environment, there may be a higher incentive to seek short term profits in exploiting the resource unsustainably.

Ecological theorists do not believe that private ownership will automatically protect the environment. Regulatory processes and ownership obligations that would discourage and eliminate overuse of resources are required. Common property needs to be valued both economically and environmentally in order to achieve an integrated decision.

To debate this assertion from a sustainability perspective, the following points can be discussed:

1. **Environmental issues are public issues that cannot be readily solved in private markets.** If property rights are hard to define or multiparty transactions are involved, negotiations may be expensive and impractical. Better to recognize that some resources cannot be treated as private property: they are public goods requiring government intervention in resource management decisions. New sustainability institutions such as fishery and forestry utilities may be required to protect the public interest.

2. **Promote environmental valuation methods that are based on the strong sustainability model.** This model proposes an integrated approach that defines limits as to how far environmental degradation will go, and avoids the balanced approach of cost–benefit analysis which undervalues the environment by discounting it as a commodity against present day considerations. Valuation is based on a strong sustainability criteria. Valuation methods such as replacement cost, avoided cost, energy analysis and actions for preservation, are increasingly important.

6.0 THE INFORMATION ASSERTION

ENVIRONMENTAL DECISIONS SHOULD NOT BE MADE WITHOUT FULL SCIENTIFIC INFORMATION

For all the green clamour, it is far too early to be panicked into Draconian actions to avert global warming; especially when most actions would pose a bigger threat to human well–being than does global warming... Consider, first, the uncertainty of scientists about the extent of global warming (The Economist (1995)).

They told us: "We can't prove there is global warming. But by the time we can you chaps will be in real trouble" (Richard Keeling, Lloyd's of London, on their climatologists' report (1995)).

6.1 Information

Many economic and environmental problems are characterized by incomplete information. The absence of this information, however, does not mean that important decisions are avoided, but that risks are taken. For environmental policy makers, the key question is how risk behaviour affects the environment and sustainability.

The insurance industry, for example, allows people to hedge their bets against an uncertain future in the absence of complete information. Models of the insurance industry reveal that when agents (people, governments, societies, firms) do not like risk, their best policy is to insure themselves. If something bad occurs, they are compensated. They are thus not as badly off as they would have been without insurance. If nothing bad happens, they have only spent the amount of the insurance premium.

Generally, a risk–averse person will be inclined to be a bit worse off normally than to be a lot worse off later should an undesirable outcome occur. This is not true of risk–neutral or risk–loving people. For someone who is risk–neutral, a 100% chance of obtaining something is worth the same as a 50% chance of obtaining twice as much. A risk–neutral person may be indifferent between a certain return and half the chance of receiving twice as much. A risk–lover will always pursue the larger return.

Key Neoclassical Economic Concepts:

- Decision making under uncertainty
- Risk management

6.2 Analyzing the Assertion

With the exception of gambling, economic theory finds people to be generally risk–averse and firms to be risk–neutral. This means that a firm can take more chances. If they pay off, so much the better. If they do not, a firm's bankruptcy is part of the normal workings of the marketplace.

In the neoclassical approach, it is argued that business risk can be mitigated by environmental risk assessments and risk management. But ecological theorists are less confident about such assessments. All systems on earth are open and complex such that decisions under uncertainty, ignorance or indeterminacy should not jeopardize human health and ecological sustainability. As the

EDITORIAL

Some Good News on Canada's Environment

We know the bad news on Canada's environment, according to an independent panel of the Organization for Economic Co-operation and Development. We know that Canada is falling behind in controlling emissions of greenhouse gases, and some of its efforts to cut pollution and manage its natural resources have not matched domestic and international objectives. We also know about the continuing threat from certain toxic chemicals, acid rain and growing garbage.

None of this should be belittled. We must address all these problems with renewed vigour. But what is the broader picture? How are we doing in relation to the other 24 member nations? The OECD really doesn't say--Canada is only the ninth nation to be audited--but it does report real progress in many areas.

Consider, for example, the level of threatened known species. The OECD finds 7.8 per cent of mammal species threatened in Canada, in contrast to 31.8 per cent in Mexico and 37.5 per cent in Australia. It also finds 4.5 per cent of bird species and 4.4 per cent of fish species threatened in Canada, far lower than in other member states. In treating waste water, Canada serves 63 per cent of its population. That's higher than Japan (50 per cent), Italy (61 per cent), Norway (57 per cent) and Spain (59 per cent).

(Editorial), Globe and Mail, November 15, 1995.

Key Sustainability Concepts:

- Precautionary principle
- Reverse onus: user/producer responsibility

probabilities of adverse outcomes or their consequences increase, the best solution is to take more precautionary steps.

6.3 Sustainability Concepts

Scientists recognize three different sources of uncertainty in their analytical work:

> **Technical uncertainty** is based on disputes over accuracy or precision of observations and measurements. **Methodological uncertainty** derives from concern about whether the right analytical tools are being applied. **Epistemological (conceptual) uncertainty** is the state of concern about whether we even have the right conception of a phenomenon or a problem (O'Riordan and Rayner, 1991: 101).

In their work on technical and scientific issues, scientists typically focus only on the uncertainty they encounter in natural (biogeochemical) processes and ignore uncertainty caused by human, social and economic development. In other words, they ignore the degree to which science is socially constructed. Natural science is affected by socioeconomic factors which cannot be ignored, such as uncertainties in management, administration, and human organization.

Given that these uncertainties exist, scientists are becoming more cautious and are endorsing concepts such as the precautionary principle and reverse onus.

LETTERS TO THE EDITOR

Poor Performance

While attempting to paint such a bright picture of Canada's environmental record, your Nov. 15 editorial, Some Good News On Canada's Environment, does not reveal the bleak landscape of our nation's environmental performance.

First, the statement that "considerable progress" has been made in reducing toxic chemicals fails to point out the repeated failures to virtually eliminate persistent toxic chemicals. Not only did Canada agree to the goal of virtual elimination in the Great Lakes Water Quality Agreement 17 years ago, but science continues to draw links between these substances and reproductive, developmental and other adverse effects on human health. Some progress simply is not good enough to arrest the human–health threat posed by these substances.

*Second, **the fact that Canada is lagging behind other industrialized countries in environmental performance also suggests that Canada is at an economic disadvantage. Countries that are good environmental performers often have an economic advantage.** These countries have more efficient, cleaner production processes and are able to market their green technologies internationally.*

It is about time the Canadian public realize that Canada's international reputation is not one of a green leader but of a country stuck in the old way of doing business.

Paul Muldoon, Counsel, Canadian Environmental Law Association Toronto, November 20, 1995 [Emphasis added].

(a) Precautionary Principle

The precautionary principle was introduced in the United Nation's document, *Agenda 21*, (1992) as a leading principle:

> In order to protect the environment, the precautionary approach shall be widely applied by states according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost–effective measures to prevent environmental degradation.

A tougher definition is found in recommendations of the House of Commons Standing Committee on Environment and Sustainable Development. In their Report on the Canadian Environmental Protection Act (1995), the Committee stated that:

> The precautionary principle implies that, where an activity or substance poses a serious threat of harm to the environment or human health, precautionary measures will be taken even in the face of scientific uncertainty.

The precautionary principle is an approach to save and improve biodiversity and promote sustainable development. According to *Agenda 21*, the goal for all states is to conserve their biological diversity by making better decisions. Participation is required from all sectors, including the government, the private sector, financial institutions, the scientific community and non–governmental organizations.

Participants are urged to:

> ...develop and integrate national strategies for the conservation of biological diversity and the sustainable use of biological resources,

> exchange information on research and development, conduct studies, and improve mechanisms for the improvement, generation, development and sustainable use of biotechnology *(Agenda 21*, section 15).

An example of the disaster that may happen when the precautionary principle is not used is the Atlantic cod fishery (House of Commons, 1995: 54).

(b) Reverse Onus: User/ Producer Responsibility

According to the Standing Committee on Environment and Sustainable Development, the reverse onus concept,

> ...implies that those proposing a potentially harmful activity be required to prove that the activity *will not* be harmful, rather than requiring those protecting the environment to prove that the activity will be harmful (House of Commons, 1995: 56).

This concept ties in closely with the precautionary principle. Rather than have a government prove that a proposed activity is harmful to the environment, industry should bear the onus of proving that the activity is safe. In order to prove that an activity is safe, information needs to be gathered and presented. From an economic perspective, this approach avoids the false economies created by react–and–cure approaches to environmental protection. By making both the producers and users of a product, substance, or activity responsible, one internalizes the costs of production at the front end of the development cycle where it belongs, not at the downstream end where they become a public policy problem.

> *We should not be surprised that no major piece of environmental legislation has ever been supported by corporate America* (Hawken, 1993: 31).

> *In business as in science, the most important thing to know is what you don't know. Admitting one's ignorance can be a powerful inducement to caution. We do not know how long we can continue to create molecular–level toxic garbage that floats in the air, seeps into our water, lodges in the fat, targets our genes, and interacts with biological evolution, before life as we know it is irrevocably altered* (Hawken, 1993: 45).

