SUSTAINABLE DEVELOPMENT, ENVIRONMENT AND POVERTY NEXUS

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Foreword

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Chief Economist
Economics and Development Resource Center
### Abbreviations

<table>
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<th>Abbreviation</th>
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<tbody>
<tr>
<td>ADF</td>
<td>Asian Development Fund (ADB)</td>
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<td>DMCs</td>
<td>Developing Member Countries (ADB)</td>
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<td>EDRC</td>
<td>Economics and Development Resource Center (ADB)</td>
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<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<td>ESCAP</td>
<td>Economic and Social Commission for Asia and the Pacific</td>
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<td>EPA</td>
<td>Environmental Protection Agency (United States)</td>
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<td>FAO</td>
<td>Food and Agriculture Organization</td>
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<td>GDP</td>
<td>gross domestic product</td>
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<td>GNP</td>
<td>gross national product</td>
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<td>HRD</td>
<td>human resources development</td>
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<td>IFAD</td>
<td>International Fund for Agricultural Development</td>
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<td>IRDP</td>
<td>Integrated Rural Development Programme</td>
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<td>NO₂</td>
<td>nitrogen oxide</td>
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<tr>
<td>ODA</td>
<td>Overseas Development Administration (United Kingdom)</td>
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<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
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<td>OENV</td>
<td>Office of the Environment (ADB)</td>
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<td>PRC</td>
<td>People’s Republic of China</td>
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<td>RETA</td>
<td>regional technical assistance</td>
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<td>SO₂</td>
<td>sulfur oxide</td>
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<tr>
<td>WCED</td>
<td>World Commission on Environment and Development (Brundtland Commission)</td>
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I. Introduction

The Asian Development Bank's January 1989 External Panel Report "The Asian Development Bank in the 1990s" recommended that the overall goal of the Bank for the 1990s should be the improvement of living conditions in DMCs through income growth, progress in social conditions, and protection of the environment, and that the Bank should assign highest priority to assisting the most disadvantaged and vulnerable social groups.

At the 1992 Annual Meeting of the Bank held in Hong Kong, the issues of environment protection and poverty alleviation received considerable attention, with the Bank's Governors indicating a desire to see a stronger linkage between poverty alleviation and the Bank's program on environment. In fact, President Kimimasa Tarumizu, in his closing statement to the Annual Meeting, observed:

The issue of poverty emerged as a major theme of our meeting—alongside that of resource mobilization and the environment. Problems concerning population and social development were emphasized and the need to enhance the role of women in development was widely voiced.

President Tarumizu also said:

Asia and the Pacific has become the fastest growing region in the world. At the same time, it is still home to large numbers of the poor, the malnourished and the disadvantaged. A major challenge today is to strike a balance between economic growth and poverty reduction while at the same time protecting the environment.

The Annual Meeting saw the dilemma of the region's estimated 800 million poor as a problem to be addressed more aggressively and one that should be considered in all Bank activities. The meeting recommended that poverty be addressed by the Bank not only through ADF lending but also through lending from ordinary capital resources. The meeting cited technical assistance and policy dialogue as additional means to address poverty.

To do this, the Bank will need to focus more closely on policies and activities that do not see economic growth as an end in itself. Poverty reduction can no longer be viewed simply as a side effect of development. Growth must go hand in hand with equitable distribution of economic gains and must reach all intended beneficiaries.

These concerns match the Bank's strategic development objectives: promotion of economic growth, reduction of poverty, improvement of the status of women, progress in population planning, and promotion of sound management of natural resources and the environment. In its current medium-term strategy and future work plan, the Bank has assigned greater emphasis to the following:

- Promotion of an environment that will enable the private sector to flourish
- Poverty reduction and improving the status of women
- Increasing the value of human capital through investments in social infrastructure and human resources development
- Continued integration of environmental considerations into Bank operations.

As expressed in the Bank's Strategic Framework, the ultimate goal is for DMCs to achieve sustainable growth with greater equity so as to improve living standards and the quality of life.
At a time when the Bank’s strategy is to reduce poverty and promote environmentally sound and sustainable development among its DMCs, the recommendation to focus attention on poverty-environment linkages and to strengthen the Bank’s strategy and action plan addressing these aspects could not be more appropriate.

II. Environmental Problems and the Need for an Appropriate Response

Development processes are primarily resource-driven. Even technological and institutional changes are triggered by human resources; people are the prime movers in processes that utilize both renewable and non-renewable natural resources. However, resource utilization strategies vary from society to society, and the measure of how effectively and efficiently a society utilizes its natural resources typically is reflected in how well that society manages and sustains its resources such that development processes are not impeded due to resource depletion or degradation.

A multitude of problems relating to resource depletion and degradation exist in the Asian-Pacific region. While basic concerns among countries in the region still focus on economic growth and the general uplifting of living standards, there are fears that this goal cannot be reached if corresponding attention is not given to examining and providing remedial and preventive measures to avoid worsening environmental conditions.

