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Development and the Environment: Experiences of Japan and Industrializing Asia

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I. Rethinking Economic Growth and Its Implications for Resources and the Environment

There has been considerable debate about development and the environment. The expanding scale of human activity in recent years has caused local pollution problems to be compounded by environmental destruction on a global scale, and led people to realize that economic development aimed at making life more affluent can, if not properly handled, ultimately jeopardize humanity's very survival. Clearly the time has come to rethink the concept of development from an environmental perspective. But we must also recognize that human existence inevitably has some effect on the environment. Nature itself does not settle down in a fixed and permanent state but changes continually. However much importance we place on preservation, it would be meaningless to define the ideal situation as one in which human activity has absolutely no impact on the environment. The best we can do is to minimize the negative influence our actions have on environmental conditions now and in the future.

1. The Right to Develop and the Growth Debate

One of the most conspicuous features of the United Nations Conference on Environment and Development (Earth Summit) and the processes that led up to that event was the emergence of the first sharp confrontation between North and South for several years.

This North-South confrontation was triggered primarily by the issue of global warming and approaches to overcoming this problem. Emissions of greenhouse gases in developing countries are low at present, but there is a strong possibility that future development will bring a sharp rise in emission levels. While the advanced countries are concerned about the impact of development in the developing countries, the developing countries are worried about how their development may be limited by global warming and efforts to counter this problem.[1] Even during the Earth Summit itself, there was profound disagreement between North and South over the concept of the right to develop. To reflect the position of the developing countries, those framing the Rio Declaration ultimately agreed on the following

wording for Principle 3: "The right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations." However, while the controversy on "development rights" was based on awareness of the limitations imposed by the global environment, it is extremely surprising that the issue was discussed at all.

About 20 years ago the merits of economic growth became the subject of a major debate involving not only economists but also natural scientists.[2] Serious environmental pollution resulting from rapid economic growth in the postwar period called into doubt the entire concept of economic growth. Among the leading economists who took an anti-growth stance in this debate were K.E. Boulding, H. Daly, and E.J. Mishan. The basic assertions of Boulding and Daly were first that the global environment was finite, and second that countries should therefore shift from a growth economy to a steady-state economy, and in extreme cases to a negative-growth economy. Mishan focused on environmental degradation and questioned whether growth was really contributing to the welfare of mankind.

However, it is important to remember that not even those who took an anti-growth stance in this debate advocated the limitation of growth in the developing countries. Their anti-growth arguments were targeted toward the advanced economies, and they did not oppose growth in the developing countries. For example, Mishan recognized the importance of economic growth in poor societies and overpopulated countries with vast numbers of people struggling for survival.[3] Similarly, Daly stated that "In sum, extra GNP in a poor country, assuming it does not go mainly to the richest class of that country, represents satisfaction of relatively basic wants, whereas extra GNP in a rich country, assuming it does not go mainly to the poorest class of that country, represents satisfaction of relatively trivial wants. . . . the upshot of these differences is that for the poor, growth in GNP is still a good thing, but for the rich it is probably a bad thing." He stated clearly that he advocated a shift to a steady-state economy only where rich, affluent-effluent economies, such as the United States of America, were concerned.[4]

Decades later world attention is focused on global environmental problems, such as ozone layer depletion and global warming. This reflects a renewed understanding of the finite nature of the global environment. People are forming a renewed awareness of the fact that they are, as Boulding stated, passengers on "Spaceship Earth." In addition, the advanced countries have started to take issue with the developing countries' "right to develop." As we have already seen, however, not even economists of the anti-growth camp have taken such a position.

2. The Impact of Growth on Resources and the Environment

Resource and environment issues involve an extremely diverse range of factors, and the premises for discussion of these issues often vary according to the perspectives of individual participants in the debate. This tends to produce situations in which discussions end in misunderstanding and exchanges of views become almost futile.

For example, it seems reasonable to assume that environmental issues can be classified into problems occurring on different levels. First, there are extremely localized problems that cause acute harm, such as Minamata disease in Japan. Second, there are chronic problems that cause harm over wider areas, such as urban air pollution caused by nitrogen oxides or acid rain damage spreading across national borders. Third, there are problems that require action on a global scale, such as ozone layer depletion or global warming.[5]

Boulding and Daly appear to have been led to their anti-growth conclusions by problems in the third of these categories, in the sense that their arguments were based on the assumption that the Earth's resources and environmental capacity are finite.[6] W. Beckerman,

who approaches the debate from his stance as a traditional economist and has developed arguments in defense of growth, has severely criticized Boulding and others. Beckerman defines environmental problems in terms of the first two categories and totally denies even the existence of the third category.[7] He concludes that environmental problems are attributable not to economic growth but to inappropriate choices and resource allocation, and that growth is vital to the solution of these problems.[8]

It has become apparent with the passage of time that there are major flaws in the positions of both the pro-growth and anti-growth factions. The flaw in the anti-growth position is that arguments based on global perspectives have been applied directly at the regional level.[9] For example, even if there is no more room for growth on a global scale and the transition to a steady-state economy is unavoidable, it is wrong to use this as grounds for the immediate denial of growth at the regional level. If we accept that a steady-state economy is necessary at the global level, and that growth is a bad thing for rich countries and a good thing for poor countries, then logically we must seek a situation in which there is positive growth in poor countries and negative growth in rich countries.

However, Daly and others advocate a shift to steady-state economies in rich countries.[10] According to Daly, the requirements for a steady-state economy are (1) that population remains steady,[11] and (2) that stocks of physical wealth remain steady. A basic point of doubt with regard to the first of these requirements is that population growth is a global issue and cannot be debated at national level. National population growth rates in rich advanced countries are already on sustained downtrends, with the result that some countries are even concerned about population decline. It is in the developing countries, which have not yet completed demographic transitions, that populations are expanding rapidly. The fundamental reason for this is the low level of incomes.

The basic flaw in the arguments of the pro-growth camp relates to their extremely shallow appreciation of the global problems that form the third category of environmental issues, although this was perhaps inevitable at that time. From the resource perspective, they also lacked awareness of the concept of renewable resources. Twenty years ago the Club of Rome warned of the depletion of nonrenewable resources (energy and mineral resources) in a report called *The Limits to Growth*.[12] It has become apparent since then that there is little likelihood that such a crisis will occur in the short- or even medium-term future. However, it has also become apparent that renewable resources are being rapidly destroyed. The ownership of most mineral resources is relatively unambiguous, and it is comparatively easy to make adjustments through price mechanisms and new technology, as pointed out by the pro-growth lobby. Unfortunately the same argument cannot be applied to renewable resources, since it is not always easy to establish appropriate property rights over such resources.

The gap between the positions of the anti-growth and pro-growth camps is not attributable just to these differences in the resource- and environment-related definitions on which their arguments are based. The two lobbies also differ in their concepts of growth itself. On the anti-growth side, Boulding and Daly always measure growth in physical terms, such as population and stocks of physical wealth. The pro-growth lobby uses the conventional definition of growth in monetary terms.

It is important to understand that the concept of a steady-state economy, as advocated by the anti-growth lobby, does not necessarily imply zero growth in both physical and monetary terms. According to Daly's definition, for example, the maintenance of physical wealth at a constant level is one of the requirements for a steady-state economy. In their terminology, "inputs" are resources that flow into economic systems from natural systems, while "outputs" are waste products flowing from economic systems into natural systems. They use

the term "throughput" to describe the processes that are referred in conventional economics as "production" and "consumption."

According to Boulding, the reduction of throughput (and hence the minimization of inputs and outputs) to the minimum required to maintain material asset stocks at a constant level is a key principle for the "spaceman economy." This contrasts with "the cowboy economy," in which the aim is to maximize production and consumption (throughput).[13] However, until the durability of all physical wealth becomes equally infinite, there will inevitably be a positive throughput in amounts that vary each year.[14] This means that a steady state, as defined in terms of the concept of stock, is not synonymous with zero growth of throughput, as measured according to the concept of flow. Furthermore, since their argument is based on physical quantities, these must be converted into monetary quantities before the issue can be discussed in conventional economic terms. And once these values have been translated into monetary terms, the meaning of "steady state" becomes unclear.

The debate between the pro-growth and anti-growth camps was thus based on differing concepts of growth. In retrospect, it is clear that this apparently futile debate offers some extremely important lessons.

