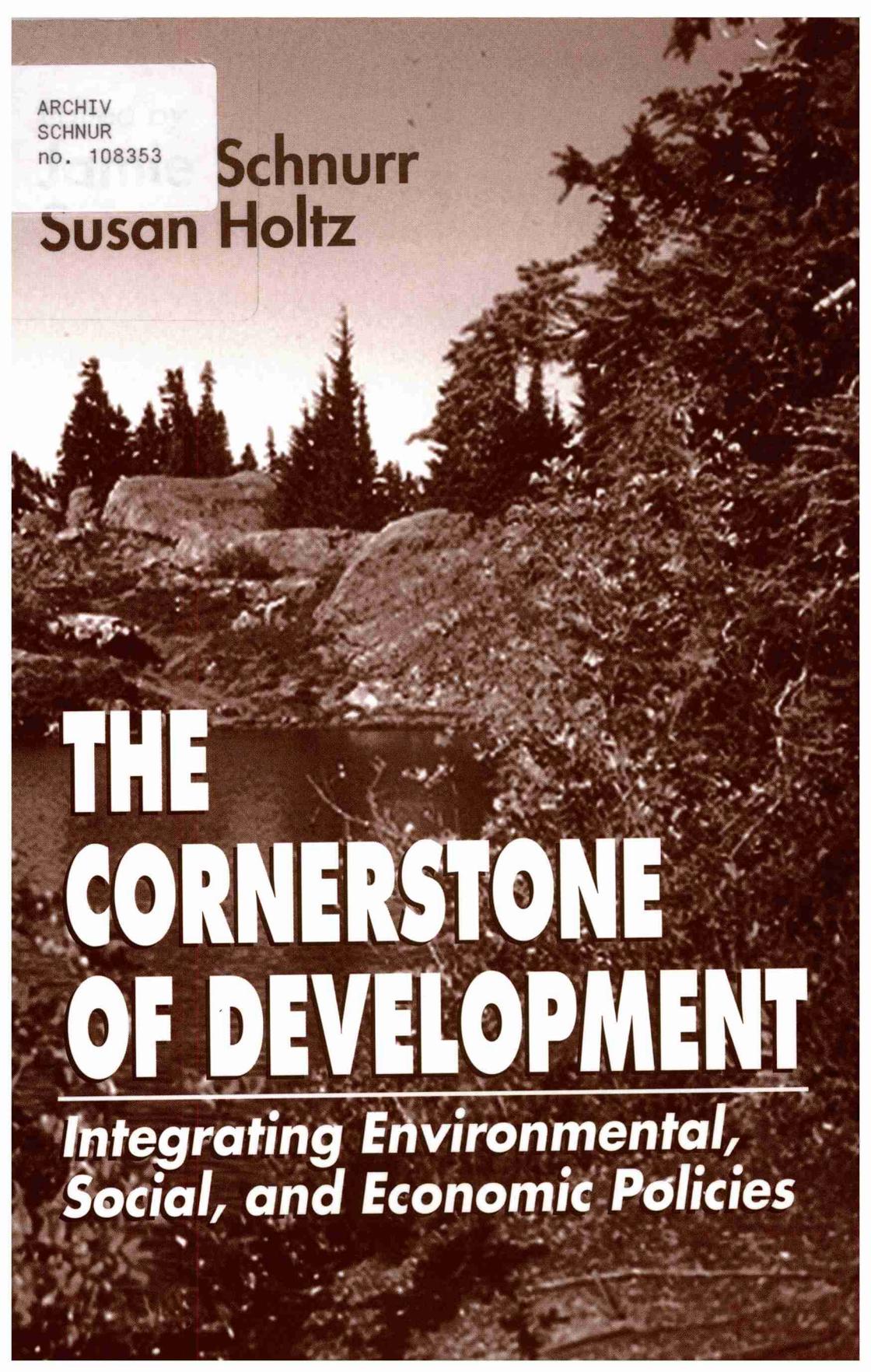


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Susan Holtz



THE CORNERSTONE OF DEVELOPMENT

*Integrating Environmental,
Social, and Economic Policies*

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***Integrating Environmental,
Social, and Economic Policies***

Edited by
Jamie Schnurr
Susan Holtz

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**INTERNATIONAL DEVELOPMENT
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Reconciling Ecological, Economic, and Social Imperatives

J. Robinson and J. Tinker



Three challenges

As we move toward the 21st century, human institutions, from the local level to the global level, are facing a range of ecological, economic, and social challenges.

It is becoming clear that much of our industry and agriculture and our use of renewable and nonrenewable natural resources are unsustainable. Two examples suggest the global scope of the problem:

- ◆ Humans may now directly and indirectly appropriate about 40% of the total photosynthetic product of the planet (Vitousek et al. 1986; for marine resources, see Pauly and Christensen 1995). This will likely stringently limit future growth in human consumption.
- ◆ If the current global population consumed resources at the same rate as the average Canadian, two additional planets would be required (Rees and Wackernagel 1994; see also Turner et al. 1990; WRI 1994; WI 1995).

Such calculations suggest that global carrying capacity will soon be exceeded, if it hasn't been already, and that global adoption of industrialized countries' rates of consumption and production would simply be untenable.

Economically, change is now extremely rapid, including the disappearance of centrally planned economies; the powerful trend toward the use of market forces and market-based policies throughout the world; global economic integration, driven by trade liberalization; and the emergence of a global capital market, characterized by financial flows that dwarf flows of traded goods and services.

These developments have in turn had a number of effects:

- ◆ Increased economic interdependence among nation states and reductions in national economic sovereignty;
- ◆ The emergence of global corporations and financial institutions whose activities cannot now be effectively regulated by governments;
- ◆ Highly mobile international trade and investment flows, which are felt to limit nations' freedom to raise taxes for social programs;
- ◆ Increasing pressures to maintain international competitiveness;
- ◆ Pressures to reduce the size of the public sector, to reduce (or at least not increase) taxation (especially direct taxes), and to reduce deficit financing and public debt;
- ◆ Growing structural unemployment in many industrialized countries;
- ◆ A rising and unacceptable number of people living in absolute poverty; and
- ◆ Large income disparities between richer and poorer countries and between rich and poor within both industrialized and developing countries.

The causes of these problems are the subject of much debate, as are the most promising remedies; in some cases, the debate is about whether these phenomena are problems at all. But current economic conditions are clearly unsustainable for a significant proportion of the world's population, in developed as well as developing countries.

Governance and other social structures are also under unprecedented stress. In many market-oriented industrial societies, the system of governance is viewed with growing distrust, a sense of alienation, and even distaste. This is coupled with the failure of governments to address basic social issues, such as crime, drugs, poverty, unemployment, and homelessness, in ways that command public support. Such alienation may grow as public demands to cut taxes and reduce debt conflict with the desire to maintain social and environmental programs. The overall effect is a decline in civil society and, in many inner-city neighbourhoods, a descent toward lawlessness and ungovernability.

In the former centrally planned economies, fragile structures of governance are often barely surviving the stresses and social problems accompanying the transformation to a market economy. In the developing world, poverty, rapid population growth and displacement, the replacement of a subsistence economy, other forms of economic development, and massive environmental impacts are being managed with only mixed success, perhaps best in parts of Asia and worst in parts of Africa. The major challenge in many former command economies and many developing countries faced with a rapid decline or even collapse of traditional value systems is to enlarge and strengthen a stable

civil society, which at present is only embryonic. Without a stable society, the trust and public self-confidence needed for participatory governance are limited.

The end of the Cold War and the winding down of the superpower nuclear arms race have not ended high worldwide levels of military expenditure but have revealed new instabilities. Tensions between different ethnic groups and the demand for subdivision of existing states often lead to armed conflicts that international mechanisms fail to resolve. At the same time, social cohesion is declining in many if not most societies. Societal and cultural dislocation, fueled by the globalization of communication, is endangering the existence of many small cultures (especially those of indigenous peoples) and may threaten the health or integrity of many more; even cultures that feel invulnerable are experiencing a decline in sense of community.

The extent of these problems illustrates a form of social unsustainability: in many parts of the world, we may have exceeded the “carrying capacity” of our current cultures and governance systems (for more details, see UNDP 1994; UNICEF 1994; World Bank 1994).¹

Interconnections

Since the 1960s, and even more so since the mid-1980s, the inadequacy of policies that fail to recognize the interconnectedness of ecological, economic, and social challenges has become apparent. In fact, the interaction of these challenges often reinforces their negative impacts. For example,

- ◆ A legacy of environmental mismanagement is now seen as one of the most severe economic burdens on the countries of the former Soviet Union;
- ◆ Internationally agreed targets for reducing greenhouse gas emissions are not being reached because governments are unable or unwilling to accept the economic cost;
- ◆ Addressing the mismanagement and environmental deterioration of agricultural land often proves difficult or impossible with current land-tenure and other socioeconomic structures;
- ◆ Growing trade liberalization and structural readjustment are in many countries seen as (or blamed for) being directly responsible for reductions in health, education, and other social programs;

¹ Rapid population growth will continue to have major impacts on society, the market system, and the biosphere, although completed family size is now falling in some developing countries. Rapid population growth may well end by the close of the 21st century. However, the level at which global population stabilizes (and its geographical distribution) will have a massive influence on the feasibility of the dematerialization and resocialization strategies outlined in this chapter. This topic deserves an explicit treatment, which we do not provide here.

- ◆ Increasing human demand for declining or damaged natural resources, such as water, agricultural land, and pasture, is a major cause of social and ethnic tensions, often leading to armed conflict; and
- ◆ Economic inequality within societies, especially when it appears to be connected to increasing globalization of the world's economies, is reducing social cohesion and making it more difficult for people to accept macroeconomic change without social tension.