In dealing with environmental problems of Asia and the Pacific as well as the promotion of environmentally sound and sustainable development, two characteristic features of the region should be noted. First, the region, which is home to 54 per cent of the world’s total population, contains some of the world’s most productive and ecologically sensitive areas, such as tropical forests, mangroves, and small islands and coral reefs. Second, both lack of development and the development process itself have caused and continue to cause environmental degradation. Poverty is still rampant, despite the fact that during the 1980s the region registered a 7 per cent average annual growth rate, compared with the world’s average annual growth rate of 3 per cent. The region has more than 80 per cent of the world’s more than 1 billion absolute poor—people who earn less than a dollar per day but who exert tremendous pressure on the region’s resources. Existing development processes continue to be unmindful of the negative consequences to the environment.

Before introducing the concept of sustainable development and establishing an operational linkage between environment and poverty, a review of the environmental problems of Asia and the Pacific would be in order.

Basically there are four major environmental problems facing the region, arising from population pressure, lack of development, and the development process itself. The problems are: land degradation and depletion of natural resources; unsustainable environments in human settlements due to inadequate shelter, sanitation and water supplies; pollution of soil, water and air; and consequences of global warming due to excessive discharge of greenhouse gases to the atmosphere.

\footnote{For details please refer to ESCAP, State of the Environment in Asia and the Pacific 1990, Bangkok, 1990.}
Land degradation in forested areas specifically has reached alarming levels. In 1990, the Food and Agricultural Organization estimated the rate of tropical deforestation in the region for the last decade at 5 million ha per year. At this rate, an additional 50 million ha, or about 16 per cent of the region’s remaining tropical forests, will be lost by the year 2000. At the same time, 1.2 million ha of mangroves has been lost to aquaculture pond development alone. In land erosion, each year in the region approximately 15 billion tons of sediment is carried away by rivers. Desertification affects more than 860 million ha of land in the region and 150 million people. Overexploitation of groundwater has caused such problems as water yield losses, land subsidence, salt water intrusion and groundwater pollution in more than one-third of the countries in the region.

The prevailing conditions in the region’s human settlements are equally severe. Standard dwellings constitute only 17 per cent of the region’s shelter stock. The number of megacities (more than 4 million people) has quadrupled between 1950 and 1990, causing associated environmental problems within and in the immediate vicinities of urban centers.

A large number of households in rural areas are still without sanitation. The fuel needs of many households are met through continued exploitation of declining wood reserves. The use of agrochemicals in the region increased from 22 million tons in 1977 to 46 million tons in 1987, and pesticide consumption is growing at the rate of 5-7 per cent per annum.

The pollution scenario is not much different. Few countries of the region meet the World Health Organization’s standard for safe drinking water, which calls for 95 per cent of samples to be free from fecal coliform bacteria. The worsened condition of air is being threatened anew by rapid increases in the use of solid (dirty) fuel—about 37 per cent in eight years, from 620 million tons in 1978 to 850 million tons in 1986. Solid fuel use is a primary contributor to the increase in the industrial emission of carbon dioxide, from 365 million metric tons in 1965 to well in excess of 1 billion metric tons in 1990. Consequently, suspended particulate matter levels in the ambient air in most large DMC cities far exceed WHO limits.

The consequences of global warming are being felt increasingly by countries in the region, though the database at present is too scanty to make predictions regarding impact of global warming on the region. A number of Bank-executed national-level and regional technical assistance projects on climate change and its response strategies are currently underway, and it should be possible to provide a better idea of the regional effects of global warming once these projects are completed. Nevertheless, some tentative conclusions have been drawn regarding: the possible changes in storm frequency and severity, particularly in South China and in the Philippines, Fiji and other island countries; sea level rise and flooding of coastal and island countries such as Bangladesh, Maldives and Pacific Island DMCs; the increase of incidence of skin cancer among human beings, particularly in higher latitude countries such as Australia; and increased production of agricultural crops in the northern part of China and some damage to agriculture in the south.

Figure 1 is a summary assessment of the relative significance and severity of environmental problems in DMCs, while Figure 2 is an attempt to reveal root causes, the environmental problems, the solutions, and the method of approach that should be followed to counter prevailing environmental problems in the Asian Pacific region. At the risk of oversimplification, the scheme not only describes the major problems but also presents a solution which lies in dealing with the root causes.

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FIGURE 1
Relative Significance of Resource and Environmental Issues in Selected DMCs

REGION/COUNTRY (ranking)

SOUTH ASIA
Bangladesh (7)
India (1)
Myanmar (13)
Nepal (11)
Pakistan (6)
Sri Lanka (8)
China (3)

SOUTHEAST ASIA
Indonesia (4)
Lao PDR (12)
Malaysia (9)
Philippines (5)
Thailand (2)
Viet Nam (10)

PACIFIC ISLANDS (8)

LEGEND:

| high priority | medium priority | low priority | n.a. = not applicable |

Note: Figures in parenthesis indicate diversity and severity of environmental problems in descending order.