6.4 Commentary

The assertion that environmental decisions should not be made without full scientific information has been addressed in this chapter. People, firms and governments make decisions every day without full information. Ecological economists state that decisions about the environment will inevitably involve uncertainty because of the complexity of ecological systems. Concepts such as the precautionary principle and reverse onus provide the level of assurance necessary to protect ecological sustainability when information is inadequate.

The following points can be used to debate the implications of the information assertion from a sustainability perspective:

1. **Assess Ignorance and Indeterminacy:** Distinguish between situations in which we know or can calculate the odds of something happening (risk), do not know the odds (uncertainty), do not know what we should know (ignorance), and where complete understanding is not possible (indeterminacy) (Wynne, 1992).

2. **Promote the Precautionary Principle**: Where there is significant uncertainty about the ecosystem and human health impacts of a particular activity or substance, adopt precautionary measures to prevent serious or irreversible damage.

3. **Insist on Reverse Onus**: Shift the focus of the debate from proving that a substance, activity, or product is harmful to the demonstration that it is safe.

7.0 THE TECHNOLOGY ASSERTION

NEW TECHNOLOGIES WILL SOLVE ENVIRONMENTAL PROBLEMS

...the world can, in effect, get along without natural resources (Solow, 1974).

The history of mankind shows that economic incentives have consistently led to new discoveries of raw materials, changed methods of production, and changes in consumption that have put off the day of reckoning year after year, despite predictions of impending doom. The reason is that changes in prices for natural resources compel shifts in production and consumption. If we really were running out of some resource, then its price would rise. And if the rise exceeded the interest rate, the owners of such resources would have an incentive to conserve them and add to their stocks. And of course consumers would reduce their consumption, and producers would shift their production to other methods. Yet the assumption that resources are finite persists (Bartlett, 1994).

7.1 Technology

The market economy model is optimistic about the role of technology in the economic growth process. The assumption is that technological progress leads to increased productivity and hence to market efficiency. New environmentally–friendly technologies will solve the problems associated with older technologies and new processes or products will replace harmful ones. Technologies raise questions about values and risks. In the market economy view, dangerous technologies can be controlled through risk assessment and management.

7.2 Analyzing the Assertion

The quote from Bartlett above implies that economic growth and new technologies can be relied upon to constantly forestall the "day of reckoning." The quote contains a concise presentation of the "necessity is the mother of invention" argument. To analyze this argument from the neoclassical perspective, the quote is converted into a series of premises (p), leading to their conclusion (c), allowing the comparison of each of the claims against economic theory:

Key Neoclassical Economic Concepts:

- Substitutability
- Technical change
- Economic growth

Premises

p1. Economic growth is assumed to increase demand for resources.

p2. Increased demand for a resource is assumed to increase its price.

p3. Higher prices make previously more expensive substitutes (including those not yet invented) more competitive.

p4. The increased competitiveness of substitutes will spur their development.

Conclusion

c. Increased research and development will lead to inventions that will solve resource scarcity problems.

> *The rate of growth of our income per capita––a measure of our wealth as a nation––ultimately depends on the rate of productivity growth of labour and capital. The rate of productivity depends, to a considerable start, on the rate of technical advance or progress* (Royal Commission Report, 1985: 89).

According to the neoclassical perspective:

- Premise 1 is considered largely accurate. Economic growth leads to higher national incomes and increased consumption of normal goods.
- Premise 2 is also considered correct as sellers adjust prices to what the market will bear.
- Premise 3 is also considered correct. Interest in Newfoundland's Hibernia oil fields picks up whenever OPEC raises its prices.
- Premise 4 is considered correct. Economic activities are engaged in, such that marginal costs equal marginal benefits. When the benefits of researching and developing a substitute increase, greater amounts will be expended in doing so.

The conclusion, however, is largely unsubstantiated. Economic theory has traditionally recognized certain variables as "exogenous," outside its sphere of analysis. Technology is one of these variables. The field of economics cannot predict technological change. While there is ongoing work within economics to improve understanding of technological change, sweeping conclusions that new technologies will solve environmental problems cannot be supported. Nor are such conclusions likely to be supported in their general form, because

> *When business does acknowledge ecological issues, as it is increasingly forced to do, it proclaims unbounded optimism in the power of technology. When scientific data foretell resource depletion, toxic contamination, or detrimental impacts on human communities, these predictions are overridden by a religious belief in the ability of humankind to devise new technologies for offsetting the hazards of the old technologies. Common sense advises us to doubt this logic, which not only requires faith in technology, but––predictably––rationalizes the further unshackling of industrial capitalism to use more of the earth's future resources to fuel future ingeniousness* (Hawken, 1993: 32).

however powerful the incentives to develop new technologies, technological change is ultimately constrained by the laws of nature.

There are also criticisms from the field of ecological economics:

- Premise 1 may not be correct. Supply and demand are dynamic such that economic growth may dampen demand. Also, one cannot be cavalier about undifferentiated growth. Much of the traditional growth may be harmful to business and personal welfare in the longer run.
- Premise 2 may also be incorrect or have pernicious outcomes. In fact, as Daly observes (1991), increased demand may convert a free resource, one which does not need to be rationed by price into a scarce resource whose use must be paid for. For example, industrial demand for water in a sparsely populated river basin may deprive existing residents of the same water or other amenity benefits. Thus, increased demand makes the same standard of life more expensive.
- Premise 3 assumes that substitutes are available. This is not the case for many important life–support functions that the

natural environment provides, for example, the stratospheric ozone layer.

- Premise 4 is only true in theory. In practice the system of subsidies that is already in place may mitigate against the development of competitive options such as wind or solar energy.

7.3 Sustainability Concepts

Sustainability theorists are more likely to replace technological optimism with prudent pessimism. They question the wisdom of relying on the market and technological innovation to protect (find substitutes for) the ozone layer, photosynthetic products, and biodiversity. While the history of industrialization is the history of economic and technological change, much of this change has caused widespread environmental harm. Technological change has to be differentiated between change in production processes (i.e., better ways of producing goods) and redundant product development (i.e., more product choice but no net increase in eco–efficiency).

Economic theory does not support the belief that goods are infinitely substitutable or that manufactured goods can substitute for biogeophysical life support systems. In a world in which infinite substitutability between resources is not possible, the existence of fixed factors will limit growth. Land is one factor that is largely fixed and subject to declines in quality; stratospheric ozone is another. Current development practices fail to measure and prevent the loss of environmental life support functions. This has lead Pearse *et al* (1990: 7) to note that "conserving what there is could be a sound risk–averse strategy."

Key Sustainability Concepts:

- Precautionary principle
- Behavioural change

The substitution argument does have an important environmental dimension. Would not a ban on chlorinated substance use and emissions in the Great Lakes simply cause environmentally–sound substitutes to be found?

The precautionary principle and behavioural change are suggested as two ways of disputing the technology assertion.

(a) Precautionary Principle

The Swedish cancer researcher Dr. Karl–Henrick Robert believes that we need to ask easy–to–answer, systemic questions about the chemicals introduced into the environment (Hawken, 1993: 53). His approach avoids posing the types of questions that can only lead to endless disagreement over the variables, data, methodologies, and toxicity, of a given toxin. He asks: Is the toxin natural? Is it stable? Does it degrade into harmless substances? Does it accumulate in bodily tissues? Is it possible to predict the acceptable tolerances?

This approach provides methodological clarity and may go a long way to shaping the operational aspects of the precautionary principle.

(b) Behavioural Change

Although technology is a factor in production functions (which ignore the environment) and technological change is linked to increases in productivity, there is no basis for arguing that it will inevitably solve environmental problems. Moreover, pricing as a mechanism

> *Given the market failures noted..., the standard measures of scarcity (prices and costs) may fail absolutely to induce either the conservation of vital stocks or technological innovation. In any case, it is unlikely that humans will devise technological substitute for many ecosphere life–support functions whose loss would be irreversible and potentially catastrophic* (Rees, 1995: 345).

to encourage technology only works well in markets driven by a profit motive. Since many environmental assets have no market value, they fall outside the realm of a pricing framework. The idea that technological innovation can produce an affluent, service–oriented sustainable society without behavioural change, is erroneous. The true integration of environmental and economic decisions has to change the behaviours and relationships humans have with the environment to ensure overall sustainability. Part of this behavioural change may be driven by green consumerism, the purchasing of goods with positive environmental attributes. Green goods may increase eco–efficiency at the unit level. Unsolved questions about total aggregate impact may influence the choice of products that can be certified as green.

7.4 Commentary

The assertion that new technologies will solve environmental problems has been debated in this chapter. Market economy proponents argue that new technologies solve problems such as resource scarcity and environmental pollution.

Many sustainability theorists are less enthusiastic about the role of technology. Some note that the most serious environmental problems are driven by "so–called" technological successes.