Perhaps most fundamental is the fact that in the last half century, economic objectives have been having a major influence on the other two systems, whereas the ability of the social system (via the state) to influence the economic system has been declining. On the other hand, there is also evidence that other social influences on the market are growing (via consumer and environmental groups, for example) (Drucker 1995; Elkins 1995). On the whole, however, in many parts of the world, global economic integration clearly seems to be connected with social and cultural fragmentation or even disintegration. For example, increasing "secession of the elites" from a society of declining mutual obligations and growing economic inequities has been linked to continued economic globalization (Schrecker 1998). This is not merely a matter of the direct economic and employment effects of, say, trade liberalization or structural-adjustment policies. Arguably, the perceived as well as the actual loss of national economic control associated with global economic integration is a major factor in increasing social tensions and in reinforcing a desire to build a sense of community through local sovereignty and separatist groups of various kinds. For example, Ignatieff (1993) has argued that the recent increase in ethnic nationalism around the globe is closely tied to a decline in civic nationalism (the collective sense of security and trust in national authority and institutions), although Elkins (1995) has expressed a more positive view of the unbundling of the nation state. Perhaps even more disturbing, though, are the causal connections that Homer-Dixon (1991) found among environmental degradation, economic development, population growth, refugee movements, and war. Problems of national and subnational security, the arms trade, and increased militarization are connected in complex ways with economic, social, and ecological factors.

Ecological, economic, and social unsustainabilities are mutually reinforcing in a least two ways. First, they have direct effects on each other. Second, addressing any of these issues in isolation, without considering their interactive effects, can give rise to unanticipated higher order consequences in the other realms, which cause problems of their own or undercut the initial policies. For example, raising energy prices significantly to reduce energy emissions will disproportionately affect poorer citizens, thus increasing income disparities and contributing to social unsustainability.

Poorer citizens spend a greater proportion of their income on energy in countries where most energy requirements are met through purchase of commercial fuels. In some developing countries, however, commercial fuels are used

mainly by wealthier urbanites, whereas poorer rural citizens use nonmarket sources of energy. In such cases, increases in the price of commercial energy sources will effect mainly the richer citizens, with quite different equity (not to mention economic and sociopolitical) consequences.

The extensive interactions among the ecological, economic, and social systems suggest that none of these three groups of issues can usefully be addressed in isolation. This chapter proposes a single conceptual framework for considering ecological, economic, and social objectives. It suggests how these different objectives might be reconciled, as well as the need for a new analytical framework to evaluate the ability of local, national, and international policies to reconcile these three types of goals.

The arguments of this chapter are preliminary. Much work remains to be done in a number of fields for these arguments to be fully fleshed out. They represent an initial attempt to provide an integrated look at these issues, with the hope that any response to the positions taken here will help us develop the arguments further.

The present conceptual framework: trifocal vision

One of the main obstacles to developing a common conceptual framework for ecological, economic, and social problems is the little consensus on how the three systems relate. The three relevant disciplines provide us with very different views of the world that are difficult if not impossible to reconcile in a single mental image. Constructing an integrated understanding from these three is like trying to see with trifocal vision; making effective management decisions is even harder.

Environmentalists often insist that both the economy and human society are subsets of the global ecosystem and must obviously be subject to constraints based on ecological limits. From this point of view, continued economic and population growth will cause breakdowns in ecological life-support systems and exceed the carrying capacity of the biosphere, which in some respects has already happened. Environmentalists stress that nonrenewable resources are finite; that renewable resources can be (and often are) overexploited, leading to collapse; and that losses of biodiversity are irreversible.

Economists tend to argue that both ecological and social factors can be expressed in economic or market terms (for example, by cost–benefit analysis) and that ecosystems and society, by definition, lie within the global economy. Many believe that market-driven substitution is an answer to depletion or exhaustion of renewable or nonrenewable resources and deny that there are any real or immediate global limits to economic growth. Some argue that market solutions are available for all ecological and social problems.

Social and political scientists also tend to see their discipline as fundamental. They tend to address environmental and economic issues as aspects of human social issues. Although sociologists are often sympathetic to environmental concerns, they argue that neither ecology nor economics can adequately address issues such as social justice and equity (including intergenerational equity).²

All these insights are valuable. A more or less convincing case can be made for saying that the biosphere encompasses the market and human society; that economics can address environmental and social concerns; or that the economy and the environment are best regarded as cultural subsets, or constructs of human society. However, ecologists, economists, and social scientists are all generally resistant to the more extreme claims of those in other disciplines, that the ecosystem, the economic system, or the social system has fundamental primacy over the others. Such a view is not widely accepted outside its related discipline, nor does any such view seem likely to become so.

We argue that it is more fruitful to consider the biosphere, the market, and human society as three interacting “prime systems” that share many common characteristics but are equivalent in primacy and importance. Some of the implications of this approach are explored in the remainder of this chapter.

Toward a new conceptual framework: the three prime systems

The three prime systems, interconnected, overlapping, and coequal, as defined above, are

- ◆ The biosphere, or ecological system (the planetary biogeochemical system *sensu stricto*; it is not a closed system, as it depends on energy exchange within the solar system);
- ◆ The economy, the market, or economic system; and
- ◆ Human society, the human social system, which includes the political system (governance), the social system (family, communities, etc.), and cultures.

Of course, this division into three prime systems is to some extent arbitrary. Many other divisions are possible. Some people, for example, might prefer to make human population a fourth system (a subset of our social system); others might consider the technosphere, or industry, a fifth (a subset of our

² Interconnections of social (or sociopolitical) and economic factors have long been studied and accepted, as suggested by the term *socioeconomics*. Recognition of the interrelationships of ecological factors and economic and social factors is more recent, giving rise to newer concepts, such as those of *human ecology* and *industrial ecology*.

economic system). Astronomers would regard all these systems as subsets of the solar system or the universe.

The three prime systems postulated here can be visualized as an equilateral triangle. An alternative model would be an equilateral pyramid (a tetrahedron), with the three grounded corners symbolizing the biosphere, the economy, and society and with the apex symbolizing politics. This alternative conceptual framework emphasizes that politics is the system or tool by which we attempt to manage all three other systems. We prefer to treat the sociopolitical system (including its cultural component) as a single system, largely because no clear distinction can be made between the political system — governance — and the social system in which it is rooted.

We have adopted the equilateral framework because it seems an intuitively reasonable structure, reflects common usage, and leads to useful insights into human problems, responses, strategies, and policies. We do not claim that ours is the correct framework and that other frameworks are wrong, any more than a dictionary is logically preferable to a thesaurus. A conceptual framework is no more than a mental construct; its validity derives primarily from its utility.

As the following subsections show, the prime systems display, to a greater or lesser extent, a number of common attributes: having subsystems and being affected by globalization; being self-organizing; being capable to some extent of responding to stress; and having more or less inflexible outer limits beyond which the system will collapse.

Subsystems and globalization

The prime systems can each be divided into subsystems of varying size, both spatially and sectorally. Also, all three systems seem to be undergoing changes related to globalization.

Although the planetary biosphere is one ecosystem, it can be subdivided spatially: each wood, marsh, or farm can be considered a distinct ecological community. Larger units may have a geographical basis: Canada, for example, has been divided into 15 ecozones. The global ecosystem may also be subdivided sectorally into broad and often noncontinuous biomes, such as subarctic tundra, tropical moist forest, and coral reef. The biosphere has, of course, always been a global system, but anthropogenic impacts on it (those derived from human activities) are unquestionably undergoing a rapid globalization: water pollutants, for example, were once confined to rivers downstream of settlements, but they are now found throughout the oceans.

The economy, or market, can also be divided spatially or sectorally. We may consider the economy of a country, of one of its regions, of a town or village, or of a small community or family. Alternatively, we may consider the market in terms of a particular sector or commodity, such as copper, timber, sorghum, or recreation.

The market is also undergoing rapid globalization, driven both by communications technology (causing the progressive global integration of the banking system and of the stock, currency, and commodity markets) and by political pressures in favour of free trade. The market was once regulated locally (for example, by village markets or town guilds) or nationally, but increasingly there is also some form of regulation at the regional level (for instance, the European Union, the North American Free Trade Area, the Association of Southeast Asian Nations [ASEAN]) and globally (the General Agreement on Tariffs and Trade, the new World Trade Organization, and the International Monetary Fund). Moreover, globalization of the world's economies — that is, increased trade, investment, and communications — tends to reduce the relative importance of national economic decision-making. The effect of these phenomena is a weakening of national economic sovereignty, except perhaps for the very largest states.

Society, too, may be subdivided, with the basic unit remaining that of the family (currently shifting in many places from the extended to the nuclear). Political subdivisions are largely spatial, from the city or province, via the state, to the region (for example, the European Union and ASEAN) and the globe (for example, the United Nations and its agencies). Sociocultural subdivisions are more often sectoral (religious, linguistic, cultural, recreational, special interest, and the like). Increasingly, social links tend to transcend geographical boundaries.

Again, communications technology is leading to a globalization of society (the global village) and to a far more rapid rate of change in societal structures than in the past: the current abandonment of Soviet-style communism and the rise of Islamic fundamentalism, for example, are occurring substantially faster than did the decline of feudalism or the Reformation in Europe. In physical terms, transport technology allows more rapid and substantial transfers of population than in the past, with the new phenomena of economic and environmental refugees added to the more familiar ones of economic migrants and political refugees. Paradoxically, this social globalization seems to be connected to various forms of social and cultural fragmentation and localization.

Self-organization

A second characteristic common to all three prime systems is that they are to a considerable extent self-organizing. The biosphere, the economy, and human society follow certain patterns, which ecologists, economists, and social and political scientists study, explain, and even try to predict. But the ability of humans to influence or adjust the three prime systems in a desired direction is limited. Observation of each prime system suggests that it operates at least partially according to internally derived and inherent principles in ways that we cannot fully understand or control.