First, it is the quality and quantity of the material items used in production and consumption, not the quantity of money, that can impact on the environment and resources. Concern about environmental and resource problems led Daly and others to carry out research regarding the achievement of a steady state in terms of the concept of physical wealth. Their work appears to have provided ideas that can be used as the basis for environmental resource accounting, which is currently being developed.[15]

Second, it appears that the anti-growth lobby, which attacked the "growth mania" of pro-growth economists,[16] assumed the existence of a linear relationship between growth measured in monetary terms and growth measured in terms of material quantities. Specifically, they assumed that energy consumption would grow in direct proportion to GNP growth. However, our experience over the past 20 years teaches us that this relationship is not always linear. The Japanese economy has continued to grow since the oil crises, even though there has been a dramatic decline in energy consumption rate (for example, the amount of energy consumed per unit of GDP).

This suggests that the issue that really needs to be examined in relation to resources and the environment is not the existence of growth in monetary terms (or the existence of development rights), but rather the efficiency of material consumption in an economy. For example, the demand for energy is always a derived demand. The amount of energy required to perform work (such as the improvement of economic welfare), which is the source of primary demand, is determined by the consumption efficiency of the mechanisms (economic systems) through which it is channeled. In other words, the increase in utility (satisfaction) is not proportionate to increases in the amount of energy consumed. The most important issue that we should be considering today is the way in which we can change technology and society to yield the greatest possible economic benefit from a given level of material consumption.

3. The "Steady-State" Theory Revisited

Global environmental problems have become the focus of worldwide interest. Today it is important to consider both economic (especially material production and consumption) and population growths on a global scale. However, thinking on a global scale can sometimes lead people into a kind of delusion. The proposition that the world as a whole is continuing

to register growth does not necessarily equate with the proposition that all countries and regions that make up the world are achieving growth, since the truth of the first statement does not directly verify the truth of the second. Unfortunately people often assume the two statements are equivalent. In reality, while the world as a whole may have continued to achieve growth, this is certainly not true of all the countries and regions that comprise the world. Some places have positive growth rates, others zero, and some negative.

On average, economic growth (defined here as per capita GNP growth between 1965 and 1990) has been slightly higher in the developing economies than in the advanced economies. However, there was also variation in the growth rates of advanced economies. Japan led with an annual growth rate of 4.1%, but Britain, home of the industrial revolution, had a growth rate of only 2.0%, while that of the United States was a mere 1.7%. The variation among developing economies was even wider. The East Asian economies have achieved growth rates in excess of 5%, but the economies of sub-Saharan Africa were close to zero growth with a growth rate of just 0.2%.

The economies of East Asia's growth zone are sometimes likened to flying wild geese,[17] with Japan in the lead followed by the newly industrialized economies (NIEs), the members of the Association of Southeast Asian Nations, and China. As each member of the formation achieves self-sustaining growth, it begins to pursue those in front by accelerating its growth rate. Today the NIEs are growing faster than Japan, ASEAN faster than the NIEs, and China faster than ASEAN. In 1992 China recorded a growth rate of 12%. In some parts of Southern China, such as Jiangsu Province, the growth rate was in fact substantially higher than 20%.

In Japan the present recession is breaking down the myth of consistent growth. Even the automobile industry, which is a key sector in the Japanese economy, is seeking to establish a structure capable of generating profit even in a zero-growth environment. In view of the recent trend toward having fewer children, as well as the saturation of markets for consumer durables, it seems unlikely that there will ever be a return to the high growth of the past. Even in Korea, which is still achieving growth rates as high as 7%, rising standards of living are being blamed for a decline in the motivation to work, which has been described as the "Korean disease."[18]

These observations show first that the phenomenon of growth does not occur uniformly in all countries and regions, and second that even if a country is able to ride the wave of growth today, it will tend to lose its momentum with the passage of time.

Population growth is sometimes discussed in terms of a "population explosion." However, it is important to recognize that this explosion is not occurring all over the world. As discussed earlier, there has been a marked decline in the birth rates of advanced countries, which have already completed their demographic transitions, and there is even concern that populations may start to decline in the future. The World Bank estimates that the present rapid uptrend in total world population will gradually decelerate, and that population will stabilize at a certain level during the 21st and early 22nd centuries.[19]

At the very least, the experience of the advanced countries and some developing countries shows that population growth does not continue indefinitely. And even without the example of Britain, the superpower in the nineteenth century, it is apparent that the same is true of economic growth.

The world economy began to show clear and rapid growth as a result of the industrial revolution in Britain. The center of growth has shifted a number of times in the brief period since the industrial revolution, a process that has maintained the vitality of the world economy as a whole, enabling growth to continue. This pattern of world vitality maintained

through shifting growth zones is unlikely to change in the future. However, the growth of the world economy as a whole will inevitably enter a phase of decline or stagnation, at least in material terms, as demand reaches saturation point. This is because it is unlikely that demand for food, for example, will continue to show quantitative growth after the global population reaches a certain level and basic human needs have been met.

If this statement is correct, it is possible to conclude that the world is moving in the long-term perspective, as measured in centuries, toward the "steady state" (steady population, steady stocks of physical wealth) proposed by Boulding and others. The present era can be regarded as an immense transition from the quantitative expansion, or growth, that followed the industrial revolution, to a steady state. Furthermore, this transition is being driven by autonomous economic and social trends. Population dynamics and trends in production and consumption suggest that some advanced economies are already approaching a steady state. For developing economies, accelerating growth in the short- to the medium-term future offers a shortcut to the achievement of a steady state. The improvement of income levels is vital to the achievement of population stability, which is the first requirement for this process.

It is certainly valuable to consider the future of the Earth. However, what we really need to do is develop and implement countermeasures that reflect the realities in diverse societies and economies.

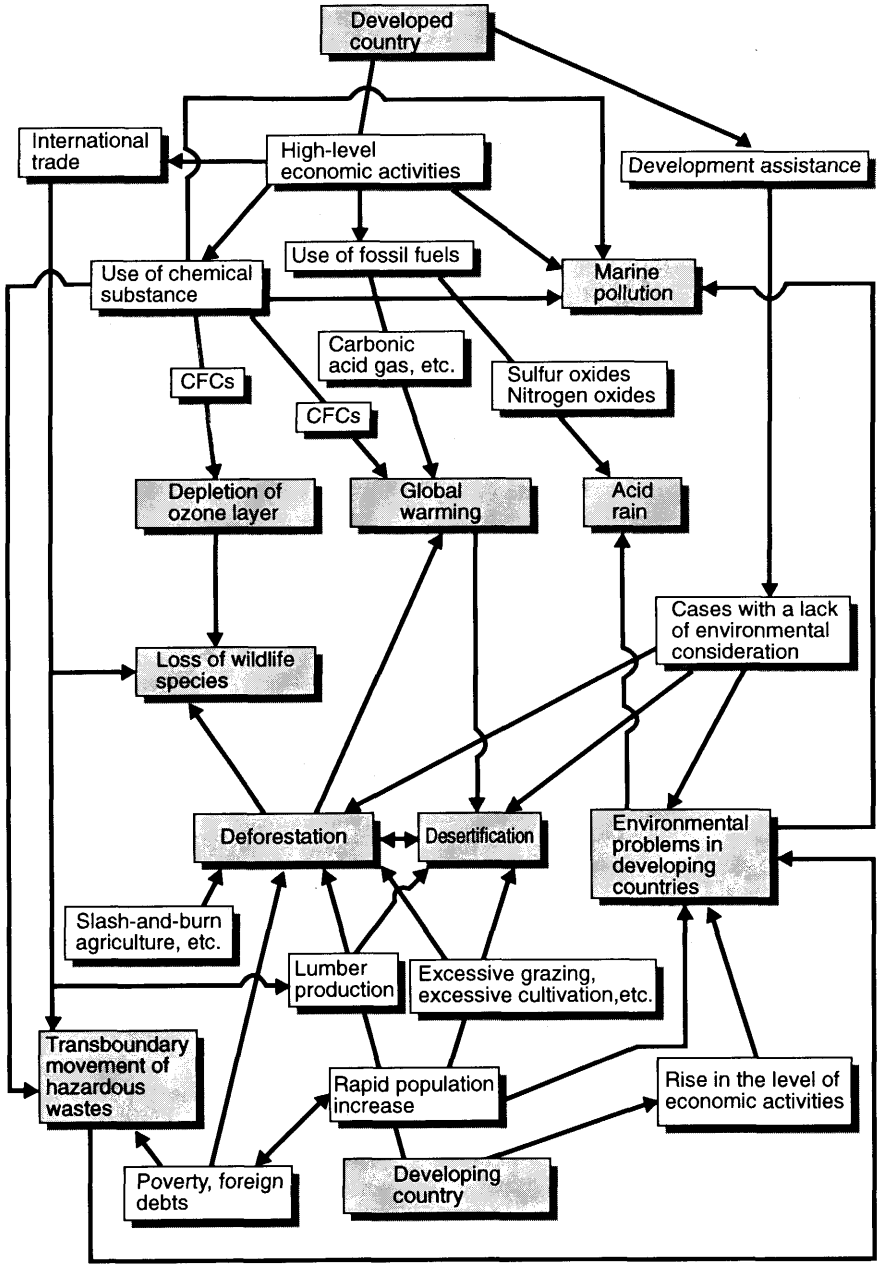
II. Global Environmental Problems and the Developing Countries