Two debating points are presented here to discuss the implications of the assertion from a sustainability viewpoint:

1. **The idea that environmental solutions will come about through technological innovation is deterministic**. It is often based on the view that pro–growth goals validate all technical solutions. Moreover, a technical orientation is often preferred by its proponents because it does not require behavioural changes in production and consumption.

2. **Technological solutions often promote green consumerism as a solution to environmental problems.** In this view, sustainability can be achieved by ensuring that products, manufacturing processes, and ultimate disposal are environmentally sound. This approach to sustainability may be an appropriate transition strategy. In the longer term, it is an open question whether green consumerism (at least as presently conceived) would still lead to unsustainable rates of resource use and pollution.

8.0 THE EMPLOYMENT ASSERTION

PROTECTING THE ENVIRONMENT WILL COST JOBS

If, for example, the automobile industry suffers from a contraction as a result of environmental regulation, unemployment in Detroit can be expected to increase disproportionately. Small towns whose primary sources of income and employment are a single, heavily polluting plant may be particularly vulnerable. There have been, in fact, several episodes of that sort. For example, in San Juan Bautista, California, stringent air pollution laws led to the shutdown of the Ideal Cement Company and the dismissal of its 130 workers (Baumol and Oates, 1979).

8.1 Employment

The level of employment in an economy is a critical factor in judging the economy's success. This leads to economic policies to stimulate job growth. For example, many economists advocated free trade with the U.S. and Mexico because they believed that the short–term pain of closing down inefficient industries (i.e., those with higher costs than other trading partners) would be outweighed by the long–term gains of new production elsewhere in the economy. The counter–argument that long–term gains may not adequately compensate for the certainty of immediate job loss and unemployment, was considered less valid in business–government circles. Many argued that the best way of creating new jobs was to ensure open access to foreign markets. When environmental issues were raised, they were largely seen as extraneous to the free trade deal.

8.2 Analyzing the Assertion

The debate between "jobs" and "environment" protagonists often originates in disagreements about the laissez–faire approach to economic growth, power (who's in charge), distributional impacts, and the valuation of the environment. Inevitably, the impact of an environmental measure on unemployment or job creation has

Key Neoclassical Economic Concepts:

- Economic dynamics
- Technological change
- Labour productivity

to be argued on a case–by–case basis. What must be emphasized is that routine economic dynamics are at play. We would normally expect jobs to be created and lost in a dynamic economy as companies restructure and seek increases in labour productivity through technological change. The loss of jobs attributed to environmental efficiency is no less legitimate than losses attributed to technological change or shifting consumer demand, even though often portrayed as unreasonable.

In other words, as an economy restructures, there are "winners" and "losers" even if the economy as a whole benefits. The economist Joseph Schumpeter explained this when he coined the phrase "creative destruction" to describe the process of capitalism. Inefficient industries will, nevertheless, struggle to survive. Unless the government is able and committed to transferring resources from the "created" to the "destroyed," the latter can be expected to oppose changes.

ANECDOTAL EVIDENCE

- Protection of the northern spotted owl in the Pacific Northwest has purportedly cost anywhere from 20,000 to 140,000 jobs--hence the bumper sticker 'Save a Logger, Kill an Owl.'
- Phillips Petroleum Company announced 1,350 layoffs in April 1992 and blamed environmental regulations.
- The Chemical Council of New Jersey claimed in August 1992 that environmental regulations had cost the state 12,000 jobs in the chemical industry over the previous 10 years.
- Local sugar growers in Florida claim that measures to protect the Everglades will cost 15,000 jobs.
- The American Petroleum Institute blames environmental restrictions for the loss of 400,000 jobs during the 1980s.
- The Motor Vehicle Manufacturers Association claims that increasing fuel economy standards will cost 300,000 jobs.
- The 1992 closing of a polluting oil refinery in Wyoming cost 200 jobs.
- An analyst has estimated that every job 'protected' by clean-air legislation costs more than $1 million in 1992 dollars per year.
- And several years ago, the Canadian pulp–and–paper industry and its labour unions successfully opposed federal regulations mandating production using 'environmentally benign' processes and thereby preserved existing industrial plants and thousands of jobs.

Source: Bezdek, 1993: 8.

Key Sustainability Concepts:

- Sustainable livelihoods
- Ecological fiscal reform
- Transition strategies

8.3 Sustainability Concepts

Industry and governments have to be more proactive about job loss attributed to environmental protection. If they can accept job loss because of technological change, they must also accept it for environmental reasons. Because job loss is a basic attribute of a dynamic economy, three concepts are proposed to discuss the environment and jobs.

(a) Sustainable Livelihoods

The idea that economic growth automatically reduces the rate of unemployment is questionable. First, as industries seek to increase productivity, they replace employees with labour–saving technologies. Second, the rate at which the present economy would have to grow to make a significant impact on unemployment is unsustainable. This means that a growth–oriented economy is problematic not only for the unemployed (technology is favoured over labour), but also for society as a whole (many jobs are harmful to the environment).

Advanced industrial societies often envisage technological advances and productivity gains as leading to more automated production and increased leisure time. But the underlying logic of this vision fails to tackle the marketplace's more practical tenet that income is derived from paid employment or investment and that there should be no rewards for "idleness." This creates a dichotomy between the number of jobs available and access to income. This

ANECDOTAL EVIDENCE

- Recycling created 14,000 jobs in California in 1991.
- Recent energy conservation programs have created 600 jobs in British Columbia.
- The U.S. Environmental Protection Agency estimates that the Clean Air Act Amendments of 1990 will create 60,000 new jobs.
- The wTe Corp, an environmental concern, has grown rapidly since its startup and employs 200 workers.
- Diversification into environmental business is credited with saving the Fluor Corporation from extinction and thousands of its workers from unemployment. Environmental work accounts for more than half of the firm's new 1992 revenues of $8 billion.
- A disproportionate share of the jobs forecast by the U.S. Bureau of Labour Statistics to be the fastest growing during the 1990s are environment–related.
- In the United States, many of the sectors subject to the most stringent environmental regulations--including chemicals, plastics, synthetics, fabrics, and paints--have become the most efficient and have actually improved their international competitiveness.
- The formerly communist nations of Eastern Europe promoted economic development while ignoring environmental concerns and produced both environmental catastrophe and economic failure.
- The European Economic Community recently banned the imports of pulp–and–paper products not produced in an 'environmentally benign' manner, thus devastating the Canadian pulp–and–paper industry (which had successfully opposed federal regulations mandating such processes) and costing thousands of jobs.

Source: Bezdek, 1993: 8

A livelihood comprises the capabilities, assets (stores, resources, claims, and access) and activities required for a means of living; a livelihood is sustainable which can cope and recover from stress and shocks, maintain and enhance the capabilities and assets and provide opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term (Chambers and Conway, 1992).

dichotomy raises important questions about developing sustainable employment and livelihoods that will require tax reform and innovative transition strategies.

(b) Ecological Fiscal Reform

EFR is about trying to achieve "a wider use of labour and a wiser use of nature." It can tackle three problems directly: unemployment, environmental deterioration and economic efficiency. In other words, it could lead to a triple dividend (with the added benefit that some proportion of revenues could also be used to retire the deficit). EFR can tackle these problems by changing the signals as to what constitutes sound economic development. On the one hand, governments tax the activities of people they should encourage (employees, entrepreneurs, savers and investors). On the other hand, they do not adequately tax the throughput of energy and raw materials. Governments do not deal with the externalities problem.

The idea that taxes can be shifted off income and employment and onto pollution emerged in earnest in the European Union's 1993 White Paper on "Growth, Competitiveness and Employment." Jacques Delors, the former President of the European Commission, argued in this paper that:

> ...if the double challenge of unemployment and pollution is to be addressed, a swap can be envisaged between reducing labour costs through increased pollution charges.

For example, payroll taxes could be reduced if an equivalent amount of revenue could be raised from pollution charges on industry emissions or products. The capital/ labour ratio contributes to the unemployment rate. Because our fiscal systems encourage resource depletion (e.g., over fishing) and environmental pollution (e.g., toxic chemicals) and often penalize hiring through payroll and other taxes, polluters are rewarded and labour punished. From a sustainability perspective, a shift towards labour–intensive, non–polluting production is a necessary part of a shift towards a sustainable economy. This shift would be greatly assisted through conservation, resource and pollution taxes.

> *It is bad environmental management, not environmental regulation, which poses a greater threat to jobs in industry* (Friends of the Earth U.K., 1994: 93).

(c) Transition Strategies

The size and scale of industrial economies have to be considered in any strategy to reduce unemployment. Big business is not a major employer relative to its activities. The five hundred largest corporations in the world, corporations which control 25 percent of the world's gross output, only employ 0.05 of one percent of the world's population (Hawken, 1993: 92).