Response to stress: system change

A third set of characteristics common to all three prime systems relates to their capacity for change: diversity, stability, resilience, and self-organization all change as a result of stress. The biosphere, unlike the other two prime systems, can exist independently of human activity, but it is increasingly intertwined with the other two in practice, and all three systems exhibit some similar behaviours.

The biosphere, the economy, and society all have a certain stability, but all three incorporate considerable diversity, are in a dynamic rather than static equilibrium, and are subject to continual change. In each case, diversity appears to be related to both stability (limited change over the long term) and resilience (the ability to absorb and adapt to stress). However, the belief that a simple, homogeneous ecosystem is by definition less stable or less resilient than a complex, heterogeneous one is ill supported by observed data (Holling 1986; Kay and Schneider 1994).

Each prime system is affected by stress created within or outside the system. The sources of these stresses include new technology and ideas; anthropogenic stress generated on a global scale is increasing in all three prime systems.

The stress-response time of each prime system varies with the stress and with the system. Oil prices, for example, can change within minutes if there is news of a threat to supply, and both society and ecosystems can also react to certain stresses very quickly. Other responses can be much slower, lasting years or decades; for example, the impacts on metropolitan Spain and Portugal of the collapse of their colonial empires were spread over more than a century, and the response of global temperature to greenhouse gas emissions is thought to be measured in many decades.

Each prime system shows considerable resilience, that is, the capacity to absorb stress without noticeable change (a capacity for buffering). But each prime system changes when stress cannot be absorbed, or when its resilience or buffering capacity is exceeded. Moreover, change in response to stress is a crucial component of long-term system stability; for example, wildfires started by lightning are now seen as an integral part of the stability of prairie and boreal-forest ecosystems. Such change is often incremental and may well be largely reversible once the stress is removed. More severe stresses can cause nonincremental change, which seems usually to be evolutionary and unidirectional (that is, irreversible) and may increase or decrease diversity, homogeneity, stability, and resilience.

In all three prime systems, major stress can cause a discontinuous change of state, a nonlinear flip into a significantly different state. This is like the response of a gas to increased pressure: first, a steady reduction in volume and then a sudden liquefaction. In the economy, society, or the environment, such a change of state is often, perhaps usually, irreversible. Pollution in the North American Great Lakes, for example, caused a major shift in fish species that was not reversed when pollution levels were reduced (Regier 1995). Clearing

Amazonian rainforests on laterite soils and replacing them with low-grade pasture is a change that cannot be reversed (at least, not for millennia) by attempting to recreate the original forests. Similar phase changes in society, such as the overthrow of the ruling class in the French and Russian revolutions, seem irreversible. Discontinuities in economies, such as the 1929 Wall Street crash and the industrialization process, also seem to be irreversible. In general terms, major changes of state occurring in a prime system in response to stress are not followed by a return to the *status quo ante* after the stress has been removed.

The interconnections among the three prime systems imply that changes in response to stress are rarely confined to one system. For example, where a first-growth forest is replaced by a species-poor, second-growth forest (an ecological response) after clear-cutting or burning, the consequences will also be felt by local forestry-based human communities and industries (economic and social responses). Not all of these responses are local: ecosystems are connected by global biogeochemical systems; economic systems, by increasingly global markets; and social systems, by a growing telecommunications web.

Accurately predicting system change in response to stress, especially changes in one prime system caused by stresses on another, requires greater knowledge than we currently have. Such change often occurs in counterintuitive ways. For example, in the early stages of the AIDS pandemic, it was feared that in countries severely affected by a disease that primarily affects people in their sexually active and therefore economically productive years, changes in the mortality and morbidity rates would significantly increase the dependency ratio, or the number of nonproductive persons that each working person has to support. The economic and social consequences of such an increase would clearly be harmful. In actuality, this intuitive expectation appears unrealized in places like Africa, where transmission is primarily heterosexual. Here, vertical transmission (perinatally, from mother to child) occurs as well as horizontal transmission (between sexual partners, or by contaminated blood). Therefore, it seems probable that the rise in infant and child mortality from AIDS counterbalances deaths among productive age groups, holding the dependency ratio roughly stable (Anderson 1993).

The desirability of change

It can be argued that another common characteristic of all three prime systems is having more or less inflexible outer limits, beyond which the system will collapse. For example, it is often claimed that the biosphere's limits may be exceeded by the continued emissions of greenhouse gases, leading to the total breakdown of the system. Similar system collapse has been predicted for the economy if major Third World debtor nations discontinue repayments to Western banks. It can be argued that a equivalent collapse of the social system has recently occurred in Somalia and Rwanda.

Whether such analyses are correct depends on how one defines *collapse*. If system collapse is defined anthropocentrically as being a major change with unpleasant or fatal consequences for humans or even (in the case of the biosphere) for the human species, then such a fundamental breakdown seems possible. But from the point of view of the system, this is not a collapse, merely a major flip, or phase change. It is important to be clear about what is collapsing, what is adapting, and what remains unchanged. For example, the biosphere has in the geological past gone through substantially warmer periods. If it is subjected to such stresses in the future, it will most likely adapt to them too. Many species — and conceivably the human species — would probably become extinct; nevertheless, the biosphere itself would not be destroyed. The aftermath of World War II included traumatic changes to the German economy and society, which did not destroy them. Although civil society has changed radically (and painfully) in Somalia and Rwanda, as in any community involved in civil war or revolution, social structures have adapted and changed, rather than being destroyed completely. We're not saying that efforts to avoid disasters should be neglected but that consideration should also be given to the potential for renewal, adaptation, and innovative response.

As all three prime systems are largely self-organizing, they are highly unlikely to collapse. Gradually or suddenly, all such systems adapt in response to stress. The question is whether such change is desirable. A radical phase change may even be desirable and lead to a more stable system. In the long run, was the French Revolution of 1789, along with the Terror that followed it, beneficial or harmful to the French people? The conversion of much of Java from rainforest to terraced rice paddies put an agricultural system in place of a natural ecosystem, but this agricultural system has remained stable for many centuries and has supported a far more numerous human population than the rainforest ever did.

System change may be evaluated using two partly overlapping yardsticks:

- ◆ Whether the direction, quality, and rate of change are beneficial or harmful to humanity (over various time scales or to individuals or defined human communities); and
- ◆ Whether such change is ethical (which can, if desired, include consideration of intergenerational equity and of other species).

In the last resort, both yardsticks are variants of desirability and are value based, rather than being purely objective. This means that decisions about whether changes are beneficial are not scientific or technical but political. Scientific analysis can tell us about the potential consequences and likelihood of various changes, but decisions about their desirability and what should be done to avoid or adapt to them must be made in the political arena.³

³ This discussion has focused on the commonalities among the three prime systems. There are also, of course, many important differences. Perhaps the most fundamental is that the economic and social systems depend on the existence of humans, whereas the biosphere does not. Given sufficient stress, the planetary ecosystem could alter so radically that it no longer supported our species.

Managing system change: sustainable development and its limitations

The most widely accepted basis for understanding the interdependence of ecological, economic, and social challenges has been the concept of sustainable development, which grew out of the ideas of ecodevelopment in the 1960s and 1970s (Sachs 1984) and the UN Conference on the Human Environment (held in Stockholm in 1972). During the 1980s, sustainable-development thinking was further elaborated in the *World Conservation Strategy* (IUCN 1980) and the work of Brown (1981) and others, such as Clark and Munn (1986). The term *sustainable development* reached public prominence with the report of the World Commission on Environment and Development, often referred to as the Brundtland Commission, in the late 1980s (WCED 1988).

The most widely used definition of sustainable development comes from the Brundtland Commission report (WCED 1988, p. 8): "Humanity has the ability to make development sustainable — to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs." The Commission report also stated (p. 9) that "sustainable development is not a fixed state of harmony, but rather a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are made consistent with future as well as present needs."

Fundamental to the Commission's position were the views that sustainable development is a global issue; that poverty and environmental concerns must be addressed together; that significant improvements in the material standard of living of developing countries are a precondition to global sustainable development; and that considerable opportunities exist for improving environmental quality and human development through technological development and institutional reform. In a famous and controversial proposal, the Brundtland report called for a 5- to 10-fold increase in gross world economic output, to meet the development needs of the poor and to provide the wealth and technological advances required to address ecological problems.

The report of the Brundtland Commission marked the start of a series of activities and events at international, national, and subnational levels. A host of sustainable-development policies, boards, commissions, and round tables sprang up. In the private sector, organizations such as the Business Council for Sustainable Development and the International Chamber of Commerce, as well as many corporations, developed sustainable-development principles and policies. These developments coincided with an upsurge of public interest in environmental issues in many countries (Dunlap et al. 1993) and perhaps reached their culmination in the Earth Summit (and the accompanying NGO Global Forum), held in Rio de Janeiro in 1992. At that conference, attended by more heads of state than any previous meeting, several documents were signed, including Agenda 21 (UNCED 1992), an international action plan for

sustainable development; the Framework Convention on Global Climate Change; the Biodiversity Convention; and the Statement on Forest Principles. Although public interest subsequently declined and governments failed to pursue these initiatives aggressively, many countries, corporations, and other organizations continue to develop sustainable-development policies, although these rarely manage to fully integrate all three prime systems.

The principles and practice of sustainable development have also been criticized. The concerns stem from the different views of those engaged in related public-policy issues. As the Brundtland report pointed out, any attempt to achieve sustainable development must address a number of economic questions, including how and what is produced and consumed and how wealth and prosperity are generated. Many people with strong ecological values, especially those with a belief in finite ecological limits to growth, also consider such values as standing in opposition to the economic priorities that drive our societies toward ever greater levels of environmentally destructive production and consumption. From this perspective, ecological and economic goals are locked in conflict, and each can be satisfied only at the expense of the other; in other words, more economic growth leads to environmental collapse, whereas no economic growth leads to economic collapse. A contrary view, rooted in the belief that biophysical limits are either distant or subject to technological mitigation, is that both the aspirations of the well-off and the needs of those living in poverty demand continued economic growth; indeed, those who hold this view argue that such growth is needed to pay for the implementation of any strong environmental and social policies.

