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Global Environmental Imperatives and Institutions to Ensure Sustainability

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A society can be thought of as having achieved a sustainable growth path if it meets three conditions of sustainability: ecological, economic, and social. My observations here are concerned with ecological and economic sustainability. Yet, as the World Bank frequently emphasizes, the three aspects of sustainability should not and cannot be separated. This fact is of special importance for the developing world.

Economic history teaches us that economic growth has been fed equally by the increased use of natural resources of all kinds, by growth of the labor force, and by new technologies. In the past, new technologies helped people replace the natural resources that had become scarce through overexploitation with resources that were still abundant. The switch from charcoal to hard coal was such an event in European regions where forests were under the threat of extinction. Today, many environmental problems have a similar character. However, it is not the quantitative scarcity of a natural resource that is of concern, but the threat to human health imposed by the deteriorating quality of environmental resources.

What global environmental imperatives will move the world toward a sustainable growth path? What institutions will be appropriate for achieving such a path? To answer these questions, we need to look at the global environmental problems that will accompany us into the 21st century. Then we will examine their causes and their interactions with other problems. Finally, we need to identify imperatives and institutions that can help move the world economy toward a sustainable growth path.

Growth, the Environment, and Sustainability

In the past 20 years, knowledge about the nature and extent of environmental problems and natural resource scarcity has increased remarkably. Local, national, and transfrontier problems all pose different challenges for policymakers. Efficient ways have been found to internalize negative environmental externalities through mechanisms such as taxes, charges, tradable emissions rights, and—where possible—through the establishment of private property rights that create incentives for the efficient use of environmental resources.

The static analysis of environmental problems has recently been supplemented with a closer focus on intertemporal problems. Problems such as climate change, water resource availability, the loss of biodiversity, and the relationship between economic growth and the environmental and sustainability issues have moved to the center of attention, thus requiring a more long-term view for policymakers and researchers.

Economic activity should aim to improve the well-being of individuals through income growth. The three main sources of income growth are

- Increases in reproducible factors of production such as labor and capital
- Increases in knowledge that result in new technologies
- Increases in the use of natural and environmental resources, both renewable and nonrenewable.

These sources can increase the number of goods a country produces, but they do not necessarily contribute to achieving a steady long-term growth path or sustainable levels of consumption or well-being.

Measuring Sustainability

The public attention that the terms sustainability and sustainable development have received has also revived academic interest in an appropriate intertemporal indicator of sustainable income. The pioneering insights of Hicks (1946), and later Weitzman (1976), have been extended to include natural and environmental resources. The Hartwick Rule states—based on a simple neoclassical growth model—that a sustainable level of consumption can be achieved if rents from the extraction of nonrenewable resources are invested in the capital stock of the economy (Hartwick 1977). Several authors have used this basic insight to empirically assess the sustainability of economies by measuring genuine savings, an indicator of savings that accounts for changes in the stock of natural and environmental resources (Hamilton 1994; Pearce and Atkinson 1993; World Bank 1995). Empirical findings suggest that resource-rich countries with low savings rates have development models that are unsustainable. Many such countries are developing countries.

Weitzman (1997) challenged these findings and claimed that indicators of sustainability such as savings and net national product systematically understate the potential sustainable growth path of an economy by neglecting the contribution of technical progress (Weitzman 1997). Weitzman's estimate of the influence of technical change on sustainable consumption is that expected income could be about 40 percent higher than conventional measures suggest, meaning that sustainability may not be as serious a problem as conventional indicators suggest.

The Implementation Problem

While findings on the importance of technological change for long-term sustainability are good news, they are based on the assumption that economies follow efficient policies in their use of environmental resources. This is often far from the case. Even though the economics profession has made remarkable progress in identifying different types of environmental externalities and in finding mechanisms for internalizing them, economists' recommendations are frequently not implemented. This may happen for several reasons. First, by focusing on measures and instruments' efficiency, economic analysis has left out distribution issues that are often decisive in determining the outcome of the policy process. Second, issues of the practical implementation of environmental policy instruments have not been dealt with adequately. Third, political and economic constraints—especially where transfrontier pollution is concerned—make implementation difficult. Finally, knowledge about the interaction between environmental change and its causes is still weak in many areas.

Overall, it has become apparent that achieving sustainability in ecologically, economically, and socially sound ways is more difficult than previously thought. Therefore, analysis and policy in the 21st century should focus on the complexities of and interactions between ecological constraints, economic objectives, social needs, and political opportunities.