The benefits many companies receive in terms of subsidies and tax incentives have to be reconsidered from an environmental and job creation perspective. Because companies are poor at calculating costs, many of the efficiency gains they have achieved have high ecological and social costs. Productivity gains in corporate terms require the elimination of labour. This elimination, however, may be a cost that has to be borne by society in the same way that pollution is an unaccounted for social cost. A company may be able to achieve greater returns on its investment in laying off employees, but the overall economy is weaker because of the unemployment created. Transition steps may be required to assist firms and employees in eco–efficiency gains.

> *Today, every toxin, every heavy metal, every organochlorine has a champion, a company or an industry that fights fast and furious for its sake. Industry marshals arguments about cost–savings, job loss, and other "evidence" to forestall regulation, postpone action, further commercial development and delay or prohibit the onset of any societal change that would impede its business. Oftentimes, an industry will even form a trade group or an "independent" foundation ... whose explicit purpose is to further the life and/ or promote a toxin or heavy metal* (Hawken, 1993: 49).

8.4 Commentary

The assertion debated in this chapter is that protecting the environment will cost jobs. Unemployment is one measure of economic growth (or lack of it). Industries argue that environmental policies jeopardize employment and job creation because they affect economic growth. Government should encourage undifferentiated economic growth, according to many economists, to stimulate job creation.

Ecological theorists refute this by stating that unemployment will always occur in an economy regardless of environmental regulations. It will occur when new technology replaces the need for workers or when consumer demand shifts. In fact, these

theorists argue that as environment protection becomes more important, pollution should be taxed, not workers' incomes. This would create more income and spending power for people, thereby increasing job growth. Taxing pollution and not workers would result in decreased labour costs as well. Tax shifts support the integrated approach to environment–economy decision making.

To further debate this assertion from a sustainability perspective, the following points are presented:

1. **We can expect jobs to be created and lost in a dynamic economy**. Job dislocation is an inevitable part of capitalism. Jobs are lost or gained because of technological change or shifting consumer demand. The same can be said of eco–efficiency measures: some measures will create jobs, some will lead to job loss––especially if those jobs are ecologically expensive. Overall, valuing the environment will lead to more jobs as the economy is restructured for eco–efficiency. Transition plans may, of course, be required to minimize social and community costs.

2. **The relative size of job losses are manageable**. Compared to job losses associated with financial and political developments such as free trade, deregulation, bankruptcies, corporate downsizing, recessions and real estate crashes, the loss of jobs for environmental reasons is minor.

9.0 THE COMPETITIVENESS ASSERTION

HIGHER ENVIRONMENTAL STANDARDS MAKES INDUSTRY LESS COMPETITIVE

Canada's fragile economic recovery could be readily derailed and many elements of Canadian industry would become non–competitive by new taxes or prescriptive regulations leveled under the guise of a quickly developed National Action Plan [for a climate change policy] (Alliance for Responsible Environmental Alternatives, 1994).

9.1 Competitiveness

In a neoclassical market economy, a country needs to be competitive in order to increase its national productivity, living standards and employment. A country will often be competitive if it has a comparative advantage in sectors that trade internationally, such as the automotive sector in Canada.

Governments often intervene in the economy to set the terms of reference for competitiveness. The North American Free Trade Agreement is an example of such intervention. The Agreement was pursued not only to ensure better access for Canadian industry to the American market, but to protect the existing level of access from protectionist pressures in the United States.

9.2 Analyzing the Assertion

Given the problem with market failure (i.e., pollution as a negative externality), government intervention is necessary to provide some degree of environmental protection and resource management. The extent of this intervention is often questioned. Economists generally argue that tougher regulations (or higher taxes) will make it more difficult for companies to compete on price. Many economists, however, do not distinguish between economic "goods" and "bads." They are indifferent to the form of production. For example, most economists view the manufacturing of cigarettes, as well as public health expenditures on tobacco–induced cancer treatment, as positive economic contributions. They do not account for social costs because they are external to the manufacturer. At the same time, they do "account" for the pollution control costs government assigns through regulations. They often argue that these costs impede competitiveness and reduce national economic growth. But this argument is short–sighted. It ignores the overall cost of a pernicious activity to society as a whole.

Key Neoclassical Economic Concepts:

- Competition
- Profitability
- Market failure

Ensuring an environmentally sound "level playing field" in competition policy is a difficult task. It can be achieved by outright prohibition of goods that do not meet a certain environmental standard, by tariffs on goods that do not meet those standards or by taxing all goods (Canadian or otherwise) according to the extent to which they exploit market failure. Outright prohibition has been successfully used in some areas but would not

Stringent standards for product performance, product safety, and environmental impact contribute to creating and upgrading competitive advantage. They pressure firms to improve quality, upgrade technology and provide features in areas of important customer (and social) concern (Porter, 1990).

be considered an economic measure or instrument. Tariffs are often neither politically feasible nor economically defensible.

The difficulty with the competitiveness assertion is that it has no limits. We cannot match the rate of compensation for labour in the developing world. This means that to be competitive and profitable we have to compete on other factors than the cost of labour. Nor can we expect to change our constitution, regulatory or political structures at will, just to match less effective structures elsewhere. Again, this means that competition has to be based on policies that are protective of health and welfare. We do not want a race to the lowest common standard. This means that we have to compete on other factors than the cost to the environment.

Higher environmental standards may well offer competitiveness advantages. This case has been argued by Porter (1990, 1991). They can reap "first–mover" benefits by securing business in markets requiring eco–efficiency. Countries fostering such firms will share in the benefits. Those who hesitate will lose this advantage. At the same time, the claim that higher environmental standards than our competitors will make us more competitive, has to be considered on an industry–by–industry basis.

In some instances, labeling schemes and industry standards may be an alternative to government intervention to correct market

Key Sustainability Concepts:

- Full cost accounting
- Ecological fiscal reform
- EMS and auditing
- Eco–labeling
- Life cycle assessment
- Environmental performance evaluation
- Green procurement
- Sustainability reporting

failure. Canada's EcoChoice ecolabel program provides one such example. Labels and standards should be designed as competitive tools, not to protect existing firms or technologies.

9.3 Sustainability Concepts

Competitive issues are complex and cannot be judged at face value. A range of responses are suggested to explore all the dimensions of the competitiveness question.

(a) Full Cost Accounting

Industry and government need a system of environmental commerce and accounting. Because the market is good at setting prices and poor at recognizing ecological and social costs, there is a role for government in directing industry to internalize the costs of pollution and resource depletion. This can be achieved by pollution, conservation, and resource depletion taxes.

Full cost accounting takes into account the full cost of production plus the cost of any environmental damage associated with it, or the cost of extracting a resource and the cost of its environmental damage (Schmidheiny, 1992: 17). Industries should include environmental costs in their accounts––the full cost of pollution and environmental damage. Some costs will be estimates

because it is difficult to place a price on some environmental problems. However, that does not mean that no price can be determined and placed on that problem. Society can establish a price to put on public goods such as air and water that are in danger of being polluted.

Government's role will be to ensure that some products, processes and ambitions are taxed out of existence. By subsidizing prices in the past with unpaid ecological costs, business has effectively damaged innovation, competitiveness and job creation. Government intervention is required to integrate prices and costs in the marketplace. Business must still be able to make money, but profits will only be legitimate if business activities sustain living systems instead of destroying them.

(b) Ecological Fiscal Reform

Neoclassical economists believe that because controlling pollution is expensive, there is a trade–off between balancing costs and benefits. This is their basic economic premise in assessing impacts on competitiveness. In seeking a balance between costs and benefits, they argue that there is a "right" level of pollution which the environment can bear and which won't harm industry competitiveness. The acceptable amount of pollution is always greater than zero.

An integrated environment–economy framework which addresses competitiveness can only be achieved by reforming the tax and fiscal system from an ecological perspective. In this approach, competitive dynamics would be changed by taxing pollution, resource depletion, energy and material use--factors that contribute to unsustainable development. Higher taxes in these areas would be offset by lower taxes on labour, investment, profits and corporate payrolls. Industries adversely affected by a tax shift would be compensated through transitional strategies that would help them achieve behavioural change, while at the same time ensuring compliance with a sustainability policy direction.

> *To celebrate the environmental clean–up sector of the economy as a "growth industry," is worse than ignorant. We might as well celebrate cancer treatment as a growth industry, rather than take cancer epidemics as a warning about the hundreds of toxic chemicals loosed in the environment* (Hawken, 1993: 45).

(c) EMS and Auditing

The development of formal environmental management systems could improve corporate environmental performance and competitiveness. An organization with an environmental policy and objectives will be better able to assess environmental performance with audits and other environmental management tools.

The EMS design is critical. It should emphasize pollution prevention. Each corporation will need to identify its significant environmental effects, applicable laws and regulations, priorities, and facilitate corrective actions, systems auditing, and operational processes and procedures.

> *An environmental management system is defined as an organization's structure of responsibilities and policies, practices, procedures, processes, and resources for protecting the environment and managing environmental issues* (Institute of Internal Auditors Research Foundation, 1993: xi).