In this context, many advocates on both sides have been suspicious of the concept of sustainable development, which (as argued by Brundtland) seems to imply that the world could and must have both continued economic growth and ecological sustainability. From one perspective, this concept seems to provide a veneer of environmental respectability for what is really continuing, nonsustainable economic growth. From another perspective, it seems to impose a particular, elitist view about the overriding importance of certain environmental issues and thereby blocks progress and human development, particularly in the South (Guha 1989).⁴

To escape from this deadlock, we need to forge imaginative new approaches that recognize and integrate ecological, social, and economic conditions and goals. For example, merely imposing ecologically based constraints on economic behaviour is certain to be insufficient. Not only would such constraints continue to be resisted by powerful interests, but they too often represent an end-of-pipe approach that treats ecological solutions as an add-on, to be

⁴ This typology grossly simplifies a complex set of positions. In particular, it fails to address the significant differences among positions articulated in different parts of the world, such as in developing countries or rapidly industrializing economies. Yet, we believe it captures a critical distinction that runs through much of the overall debate.

incorporated after the fact and only insofar as required. Moreover, such constraints scarcely even begin to address the social or economic problems caused by globalization.

A clearly preferable alternative would be to integrate environmental concerns at a deeper level, that at which ecologically sound reasoning is also economically and socially sound. Is such an approach possible?

Three imperatives

We suggest approaching the goal of integration by building on the concept of sustainable development, defined in terms of opposition to the three categories discussed above. Our central thesis is that it is critically important that all three prime systems move in the direction of sustainability and that these movements reinforce each other.

We suggest redefining sustainable development as the reconciliation of three imperatives:

- ◆ The ecological imperative to remain within planetary biophysical carrying capacity;
- ◆ The economic imperative to ensure and maintain adequate material living standards for all people; and
- ◆ The social imperative to provide social structures, including systems of governance, that effectively propagate and sustain the values that people wish to live by.

In other words, sustainable development is for us inherently a normative concept, with each of these three imperatives being an ethical statement regarding its respective prime system. All three imperatives are more value laden than objective.

This is most evident in the case of the social imperative, which has both political and cultural components. The political component has to do with systems of governance that are feasible in the sense of being acceptable to citizenry and perceived as giving rise to a collective sense of well-being. The related cultural component has to do with the preservation and enhancement of social structures, including traditional cultures of various kinds. Together these two components are expected to foster a sense of community, an indispensable requirement for sustainable social well-being.

The economic imperative also implies a value judgment regarding the levels of nutrition, shelter, and material well-being that may be considered adequate and how these levels can best be reached (that is the meaning of *ensure and maintain*). One needs to consider both basic human needs and economic aspirations beyond simple subsistence requirements. Different countries have taken different approaches to satisfying the basic human needs of their populations;

clearly, the degree of need differs greatly between and within countries. Moreover, many different approaches are available to provide opportunities for people with larger economic aspirations. It is crucial that any attempt to promote sustainable development take into consideration the adequacy of material living standards, people's aspirations for higher living standards, and the methods for such improvements.

The ecological imperative at first sight appears more objective, but defining carrying capacity in terms that are not value laden is very difficult. The biomass productivity and mass–energy flux of largely untouched natural forests and prairie ecosystems may be substantially higher than those of the pastures or agricultural systems that replace them. But natural ecosystems can support only small human populations of hunter–gatherers, whereas pastures and agricultural systems can sustainably support far more people. Nevertheless, few people would argue that all natural ecosystems should be replaced by human settlements, industry, or intensively managed agriculture; at least some natural systems should be maintained to leave options for future generations, for ethical and spiritual reasons, and to maintain biodiversity for biotechnology.

Carrying capacity can perhaps best be defined as the maximum sustainable load, measured in terms of mass–energy flux of a desired kind, that can be extracted from or absorbed by a given biological system. This emphasizes the value-laden nature of the determination of what is desired, as well as emphasizing the biophysical limitations on achieving those desires (Dale et al. 1995).

Each of the three imperatives, therefore, appears to involve both objective and value-laden (ethical) components. The definitions suggested above need to be tested more widely, especially in cultures, societies, and economies other than those found in Canada. It may be possible to develop consensus on common global definitions of the three imperatives, at the same time leaving room for regional, national, and perhaps cultural and local variants of these definitions.

Some would argue that one imperative is more fundamental than the others: for example, that social justice is more important than economic well-being or that the objective of remaining within planetary carrying capacity is more basic than any other. In our view, just as the three prime systems are regarded as coequal, in that none has primacy over the others, so none of the three imperatives should be given special priority. Satisfying any one imperative without also satisfying the others would be unacceptable for at least three reasons.

First, each imperative is independently crucial. To ignore the social imperative is to risk serious dislocation in social structure and governance and to deny spiritual, philosophical, and societal needs. Humanity does not live by bread alone. To ignore the economic imperative is to accept that two-fifths of humanity will continue to live in absolute poverty. Finally, to ignore the ecological imperative is to invite ecological loss and disruption that will result in human health problems, massive effects on both economic well-being and social justice, and impoverishment of the planetary heritage.

Second, each imperative is urgent. We cannot afford to wait in any of these three areas. The scope and scale of the problems in each of these systems are such that we have no time left to stop and decide which is most important to deal with first.

Third, the three imperatives are interconnected. The extent of interaction among the three systems suggests that any attempt to address the issues of one system in isolation not only runs the risk of intensifying problems in the others but may also give rise to feedback effects from the other systems that would overwhelm the beneficial effects of the first intervention. For example, attempts to address environmental problems in isolation may involve policies that exacerbate economic or social problems, thus giving rise to further environmental stress. Consider wildlife-conservation programs in developing countries that displace people from a protected habitat, thus causing them to degrade the often marginal lands to which they are relocated (Guha 1989). Similar problems can occur with other economic and social systems; for example, economic policies in industrialized countries that create social tensions can in turn affect these countries' ability to compete internationally.

Because of the essential interconnectedness of the three prime systems and the urgency of the problems associated with each, addressing any one of the three imperatives in isolation virtually guarantees failure. Nevertheless, this is what policymakers commonly do. We argue for a more integrated approach, one that explicitly addresses all three dimensions of the overall problem. Truly sustainable development must reconcile all three imperatives. How can this be achieved?

Uncoupling economic growth from its environmental impacts

The linkage among the three prime systems is widely understood in terms of the interconnections between economic and social policies. The impact of taxation, access to credit, and investment patterns on employment, poverty, and child health, for example, are well recognized, if not always fully understood. The effects on the economy of social institutions and events such as education, disease, and migration are similarly recognized. More and more, however, as anthropogenic stresses on the biosphere have increased, socioeconomic linkages have become complicated by impacts from and on the ecological system, to the extent that environmental factors now often confound economic and social policies.

For example, irrigation and flood control have become dominant political and economic factors in Bangladesh and elsewhere. The economies and social structures of Sahelian countries are heavily influenced by desertification. Also, the long-term environmental problems of nuclear power (combined with its failure to win social acceptance) have proven a major brake on its use.

Although these interactions usually bring ecological and economic imperatives into conflict, these imperatives can be made compatible and even mutually reinforcing, at least in open, highly industrialized economies. What needs to be done in one arena may be complementary to and supportive of the objectives in another. To see this, it is helpful to examine the ways economic and ecological imperatives are discussed in some industrialized countries.

On the economic side, it is increasingly argued that in response to global economic integration, the high-wage, resource-based industrialized countries, such as Canada, must develop an economy based on goods and services with higher information content (RCEUDPC 1985). Such an economy is required if Canada is to compete in an increasingly integrated and competitive global market, characterized by very mobile capital and investment flows and decreasing barriers to such movements. Moreover, if the economic and social needs of developing countries, economies in transition, and rapidly industrializing economies are to be met, trade and flows of investment capital must be greatly expanded. For the poorest countries, such economic activity is needed merely to maintain their current, often inadequate, growth rates; moreover, industrialized countries increasingly depend on export revenues derived from trade with the rest of the world.

On the ecological side, there are calls for strategies and policies to encourage industry to develop industrial processes that are inherently more benign and to introduce production and consumption patterns that reduce the flow of matter and energy per unit of economic activity. Such “dematerialization” strategies would reduce environmental impacts in industrialized countries and lead to new technologies for export, thus reducing environmental impacts in other countries as well. Some evidence shows that much of the technology currently exported from industrialized to developing countries is not state-of-the-art in terms of environmental impact and matter–energy input but is cheaper technology that is already obsolescent in the home country. This represents, not dematerialization, but increased materialization in these economies.

The original argument for reducing the throughput of matter and energy per unit of economic activity was made by Daly in 1980, in the context of arguments in favour of a steady-state economy (see Daly 1991). Since then, the arguments have been extended to encompass dematerialization, inherently benign industrial processes, ecoefficiency, and “green” technologies (Williams et al. 1987; Kanoh 1992; Robins 1993; BCSD 1994).

The economic and ecological arguments presented in this section raise an interesting question: To what extent are the measures required for living within our ecological carrying capacity compatible with, or even necessary to, the measures required to meet the challenge of economic restructuring driven by global economic integration?

Must economic and environmental agendas conflict?

Society and business may have a strategic opportunity to go beyond thinking that environmental and economic agendas necessarily conflict, that economic activity undermines sustainability, and that ecological sustainability constrains economic activity. The ecological and economic imperatives could reinforce each other, if they are interpreted and acted on imaginatively.

If, for ecological reasons, Canada and other industrialized countries need to dematerialize their economies by uncoupling human well-being from the throughput of matter and energy in society, they will have to develop more eco-efficient technologies (that is, substitute knowledge and efficient design for wasteful, “brute-force” technologies). Conversely, if, for economic reasons, Canada needs high value-added, information-intensive industries that maintain international competitiveness and generate high standards of living, it will have to develop industries characterized by their innovation and information content and by principles of advanced design and management. In either case, international trade becomes a crucial factor in achieving or undermining such connections.