The Environment Agency of Japan defines global environmental problems as (1) depletion of ozone layer, (2) global warming, (3) acid rain, (4) deforestation, (5) desertification, (6) environmental problems, more specifically industrial and urban pollution problems in developing countries, (7) loss of wildlife species, (8) marine pollution, and (9) transboundary movement of hazardous wastes. According to the Agency, the common features of all of these problems are first that they are processes that occur over long periods of time, producing a variety of harmful effects and damage over wide areas, and second that the individual problems are interlinked with each other through the networks of the environment and the world economy to form a single syndrome.[20]

The nine problems listed above all exhibit one or both of these characteristics, and it is thus possible to define global environmental problems in this way. However, this definition is not without flaws.

First, from the viewpoint of finding solutions, there is a blurred distinction between problems that really require a response on a global scale, and those that basically require a regional response by one country or a group of countries. Ozone layer depletion and global warming clearly fall into the first of these categories, but the remaining seven problems essentially belong to the second. For example, the issue of industrial and urban pollution problems in developing countries is closely linked to the activities of the world economy due to economic globalization, but it is residents, governments, and local authorities in the affected areas who suffer the effects of these problems and must implement countermeasures against them. Again, deforestation, especially tropical forest depletion is linked to global warming and the loss of wildlife species, and in this sense it can be regarded as a global problem. However, it is residents in the affected region who are already suffering the direct impact of the problem, and it is these people who must play a significant role in overcoming the problem.

Figure 1 Problems on Global Environment as a Group of Issue



Source: Environment Agency, *Quality of the Environment in Japan 1990* (Tokyo: Printing Bureau, Ministry of Finance, 1992) p. 48.

Second, the definition creates the impression that global environment problems are occurring mostly in developing countries. Of the seven problems other than ozone layer depletion and global warming, four are identified as arising primarily in developing countries. It is a fact that these problems are occurring in the developing countries. However, it seems questionable that these issues should be debated in the same context as global warming, which is now seen as an extreme environmental problem resulting from the massive expansion of human activity (mostly in the advanced countries so far). To begin with, it is totally unfair for the Environment Agency's list to include "industrial and urban pollution problems in the developing countries" while failing to itemize "industrial and urban pollution problems in the advanced countries."

The most extraordinary aspect of the events that led to the holding of the Earth Summit in June 1992 was the fact that both North and South took full advantage of the phrase "global environment." The South took every opportunity to blame the North for polluting the global environment, while the North expressed strong concern about the impact of future development in the South on the world environment.

The attitudes of both sides clearly reflect their awareness of global warming and ozone layer destruction. Eventually North and South agreed on the need to commence action now for the sake of the Earth's future. What was needed for this agreement was an undertaking from the North to provide aid to pay for global environmental countermeasures. However, funds provided for this purpose will not necessarily be used to prevent ozone layer depletion or global warming. Most of the funds will be channeled into areas in which the advanced countries have already established pollution prevention technology, and in which action can therefore be taken provided that funds are available.

Since pollution problems in the developing countries are classified as "global environmental problems" according to the Environment Agency's definition, funds provided to counter these pollution problems can easily be classified as funds for global environmental measures. In any event, the phrase "global environment" was used as a bargaining chip by both North and South. From the viewpoint of the developing countries, for which fund shortages are a problem, the extraction of a promise of increased aid from the advanced countries, regardless of the nominal purpose for that aid, was doubtless the greatest achievement of the Earth Summit.

Unless otherwise stated, the use of the term "global environmental problems" in this paper will be limited to ozone layer depletion and global warming. This is because of the danger that the use of this term in its broader sense could have a harmful effect. The main issue examined here will be global warming.

The emission of the greenhouse gases that cause global warming, such as carbon dioxide, occurs throughout society. For this reason, it is extremely difficult to develop an effective technical response to the issue, unlike industrial pollution and other problems that are limited to certain regions. Global warming is basically a socioeconomic problem.[21] Moreover, since the emission of carbon dioxide is closely linked to the use of fossil fuels, this problem could have an important bearing on the direction of development in the developing countries. For the developing countries, the emergence of global environmental problems constitutes a new limitation on development, and it will be necessary to find a way to overcome this factor.

1. The Earth Summit and the Developing Countries

(1) The North-South perception gap

It was predicted that the United Nations Conference on Environment and Development

would bog down amid confrontations between the industrial North and developing South and quarrels among the rich countries of the North. As it turned out, however, the delegates who gathered in Rio de Janeiro were able to reach resolutions on most of the original agenda items. The credit for this must be given to determined behind-the-scenes maneuvering by Latin American nations, notably the host country, Brazil. Among the achievements of this Earth Summit, mention should be made of the adoption of the Rio Declaration on Environment and Development, Agenda 21, which sets out specific action plans, and the Statement on Forest Principles, as well as the commencement of signing of the Global Warming Convention (UN Framework Convention on Climate Change) and the Biodiversity Convention. Above all, the conference was significant as a forum where nations agreed on the need to maintain the global environment for their common future and began to work toward the achievement of that goal. We must bear in mind, however, that behind the lofty ideals agreed to by the participants lay major differences in national aims and ways of thinking, especially between the countries of the North and the South.

These days talk about symbiosis ("kyosei" in Japanese) with nature and being tender ("yasashii" in Japanese) to the Earth can be heard constantly in Japan, and the outpouring of such sentiments was particularly pronounced around the time of the Earth Summit. It was as if the entire population of some 120 million had all become environmentalists. The meeting undoubtedly produced an effect on public awareness, since environmental issues on the conference table were reported and discussed ad nauseam. Judging from reports in newspapers and magazines, the event had a similar impact in other industrial countries.

What was the situation in the developing countries? How was the Summit reported there, and how did people react? The Institute of Developing Economies attempted to answer these questions with a study of the Summit's coverage by newspapers in 29 major developing countries. It appears that the reaction to the conference was generally cool and that the developing countries wanted the industrial nations to accept responsibility for the problems. Of course, because freedom of the press is not guaranteed in many developing countries, we cannot be sure that this finding is an accurate reflection of public sentiment, but we can be certain it reveals the thinking of those who disseminate information, governments included, and can also assume that the reporting had an impact on public opinion. After all, attitudes are shaped by the information that is available, and while people may make up their own minds about things that personally affect them, they rely heavily on the mass media, including newspapers, radio, and television, for more remote affairs, especially happenings in other countries. Thus we may conclude that the press coverage of the Earth Summit provides a clear indication of a perception gap between North and South on the Summit's theme of the environment and development.

(2) Battling over the Global environment

The backdrop to the Earth Summit was the growing awareness that environmental problems are emerging on a global scale. Since ancient times humankind has repeated a pattern of activity whereby resources are obtained from the natural environment for use in the production and consumption of essential goods, and unwanted materials are returned to the natural environment as waste products. Some of the resources put to use are renewable, while others, such as fossil fuels and minerals, are nonrenewable.

In 1972 the Club of Rome, which published *The Limits to Growth*, grabbed the attention of the world with its prediction of the collapse of society as we know it due mainly to the depletion of nonrenewable resources. As we look back over the years since then, however, we find that the resources that are being destroyed the fastest are instead those in the

renewable category. Forests are being cleared (notably the tropical rain forests in developing countries), deserts are expanding, and marine resources are dwindling. From the 1980s onward, moreover, a succession of reports came out indicating that there are also limits to the Earth's capacity to absorb the wastes being discarded. It gradually became apparent, for example, that the release of chlorofluorocarbons and carbon dioxide, which had previously been considered harmless, was destroying the ozone layer and causing global warming. Today the damage from the contamination and destruction of the "global commons" has come to affect the entire human race. The very sustainability of human life is being threatened by global environmental problems.