One framework for an EMS is based on four general principles for management systems

purpose, commitment, capability, and learning (Canadian Standards Association, 1994):

1. The "purpose" principle concerns the organization's environmental policy; the risks associated with its activities, processes, products, and services; and its environmental objectives and targets.
2. "Commitment" refers to motivation according to environmental values; organizational alignment and integration; and accountability and responsibility.
3. "Capability" refers to human, physical and financial resources; skills, training; and information management.
4. "Learning" is about measuring and monitoring, communication and reporting, system audits and management review; and continuous improvement.

Environmental auditing is a process of obtaining and evaluating evidence about corporate environmental performance according to designated criteria. The results must be objective and documented by supportable data.

> *All organizational activities, products and services interact with, and have some effect upon, the environment, and an effective environmental management system needs to be capable of dealing with this complexity. Therefore, the environmental management system components will be inextricably interwoven with most, if not all, of the organization's overall management system* (BSI, 1992: 9).

(d) Eco–Labeling

There is a growing demand for products that do not harm the environment. The controversy over disposable versus washable diapers was one of the first instances where the environmental impacts of a throwaway product came under public scrutiny. Since then, other products such as non–toxic household cleaning agents, chlorine–free paper, recycled oil, and mercury–free batteries have become part of a "greening" of the market place. Public willingness to use its buying power as a tool to protect the environment is an opportunity for manufacturers who want to develop products with the environment in mind. In many instances, it is an opportunity to be more competitive.

> *The marketplace has seen an explosion in recent years of products that claim to be "green" or environmentally acceptable. In 1989, 24 products in the U.S. claimed to be green; by 1990, there were over 600 products; by 1994, it is predicted that green products will become an $8.8 billion business. How can manufacturer's and advertisers label these products honestly to avoid confusion in the marketplace?* (CSA, 1993: 5).

With the growth in so–called green products came the need for rules about environmental labeling (eco–labeling). The need for an eco–labeling standard arises because customers cannot substantiate the environmental claims of a product. Standards for eco–labeling should be based on well–chosen criteria through an unbiased, open decision–making process which includes industry, consumers, environmental groups and the government. Eco–labeling standards provide society with an opportunity to discriminate against environmentally harmful products.

(e) Life Cycle Assessment

Life cycle assessment (LCA) is a method of checking the facts about the environmental burden of a product, from its production stage through to disposal. LCA considers the air, water and solid waste pollution generated when raw materials are extracted. It includes

Sustainability demands that we pay attention to the entire life cycles of our products and to the specific and changing needs of our customers (Schmidheiny, 1992: xii).

the energy used in the extraction of raw materials and the pollution that results from manufacturing the product. It also accounts for environmental harm that might occur during the distribution and use of the product.

Lastly, LCA examines the solid and liquid wastes that are loaded onto the environment following final use of the product.

The following are the basic components of any LCA process:

1. Inventory Analysis: the identification and quantification of energy and resource use and environmental releases to air, water and land;
2. Impact Analysis: the technical qualitative and quantitative characterization and assessment of the consequences on the environment; and,
3. Improvement Analysis: the evaluation and implementation of opportunities to reduce environmental burdens.

(f) Environmental Performance Evaluation

Corporate interest in environmental performance evaluation has arisen because companies are increasingly being held responsible for a wide range of environmental problems. Since business is often held liable for environmental costs and confronted by a growing number of regulations and penalties, the current emphasis on pollution prevention is an attempt to be proactive rather than reactive.

Businesses have an impact on the environment through their activities, services, and products. In evaluating how businesses approach environmental performance, three different elements are often taken into consideration: facilities and operations, management, and products. Company operations view the performance at individual sites to determine which resources are being used and their resulting emissions and wastes.

To provide future visions and impetus for change, the management system sets goals and supplies the resources in order to achieve these goals. Lastly, businesses need to determine the impact of products on the environment by examining their life cycles. This approach assists management in deciding what products need attention and how to begin minimizing their environmental effects.

Environmental performance measures define for employees, consumers and the public what a company considers environmental success. These measures must relate to a well thought out group of objectives supported by top management and address a number of complicated issues. In the end these measures must meet the environmental quality expected by the public (Peacock, 1993: 22).

(g) Green Procurement

Green procurement, or environmentally sound purchasing, is becoming adopted by companies who want to buy products and services that are less harmful to the environment, and by governments who want to use their power to influence the market.

There are many benefits to green procurement, including cost savings, compliance with environmental regulations, decrease in accidents, and improved human and environmental health.

Although green procurement is still at an early stage, some firms are establishing their own guidelines and criteria. While it is difficult to determine which products and services are "green" or "greener" than a competitor, some basic criteria have been identified. These include: the recycled content of a product; pollution created in product production; minimal and reusable packaging; recycled content of packaging; and hazardous byproducts (Add Green to your Bottom Line, 1996: 10).

> *...there is still a yawning gulf between the kind of friendly "green" environmentalism that business wants to promote--one that justifies growth and expansionary use of resources--and the kind that actually deals with the core issues of carrying capacity, drawdown biotic impoverishment and extinction of species. Business, despite its newly found good intentions with respect to the environment, has hardly changed at all* (Hawken, 1993: 31).

(h) Sustainability Reporting

A sustainable development report should discuss a corporation's management system standards and overall management strategy for addressing sustainability. Does its management strategy address key sustainability issues? Is the company proactive around issues of environment, people, and economic development? Does it distinguish between economic, social, and ecological sustainability?

A sustainability reporting framework may require organizations to determine the following:

> *In sustainable development reporting, two key concepts stand out. The first is integration--bringing together information relevant to all the company's stakeholders, be they financial (e.g., investors, lenders), those affected by its environmental impacts, or those whose well being is affected by the company (e.g., employees, local communities). The second key concept is interconnectedness--showing how a company's activities relate to the environment, sustainable economic development, and quality of life* (Coming Clean, 1993: 9).

a) How to provide economic benefits to the organization and society while minimizing social and environmental impacts;

b) How to take stakeholders' expectations into account regarding social and environmental issues;

c) How to comply with applicable financial, social, and environmental laws and regulations; and,

d) How to continually improve techniques to minimize detrimental impacts on the environment and society.

9.4 Commentary

This chapter debated the assertion that higher environmental standards than our competitors makes industry less competitive. In order for the economy to protect the competitive position of industry, many argue that government intervention should be on the side of industry not environmental regulations. Ecological theorists argue that higher standards are necessary to protect the environment and that industry is sufficiently innovative to adopt a standard and profit from it if the will is there.

A full cost accounting system is required to ensure that the costs and prices of goods and services are right. Ecological economists argue that in order to do this governments should ensure that pollution is regulated or taxed, and that environmentally harmful subsidies are canceled. This supports the integration approach: governments have to direct industry to internalize the costs of pollution. Industry needs to focus business practices more clearly on sustainability.

Two points are presented here to debate the competitiveness assertion from a sustainability perspective:

1. **Environmental factors by themselves should not contribute to a loss of market share.** Since industry competes on all sorts of criteria (quality, service, price), the fear may be either real or contrived. Environmental standards (whether government or voluntary) represent a very small part of the total cost of production and the literature is replete with examples of how better standards make good business sense. Indeed, there is a growing argument that stricter environmental policy makes firms more efficient by reducing wastes and promoting more efficient production techniques.
2. **Regulations and taxes have to be designed to get competitiveness right from an environmental and sustainability perspective.** Business argues that there are already too many regulations and taxes to consider new ones, especially measures that will affect competitiveness or reduce shareholder profits. Corporate interest in the status quo--or in freeing up restrictions on the market--is thus evidence that industry is incapable of acknowledging what is really happening to the environment.

Regulations and taxes are necessary for people to get the right information about costs in the market place. Governments need to be more proactive in shifting competition policy away from unsustainable practices. No one should benefit from a false economy, that is, an economy which does not account for defensive expenditures or the depreciation of its natural capital assets.

10.0 THE NATIONAL DEBT ASSERTION

DEFICIT AND DEBT REDUCTION TAKE PRIORITY OVER THE ENVIRONMENT

Moody's Investors Service, the . . . influential rating organization, based in New York, stripped Canada of its AAA rating earlier this year . . . (Toronto Star, 1995)

10.1 Deficit and Debt

Government priorities change with time. In recent years, for example, federal and provincial governments have all been concerned with the level of debt they carry. The debt is the total amount of money a government has borrowed from its creditors. It is the result of adding up yearly budget deficits--the deficit being the money that is borrowed in any one year to finance government programs.

The level of national debt is a question of government policy. On the one hand, there are concerns about whether the debt burden is too high and creating repayment problems as well as diminishing our ability to finance government programs. On the other hand, some neoclassical economists argue that Canada has experienced a major recession and may "grow" its way out of its indebtedness when the economy expands. For the government, the debt is part of its juggling of priorities.