In other words, the measures needed to achieve ecological sustainability may, at least in a country like Canada, also be the measures needed to maintain a competitive niche in the global economy. Substituting information for the throughput of matter and energy would allow Canada to capitalize on its educated work force as a source of comparative advantage and, at the same time, reduce the country’s environmental damage per unit of economic activity (the production and processing of information can involve much lower use of physical resources). Achieving such simultaneous gains in productivity and environmental impact through dematerialization of the economy is the basic premise of industrial ecology (Allenby 1992; Frosch and Gallapoulos 1992; Tibbs 1992; Hawken 1993; Ekins and Jacobs 1994; Young and Sachs 1994; Cote and Plunkett 1996).

Of course, posing the issue in this fashion raises important questions. To what degree would the growth in economic activity resulting from such economic restructuring increase the ecological impacts? In other words, would growth in activity levels more than offset increases in efficiency? Would changes in lifestyle and consumption patterns, such as substituting social-support processes for material consumption, be a more useful approach to staying within ecological carrying capacity?⁵

⁵ Dematerialization and a substantial increase in knowledge-based industry in industrialized economies may provide a powerful economic incentive for a highly educated, healthy, and socially stable work force, which may tend to satisfy some components of the social imperative. The international implications of this are less clear. Knowledge-based industries in Singapore, for example, rely heavily on immigrant, unskilled female labour. This, however, may be a transitory phenomenon; globalization of the economy may indeed temporarily shift unskilled jobs to where there is a pool of cheap, unskilled labour while the achievement of higher education and other social goals follows dematerialization.

Another important set of questions relates to the distribution and equity issues raised by either type of strategy and the ethical and practical issues raised by the large and growing fraction of the globe's human population existing in a state of extreme poverty. We will return to these questions later.

In any case, the increasing importance of international trade and investment makes it necessary to consider a sustainable-development approach of the type we suggest. This strategy would explore the prospects for enhancing Canada's international competitiveness through economic and trade policies based on the development of environmentally benign, clean, green technologies and technological systems with minimized matter-energy throughput (which may in the long run be as important as limiting pollution). This goes beyond the development and export of end-of-pipe waste-treatment plants or emission-control technologies and implies the need to develop new forms of industrial processes that are inherently benign. The focus is on the design of such processes, a focus that is more fundamental and also more supportive of an economic culture based on new knowledge and innovation. This perspective implies a significant emphasis on systems of technological innovation geared to competitive, environmentally benign industrial processes. This in turn is likely to require forms of social and political organization that promote such innovation and provide some confidence in the belief that the rewards of such processes will be shared equitably.

A dematerialization strategy would involve a progressive uncoupling of economic activity from the throughput of matter and energy in a society. Such dematerialization could result in a "factor 10" economy: one that, as a result of measures that drive a "policy wedge" between economic activity and matter-energy throughput, uses only 10% of the matter and energy used today per unit of economic activity (Schmidt-Bleek 1992a, b, 1993; von Weizsacker 1994; see also the reservations expressed in Rees 1995).

The dematerialization policy wedge

The concept of a policy wedge between economic activity and matter-energy throughput is shown in Figure 1. Traditionally, rising standards of living (economic growth) involve growing consumption of goods and services, coupled with greater consumption of energy and materials, leading to higher environmental impacts. In this scenario, economic and environmental goals are in conflict, with one achievable only at the expense of the other. The dematerialization strategy in Figure 1 would involve uncoupling economic growth from environmental impact by developing more environmentally benign technologies. This drives a policy wedge between the consumption of goods and services and matter-energy throughput, thereby helping to reconcile economic and environmental goals.

Although the argument has so far been expressed in terms of industrialized countries like Canada, similar arguments may apply to many developing and rapidly industrializing nations: matter-energy throughput could in many

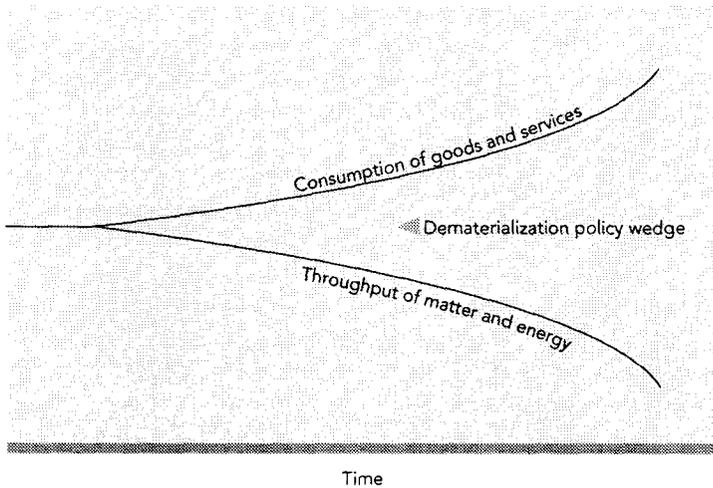


Figure 1. Dematerializing the economy. The first policy wedge, dematerialization, uncouples economic activity from matter–energy throughput. Because matter–energy throughput heavily influences environmental impact, dematerialization can reconcile environmental and economic goals. Source: Rees (1995), based on Pearce (1994).

ways be uncoupled from economic growth. The development of technological “leap-frogging” strategies in developing countries, whereby intermediate “dirty” stages of industrialization are bypassed as these countries move directly to more advanced and environmentally benign technologies, may offer significant hope for improvement in terms of ecological damage, quality of life, and economic sustainability (Berrah 1983; Goldemberg 1992). Also, as per capita income in such countries increases, it can be expected that demand for improved environmental quality will grow rapidly (World Bank 1992). Moreover, if a dematerialization approach is to improve the international competitiveness of industrialized countries, there must be a growing domestic and international demand for the goods and services produced through such a strategy. In this sense, the success of such a strategy depends on the existence of an international market for such products, which should in turn reduce environmental impacts directly and stimulate the development of more environmentally benign production processes throughout the world.

The issue is of course more complicated. The net environmental and economic impacts on developing countries of industrialized countries’ pursuit of a dematerialization strategy depend on a whole host of factors, including the types of goods traded, the terms of trade, and the indigenous technological capability of the developing countries. Most developing countries are far less “marketized” than industrialized countries and have much larger subsistence and informal economies. We do not know how much dematerialization could reduce total environmental impacts in societies in which basic needs are still widely unsatisfied and in which considerable sustained economic growth would be needed to achieve this.

Another important issue is gauging the macroeconomic effects of dematerialization strategies. Sanders (1992) and Simpson (1995) argued that insofar as increases in energy efficiency and reductions in environmental impacts contribute to reductions in input costs, they will induce extra economic growth in affected sectors, thus reducing or offsetting any efficiency or pollution-reduction gains. The existence, nature, and size of such rebound effects are critical challenges for the dematerialization strategy.

These uncertainties underline the need to investigate whether a complementary set of dematerialization strategies could be devised for the major economic regions of the world, strategies that would reinforce each other through international trade and improve human well-being and ecological conditions across a range of societies, cultures, and economies. Such dematerialization strategies go beyond the current rhetoric (let alone the practice) of the *post hoc* integration of environmental concerns into economic decision-making, as dematerialization strategies can be mutually reinforcing. Thus, they may offer significant potential for integrating the ecological and economic imperatives.

Resocialization: the second policy wedge

We also need to consider the social imperative, and here a number of concerns emerge, as the reconciliation of ecological and economic imperatives through dematerialization, suggested above, involves complex interactions with the social imperative. For example, growing global economic integration seems to produce growing social and cultural fragmentation. Would dematerialization strategies reinforce such tendencies? Certainly it is possible to imagine a version of this approach that would, at least in the short term, simply reinforce globalization's tendency to increase income disparities. In this scenario, countries and sectors within countries that succeed in pursuing the reconciliation outlined above would continue to prosper at the expense of everyone else. In particular, highly educated elites in most countries would be able to reap the benefits of a more integrated and interconnected global economy and would in so doing be increasingly able to buy whatever level of environmental quality and social security they desire (Schrecker 1998).

The problem is not so much that the rest of the world would fail to benefit from this process, as the successful pursuit of dematerialization strategies is likely to foster the emergence of prosperous markets for more environmentally benign technology and processes; it is unclear, however, whether the rest of the world would necessarily benefit from this process to the degree and in the time frame required for these strategies to be politically feasible. If dematerialization strategies themselves do not incorporate measures to address the social imperative directly, then they are likely to fail because the degree of social coherence required for such strategies to work will be unavailable. In this sense, a

trickle-down approach to the social aspects of dematerialization would be morally questionable and probably unfeasible.

A look at the issue of employment illustrates these complexities. Although dematerialization strategies will, by definition, reduce environmental impact per unit of economic activity, the labour and employment implications of this approach are much less clear. The information economy may substitute information for matter and energy, which will reduce environmental impacts, but it might also substitute information for labour, which will reduce employment. To a significant degree, the question turns on whether information and labour are substitutes or complements. If information and labour are substitutes, as information and matter–energy are, then using more information will reduce the use of labour along with the use of matter and energy. If information and labour are complements, then using more information will also use more labour. In the latter case, we would have the best of both worlds: more information, more jobs, and reduced environmental impact.

Of course, the reality is rather more complex. Whether information is a substitute or a complement for labour or for matter–energy depends on the circumstances, the technologies involved, and the relationship among all three inputs. However, although there is a reasonable argument for substituting at least some information for at least some matter and energy (the basis of the dematerialization argument), it is much less clear that employment levels will be maintained or increased by such processes.