This set of problems, which provided the motivation for the staging of the Earth Summit, has brought to light a sharp divergence in the outlook of the North and the South. Both sides share a sense of crisis, and there is general agreement that the depletion of the ozone layer, the climatic changes, and other such phenomena are tasks for all humanity to address. But when it comes to the specific measures to be adopted, conflicting opinions move to the fore. Before the conference, the basic stance of the advanced countries was that the North cannot by itself restore the global environment to a healthy state, that the South must also implement appropriate measures. But at a gathering in Beijing in June 1991, representatives of developing countries adopted a declaration insisting that the industrial countries accept responsibility for the problems.

Ever since the industrial revolution, delegates for the South pointed out, deterioration of the environment has been caused primarily by the activities of the industrial world. Even today countries outside the "developing nation" category, mostly industrial countries, account for about 70% of all carbon dioxide emissions, and they are also consuming large quantities of the CFCs that are destroying the ozone layer. To make matters worse, they said, the countries suffering damage from problems caused by the North are mainly located in the developing countries. While the North is in no position to demand that the developing countries take action to deal with these problems, they continued, if it insists nonetheless that the developing countries implement countermeasures, it must provide them with the necessary funds and give them—not sell them—the requisite technology.

That the developing countries adopted this stance is hardly surprising. Global warming, to take one example, is largely the result of environmental destruction caused by industrial countries that produce, consume, and discard products in massive quantities. Their per capita commercial energy consumption amounted to 5,179 kilograms of oil equivalent in 1990, 8.6 times that of the developing countries, which used just 605 kilograms. In Korea, which is now entering the ranks of the industrial nations, one researcher posed this hard-hitting question: "Today the Korean economy has reached the level attained by Japan 20 years ago, but what was Japan doing to combat, say, global warming when it was at our level?" How are the people in the industrial world to respond to such a remark? Incidentally, I might note that in 1990 Korea's per capita commercial energy consumption came to some 1,900 kilograms of oil equivalent, still only about half the figure for Japan.[22]

To the people in the South, environmental destruction has created a two-pronged crisis. On the one hand, there is the fear shared with the people of the North that it poses a threat to the future of the human race. On the other, there is concern that the need for a cleaner environment will form a new barrier to the South's economic growth. The developing countries are profoundly afraid that their opportunity to achieve affluence will be lost forever and they will be condemned to perpetual poverty. The people of the North are in a much more comfortable position. Having already attained affluence, they need merely concern themselves with refashioning their lifestyles in an effort to be tenderer to the environ-

ment. Such is far from the case in the South, where people are being forced to grapple with issues that industrial countries never gave a thought to during their own days of development. Small wonder, then, that these people have banded together to assert their "right to development" and compel the North to accept responsibility.

With these lines of argument, the issues before the Earth Summit provided the developing countries with a trump card for extracting new funds from the industrial world. The developing countries repeatedly blamed the advanced countries for polluting the global environment and successfully argued that if they are to take part in the efforts to overcome the crisis, they must be given an infusion of money to cover the costs of countermeasures. This, at least, is one way of summing up the outcome of the U.N. conference. I might add that most of the funds provided will not really be used to curb the greenhouse effect or preserve the global environment in other ways. This is because the developing countries are less concerned about the future of the planet than about other problems facing them now at the national and regional levels.

(3) The concept of sustainable development

At the seminal U.N. Conference on the Human Environment, which was held in Stockholm in 1972, representatives of the developing countries asserted that poverty was their greatest environmental problem and emphasized their need for development. As one developing countries' delegate bluntly put it, "We want pollution." In the 20 years since that time, efforts to achieve economic growth have not always been successful, and some regions have been experiencing stagnation. Meanwhile, the environment's quality has continued to deteriorate, leading to the recognition that further economic growth may become an impossibility if the resource base of the developing countries suffers additional damage. The concept of "sustainable development" thus became the Earth Summit's buzzword, and its official title, the Conference on Environment and Development, reflected this concern.

For some time economists had been using the concept of sustainability in analyses of renewable resources, specifically such biological resources as fisheries and forests. If consumption is kept within the level at which they can renew themselves naturally, they can be used perpetually without danger of depletion. Unfortunately, frequent overuse of these resources has caused them to dwindle. Since they are not the kinds of assets that can readily be treated as personal property—and are not, therefore, fostered carefully—individual users seek to maximize short-term profits, devoting little or no money to managing the resources so that they can replenish themselves. Herein lies the "tragedy of the commons."[23] People are wont to overuse a common resource for which nobody feels responsible, harming everybody's long-term interests. In a bid to bring this waste to a halt, fishery experts began speaking of the "maximum sustainable yield," while forestry experts talked about "maximum allowable cuts."[24]

The term "sustainable development" came into widespread use after the publication in 1987 of the report, *Our Common Future* by the World Commission on Environment and Development. The term is defined in the report as the kind of development that "meets the needs of the present without compromising the ability of future generations to meet their own needs."[25] This concept is easy to understand when we place it in the context of global environmental problems. Over the short run, or the life of the contemporary generation, little harm occurs from the release of carbon dioxide from the consumption of oil, coal, and other fossil fuels, or the use of CFCs in products like refrigerators and air conditioners. Over the long run, however, the former can cause the "greenhouse gases" responsible for global warming to build up, while the latter can expose the Earth to ultraviolet rays by depleting

the ozone layer, in both cases doing harm to future generations. While the mechanisms of global warming and ozone layer depletion are not fully understood, both phenomena offer typical examples of how "externalities"—external diseconomies of production or consumption—can produce an adverse impact extending across the generations. At the gathering in Rio participants acknowledged that the present generation should bear the costs of protecting future generations by, for instance, holding down the consumption of fossil fuels, although it must be said that the United States showed little enthusiasm for reducing its own carbon dioxide emissions.

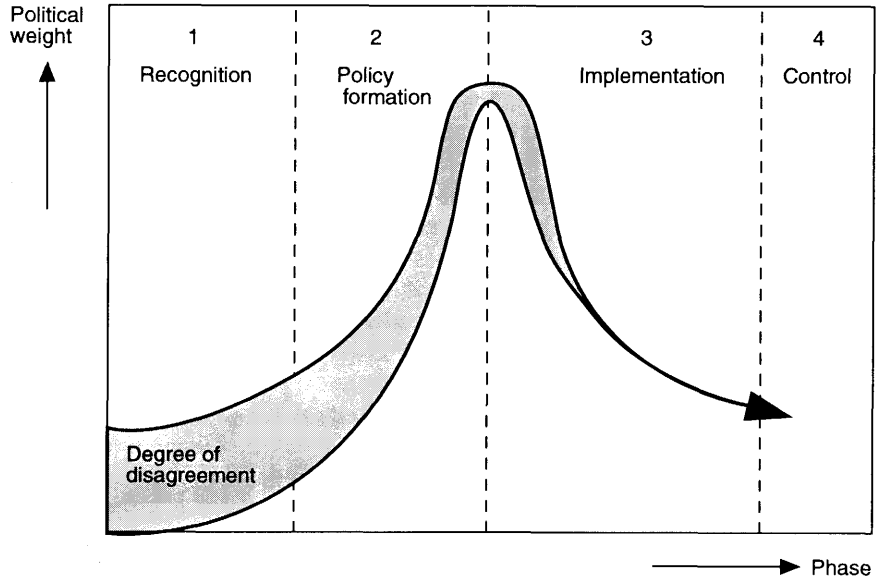
It is relatively easy to deal with externalities that extend across generations if members of the community are more or less similar in terms of such factors as income distribution, the generation of pollution, and the ability to bear cleanup costs. The members of today's international community are by no means equally treated, however. At the first U.N. environmental meeting two decades ago, "Spaceship Earth" was one of the terms in vogue, but it was a spaceship carrying just a few first-class passengers, with a great number traveling second-class. This situation remains largely unchanged today.

In view of the disparities within the contemporary generation of nations, we need to exercise considerable caution when applying the concept of sustainable development in an intergenerational context. After all, many of the poorer countries are already facing such problems of poverty and starvation that the continued existence of their present generation is being threatened. If we lose sight of this grim reality, sustainable development may turn into a philosophy that puts additional burdens on these countries for the sake of future generations in rich countries.