Ideally, a government will want to both pay down its debt and finance it in the least expensive way possible. If a government decides to service its debt at the expense of the environment, the implicit question may be: "When will the depletion of the environment be the least expensive way to service the debt?" This type of question reflects the failure of governments to recognize the economic value of the environment.

Key Neoclassical Economics Concepts:

- Ability to pay
- Interest payments to foreign bond holders
- Least-cost financing
- Government intervention
- Values

10.2 Analyzing the Assertion

A market economy undervalues environmental functions. For example, forests and wetlands provide drainage and biodiversity services. These services are likely to be ignored when a government is faced with priorities that are reflected in market transactions. Debt service repayments mean that less money can be spent on environmental and other programs. Nevertheless, the national debt versus environmental programs is not an either/or situation. Both have to be addressed. We need to recognize that in addition to the "financial" debt we also have an "environmental" debt made up of the defensive expenditures required to restore and remediate ecological services and life support systems.

We cannot safely grow our way to sustainability, particularly in the first world––the global economy is already running a massive hidden ecological deficit, attributable mostly to industrialized countries. Far from providing the surpluses needed to rehabilitate natural capital, material growth based on current economic assumptions and available technology depends on its further depletion, increasing the sustainability deficit and leading to accelerated ecological decline. Real wealth is measured by enduring cultural artifacts, supportive sociopolitical institutions, growing natural capital stocks and long–term ecological security (Rees, 1995: 346)

Key Sustainability Concepts:

- Environmental services
- Ecological debt
- Valuation and environmental assessment

10.3 Sustainability Concepts

The deficit–debt problem can be discussed with reference to three important issues: environmental services, ecological debt and valuation.

(a) Environmental Services

Jacobs (1993: 5) discusses two types of environmental services. The first are amenities which the environment provides for direct and conscious consumption (e.g., space for recreation, scenery for aesthetic enjoyment). The second, which he calls life–support, are services which are intangible and are indirectly consumed (e.g., genetic diversity, the regulation of climate).

If society overconsumes these services (environmental consumption), it will undermine the capacity of the environment to provide them (environmental capacity). This means that societies need to maintain environmental capacity to protect the economic functions of the environment. These functions are "the provision of resources (raw materials and energy), the assimilation of waste materials, and the performance of environmental services" (Jacobs, 1993: 86). Because the market economy ignores sustainability criteria it cannot protect these functions. In other words, the market cannot protect environmental capacity from too much environmental consumption. As a consequence, governments must intervene to constrain the economy within environmental limits. The role of government will be to determine what these limits are, adopt them as sustainability targets, and develop policies for their achievement. While such steps require the consideration of government debt, the current focus on financial debt in government budgets comes at the expense of environmental services.

To make sustainability operational, limits expressed in terms of the environmental capacity itself (average temperatures, species numbers) must be turned into targets for the specific features of the environment which provide those capacities. Thus global temperatures are a function of a number of variables such as carbon dioxide emissions, the vegetation cover available to absorb CO_2, methane emissions, and others. Each of these will require a target such that, if all the targets (or some other specified permutation) are achieved, global temperatures will be held to the sustainability limit. Similarly, maintaining genetic diversity to a particular degree will require the conservation of minimum areas of particular types of habitat, development of new habitats, additional scientific breeding of some species to preserve critical minimum stocks, and so on (Jacobs, 1993: 96).

(b) Ecological Debt

In the 1995 federal budget, Canadians learned about a $42 billion deficit for 1993–94 and a

$542.6 billion national debt. Some in the environmental community were hoping that this budget would begin to integrate environmental issues in economic decision making. They were disappointed, especially those who wanted a budget that would focus attention on the "ecological" deficit, the deficit created by decisions which do not protect ecological processes, biodiversity or the sustainable utilization of species and natural resources. A year later, the 1996 budget indicated that the deficit had declined to $32.7 billion in 1995/96. The government's deficit target, now 2% of GDP or $17 billion, may be reached by 1997–98. At the same time, environmental liabilities which make up our ecological deficit were not addressed.

An ecological deficit occurs when we live off ecological capital rather than the income it provides. The collapse of the Atlantic fishery represents an illustrative example. This happens because subsidies and taxes exacerbate resource depletion and environmental pollution. It happens because financial accounting does not require ecological bookkeeping.

The Auditor–General has recently focused attention on this shortcoming. In a report on hazardous waste management, the federal government was faulted for not including in its financial statements the potential liabilities it faces for cleaning up the contaminated land it owns. Studies indicate that the clean up of federally owned hazardous waste sites will cost at least $2 billion. That's part of our ecological debt. Another part is the $10 billion estimated for the disposal of radioactive wastes over the next 70 years. Ottawa's share of this liability has not been included in the government's financial statements.

Environmental Liabilities

The Auditor General recommends that high priority should be given to quantifying the government's potential liabilities, and to determining when these potential liabilities become actual liabilities. As well, the Auditor General recommends that additional steps should be taken to improve disclosure in this area. He is particularly concerned that the government provide a general understanding of the uncertainties inherent in the process of measuring environmental liabilities--including a discussion of the assumptions used to calculate the liabilities and the range of sensitivities to change in the assumptions (Government of Canada, 1996: 120).

A recent IJC report notes that the social costs of the environmental deficit for just the four largest cleanup sites on the Niagara River are estimated at $6 billion (US) over the next 30 years, and $19 billion (US) over the next 100 years. The report states that "the latest published estimates to remediate the hazardous waste legacy in the United States are in the range of $480 to $1,000 billion, with $750 billion the most likely" (IJC, 1993: 96–97).

As we learn more about environmentally harmful development practices, we also learn that our ecological deficit–debt problem is a major financial liability. But we would never know this by examining our national accounts and budgets. Governments are currently pursuing unfettered growth, not sustainability.

The deficit was $42 billion, or 5.9 per cent of GDP in 1993–94, the year the government took office. Without fiscal action, the debt dynamic then in place would have pushed the deficit up in subsequent years. With the continued uncertainty about Canada's financial future that would have ensued, Canada's economic growth potential would have been seriously eroded (Government of Canada, 1996: 120).

(c) Valuation and Environmental Assessment

The very notion of value in neoclassical economics is utilitarian. In this approach, environmental functions have to have a price which society is willing to pay if they are to be protected. But the fact that environmental functions have to have a price is evidence that the concepts and methods of neoclassical economics fail to integrate the environment into its decision making framework. From a public policy perspective, the idea that environmental functions can be reduced to monetary terms calculated by a small elite is questionable. A wider political debate and extensive community involvement in assessing environmental values, many of which are intangible, is required.

10.4 Commentary

The assertion that deficit and debt reduction take priority over the environment has been debated in this chapter. There are two views related to the debt: one is that the government's main concern should be to reduce the debt; the other is that the debt will sort itself out as the economy grows. When the debt takes priority, the environment suffers because it is perceived as having little economic value.

In order to value the environment, governments must account for the ecological debt. There is a need for better valuation methodologies and for the environmental assessment of policies to ensure that this debt is reduced in conjunction with the financial debt. One major debating point is suggested to counter the assertion that the national debt takes priority over the environment.

1. **Protecting the environment contributes to deficit reduction**. Part of our debt can be attributed to ecologically damaging subsidies (e.g., agriculture, fishing, forestry and accelerated depletion allowances for mining, oil and gas megaprojects). These subsidies are often viewed as necessary for economic growth even though they perpetuate the process by which debt leads to more environmental degradation. Governments need to intervene to protect the environment by eliminating environmentally harmful subsidies that exacerbate the debt. By reducing subsidies and increasing taxes on environmentally harmful activities, governments can improve their balance of accounts and, hence, their ability to pay outstanding loans.

11.0 CONCLUSION

Linking environment and development at the operational level has proven to be a difficult challenge. On the one hand, governments and industry ignore the links in national budgets and key economic policy decisions, progress in some areas not withstanding. On the other hand, there is a fear of debating the links. Understanding them would threaten the status quo. As a consequence, real deliberation at key industry and government decision–centers is missing. How can this be changed? What information would ensure that the links demand consideration? What arguments are so compelling that only a frivolous or reckless decision maker would avoid a thoughtful, earnest and responsible debate–– one leading to effective environmental and sustainability outcomes?

This guide has attempted to set out the grammar by which environment–economy issues are debated.

1. It has provided a basic, albeit incomplete, primer on neoclassical and ecological economic theory;
2. It has proposed eight prescriptive economic assertions about the links between the environment and the economy that are worthy of debate; and,
3. It has provided a range of arguments that can be used as strategic responses to debate each assertion.

Three general conclusions about the grammar of environment–economy links can be drawn.

First, an understanding of the origins of an economic assertion is required to debate it successfully. Since the guide is not an exhaustive treatment of economics, it has shortcomings. Moreover, because it faults the neoclassical perspective, it invites significant criticism. Hit–and–run criticisms must be accepted for what they are: an attempt to avoid or monopolize the debate. They betray an inability of neoclassical economics to assimilate the environment–economy discourse, a fear of opening up an uncontrollable debate, an antagonism towards those who raise it, and possibly even...a fear that sustainability proponents are right.