In Canada, for example, the effect of new technology in the British Columbia forest industry in recent decades has been to reduce labour per unit of production, with progressively fewer people employed to produce progressively more timber. A similar phenomenon has been widely observed in developing countries, where the agricultural work force per hectare has been reduced as cash crops have replaced subsistence farming. Considerable thought needs to be given to the employment implications of a strategy of economic dematerialization and the capacity of social systems to accommodate such changes.

These considerations suggest that it is crucial to begin thinking about ways to integrate the social imperative into our response to economic and ecological problems. Even if the dematerialization approach reduces negative environmental impacts and improves aggregate economic conditions, it is unlikely to be politically feasible unless it also reduces social tensions. Problems of governance and culture may be the real limiting variables in achieving sustainable development, not least because resolving these problems is necessary for facilitating the required changes in the economic and ecological spheres.

One way to address this issue may be to start by considering the obvious fact that human well-being and economic activity, although connected, are not synonymous. Economic indicators, such as gross domestic product (GDP), are incomplete and sometimes misleading measures of well-being, for a number of reasons:

- ♦ Changes in the composition of GDP may have major impacts on human well-being that are invisible to an analysis that considers only the level of GDP;

- ◆ Human well-being may not increase linearly with consumption, so consumption changes do not necessarily indicate commensurate changes in well-being;
- ◆ Changes in the level of GDP fail to account for the relationship between the distribution of income and overall well-being;
- ◆ GDP takes into account only activities in the formal economy and leaves out a host of informal economic activities and intangible, or nonmarket, effects; and
- ◆ Environmental degradation reduces well-being but does not result in a corresponding reduction in GDP.

Various attempts have been made to construct alternative measures of social well-being (Daly and Cobb 1994; Gustavson and Loneragan 1994). For our purposes, the distinction between economic activity and human well-being may provide a focus for a second policy wedge that links the economic and the social. What mostly seems to be missing in using measures of economic activity as a proxy for human well-being is precisely those sociopolitical and cultural factors that have to do with a sense of community, social coherence, and collective well-being. From this perspective, fostering economic growth and increasing environmental quality may be necessary but radically insufficient. In particular, we may need to explicitly recognize that some aspects of human well-being cannot be reduced to economic activity but need to be fostered on their own. This approach has been used by the United Nations Development Programme to create a human-development index that incorporates GDP but also includes levels of education and health (UNDP 1994).

Although the almost universal tendency in modern political decision-making is to maximize economic growth, with the expectation that such growth will lead to increases in human well-being, we suggest that there is a need to develop policies to increase human well-being per unit of economic activity (for example, per dollar of GDP). In other words, social strategies that uncouple human well-being from economic activity are needed to complement dematerialization strategies that uncouple matter–energy throughput from economic growth. The effect of such “resocialization,” shown in Figure 2, would be to drive a policy wedge between human well-being and the consumption of goods and services, allowing the former to rise while the latter falls.

What might some of these resocialization strategies look like? One possibility in industrialized countries is a shift to having a society with less participation in the formal economy, for example, through a shorter average work week, coupled with greater leisure and more participation in activities of the informal economy, such as community service of various kinds, child care, coaching, and managing recreational sports. The World Alliance for Citizen Participation, for example, recently discussed strengthening civil society through increased emphasis on the informal economy (CIVICUS 1994). Also, the

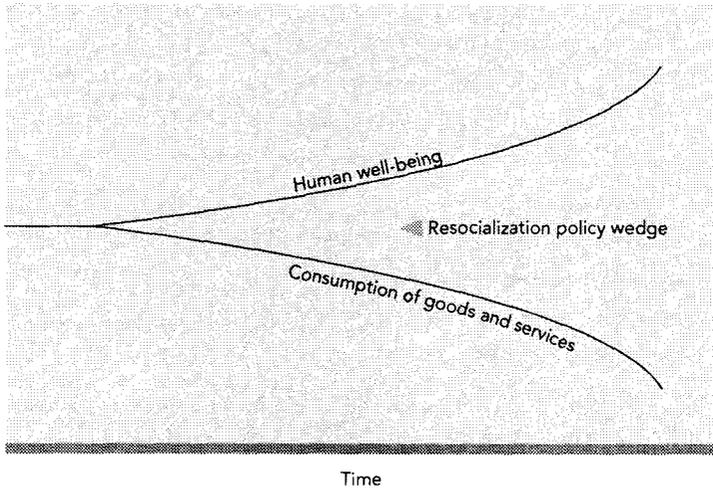


Figure 2. Resocializing society. The second policy wedge, resocialization, uncouples human well-being from the consumption of goods and services. Resocialization can reconcile economic and social goals.

Commission on Global Governance has studied general issues of governance, security, and economic interdependence (CGG 1995), and Etzioni (1993) examined communitarian approaches to these issues in a North American context, emphasizing the re-emergence of community and informal-economy activities.

To make resocialization possible, we might consider making investments in social capital that parallel our investments in natural capital. Dobell (1994) proposed a guaranteed annual income scheme, to be paid for by revenues generated through an ecological tax reform. The intended effect was to uncouple work from income and to invest in the social infrastructure to allow people more time for filling socially useful roles, as well as to free up labour markets.

A shift in emphasis from the formal economy relies on people being willing to take part of their income in the form of increased leisure and unsalaried activities. A trend toward this is found in a number of industrialized countries where people are actively exploring job-sharing arrangements of various kinds, although this is typically driven by unemployment problems, rather than a desire for shorter work weeks and lower incomes.⁶ However, if such a shift in economic activities is imposed on unwilling citizens while other socioeconomic groups maintain full employment and high incomes, further social unsustainability might result. The need for resocialization policies in this situation becomes apparent.

⁶ Our attempts to model sustainable-society scenarios for Canada revealed that a reduced average work week (that is, implicit increases in job-sharing) is one of the few ways to maintain something close to full employment in an economy with lower consumption levels (Robinson 1998).

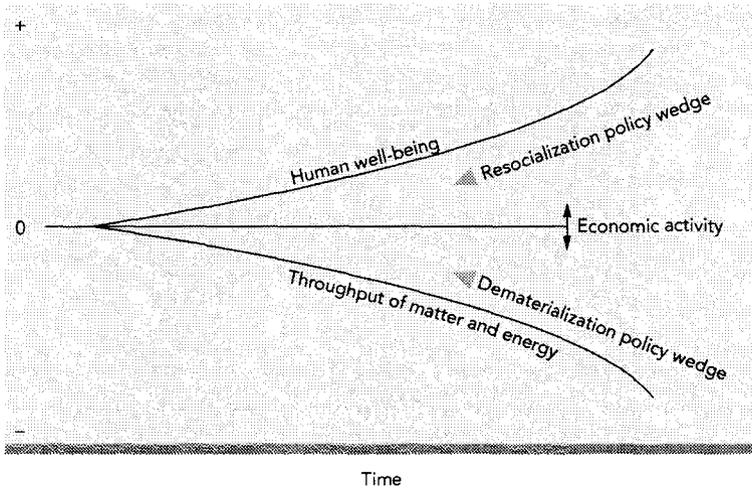


Figure 3. Reconciling human well-being and ecological carrying capacity. The combination of dematerialization and socialization can lead to win-win-win futures, in which human well-being rises and matter-energy throughput (and thus environmental impact) falls. Economic activity (consumption of goods and services) could rise, fall, or remain steady; it might well rise in poorer societies and fall in richer ones.

Combining the policy wedges

Figure 3 shows the possibilities when the first policy wedge, dematerialization, is combined with this second policy wedge, resocialization. This represents a significant elaboration of the dematerialization strategy outlined in Figure 1. In Figure 3, economic activity (the middle lines) is progressively uncoupled from matter-energy throughput (bottom line), through dematerialization strategies, and human well-being is progressively uncoupled from economic activity (top line), through resocialization strategies. Over time, throughput of matter-energy falls and so, therefore, do impacts on ecological carrying capacity. Human well-being rises, and economic activity (middle lines) stays somewhere in between, rising significantly in many parts of the developing world and among disadvantaged communities in the developed world but increasing moderately, remaining the same, or even falling in parts of the industrialized world.

This approach explicitly recognizes the importance and influence of the social dimension, in contrast to the pure-dematerialization approach illustrated in Figure 1. The approach summarized in Figure 3 offers a more hopeful and, we believe, more realistic prospect, for three reasons:

- ♦ It recognizes that without addressing questions of governance and culture, we are unlikely to develop and successfully apply dematerialization strategies. In other words, it explicitly distinguishes the three dimensions of the problem.

- ◆ It recognizes that social choices and policies themselves can help reduce environmental impacts. The whole burden of improved environmental quality is not placed on the dematerialization strategy alone but is shared by both strategies. This allows us to explicitly consider the issue of overconsumption (Durning 1992), which was introduced to the political agenda at the Earth Summit in Rio (UNCED 1992) but had been discussed without much real resolution since at least the 1970s.
- ◆ It allows policymakers in different parts of the world to take substantially different policy approaches, according to differences in poverty, material needs, technological capability, and cultural and social goals. In some areas of the world, for example, where better satisfaction of basic human needs is a priority, it is likely that economic growth will be a priority, and the emphasis should therefore be on dematerialization and reducing environmental damage. In other areas, where high levels of material consumption are already typical, the focus may be more on resocialization policies that uncouple human well-being from economic activity.