For example, some people are concerned about the destruction of forests from the standpoint of global warming, and have called for the renewal of forests in Southeast Asia and other regions to absorb carbon dioxide,[26] but effecting this is not a simple matter. If large tracts of land are set aside for forests, limiting the land that can be used by farmers, in many cases the local inhabitants will have a harder time making a living. And if afforestation projects meet stiff resistance from local people, they are unlikely to succeed. It is meaningless to plant trees unless those who live nearby are willing to protect and nurture them. Although afforestation efforts may be motivated by an admirable desire to protect the global environment, we must realize that if such activities are promoted without reference to the needs of local people, we run the risk of forcing the present generation of impoverished people in the developing countries to bear the cost of protecting the interests of future generations in the industrial world and the highest strata of the developing world. This highlights the need for renewed awareness that local communities are the key to environmental preservation in developing countries.

In Rio, the idea of sustainability was employed in a variety of contexts. One could hear talk about "sustainable land use," "sustainable consumption patterns," and "sustainable energy and transport systems."[27] Since then I have seen the idea of sustainable development applied even to local settings, but this would seem to be using the term too loosely and taking the concept too far. At the local level the environmental damage encountered is often the result of industrial pollution, and is an issue involving the distribution of resources among members of the present generation, not the welfare of future generations. The way to respond to problems at this level is to implement antipollution measures. If they are insufficient, there is always the final option, unfortunate though it may be, of having the local residents move elsewhere. The South Korean government ultimately responded to environmental damage in the Onsan region in precisely this way.[28] It is wrong to talk of sustainable development in a local context as if there was an equivalence with the sustainable develop-

Figure 2 The Policy Life Cycle and "Advantages of Backwardness"



Note: It is possible for developing countries, which are in a position to learn from experiences of the industrialized countries, to greatly lessen the degree of disagreement and debate in recognizing environmental problems and formulating environmental policy, thereby avoiding the loss of time; this may be referred to as the "advantages of backwardness in terms of awareness." There is also, of course the advantage of being able to adopt technology from the industrialized countries when implementing environmental policies, or what may be called the "advantages of backwardness in terms of technology."

Source: Jim MacNeil et al., *Beyond Interdependence–the Meshing of the World's Economy and the Earth's Ecology* (New York: Oxford University Press, 1991) p. 67.

ment of the Earth, since there is nowhere to which we can flee from global environmental problems. For that matter, the measures that have been introduced to combat local pollution cannot, for the most part, be applied effectively to problems on a planetary scale.

2. Environmental Awareness and the Advantages of Backwardness

The physical existence of some phenomenon (such as environmental destruction) does not necessarily mean the phenomenon will become a problem for humanity (such as an environmental problem). Only when its existence is widely recognized by society as something harmful will such a physical phenomenon be regarded as a problem, and only then will countermeasures be considered and implemented.[29] Unfortunately social recognition of a problem and the establishment of countermeasures at the next stage often require substantial amounts of time.

According to Jim MacNeil and others, environmental policy follow the life cycle shown in Figure 2. The first stage is recognition of a problem. In many cases this is triggered by the identification of the problem by scientists and environmental groups. Significant political disunity can occur at this stage. Public pressure for action is opposed by the industry involved,

while the government continues to conduct inconclusive studies. However, when a major accident occurs, the focus of debate shifts from the question of whether the problem really exists or not to the type of action that should be taken to overcome it. It is at this second stage that policy formation occurs. If those involved seek to avoid responsibility and shift the cost of countermeasures—usually onto the taxpayer—the debate will become more intense. The third stage, the implementation of countermeasures, can have a serious impact on specific industries and regional communities. However, once routines are in place, public interest gradually wanes, and the government can concentrate on the tasks of day-to-day regulation and management (fourth stage).[30]

The past experience of the advanced countries shows that it can be difficult even to make the public recognize that environmental problems are problems that must be solved. Britain, which was the birthplace of the industrial revolution, was also one of the first countries to experience pollution problems. Air pollution in London and other major cities was being discussed as a serious problem as early as the start of this century, yet full-scale countermeasures were not implemented until after World War II. The event that prompted this action was a massive smog in December 1952. Most people saw the existence of smoke as evidence of prosperity and mistakenly thought that increased blackening and pollution of their land would bring increased economic prosperity to their lives. Pollution was seen as something that was inevitable and must be accepted.[31] Britain remained in the first stage—recognition of the problem—for half a century.

Economists talk of the "advantages of backwardness," for example in the case that a country that has embarked on the economic development process later than others can achieve rapid development by absorbing technology acquired through trial and error by the early developers.[32] Presumably this concept can also be applied to countermeasures against environmental problems.

Developing countries are in a position that gives them full access to the experience of the advanced countries regarding the harmful effects of industrialization and urbanization. They can also learn about the social cost that results from ignoring these problems over long periods of time. This means that they can avoid the loss of time that occurs during the recognition phase due to unnecessary political disunity. It is also possible to reduce the cost of policy formation and implementation, in terms of both time and money, by utilizing technology, know-how, and systems acquired by the advanced countries through trial and error. Normally the concept of the advantage of backwardness is associated with capital and technology transfers, but clearly it also plays an important role in the recognition of environmental problems. This is because it has been an important part of the experience of advanced countries that time is wasted during the recognition of problems and the formulation of countermeasures, as the example of London's smog experience shows, and that this causes a significant increase in the harm caused by environmental problems.

The following section examines environmental awareness and the advantages of backwardness in terms of the experience of Japan and Asian countries over more than three decades. The Asian countries have achieved remarkable growth in recent years. However, there have also been numerous warnings about the danger of environmental deterioration in these countries.

(1) Development and the environment—the Japanese experience

Thirty or forty years ago Japan was still a developing economy. Income levels were low, and there was an extremely strong yearning for affluence. This was Japan's high-growth period, a time when "investment begets investment." Entrepreneurs' enthusiasm for invest-

Table 1 GNP, Population, GNP per Capita, and Growth of GNP per Capita

Country group	*1990 GNP (billions of dollars)*	*1990 population (millions)*	*1990 GNP per capita (dollars)*	*Average annual growth of GNP per capita (%)*		
				1965-73	*1973-80*	*1980-90*
Low- and middle-income	3,479	4,146	840	4.3	2.6	1.5
Low-income	1,070	3,058	350	2.4	2.7	4.0
Middle-income	2,409	1,088	2,220	5.3	2.4	0.4
Severely indebted	972	455	2,140	5.2	2.6	-0.3
Sub-Saharan Africa	166	495	340	1.6	0.6	-1.1
East Asia and the Pacific	939	1,577	600	5.1	4.8	6.3
South Asia	383	1,148	330	1.2	1.8	2.9
Europe	480	200	2,400	—	—	1.0
Middle East and North Africa	458	256	1,790	6.8	1.0	-1.5
Latin America and the Caribbean	946	433	2,180	4.6	2.3	0.5
Other economies	—	321	—	—	—	—
High-income	15,998	816	19,590	3.7	2.1	2.4
OECD members	15,672	777	21,170	3.7	2.1	2.5
World	22,173	5,284	4,200	2.8	1.3	1.4

Source: The World Bank, *World Development Report 1992* (New York: Oxford University Press, 1992) p. 196.

ment was sustained by dramatic changes in patterns of consumption, and by the belief that Japan was moving rapidly toward the attainment of American lifestyles.

The high-growth era also brought a revolution in consumption. Affluence was symbolized by ownership of a television, washing machine, and refrigerator. Parents were driven to buy televisions when their children started to visit neighbors' houses to watch television and failed to return home for dinner. Husbands bought washing machines to give to wives who complained that washing clothes was hard labor. Refrigerators became part of Japanese family life after householders were told by itinerant fish sellers that theirs was the only house in the neighborhood to which it was necessary to bring ice in order to sell *sashimi*.

These three products had a revolutionary impact on people's lives. The entrepreneurs who made and sold them, notably Konosuke Matsushita, who was known as the "god of business," became national heroes.

These symbols were later replaced by the three Cs—car, cooler, and color television. Although the products changed, the high growth of the Japanese economy continued to be driven by the powerful urge of the Japanese people to achieve affluence. Japan's high-growth era was thus characterized by a virtuous circle in which capital investment boosted personal incomes, leading to increased demand and more capital investment.