Second, environment and sustainability proponents have to be familiar with critical ecological theory to construct a positive economic message. It is not enough to be critical of present economic practices: an alternative view of the economy one is seeking is required. Ecological criticisms of neoclassical economics must be made and tested at every opportunity. To this end, easy–to–answer, systemic questions about business–government activity are particularly important. There is a need to avoid posing questions that can only lead to endless debate about data, methods and scientific uncertainty. We need to ask: Does the product, service, process encourage more consumption of the local environment? Does it reduce or prohibit other beneficial uses of the environment? Does it support strong sustainability? Is it possible to predict the state of the environment in the future on the basis of the activity?

Third, environmental specialists do not have to have the environment–economy debate framed by economists and others. They can frame the debate themselves. By understanding the grammar of the debate they

can appraise an economic assertion and identify its basic tenets. Three basic questions are fundamental to understanding the grammar of environment–economy issues.

1. What type of economy is envisaged? (Weak versus strong sustainability).

2. What is the decision making framework? (Balance or integration).

3. What are the tools or methods of analysis? (Neoclassical or ecological economics).

1. What type of economy is envisaged? The Case for Strong Sustainability.

The way in which productive assets are passed on from one generation to another has implications for sustainability. Ecologists and economists have been debating measures of a "constant capital stock" condition for sustainability. The type of capital stock one wishes to pass on--manufactured or natural capital--and the degree of substitutability between them is a critical consideration.

Conventional economists argue that there is no loss in the overall value of the capital stock if the returns from the depletion of natural capital assets produce an equivalent value of manufactured capital. In other words, they argue that manufactured capital such as an airport runway is an appropriate substitute for natural capital such as a wetland. This position has come to be known as the weak sustainability criterion.

Ecological economists have a different view. They argue that societies must live on the "interest" and not further deplete the stock of natural capital. For example, the collapse of the east coast fishery can be attributed to the substitution folly of the weak sustainability criterion. More fishing boats, and more extractive harvesting techniques, have proven to be an inadequate substitute for the depleted fish stock, lost incomes, livelihoods and social disruption. We have a modern fishing fleet but no fish. In such situations, the gain in manufactured capital is meaningless

2. What is the decision making framework? The Case for Integration

In the "balanced" approach, the environment is seen as a separate issue from the economy, one which has to be 'weighed' against economic considerations. Proponents argue that the costs and benefits of environmental pollution *can* be calculated, that the *right* level of pollution is always greater than zero, and that society is *always* better off permitting some level of environmental pollution. This ensures that industries are competitive, people have jobs, and that wealth is created to support welfare and other public programs. In this approach, the environment is valued as a commodity and resource for human use. What we tend to hear about the "balanced" approach is that "trade–offs" exist between the environment and competitiveness, the environment and jobs, the environment and economic growth, the environment and ... whatever, a trade–off that should never harm some economic interest.

For many environmentalists, framing environmental issues as trade–offs is symptomatic of an environmentally–unfriendly system of economic activity. Critiques of current development practices by the Brundtland Commission and the UN Conference on Environment and Development would not have been necessary if economic activity accounted for environmental values.

The balanced approach to environment–economy decisions often leads to simplistic assertions about trade–offs that may be half–truths, myths or caricatures of a complex situation. For environmental specialists, wherever they may work, these assertions can be problematic in policy debates. They challenge the logic of protecting the environment. To debate them, one must ask more probing, sustainability–oriented questions about the value of the environment.

An alternative decision–making framework is based on the idea that economic and environmental values have to be integrated in all aspects of development planning. In an integrated approach the economy is treated as a subsystem of the environment. Integration means ending the segregation of ecology in economic decisions and making it equal in importance to other social and economic issues. In this approach, decisions about industrial practices and consumer choice have to be made at the front end of development planning and involve serious questions about resource and energy use, product and process design, extraction rates and assimilative capacity. In this view, there is a need for an integrated environment–economy approach to sustainable development to replace the falsely–simplified idea that there must be some trade–off between the environment and the economy.

The two competing environment–economy frameworks lead to conflict in policy deliberations. If, for the most part, industry is promoting a balanced approach and environmental organizations an integrated approach, governments will be caught up in mediating between rival claims. If the role of government is to shift economic activity to sustainable development, governments will need to have a better appreciation of the nature of these claims.

3. What are the tools or methods of analysis? The Case for Ecological Economics.

The choice of tools is about the means by which objectives are reached. If the objective is efficiency, one set of tools will be preferred. If it is effectiveness, another set. Once the ends are determined the means to achieve them will become part of the debate about methodologies. But means and ends are often confused. For environment and sustainability proponents, the challenge is to ensure that economic efficiency does not become an end in–itself. Debating methodologies is thus as important as debating the economic vision or the decision making framework. Some economic methodologies will have to be replaced to advance integration and sustainability.

This guide demonstrates how one can respond to an assertion judged to be in error. It is a communications tool for environmental specialists who want to learn how to respond strategically to a questionable assertion about economic activity. By understanding the source of disagreements that arise from integrating economic and environmental decisions at the front–end of development planning, these specialists may be better able to negotiate new environment and sustainability policy initiatives. An understanding of the grammar of economics and the emerging grammar of environment–economy integration may ultimately lead to better conflict resolution skills. The assertions and sustainability concepts outlined in the guide are designed to promote a genuine understanding of the emerging sustainability paradigm (Table 2). A better understanding of the environment–economy debate is essential to a new economic perspective that values the environment.

TABLE 2: ENVIRONMENT AND ECONOMY:
A STRATEGIC RESPONSE MATRIX

Economic Vision	Superficial or Weak Sustainability	Strong Sustainability
Decision Making Framework	"Balance"	"Integration"
Analytical Concepts & Tools / Assertions	Neoclassical Economics	Ecological Economics
FREE MARKET – The best way to protect the environment is to let the market operate freely	Markets Economic Efficiency Pareto Optimality Externalities Market Failure	Natural Capital Eco–Efficiency and the Factor 10 Economy Environmental and Natural Resource Accounting Sustainability Planning Ecological Fiscal Reform
ECONOMIC GROWTH – Economic growth is required to protect the environment	Wealth Creation Economic Expansion Preferences Luxury Goods Cost–Benefit Analysis Distributive Equity	Thermodynamics Carrying Capacity Ecological Footprints and Appropriated Carrying Capacity Hicksian Income Intergenerational Equity
PRIVATE PROPERTY RIGHTS – Private property rights ensure environmental protection	Tragedy of the Commons Coase Theorem Private Ownership	Sustainable Institutions Valuation for Strong Sustainability
INFORMATION – Environmental decisions should not be made without full scientific information	Decision–Making Under Uncertainty Risk Management	Precautionary Principle Reverse Onus
TECHNOLOGY – New technologies will solve environmental problems	Substitutability Technical Change Economic Growth	Precautionary Principle Behaviour Change
EMPLOYMENT – Protecting the environment will cost jobs	Economic Dynamics Technological Change Labour Productivity	Sustainable Livelihoods Ecological Fiscal Reform Transition Strategies
COMPETITIVENESS – Higher environmental standards make industry less competitive	Competition Profitability Market Failure	Full Cost Accounting Ecological Fiscal Reform EMS and Auditing Eco–Labelling Life Cycle Assessment Environmental Performance Evaluation Green Procurement Sustainability Reporting
NATIONAL DEBT – Deficit and debt reductio take priority over the environment	Ability to Pay Interest Payments to Foreign Bond Holders Least–Cost Financing Government Intervention Values	Environmental Services Ecological Debt Valuation and Environmental Assessment

Robert Gale, Ecological Economics Inc.

BIBLIOGRAPHY

Add Green to Your Bottom Line (1996). Conference Resource Manual, Metro Business Show, Toronto, April 2.

Alliance for Responsible Environmental Alternatives (AREA) (1994). *Climate Change, Productivity, and the Canadian Standard of Living*. AREA: Edmonton.

Bartlett, Bruce (1994). "The High Cost of Turning Green", *The Wall Street Journal* Sept. 14.

Baumol, William J. and Wallace E. Oates (1979) *Economics, Environmental Policy, and the Quality of Life*. Prentice Hall: Englewood Cliffs, New Jersey.

Berkes, Fikret (1993) "Application of Ecological Economics to Development: The Institutional Dimension", in *Ecological Economics: Emergence of a New Development Paradigm*, Proceedings of a Workshop, The Institute for Research on Environment and Economy and the Canadian International Development Agency, University of Ottawa: Ottawa.

Bezdek, Roger H. (1993). "Environment and the Economy: What's the Bottom Line?", *Environment*, September 1993, Vol. 35(7): 8–9.

British Standards Institution (1992). *Profit from Standards*. BSI, London.