Both dematerialization and resocialization are likely to depend heavily on there being adequate institutions, both state-based ones and ones within civil society; there is great variation, however, in the strength of such institutions, especially in developing and former communist countries. The overall aim of the combined strategy is to increase human well-being and to decrease environmental damage, and this can be accomplished in different ways in different areas of the world. In this scenario, economic activity is not an end in itself, but merely a means to ecological and social goals.⁷

This dual role for resocialization policies — making dematerialization strategies possible and directly reducing environmental impact — emphasizes the importance of the social imperative. Fortunately, some encouraging examples can be given of such approaches. These include greater recognition and use of the informal economy, embracing the concept of “sustainable livelihoods,” rather than salaried employment; more community self-management, such as small-scale and community credit schemes; and lower cost, less impersonal ways of providing goods and services, such as home health care and the use of paramedics, rather than hospitalization, or small, intensive family farms and urban

⁷ Indeed, the economic imperative may only be a transitory phenomenon, which will ultimately disappear when living standards uniformly reach an acceptable level. This is one reason why this chapter defines the economic imperative as the need to ensure and maintain adequate material standards of living for all people. Given the grossly inadequate material living standards of about two-thirds of humanity at present (including not only the majorities in many developing countries but minorities in richer nations, such as the old, the sick, the unemployed, and the disabled, as well as many cultural, ethnic, and other disadvantaged groups), the economic imperative will clearly be with us for some time.

vegetable gardens. However, an effective and more widespread uncoupling of economic activity from human well-being would address more intractable problems, lying mainly in the social system: the consumer-society ethic, which equates human well-being with material consumption, and the degree to which global economic integration, as currently practiced, tends to decrease the sense of community, social coherence, and governability.

This integrated policy direction implies an optimistic scenario: a win-win-win solution in which all three imperatives are satisfied. However, this cannot be guaranteed to happen in any given country, let alone in all countries. Indeed, the current tendency is to concentrate on the economic imperative, combined with a *post hoc* attempt to reconcile this with the ecological imperative, while largely ignoring the social imperative and questions of North-South and intracountry equity.

Sustainable development will not be achieved through technical fixes alone. A strong social dimension has to do not only with political issues but also with values, lifestyles, social organization, and individual and collective behaviour. Both dematerialization and resocialization are needed.

Policy implications of a more integrated approach

In virtually all states and at the international level, public policy is determined sectorally within each prime system by separate ministries or agencies pursuing relatively narrow and sometimes conflicting goals. This is most clearly shown in the case of economic policy, which is determined by finance, trade, and similar agencies, sometimes with attempts to later adjust these policies to address various ecological and social objectives.

A number of attempts to do better than this have been made globally, nationally, and locally. The two iterations of the World Conservation Strategy, the Brundtland report, and the 1992 Earth Summit were all endeavours to find consensus on common international goals and strategies. The Netherlands, Canada, and Norway are among states that have tried to do the same nationally. But none of these attempts have resulted in any successful strategy or practical policies to fully reconcile the three imperatives. This is perhaps because the processes for developing such broad national strategies have tended to be dominated by environmentalists and environmental agencies and lacked high-level participation from policymakers and managers dealing with social and economic systems.

Initiatives with a more restricted scope have arguably shown greater promise. In 1994, for example, Canada's International Institute for Sustainable Development convened a small international group of government representatives, consumers, diplomats, trade experts, and environmentalists, who developed and released the Winnipeg Principles for Trade and Sustainable

Development. These principles represent an attempt to establish agreed sustainability yardsticks for measuring trade policies. International trade, worth around 6 trillion US dollars a year, has a powerful influence on all three prime systems. By creating wealth, international trade can reduce poverty and help address environmental degradation; conversely, some of the economic activities that trade accelerates can damage the ecological system and decrease equity among and within societies.

The Winnipeg Principles have established substantial common ground among those concerned with managing all three prime systems. The seven principles, all of which must be respected if a trade policy or agreement is to contribute to sustainability, address efficiency and cost internalization; equity (within and between countries and generations); environmental integrity; subsidiarity (acting at the lowest practicable jurisdictional level); international cooperation; respect for ecological science and a precautionary approach that recognizes uncertainty; and both openness and accountability.

Another policy initiative that may show us how to reconcile the imperatives is the response of the health-care system in some developed countries to the AIDS pandemic. Initially in San Francisco and subsequently in many other cities and countries, the high cost of both public education and prolonged palliative care led the health-care system to subcontract significant components of these to voluntary groups. The World Health Organization has argued that this is often less expensive and more effective. For example, AIDS typically involves short acute episodes, which may require hospital treatment, interspersed with long periods when only minimal nursing and monitoring are needed. This disease pattern made it possible to develop the "buddy" system, with home care provided by largely untrained volunteers at a fraction of the cost of permanent hospitalization, which has major benefits in terms of personal independence and dignity. Also, the perceived need in nearly all countries (derived from the economic imperative) to limit or reduce public health-care expenditures is commonly thought to involve reductions in the standards of health care. But this AIDS example shows that this need not be the case: there are ways to both improve care and reduce costs (Mann et al. 1992).

Some promising initiatives in reconciling the imperatives have arisen because the economic imperative is influencing virtually all governments today to reduce the size and costs of bureaucracies. Because this appears to militate against more environmental regulation and control, interest is growing in the use of fiscal measures to achieve environmental goals. One recent study (IISD 1994) documented 23 European and North American cases in which taxes and subsidies are used more or less successfully to achieve environmental goals. A related approach, being explored in a number of industrialized countries, is to have environmental (or sustainability) audits of corporations and industries carried out annually by independent external specialists (analogous to financial auditors). This may reduce the costs and bureaucracy of government regulation while making industry more self-policing and publicly accountable.

It seems probable, at least at this stage, that relatively limited initiatives of these types may have a greater practical impact on public and private decision-making than attempts to develop more comprehensive global agreements. However, if such new approaches are to integrate the three dimensions of the problem, they must have a policy framework that recognizes the need for such an integration. We have two suggestions: subsidiarity and binding agreements; and a constrained market. They are not worked out in detail but provide a general direction for how this might be done (see also Robinson and Van Bers 1996; Robinson 1998).

Subsidiarity and binding agreements

On the sociopolitical side, increasing pressures for recognition of cultural and ethnic differences, combined with a call for more localized decision-making, suggest the need to further decentralize political power over cultural and the environmental matters. However, owing to the increasingly global nature of ecological and economic problems, decentralization by itself is an insufficient response. Instead, we propose a form of devolution of political power and management authority, combined with a much stronger common legal framework of environmental and cultural rights. The price for such devolution would be explicit acceptance of agreed cultural and environmental standards, such as protection of minority-language rights or legally binding water-quality standards.

This approach would require an innovative form of contract, whereby larger political units expressly delegate management power to smaller jurisdictions (subsidiarity) in return for legally binding agreements on basic environmental and cultural rights and responsibilities at both the individual and community levels. This would allow for more local political involvement in environmental management and cultural development at a spatial level that may be more in tune with immediate experience and thus more likely to be both socially acceptable and effective. Establishing binding agreements on basic environmental and cultural rights and responsibilities would require a process for defining such rights and responsibilities. This might be a process of public consultation at the national level (linked to international negotiations) to propose, debate, and determine environmental strategies, programs, goals, and targets. These targets would be broadly defined and implemented at as low a level of jurisdiction as possible. Pollution-control goals, for example, would be more likely to involve environmental-quality standards than emission standards or specific forms of emission technology. A social goal might involve an agreement that the average income of the top 20% of the population exceed that of the bottom 20% by no more than a certain factor, leaving it to individual nations or provinces to decide how to achieve this target (or by how much to exceed it).

The essential components of this subsidiarity approach are that common goals should be agreed in common; that management to achieve these goals would be devolved to as low a level of jurisdiction as possible; and that the lower

jurisdiction would be formally accountable for achieving the targets. In many respects, this combination of subsidiarity and binding agreements can be summed up in the phrase “sovereignty association,” a term made prominent in the Canadian debate over the political separation of Quebec from the rest of the country. A similar sense is also evoked in the well-known environmental slogan “think globally and act locally.” Each expresses a need to combine local control and strong links to the larger context. Internationally, such an approach could develop logically from existing agreements, such as the United Nations Declaration on Human Rights or the Montréal Protocol on Substances That Deplete the Ozone Layer; nationally, many states have agreements similar to the US *Bill of Rights* or the Canadian *Charter of Rights and Freedoms*.

It can be argued that although this approach is conformable with the tradition of Western industrialized countries, it would be unlikely to appeal to governments of many former communist and developing countries, where individual and minority rights tend to be regarded as a luxury competing with economic growth and where greater emphasis is traditionally on the unitary state. Certainly, respect for individual, cultural, and other minority rights is likely to continue to be uneven, but global and regional free-trade agreements, which for most countries are a part of the economic imperative, are likely to continue to involve basic environmental and social standards, however limited and patchy they may be at first. Moreover, as suggested above, a more equitable distribution of social and economic goods may be necessary to create and maintain the social cohesion and stability needed for economic restructuring.

The constrained market

On the economic side, we suggest a constrained market, whereby extensive use is made of market-based instruments (MBIs), wherever feasible and efficient, but these are backed up by powerful, politically determined constraints and nonmarket implementation measures. Like virtually all existing economic regimes, a constrained market represents a middle ground between pure reliance on the market and pure reliance on government control. The difference is that this approach would define that middle ground partly in terms of sustainability goals. Constraints on the market would be of two general types: boundary, or external, constraints that set limits within which the markets may operate; and target, or internal, constraints that alter the market value of goods, services, and resources.

The major mechanisms for deciding such constraints would be the environmental target-setting and binding-agreement processes described above. Those processes would produce a set of targets, based partly on an analysis of the environmental implications and economic feasibility of attainment. This analysis would then be used to determine which standards are overriding and would simply be imposed, regardless of economic conditions (boundary constraints) and which ones were to be subject to constraints within the market system

(target constraints). Criteria for deciding the type of constraint to be used might include the scale of the environmental impact, whether it is reversible, uncertainty about impacts, and the economic cost of imposing a ban or other boundary constraint.

If a boundary constraint is indicated, such as zero discharge of particular toxic and persistent chemicals, then this would be applied through passage and implementation of standards and regulations of the traditional kind. If, however, analysis determined that target constraints would suffice, then this would lead to the design and implementation of appropriate MBIs, such as taxes, incentives, or tradeable permits. In this case, the target-setting analysis could be used to estimate how incentives would have to be changed so that the desirable standards and targets can be reached. Such changes would then be instituted in the form of taxes and charges on (or possibly subsidies for) goods, services, and resources, including such mechanisms as effluent charges or sale of pollution permits.