The Issues Ahead

In the past, the environmental problem was mostly seen as one of scarcity of nonrenewable natural resources, especially minerals and fuels as factors of production. Today, the focus is more on renewable resources and on the irreversible consequences of unsustainable management of these resources. In addition, we are increasingly aware that ecological sustainability (or lack thereof) can only be estimated over long periods, most notably in the cases of climate change and the irreversible reduction in biodiversity. Attention has also shifted from local or national environmental problems to global

environmental and natural resource problems, including transfrontier pollution. This shift has partly been a result of remarkable success in controlling pollution problems in industrial countries.

Efforts to solve transfrontier and global environmental problems, such as emissions into the atmosphere, and manage international common access resources, such as those in international waters, are still in their early stages, but the number of international treaties is slowly increasing. This process is accompanied by an increased understanding and increasingly advanced interpretation of the role of international law. However, we still need to resolve many issues and gain practical experience before efficient internalization of global externalities through international environmental agreements becomes a more standard practice.

Problems in Negotiating Environmental Agreements

The following partial list highlights some issues that will need to be dealt with in future international environmental agreements:

- Negotiating international environmental agreements is a complex process where parties can sometimes reach agreement more easily if the problem is well defined. In some cases linking issues may be especially successful, as it provides an opportunity for implicit or explicit compensation (Barrett 1998).
- Because international environmental agreements must be self-enforcing, they need to be adaptable to changes in the costs and benefits of their signatories' participation. Renegotiation will be especially important for longer-term environmental problems.
- International environmental agreements need to contain more than just the obligations that the signatories have agreed to. Rules for noncompliance, for free-riding of nonsignatories, and for the entry of additional signatories must be established. These issues often involve conflicts with other international treaties, as in the case of trade sanctions that conflict with the World Trade Organization's regulations or other sanctions that conflict with international law.
- All the difficulties involved in reaching international environmental agreements combine in the case of climate policy. In the Kyoto agreement, climate policy issues are strongly linked to other policy areas. As a result, neither participation nor the institutional structure of environmental measures to take have been determined and an end to the negotiating process is not yet in sight.

Issues Related to Insufficient Understanding of Environmental Problems

Another notable reason for governments and international negotiators' unwillingness to effectively tackle many environmental problems is the problem of climate change. We really do not know much about the environment and its impact on long-term economic development. As a result, the costs and benefits of action and inaction are known only with a large margin of error. Although research has made some progress in increasing our environmental knowledge, the knowledge issue will accompany us well into the next century.

Several important roadblocks to understanding, and by extension to policy, exist. Especially for environmental problems that occur and can only be resolved over a long time, the lack of knowledge—and consequently the disagreement—about both the optimal timepath or using an environmental resource and the choices made to influence this timepath has made agreement on policies difficult. Research on the interaction between economic growth and environmental degradation has moved from theory to empirical data. However, the empirical results are still inconclusive. The postulated Kuznets curve—an inverted U-shaped relationship between pollution and income—found some support in early studies (Grossman and Krueger 1995), but later studies could not confirm such a general relationship (Hettige, Mani, and Wheeler 1998). If the Kuznets curve does not describe the relationship between income growth and environmental degradation, the easy policy prescription of improving the environmental situation by promoting income growth cannot be supported.

Because the simple relationship between growth and the environment breaks down in many cases, the search for the true causes of environmental degradation must go beyond correlating income and environmental resource use. The link between poverty and the use of environmental resources is important—many of the urgent environmental problems occur in poor areas of the world—but so far this link is not understood as well as it should be. Detailed studies of poverty's impact on resource use show that it is too early to generalize any causal relationship between poverty and environmental degradation. The findings suggest that causality can go either way. A small environmental resource base can lead to more poverty, but poverty may also accelerate the destruction of the environmental resource base. Even the relationship between population growth and environmental degradation is not clear. Markandya (1998) concluded that an important factor in explaining changes in environmental degradation over time is the development of institutions and their adaptability to exogenous changes. If institutions are so important, the insights from Kuznets-type studies may be of little relevance for long-term environmental policy choices.