Bromley, Daniel W. (1991). *Environment and Economy: Property Rights and Public Policy*. Basil Blackwell: Cambridge, Mass.

Business Council on National Issues (1992). *Towards a Sustainable and Competitive Future*, Business Council on National Issues, Ottawa, Ontario.

Canadian Standards Association (1993). *Guidelines on Environmental Labeling*, Z761–93, CSA, Toronto.

Canadian Standards Association (1994). *Guidelines on Environmental Auditing: Statement of Principles and General Practices, Z751–94*, CSA, Toronto.

Chambers, Robert and Gordon R. Conway (1992). *Sustainable Rural Livelihoods: Practical Concepts for the 21st Century*, Institute of Development Studies Discussion Paper 296, IDS Publications, Briston, U.K.

Clark, Colin W. (1991). "Economic Biases Against Sustainable Development" in Robert Costanza (Ed.) *Ecological Economics: The Science and Management of Sustainability*, Columbia University Press: New York.

Clark, Colin W. (1976). *Mathematical Bioeconomics*. John Wiley: New York.

Cleveland, Cutler J. (1992). "Basic Principles and Evolution of Ecological Economics", *Environment and Urbanization*, Vol. 4(2): 38.

Cline, William R. (1992). *The Economics of Global Warming*. Washington, D.C.: Institute for International Economics.

Coase, Robert (1960). "The Problem of Social Costs", *The Journal of Law and Economics* 3.

Coming Clean (1993). London, Deloitte Touche Tohmatsu International, IISD, SustainAbility.

Commission of the European Communities (1993). *White Paper on Growth, Competitiveness, Employment: The Challenges and Ways Forward into the 21st Century*, CEC: Brussels.

Corcoran, Terence (1996). "How to Return to Rapid Growth", *The Globe and Mail* January 3.

Corcoran, Terence (1995). "Property Rights Only Answer for Fishery", *The Globe and Mail* March 15.

Costanza, R., Herman Daly and Joy Bartholomew (1991). "Goals, Agenda and Policy Recommendations for Ecological Economics", in Robert Costanza (Ed.) *Ecological Economics: The Science and Management of Sustainability*, Columbia University Press: New York.

Costanza, Robert and Herman Daly (1992). "Natural Capital and Sustainable Development", *Conservation Biology* 6(1), pp. 37–45.

Daly, Herman and John B. Cobb (1989). *For the Common Good: Redirecting the Economy Toward Community, the Environment and a Sustainable Future*, Beacon Press: Boston.

Daly, Herman (1973). "The Steady State Economy: Towards a Political Economy of Biophysical Equilibrium and Moral Growth" in *Towards a Steady State Economy*, H. Daly (Ed.), Freeman: San Francisco.

Daly, Herman (1991). "Ecological Economics and Sustainable Development", Ecological Physical Chemistry, Proceedings of an International Workshop, 8–12 November 1990, Sienna, Italy.

Friends of the Earth UK (1993). *Working Future? Jobs and the Environment* (Discussion Paper), Friends of the Earth: London.

Gale, Robert and Stephan Barg with Alexander Gillies (1995). *Green Budget Reform: An International Casebook of Leading Practices*, Earthscan: London.

George, Susan (1994). *Faith and Credit: the World Bank's Secular Empire*.

Globe and Mail (1995). Editorial 15 November.

Government of Canada (1996). Budget Plan 1996, Department of Finance, March 6.

Gowdy, John and Sabine O'Hara (1995). *Economic Theory for Environmentalists*, St. Lucie Press: Delray Beach, Florida.

Hardin, Garrett (1968). "The Tragedy of the Commons", *Science* vol. 162: 1243–1248.

Hardin, Garrett (1991). "Paramount Positions in Ecological Economics", in R. Costanza (Ed.) *Ecological Economics: The Science and Management of Sustainability*, Columbia University Press: New York.

Hawken, Paul (1993). *The Ecology of Commerce: A Declaration of Sustainability*, Harber Collins Publishers, New York.

Hicks, John (1948). *Value and Capital*, 2nd ed., Claredon: Oxford.

House of Commons (1995). *It's About Our Health: Towards Pollution Prevention*, House of Commons: Ottawa.

Institute of Internal Auditors Research Foundation (1993). *The Role of Internal Auditors in Environmental Issues*, Research Report by CH2M, The Institute of Internal Auditors Research Foundation, Florida.

International Joint Commission (1993). *A Strategy for Virtual Elimination of Persistent Toxic Substances, Volumes 1 and 2*, IJC, Windsor, Ontario.

Jacobs, Michael (1991). *The Green Economy: Environment, Sustainable Development and the Politics of the Future*, UBC Press: Vancouver.

Jacobs, Michael (1993). *Environmental Economics, Sustainable Development and Successful Economies*, Occasional Publication Number 4, April 1993. Resource Assessment Commission: Canberra, Australia.

Muldoon, Paul (1995). Letters to the Editor, *Globe and Mail*, 20 November.

Naess, Arne (1972). "The Shallow and the Deep, Long-Range Ecology Movement: A Summary", Inquiry, vol. 16, pp.95–100.

O'Riordan, T. (1981). *Environmentalism*, 2nd ed., Pion Limited: London.

O'Riordan, T. and S. Rayner (1991). "Risk Management for Environmental Change", *Global Environmental Change*, March.

Peacock, Marcus (1993). "Developing Environmental Performance Measures" in *Industrial Engineering*, September.

Pearce, D.W., E. Barbier and A. Markandya (1990). *Sustainable Development*, Earthscan, London.

Pearce, David (1993). *Economic Value and the Natural World*. Earthscan: London.

Pembina Institute for Appropriate Development (1995). "Fine Tuning Taxes for Energy Eco-Efficiency", National Round Table on the Environment and the Economy, Ottawa.

Pigou, A.C. (1920). *Economics of Welfare*. MacMillan.

Porter, Michael (1990). "The Competitive Advantage of Nations" in *The National Round Table Review*, National Round Table on Environment and Economy, Ottawa, Fall 1993.

Porter, Michael (1991). "America's Green Strategy" in *Scientific American*, April.

Potvin, Joseph (1993). "Rapporteur's Report" in *Ecological Economics: Emergence of a New Development Paradigm*, Proceedings of a Workshop, The Institute for Research on Environment and Economy and the Canadian International Development Agency, University of Ottawa: Ottawa.

Rees, William E. (1990). "Sustainable Development and the Biosphere", *Telhard Studies* Number 23, American Association of the Study of Man, or: "The Ecology of Sustainable Development", *The Ecologist*, 20(1), pp. 18–23.

Rees, William E. (1992). "Ecological Footprints and Appropriated Carrying Capacity: What Urban Economics Leaves Out", *Environment and Urbanization*, vol. 4(2), pp. 121–130.

Rees, William E. (1993). "Natural Capital in Relation to Regional/ Global Concepts of Carrying Capacity" in *Ecological Economics: Emergence of a New Development Paradigm*, Proceedings of a Workshop, The Institute for Research on Environment and Economy and the Canadian International Development Agency, University of Ottawa: Ottawa.

Rees, William E. (1995). "Achieving Sustainability: Reform or Transformation?", *Journal of Planning Literature* 9 (4) pp. 343–361.

Royal Commission on the Economic Union and Development Prospects for Canada (1995). *Final Report*, Supply and Services Canada: Ottawa.

Schmidheiny, Stephan (1992). *Changing Course: A Global Business Perspective on Development and the Environment*, Business Council on Sustainable Development, MIT Press: Cambridge, Massachusetts.

Solow, R. (1974). "The Economics of Resources or the Resources of Economics", *American Economic Review* 64: 1–14.

Sustainable Futures, LURA Group, IndEco Strategic Consulting Inc., Econometric Research Limited and Enid Slack Consulting Inc. (1996). *Economic Development Capacity and Other Benefits of Restoration, Enhancement and Protection of Metro Toronto Watersheds with Emphasis on the Humber River*. Report for Environment Canada (Ontario Region).

The Economist (1995). "Stay Cool", pp. 13–14, April 1.

Toronto Star, (1995). "Focus on Debt Urged", November 1, 1995, B1, B3.

United Nations Conference on Environment and Development (1992). *Agenda 21: Programme of Action for Sustainable Development*, United Nations: New York.

Vitousek, Peter M., Paul R. Ehrlich, Anne H. Ehrlich, and Pamela A. Matson (1986) "Human Appropriation of the Products of Photosynthesis." *BioScience* 36: 6, pp. 368–373.

Wackernagel, Mathis and William E. Rees (1996). *Our Ecological Footprint: Reducing Human Impact on the Earth*, New Society Publishers: Gabriola Island, B.C.

World Commission on Environment and Development (1987). *Our Common Future*. Oxford University Press: Oxford.

Wynne, B. (1992) "Uncertainty and Environmental Learning: Reconceiving Science and Policy in the Preventive Paradigm", *Global Environmental Change* 2 No. 2, pp. 111–127.