The quest for affluent lifestyles caused people to leave rural areas and move to the cities. Industrial and employment patterns changed dramatically, and there was rapid urbanization. These dramatic social changes also brought a variety of distortions. People owned numerous consumer durables but lived in inferior housing. They bought cars but were forced to drive them on narrow, poorly paved roads. Roads in major cities became crowded and appallingly congested. Without proper sewer systems, rivers in urban areas were turned into polluted sludge by untreated outflows of household waste water. Most houses had non-flush toilets, and the general sanitation environment was far from good. Everywhere there was evidence of underdeveloped social capital. Many of these problems still remain

unsolved, but life in Japan, particularly in major cities, was miserable and unhygienic compared with today.

In those days people saw smoke rising from factories as a symbol of prosperity. They were so caught up in the struggle to survive and achieve prosperity that in most cases they remained indifferent even when atmospheric pollution caused health problems. Even the word "environmental pollution (*kogai* in Japanese)" had not yet come into general use in Japanese society, and citizens who complained about the harm caused by pollution were treated coldly by business and the government. The country was urged to give priority to business and production, and pollution tended to be regarded as the cost of prosperity or as an insignificant by-product. Even well-known major corporations discharged toxic waste without any compunction.

By the time the high-growth era reached its peak in the late 1960s, Japan had been turned into a wasteland of pollution, and many tragic situations had occurred. Typical of these was Minamata disease, which was caused by organic mercury poisoning. Because of the debate over causal relationships, no countermeasures were taken, with the result that a second outbreak of the disease claimed many more victims. Twelve years elapsed between the official discovery of Kumamoto Minamata disease in 1956 and the government's formal recognition in 1968 that the disease was caused by pollution. Moreover, formal recognition by the government did not result in the immediate commencement of relief measures for the victims.

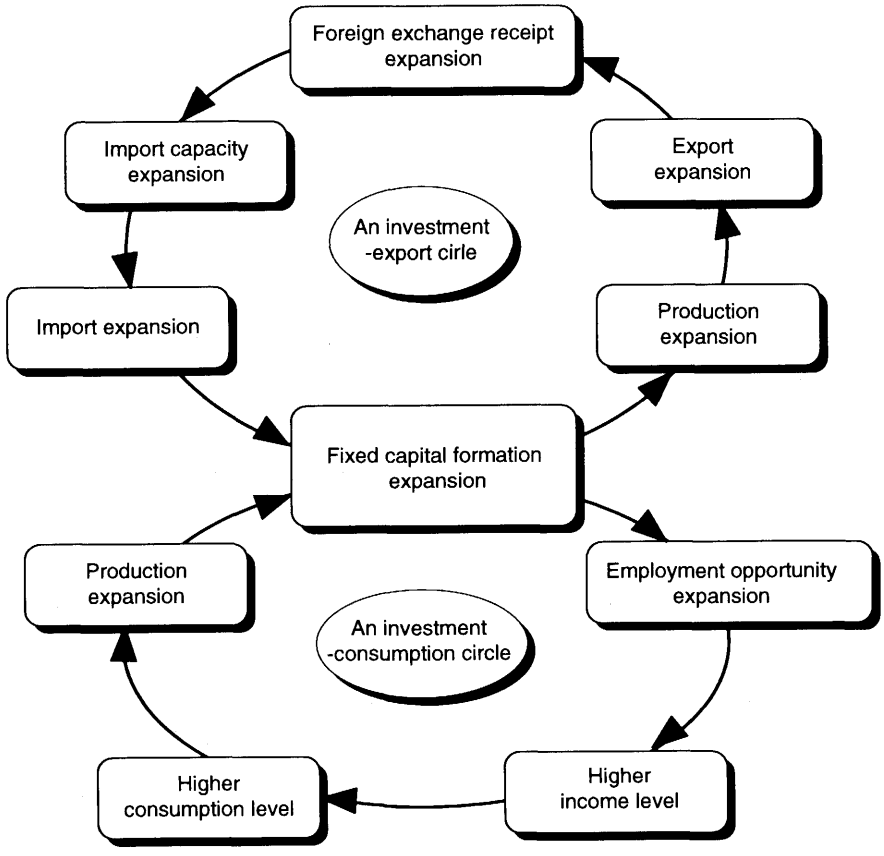
This experience of the tragic consequences of pollution, coupled with the fact that Japan had gained an unfortunate reputation as the world's most polluted country, brought a change in Japanese attitudes to the environment, especially toward pollution. Local authorities, which are the administrative organization ordinary people have the most dealings with, were the first to be forced into action by public campaigns against pollution. Eventually these campaigns also brought a shift in the stance of the central government. The government first began to take significant action against industrial and urban pollution after the amendment of the Basic Law for Environmental Pollution Control and the passage of 14 bills relating to the prevention of water contamination and other forms of pollution by the so-called "environmental pollution parliament (*kogai kokkai* in Japanese)" in November and December of 1970.

(2) Development and the environment—Issues in industrializing Asia

a. Asian growth mechanisms

In recent years Asian economies have achieved industrialization at a much faster pace than developing countries in other regions, and they have gained an enduring reputation as the growth center of the world economy. The high-growth trend that began in the Asian newly industrialized economies, notably Korea and Taiwan, first rippled out to the members of the Association of Southeast Asian Nations, such as Thailand and Malaysia. Today even China and the countries of Indochina have been caught up in this vast tide of change. The astonishing economic development achieved by the Asian economies is attributable to the fact they have reaped the full benefit of the advantages of backwardness.[33] This is particularly true with regard to the expansion of supply capacity in the region. A key factor in the economic development of the Asian economies has been direct investment from the advanced countries. One of the factors that hinders growth in developing economies is the low level of income, which is reflected in low savings and hence a shortage of capital. The Asian economies used foreign direct investment to relieve the development bottleneck

Figure 3 Asian Growth Mechanisms—A Virtuous Circle of Investment-export and a Virtuous Circle of Investment-consumption



Note: The export-led growth concept—a "virtuous circle" of investment and exports—used so far to account for the rapid growth of East and Southeast Asian countries is insufficient as an explanation. We should instead view the growth as the product of two virtuous circles working in tandem, namely an investment-export circle and an investment-consumption circle.

caused by their lack of capital. They also aggressively absorbed technology, know-how, and management resources and used them to fuel high growth.

This region's success has also been attributed to its high dependence on external demand. There is an export-led growth mechanism driven by a virtuous circle of investment and exports in which increased investment creates more export capacity, thereby increasing each country's ability to earn foreign currency and hence its capacity to import, leading to more investment. While high dependence on exports is indeed a characteristic of growth in this region, there is also a second virtuous circle in which sustained growth raises income levels in the region, thereby accelerating the expansion of domestic demand. This other virtuous circle, the investment-consumption circle, also begins with increased investment, which leads to the expansion of employment opportunities, higher income levels, higher consumer spending, the expansion of production (in response to increased domestic demand), and

thus to increased investment. The mechanism is the same as the virtuous circle that formed in Japan during its high growth era. The driving force for growth is the strong desire and determined efforts of people to achieve affluence. That is why so many economists place a high value on the growth potential of the Asian economies.

In recent years there has been a marked increase in expressions of concern about environmental deterioration caused by high growth in the rapidly growing Asian economies. Is smoke regarded as a symbol of prosperity in Asia as it was in Japan? Are environmental contamination and industrial and urban pollution inevitable by-products of economic growth and the pursuit of affluence? Will the Asian economies take as long as the advanced countries to achieve social recognition of environmental pollution as a problem that must be overcome? Is there no advantages of backwardness in the environmental context?

b. Environmental problems in industrializing Asia

In the early 1970s Tokyo's pollution problems were so severe that protesters began using the slogan, "No More Tokyos." Although many problems remain, including nitrogen oxides levels that still exceed environmental standards, Tokyo's air is now incomparably cleaner than in those days, and fish have returned to the city's rivers.

How do other Asian cities appear to Tokyo residents now that Tokyo has been cleaned up? Factories in the industrial areas of those cities belch smoke, while black exhaust gases pour from vehicles crawling along horribly congested streets. Industrial waste is apparently discharged with little or no treatment, and household waste flows untreated into rivers. Garbage is discarded haphazardly. Visitors from Tokyo are startled by dusty, gasoline-tainted air and rivers that have been turned into flows of sludge. It is not surprising that these cities have gained a reputation for poor environmental conditions. A number of indicators relating to air and water quality can be used to paint a picture of poor environmental conditions. However, the criteria that are used to represent poor environmental conditions in contemporary Tokyo or contemporary Japan must be discounted significantly for these countries.