Markets never work perfectly. Even if target constraints are used, there would likely be a need for nonmarket programs to supplement the MBIs. Such measures could, first, supplement the modified market signals resulting from the imposition of target constraints and, second, substitute for such signals altogether in the case of boundary constraints. These implementation processes would involve direct government intervention in the marketplace and could be based on the lessons learned from past environmental and energy policies. The measures might include direct instalment of environmentally friendly equipment, accelerated replacement of capital through subsidies, and involvement of local community groups in program design and delivery.

The development and implementation of target constraints would allow the marketplace considerable freedom to choose the least-cost method of achieving environmental targets. This would amount to an internalization of environmental costs and benefits, based on a political valuation of environmental costs and benefits not captured through normal market processes, such as the “bequest value” to future generations and some of the “option value,” or opportunity cost, of environmental amenities. The MBIs used to implement target constraints could also generate government revenue. The overall effect would be to reap the benefits of economic efficiency without succumbing to the short-term focus and lack of goals implicit in traditional market approaches or to the rigidity and inefficiency of purely regulation-based approaches.

Dematerialization and resocialization are two key strategies for reconciling the three imperatives, and subsidiarity and binding agreements and the constrained market are two possible approaches to the policy implementation of such strategies. Although global consensus on the three imperatives and on complementary national strategies for addressing them is clearly needed, policy implementation will vary according to national and local circumstances, rather than being internationally homogeneous.

The need for better analytical frameworks

Our current state of knowledge about each of the three prime systems is probably too insufficient and certainly too inadequate, given their interactions, to allow us to manage any of them effectively in isolation. Scientific and other scholarly studies, both theoretical and policy oriented, are still sectorally fragmented by academic and bureaucratic boundaries, with major differences in vocabulary, concepts, and unstated assumptions. The recognition that the ecological, economic, and social spheres are largely coterminous, interacting, complex, self-organizing systems, each coequal in primacy, as argued above, may provide some common ground. So might the application of a common systems-analysis approach to managing all three prime systems.

We developed this framework, based on the three prime systems and the three imperatives, primarily in response to conditions in Canada and in other industrialized countries. Careful consideration and adaptation are needed to apply this framework in rapidly industrializing countries, in countries in transition from command to market economies, and in other developing regions of the world. For example, in working to reconcile the three imperatives in other societies, where does one find similar policy wedges? Are the various policy wedges in different societies compatible?

Arguably, the research needed the most urgently is the development of a common analytical framework that functions equally well in all three prime systems and among their interactions: a tool to measure the success of strategies and policies from the local to the international levels and to determine the extent to which they contribute to developing more-sustainable societies and to reconciling the three imperatives.

The limitations of existing analytical tools

Many analytical tools have been developed to address aspects of these issues. Perhaps the most commonly used are environmental-impact assessment (EIA); social-impact assessment (SIA), which is often combined in various ways with EIA; cost-benefit analysis (and its variants, such as cost-effectiveness analysis); and, more recently, integrated assessment (IA). Bailey et al. (1995) recently reviewed cost-benefit analysis and other analytical approaches in the context of an IA of environmental change (see also Cohen 1996; Rothman and Robinson 1997; IPCC 1998).

With the exception of IA, such analyses are typically focused on only one aspect of one of the three systems. For example, EIA is often combined with SIA and with economic analysis in various ways, but the central focus is on ecological impacts and their direct consequences. Similarly, cost-benefit analysis typically addresses only the direct and indirect economic costs and benefits of a

project or policy. Although such analyses may provide very useful information for decision-makers, they clearly do not address the full range of factors.

When we turn to IA approaches, the scope is broader but still inadequate from the point of view of integration. For example, to date, the usual attempt to develop IA of options to mitigate climate change is to apply a comprehensive cost–benefit framework to the analysis of alternative climate policies, including an explicit attempt to estimate the costs associated with some environmental and social impacts. This is done to provide some common dollar metric with which to weigh the positive and negative impacts of different policies over time. One should applaud the attempt to systematically compare both the positive and the negative impacts of various options or scenarios. However, expressing these impacts in purely monetary terms raises many concerns:

- ◆ Economic activity is not a direct measure of well-being;
- ◆ Many intangible and effectively unquantifiable effects need to be considered;
- ◆ Serious methodological problems plague such indirect measurement techniques as contingent valuation;
- ◆ Fundamental disputes about whether markets should be assumed to operate efficiently and about how issues of equity and discounting should be addressed are waged in the literature; and
- ◆ Grave difficulties hamper the application of existing macroeconomic models to economies in transition or those of developing countries.

Moreover, purely economic factors are clearly only one input to complex political and business decision-making processes, which often seem resistant to the results of economic analysis. (In this sense, economic analysts often seem to mimic the political naivete of natural scientists in the environmental field, who sometimes act as if they believed that the results of their analysis should dictate policy decisions.) The point here is not that decisions are in practice made for irrational, noneconomic reasons but that the scope of purely economic analyses may be too narrow to encompass crucial dimensions of the problems of interest to decision-makers.

More recently, in response to dissatisfaction with our ability to meaningfully express very different kinds of effects in monetary terms, a growing interest has emerged in multiattribute forms of analysis that make no attempt to express all values in terms of dollars. Such approaches avoid the mistake of trying to force all issues into one metric, and they allow users of the analysis to apply their own weighting schemes and priorities to the results. But these analyses do not go far enough in addressing social and economic issues, as they are still too focused on the direct, quantifiable impacts.

These considerations suggest the need for new analytical frameworks to supplement the more specific and detailed, but narrower ones and provide a much broader and more integrated view of the problems.

Three suggestions for an improved analytical framework

To satisfy the needs of integration, any new analytical framework must address two main concerns. First, the substantive scope of analysis needs to be broader, embracing social and economic issues, such as migration, equity, income disparities, governance, cultural diversity, international trade and competitiveness, and investment, as well as biophysical issues, like species loss, pollution, resource scarcity, and the maintenance of ecological life-support systems. Second, the methodological scope of analysis needs to be wider, going beyond impact assessment to a much more integrated assessment of such things as alternative scenarios, development paths, and the implications of lifestyle changes and systems of governance.

One fruitful approach may be to recognize the complex, self-organizing nature of the ecological, economic, and social systems and the interactions among them. This means a strong focus on interactive effects, second- and higher-order consequences, nonlinearity, thresholds, and changes in state, diversity, and resilience. In turn, this suggests the need to develop integrated modeling and scenario analysis to allow us to treat each of these systems explicitly in terms of alternative development paths, rather than in terms of probable futures (Robinson 1988, 1991). This also means that economic, ecological, and social factors should be considered at the system level, not just in terms of direct impacts. Of interest are not simply the direct economic costs of various measures or effects, but their implications in terms of, say, trade or competitiveness. Social and ecological effects go beyond their direct impacts, like job or species losses, and encompass broader changes at the community or ecosystem scale.

Moreover, we need to explicitly consider interactions among these systems. We might start from the observation that each of the prime systems generally responds to stress, first, by absorbing it, through a variety of buffering mechanisms; second, by small, incremental, and evolutionary changes; and third, by major flips, or phase changes, which normally appear to be sudden, unidirectional, and irreversible. The direction, quality, and extent of such major phase changes may be unexpected, counterintuitive, and unpredictable.

A second dimension of more integrated analytical frameworks is the need to explicitly recognize the qualitative aspects of social and economic systems. Many assessment methods, based as they are on purely quantitative methods, are blind to such crucial issues as power, control, sense of community, trust, nationalism, and cultural identity. These issues are typically addressed in the humanities or the more qualitative parts of the social sciences (Robinson and Timmerman 1993). Any IA designed to comprehensively survey the implications of alternative

patterns of developments or sets of policies must pay significant attention to such qualitative dimensions.

A third suggestion is to use and further develop approaches to analysis that are inherently interdisciplinary and policy relevant and involve the user community, not just as the audience for the published results, but as partners in designing and sometimes in undertaking the research.⁸ Such an orientation changes the focus and design of the research and the nature of the interaction between analysts and the user community in ways that usually produce a more integrated picture of the issues.

The net effect of these suggestions would be the development of analytical frameworks based on constructing alternative scenarios and describing key interactions within and among the ecological, economic, and social systems. The goal of these frameworks would be to compare the relative effects of these scenarios in terms meaningful to all participants, using state-of-the-art understanding and techniques. Scenarios would be both qualitative (for example, story telling) and quantitative (for example, formal modeling) and would focus on issues such as choice, constraints, uncertainty, and surprise.

The type of analysis we are recommending would not of course replace more traditional approaches to IA, cost-benefit analysis, EIA, or SIA. Such conventional tools, which can provide a much more detailed examination of certain economic and biophysical dimensions of the problems, will continue to be used. Because the approach to IA we propose is necessarily highly aggregated and simplified, this type of analysis cannot do more than supplement existing methods. Nevertheless, this supplementary role is very important in addressing the kinds of issues involved in integration.

We are suggesting a form of IA going well beyond those typically found, for example, in the climate-change literature (Rothman and Robinson 1997). Our suggestions pose some formidable practical, methodological, and theoretical obstacles, including problems of data availability, problems of aggregation and integration, serious communication problems among and between different disciplines, lack of clear conceptual frameworks and theories, and uncertain prospects for success, either analytically or in terms of policy relevance. From one point of view, these problems may seem daunting. From another, they are challenges merely reflecting the need to change what is typically done.

⁸ Such an approach, which is embedded in the mandate of the Sustainable Development Research Institute, has strong parallels with the concepts of "civic science," "vernacular science," and "post-normal science," as suggested by O'Riordan (1991, 1994) and Funtowicz and Ravetz (1993) (see also Wynne 1992; Shackley and Wynne 1995).