Economic analysis often focuses on the efficiency of environmental policies, but pays little attention to distribution questions. As policymakers have long recognized, policy interventions must take into account the people that do and do not benefit, not only from a moral point of view, but also because the political acceptability and effectiveness of instruments depends on the distribution of their costs and benefits. This is the case at the national level and, especially, at the international level. Including distribution issues in the analysis requires a deeper understanding of the costs and benefits of environmental policies. Today, there is good knowledge about the short-term costs of abatement measures, but little about the benefits of abatement, as these benefits usually cannot be measured in terms of prices and observable quantities. In the long term, even knowledge about costs is fuzzy, and the assessment of future benefits for future generations is even more complex, because it depends on intergenerational preferences, which is an area where ethical considerations go far beyond economic analysis.

As far as global and transfrontier pollution problems are concerned, the intertemporal distribution of costs and benefits also raises difficult questions. Some countries may prefer a growth path in which they first expand the exploitation of their resource base to quickly raise income levels, then implement environmental measures. This growth path mimics the historical development of industrial countries. Because people in industrial countries tend to value the tradeoff between additional income and environmental quality differently from people in developing countries, policy coordination requires a compromise that balances these different preferences.

Possible Effects of Globalization

Since World War II the world economy has grown about 4 percent a year. However, the increase in the international division of labor has been even more rapid, with the number of exports increasing about 6 percent a year. An even more remarkable development started in the mid-1980s: the rapid increase in international capital flows and foreign direct investment.

Globalization of the world economy initially meant capital flows between industrial countries, but today increasing amounts of capital exports from industrial countries go to developing countries. Theoretically, the increase of foreign direct investment has an ambiguous impact on the environment. On the one hand, strict environmental regulations in richer countries may force a relocation of economic activities into less regulated areas. The effects of the resulting emissions leakage have been studied intensively for climate policies and for the regulation of hazardous substances. On the other hand, foreign direct investment is often a vehicle through which technology transfers take place. Such technology transfers could potentially improve the environmental situation in countries receiving foreign direct investment. So far the overall effect of globalization on the environment is indeterminable; case studies of the impact of foreign direct investment on technology transfers are still rare.

The globalization of the world economy will likely continue well into the 21st century. It is therefore important to gain knowledge about whether this process helps solve environmental problems in

developing countries and to determine which aspects of globalization may contribute to a positive impact, so that appropriate policy interventions can be made.

The findings of Weitzman (1997) on the importance of technical change for achieving a sustainable growth path mirror a number of bottom-up studies that detail the roles of efficiency and technology in determining the amount of environmental and natural resources needed to produce a specific amount of consumption services. In industrial countries a non-negligible potential for efficiency gains and technological advances still exists (see, for example, Deutscher Bundestag 1994). This potential is greater in developing countries, for the following reasons:

- Environmental and natural resources are often underpriced when compared with the resources of industrialized countries
- Institutions for environmental enforcement do not function well
- Firms and households lack information about potential efficiency gains
- Advanced, environmentally-friendly technologies are either not available or too expensive.

These facts indicate that there are a number of win-win situations for the preservation of the environment. However, they also reveal that some important institutional and market failures prevent these win-win options from being implemented. Such market failures can often be attributed to inadequate environmental policies, but they may also stem from inadequacies in other policy arenas—such as capital market regulation and competition policy—that distort incentives for production to be efficiently combined with environmental protection.

Global Environmental Imperatives

In the 21st century, the world faces a mixed environmental picture. While remarkable success has been achieved in delinking economic growth from natural resource extraction and pollution, a variety of environmental threats remain, some of which are on the rise. These threats include degradation in the quality of local resources such as soils and water; health-threatening air pollution, especially in urban areas of developing countries; continued decline in biodiversity; overexploitation of common access resources; and future threats of climate change. If no action is taken, these problems are likely to become more severe by the middle of the next century, when the population of the earth will have doubled and the world's gross domestic product will be about five times as high as it is today.

The available knowledge about the effects of economic activity on natural resources and the environment—and the institutions governing their interaction—still has large gaps about the basic forces leading to unsustainable development. This lack of knowledge makes it difficult to find the appropriate policy responses and puts decisionmakers in a situation of uncertainty about the costs and benefits of policy alternatives. Nevertheless, from the insights that we have today we can derive some global environmental imperatives for the 21st century.

Cultivate Linkages

Regulation of local environmental problems in industrial countries has yielded two important lessons. First, incentives for environmentally friendly behavior need to be set by the government; moral suasion is insufficient. Second, price incentives often have advantages over command and control measures.

Once environmental policies are in place, they need to be supplemented by policies that are directed toward the links between economic decisions and the demand for environmental resources. Examples of synergies include the relationships between public transportation infrastructure and private demand for fossil fuels and between building regulations and demand for heating energy. These linkages require environmental policies to cover all policy fields instead of just focusing on emissions.