First, we must compare current conditions in the Asian economies not with contemporary Japan but with the Japan of the high-growth era. Like the Japan of that period, the Asian economies are full of people who are eager to achieve affluence. This explosion of expectation is the real source of rapid growth in the Asian economies. There has been a dramatic increase in private-sector investment in activities that lead directly to affluence, but investment in the public sector has been comparatively slow, resulting in a relative lack of social overhead capital. Even in the private sector, priority is given to production-related investment, while investment in environmental countermeasures, which lead to increased costs, is deferred. Similarly, industrial infrastructure, such as port facilities, roads and power plant, is the first priority for investment in social overhead capital. This situation is reflected in the imbalance between the abundance of manufactured goods that overflow in the marketplaces of these countries and the dirty and dilapidated state of their cities. The investment imbalance between or within sectors during the accelerating growth phase is a major reason for poor environmental conditions in Asian economies. In this sense, it would be reasonable to say that the Japan of the high-growth era is being recreated in the Asian countries.

The second factor that must be taken into account is the fact that Japan's experience during its high-growth period is being applied, albeit inadequately, in the Asian economies. In other words, the advantages of backwardness are functioning steadily in the environmental field. Although the Asian economies have come in for criticism about their environmental regulations, including accusations that their standards and regulations have merely been

imported or copied from the advanced countries and invite exported pollution because of their ineffectiveness and relative laxity, these countries actually began to establish environmental laws relatively early. This indicates that environmental problems are recognized by society as problems that need to be overcome. The Asian countries are aware of the environmental tragedies, such as Minamata disease, that result from the discharge of toxic waste and have carried out their own research.

The advantage of backwardness is also manifested in the area of technology. When Korea and Taiwan began to establish heavy and chemical industries in the 1970s, the development of technology to overcome environmental problems had already become a major priority in the advanced countries. As a result, Korea and Taiwan were able to import production systems that embodied environmental technology. Korea has suffered its own environmental tragedy in the form of Onsan disease. There is also evidence of increasingly serious environmental contamination in Taiwan, including frequent conflicts between residents and industry over pollution problems since the early 1980s. However, Korea and Taiwan have developed chemical and heavy industries at an even faster pace than Japan, and it therefore seems reasonable to conclude that the harm caused by environmental damage has been relatively light. At least there have been no repeat outbreaks of environmental disease, as was the case with Japan's Minamata disease.

The ASEAN economies are also likely to move gradually toward domestic production (import substitution) of intermediate goods and capital goods, including chemical and heavy industrialization. These countries will be able to draw on the experience of Korea and Taiwan as well as Japan, and it is anticipated that they will be able to industrialize successfully with less side effects.

Third, given the realities of the situation in developing countries, it may not be appropriate to base evaluations on the experiences of the advanced countries, such as environmental deterioration due to high growth and the view of environmental pollution as an inevitable by-product of growth. There are certain aspects of environmental contamination and industrial and urban pollution in developing countries that cannot be interpreted as the cost of growth. After the oil crises, and during the 1980s in particular, most developing countries faced serious economic stagnation. The high growth achieved by the Asian economies during this period was extremely exceptional. What were the consequences of this stagnation? Industrial and urban pollution worsened in the countries affected.

Serious pollution damage in Japan prompted a major Japanese newspaper to launch a campaign under the slogan, "Death to GNP." Yet it was not the death of GNP that brought clean air back to Tokyo. It was possible to restore clean air because sustained macroeconomic growth provided the funds needed to pay for environmental countermeasures.

Events in the developing countries followed the reverse pattern. Faced with economic stagnation, most companies have found it difficult to undertake new investment or even replacement investment, even for production-related purposes. Under these circumstances, outdated plant and vehicles remain in use without adequate maintenance or replacement of parts. Companies that are unable to invest in production have even less money to spend on environmental countermeasures. Even the public sector is forced to cut back on investment because of fiscal problems. In this way, economic stagnation is paralleled by environmental deterioration. The only country in Asia that has faced economic stagnation is the Philippines. The air and rivers of Manila are as polluted as those of Bangkok.

We can draw similar conclusions about developments in China. China shifted to reform and open-door policies after the third plenum of the Eleventh Central Committee of the Chinese Communist Party in December 1978. Thereafter its economy began to grow by

as much as 10% annually, but there have also been complaints that growth was leading to environmental pollution. What is significant here, however, is the fact that the most serious pollution damage has been reported in heavy industrial areas, such as northeastern China, where the economy has stagnated rather than expanded. Environmental damage has been relatively light in southern China, which has provided most of the impetus for China's economic growth, and where industry is based primarily on light manufacturing.

The remedy for industrial and urban pollution in Asian countries does not lie in the limitation of industrialization and economic growth. The source of rapid industrialization and resulting high growth is a strong desire for affluence on the part of people in these countries. No one can repress this ambition. The fastest route to the solution of the problem is through the maintenance of high growth in order to generate funds for investment in appropriate areas.

During the Earth Summit the advanced countries, including Japan, promised to provide increased aid in environmental fields. As we have already seen, however, it is the people of the countries concerned who must take the lead in both development and environmental protection. The amount of aid available is limited, and it is obviously not possible to install antipollution systems in every factory. The advanced countries can contribute in this area first of all by helping these countries maintain their growth. Environmental countermeasures cannot be implemented if countries are unable to secure the necessary funds. A second way to help the developing countries is to enable them to maximize the advantages of backwardness in terms of awareness by providing detailed information about the experience of the advanced countries, with particular emphasis on the negative aspects. A third way to assist is through the acceleration of transfers of technology relating to environmental countermeasures. Efforts should be made to minimize the amount of time lost during the problem-recognition and policy-formation stages, and to guide public- and private-sector investment in appropriate directions. The advantages of backwardness in terms of technology will not start to function until this stage is reached.

3. Poverty and the Environment—The Tasks Confronting the Developing Countries

The Earth Summit focused primarily on global environmental problems, such as ozone layer depletion and global warming. These problems, which began to attract world attention during the late 1980s, have a number of characteristics that make them substantially different in character from traditional environmental issues. First, regardless of the source of pollution, the damage affects every part of the globe. That is why we talk of global environmental problems. Second, the time required for damage to occur is extremely long. There is a strong possibility that the next generation will suffer the consequences of the behavior of the present generation. In other words, the problems transcend generations. Third, predictions regarding the extent and scope of damage are surrounded by considerable uncertainty. However, if problems are left unremedied because of this uncertainty, we may find that they have become irreversible by the time that harmful effects are manifested. The emergence of global environmental problems has confronted humanity with the new task of ensuring that resources are distributed fairly between generations. The Earth Summit thus became a forum where the governments of the world recognized the need to maintain the global environment for the common future of humanity.

(1) Poverty in developing countries and the global environment

As discussed in Section I, it would be relatively easy to ensure intergenerational equity

if the present generation were homogeneous. However, the existence of widespread poverty in developing countries demonstrates that this is not the case. Rich people and poor people necessarily differ in their attitudes toward the Earth's future, and in their capacity to take action regarding that future. Given the difficulty of achieving equity within the same generation, it will be far more difficult to ensure equity between different generations.

Japan now ranks among the advanced countries, albeit as the last in this category to achieve development. Its people have been freed from hunger and want, and concern about the availability of food was banished long ago. Japan has been the world's biggest creditor nation since the late 1980s and even expected to overtake the United States in terms of economic power. Everywhere there is an abundance of consumer durables, and the present recession has brought serious debate about the saturation of demand. Most people are unaware of the threat and talk only of the blessings of nature. It is easy for the Japanese of this generation to talk about the future of the Earth and intergenerational equity and debate about environment-friendly lifestyles. This is simply because the people of Japan have the freedom that comes from not needing to worry about one's daily bread.

The situation is quite different for the many poor people who live in developing countries. For them, poverty means a situation in which one must worry about finding sufficient food for today. There can be no tomorrow until one survives today. It is even possible to justify the behavior of people who plunder the natural resource base and rob themselves of tomorrow's daily bread in order to meet their present needs. There is a close link between poverty and the destruction of tropical forests, which is seen as one cause of global warming. Distorted land ownership systems and powerful population pressure have created landless classes across wide areas of the world. For these people, the only path to survival is to go into the uplands and establish farmland through nontraditional slash-and-burn agriculture, even if this is illegal. Shortened perspectives are the most obvious consequence of poverty. People who face the danger of starvation today will regard talk of the Earth's future as a luxury for the rich.