Linkages are even more important in developing countries, where markets and institutions are far less well developed than they are in the industrial world. In these countries the best way to correct environmental externalities may not involve a focus on direct emission control, but on indirect factors such as the availability of substitutes for pollutants or the establishment of local institutions for internalizing externality problems at the local level.

Even linkages between the local situation and global objectives need to be considered if effective policies are to be implemented. More efficient use of fossil fuels or the preservation of carbon sinks, for example through sustainable forestry, cannot be made successful merely by introducing internationally tradable carbon permits that transfer resources into developing countries. International activities need to be complemented with local policies and institutional changes that can pave the way toward the introduction and diffusion of new technologies and toward a more educated, and hence more efficient, allocation of resources. Institutional capacity building is an important linkage between efficiency in production and environmental protection.

Pay Attention to Distribution

Environmental degradation and natural resource scarcity affect people to different degrees depending on geographic location and social and economic status. Policies designed to reduce environmental problems have a similarly differential impact. Such distributional effects are likely to become more pronounced in the future, when developing countries will need to make major changes in the way they use environmental resources to cope with increasing population pressure and—at least in some regions—a quickly deteriorating living environment.

Distributional concerns are important at both national and international levels. For both local and global pollution problems, designing successful environmental policies depends greatly on knowing how different social groups may react to policymakers' incentives. Such knowledge can significantly improve the effectiveness of mechanisms designed to achieve sustainability.

It has long been recognized that the political economy of different policy arenas has an important influence on policy outcomes. This is true for environmental policies, although so far the importance of political economy is not as well recognized for environmental policies as it is in areas such as trade policy or industrial policy. Nevertheless, the political economy of environmental issues may undergo changes that are more rapid than the changes in the political economy of trade or industrial policy (Klepper 1992).

The distribution of costs and benefits of political action is most important in negotiating and designing international environmental agreements. Unlike contracts, no international institutions can currently enforce international environmental agreements, hence they need to be self-enforcing. Reaching such agreements requires creating a net benefit for each participating country. In addition, to assess potential areas of compromise, negotiators need reliable information about the distribution costs and benefits for their own country and for other countries. The more reliable this information is, the more likely it is that agreements can be reached. Mechanisms for creating and disseminating such information may be helpful.

Focus on Institutions

The use and often overuse of environmental and natural resources in a market economy is to a large extent due to the failure of markets to correctly price the externalities of using environmental resources. At the local level, traditional allocation rules for environmental and natural resources have often collapsed in the process of economic development, and have not yet been replaced by new mechanisms. At the level of global pollution and common access resources, the problem has in the past been less severe, but will grow in importance as the pressure on global resources and the threat of global pollution to human health and economic development continue to grow. So far, international mechanisms mainly

consist of many international environmental agreements, some of which are more successful than others. Recurring problems of international environmental agreements have been the free-riding of nonparticipants and the noncompliance of participants. The creation of an international body for environment and sustainability ought therefore to be thoroughly discussed. A group of scientists in Germany have proposed a world organization for the environment and development (Biermann and Simonis 1998). Such an institution might smooth the processes for reaching international environmental agreements and might be able to coordinate an ever growing number of international environmental agreements. However, other institutional structures should also be investigated.

Conclusion

The 21st century will present increasing environmental challenges as population pressure and economic growth—possibly accelerated by the ongoing globalization of the world economy—lead to greater demand for the earth's resources. In addition, the impact of the overuse of environmental resources, which has a long time lag, will begin to be felt within the next few decades. Therefore, adaptation to irreversible changes and precautionary measures to prevent further deterioration are necessary.

The following three factors should be kept in mind when people analyze causes of environmental problems, design policy instruments, or create institutions for allocating scarce environmental resources:

- Linkages are important. The interactions between the environment and economic and social issues, the linkages between global environmental problems and local causes, and the interactions among different policy areas all suggest that achieving sustainability will require a more holistic approach to policymaking (Rayner and Malone 1998).
- Distribution matters when one assesses the costs and benefits of environmental policies. It also matters to the political acceptability of policies from the local to the global level.
- Institutions that support a sustainable growth path will need to receive more attention. The use of environmental resources should not be regulated on an ad hoc basis, but should become integrated into societal decisionmaking processes, for which the appropriate institutional structure should be developed locally and globally.

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