In economic parlance, this shortening of perspectives can be defined as a situation in which it is not possible to minimize long-term costs due to the constraints of income and assets. In Indonesia, for example, it is possible to build a business based on the itinerant peddling of kerosene, which is an essential commodity. This is because poor people generally buy only enough for one day. It would be cheaper to buy kerosene in bulk, but people cannot afford the initial investment and must therefore buy in small quantities, knowing that the cost will be higher. Because their income is limited, these people are unable to minimize their costs from the long-term perspective.

The number of homes in Indonesia with electric power is increasing rapidly. Let us consider how these people will approach the choice of electrical appliances. Energy conservation is an important element in efforts to prevent global warming. What would happen if energy-efficient electrical products, such as light bulbs, were to go on sale in Indonesia? Such products might be more expensive than their conventional counterparts, but it should be possible to recover this cost in the long run since there would be an equivalent reduction in power consumption. How would people react? It is likely that the choice of energy-efficient products would be limited to those whose income is sufficient to allow them to minimize long-term costs. Poverty can have a significant limiting effect on environment-friendly behavior and the capacity to respond to environmental problems.

There is also concern about the adverse environmental impact of rapid population growth in the developing countries. Here again, poverty is a factor. A comparison of trends in population growth rates with the economic growth figures shows that there has been a

Table 2 Average Annual Growth of Population

	Average annual growth (%)				
Country group	*1965-73*	*1973-80*	*1980-90*	*1990-2000[a]*	*2000-2030[a]*
Low- and middle-income	2.5	2.1	2.0	1.9	1.4
Low-income	2.5	2.0	2.0	1.8	1.3
Middle-income	2.3	2.3	2.0	1.9	1.4
Severely indebted	2.5	2.3	2.1	1.8	1.3
Sub-Saharan Africa	2.7	2.8	3.1	3.0	2.4
East Asia and the Pacific	2.6	1.7	1.6	1.4	0.9
South Asia	2.4	2.4	2.2	1.8	1.1
Europe	1.1	1.2	1.0	0.8	0.6
Middle East and North Africa	2.7	3.0	3.1	2.9	2.3
Latin America and the Caribbean	2.6	2.4	2.1	1.8	1.2
Other economies	1.1	1.0	0.9	0.7	—
High-income	1.0	0.8	0.6	0.5	0.2
OECD members	0.9	0.7	0.6	0.5	0.2
World	2.1	1.8	1.7	1.6	1.2

Note: a. Projections.
Source: The World Bank, *World Development Report 1992* (New York: Oxford University Press, 1992) p. 196.

rapid decline in the population growth rates of the East Asian and Pacific countries, which have registered the highest growth in per capita GNP, and that population growth rates have actually risen in the countries of sub-Saharan Africa, the Middle East and North Africa, which have experienced serious economic stagnation, including negative GNP growth, since the early 1980s. From the economist's viewpoint, population growth is the result of rational behavior under conditions of poverty. This is because the benefit (utility) of having many children usually outweighs the cost (disutility) for a husband and wife living in poverty.[34] If large families are the result of rational behavior, then population policies that ignore poverty are unlikely to have a significant impact. Of course, countries cannot afford the cost of population policies unless their economies are growing.

It seems reasonable to conclude that developing countries will not be able to attack global environmental problems in earnest until they are achieving sustained economic growth, and until that economic growth is helping to eliminate poverty.

(2) Global environmental problems and tasks for the developing countries

The Earth Summit and developments that led to that event have shown that there is a wide gulf between North and South regarding responses to global environmental problems, especially global warming. The advanced countries are concerned about the impact of development, while the developing countries are concerned about the limitation of development, which is vital to their future, as a consequence of global warming and measures to overcome it. The position of the advanced countries on the issue of global warming is that their own efforts will not be sufficient to overcome the problem because of the development activity that is occurring in the developing countries. They therefore want the developing countries to take appropriate action.

What is meant by "appropriate action?" The limitation of energy consumption under existing technology and social structures could limit economic growth. Do the advanced nations expect people in developing countries to abandon their struggle for affluence? If so,

Table 3 Global Carbon Dioxide Emissions

Country group	*Total emissions from fossil fuels and cement manufacture (million tons of carbon)*		*Average annual rate of growth 1980-89 (%)*	*Carbon dioxide emissions (tons of carbon)*	
	1965	*1989*		*Per capita 1989*	*Per million dollars of GDP 1989*
Low-income	203	952	5.8	0.32	926
China[a]	131	652	5.9	0.59	1,547
India[a]	46	178	7.0	0.21	670
Middle-income	373	1,061	2.3	0.96	471
Lower-middle-income	176	478	2.3	0.70	551
Upper-middle-income	198	583	2.3	1.38	421
Low- and middle-income	576	2,013	3.8	0.50	614
Sub-Saharan Africa	12	61	4.9	0.13	376
East Asia and the Pacific	157	837	5.7	0.54	934
South Asia	47	201	7.0	0.18	567
Europe	191	391	1.0	2.00	809
Middle East and North Africa	37	189	4.3	0.76	516
Latin America and the Caribbean	97	258	1.2	0.61	278
Other economies	535	1,089	2.0	—	—
High-income	1,901	2,702	0.5	3.26	186
Germany[a]	178	175	-1.2	2.82	147
Japan[a]	106	284	1.0	2.31	99
United Kingdom[a]	171	155	0.1	2.72	185
United States[a]	948	1,329	1.0	5.34	259
World[b]	3,012	5,822	1.8	1.12	327

Notes: a. Top six emitters of carbon dioxide; data refer to Federal Republic of Germany only.

b. Includes countries not elsewhere specified and economies with populations under 30,000.

Source: The World Bank, *World Development Report 1992* (New York: Oxford University Press, 1992) p. 204.

their demands are unreasonable. Even in the impoverished world, there has been an explosive "revolution of expectations" that has brought a rapid increase in expectations toward affluent consumer lifestyles. The entire world, and not just the growth zone of Asia, is full of people who aspire to affluence.

The United States negotiated a watered-down version of the Global Warming Convention and even then continued to express reluctance when the convention was signed. My own experience of life at an American university was that people wear summer sweaters in the summertime and T-shirts in winter, due to excessive use of heating and air conditioning. As a result of this waste, one American consumed 13 times more commercial energy than the per capita average for developing countries in 1990.[35] Unless this situation is remedied, the United States cannot argue convincingly that the developing countries should take "appropriate action."

If we are to make serious efforts to overcome the problem of global warming, the advanced countries must first implement significant countermeasures at home. This will probably require sweeping reforms to technology systems and social systems. However, only the advanced countries have the capacity to take such action. The results of these efforts will

undoubtedly be used to even greater benefit in the developing countries. This is because while the advanced countries must go through a lengthy and difficult restructuring process, the developing countries will be able to introduce ready-made environment-friendly technology systems and social systems (newly developed and devised technologies and systems). The advantages of backwardness can be expected to make a sustained contribution in this context, too.

There is strong likelihood that the developing countries will benefit from the advantages of backwardness in another sense, at the awareness level, in relation to efforts to overcome global warming. As discussed in Section II, developing countries are characterized by the inadequacy of various types of infrastructure (social overhead capital). This infrastructure forms the physical base for a society's technology and social systems. The developing countries should be able to incorporate global environmental considerations from the outset as they develop their infrastructure by improving combinations of existing technology. In the area of transportation, for example, investment should be based on careful studies to ascertain the cost of relying solely on roads and automobiles. The same is true of the power sector.

As discussed earlier, the orientation of investment (in this case, public investment) is vital. In any event, the developing countries must make full use of the advantages of backwardness in terms of the awareness that results when global environmental problems are encountered during the early stages of development. This is the most important task facing the developing countries.[36]

Notes

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8. Beckerman, W., *op. cit.*, pp. 102-179.
9. The most comprehensive arguments based on global perspective will be found in numerous articles and books by Prof. Nicholas Georgescu-Roegen. In his arguments, the earth itself is a thermodynamic system and the entropy law, the second law of thermodynamics, is applied to connect economics to its biophysical foundation. See, for instance, N. Georgescu-Roegen, "The Entropy Law and Economic Problem," in Daly, H., ed., *op. cit.*, pp. 37-49. Also see H. Daly, "Introduction," in Daly, H., ed., *op. cit.*, pp. 33-36.

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36. It is really one aspect of "disadvantages of backwardness" for the developing countries to tackle global environmental issues in the early stage of their development. Regarding the term of disadvantages of backwardness, please see Gerschenkron, A., *op. cit.*, pp. 152-187.