FIGURE 2
Environmental Problems in Asia and the Pacific Region

Root causes

POVERTY AND
LACK OF DEVELOPMENT

DEVELOPMENT
(Environmentally unsound)

Problems

ENVIRONMENTAL PROBLEMS OF ASIA-PACIFIC REGION

Land degradation
Unsustainable environment in human settlements
Pollution of air, water and soil
Regional impact of global warming

Solutions

POVERTY ALLEVIATION AND SATISFACTION OF BASIC NEEDS

INTEGRATION OF ENVIRONMENTAL CONSIDERATIONS IN DEVELOPMENT PROCESS

Methods of Approach

1. Identity target groups
   Design programs to meet the needs of target groups.
2. Implement programs with emphasis on holistic planning, involvement of poor and women, efficiency and appropriate technology.

1. Institute policies and procedures for systematic examination of all development programs and policies.
2. Promote programs and projects designed to protect, rehabilitate or enhance environment.
The appropriate response basically consists of two essential measures that are the keys to promoting sustainable development:

- Alleviate poverty to resolve environmental problems associated with lack of development.
- Integrate environmental considerations into development programs and projects to resolve environmental problems associated with development.

III. Sustainable Development

From the above, it is quite clear that for the Asian-Pacific region, the question is not whether to develop, but how. According to its existing environment policy, the Bank believes that development need not come at the expense of the environment, and is committed to promoting sustainable development.

Several definitions of sustainable development have been put forward as a result of the growing concern over economic growth and its consequences for the environment. The most widely known as well as most widely debated definition of sustainable development is that of the World Commission on Environment and Development (WCED; more popularly known as the Brundtland Commission), which defines sustainable development as a process in which the exploitation of resources, the direction of investment, and the orientation of technological development and institutional change meet the needs of the present generation without compromising the ability of future generations to meet their own needs. It implies, as the Overseas Development Administration sees it, "the handing down to successive generations not only of man-made wealth but also of natural wealth in sufficient amounts to allow a continuing improvement in the quality of life." WCED recognized that unlimited growth is neither feasible nor desirable, that meeting the basic needs of all people should be the goal of development, and that only a protected and carefully nurtured environment can sustain human aspirations. Waste and greed must give way to efficiency of resource use and equity in resource distribution.

Common among definitions of sustainable development is the reference to processes that must be undertaken so that future generations can enjoy what the present generation now enjoys. The difficulty arises when even the present generation is not in a position to satisfy its own needs. It can, therefore, be argued that sustainable development should make the present generation not want so much, such that the available resource stock can be utilized conservatively to afford others—those who at present are in want, and those who will come in the future—the same enjoyment. While the present generation recognizes the problem of what they will leave their descendants as an economic resource base, the present generation may be forced to borrow from the resources of the future generation just to satisfy present demands.

There is also the problem of reference to global actions to counter global environmental problems, when in fact humans, and communities for that matter, normally

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act within the purview of their surroundings. A farmer from a tropical developing country besieged with the problems of declining soil fertility and lack of irrigation water would find and implement solutions totally different from a farmer in a developed Western country who is beset with the problems of continuing transboundary movement of pollutants from a neighboring country's industrial center. However, both farmers would realize that each situation threatens agricultural productivity and the economic base, and that the problems should be dealt with accordingly. Although environmental issues should be treated conceptually in a holistic rather than in an isolated manner, efforts at sustainable development should be based in the context of the ways in which individual communities operate. This is appropriately expressed in the slogan “Think Globally, Act Locally.”

Unfortunately, the term “sustainable development” has also been interpreted by various groups of people to serve their own interest. In this regard, Mohammad Idris, an environmental activist from Malaysia, states: “The term ‘sustainable’ from the point of view of non-ecological elite means how to continue to sustain the supply of raw materials when existing sources of raw material run out.” The argument against this definition obviously lies in the definition’s indifference to the resource base and the opportunities for others to make full use of a resource, had it been conserved and rehabilitated. Nevertheless, it does reflect the selfish and greedy attitude of many profit-maximizers, who would continue “business as usual” under the rhetoric of sustainable development.

In 1990, the Bank completed a study and published the report Economic Policies for Sustainable Development. This report, a comprehensive set of seven DMC case studies searching for the causes of unsustainable development, concluded that factors vary from country to country, but that the most important common denominator in the process is poverty. Referring to country case studies, the report concludes: “All reports confirm the hypothesis put forward by the Brundtland Commission that amelioration of poverty is a necessary and central condition of any effective program to deal with environmental concern.”

Sustainable development can be visualized in terms of a water tank having two leaks, one leak being “poverty” and the other “environmental degradation.” Sustainable development will thus remain a dream unless problems of poverty alleviation and control of environmental degradation are dealt with simultaneously. The situation is illustrated in Figure 3, which suggests that it is necessary to break two vicious circles—one of poverty-environment and the other of development-environment—to promote sustainable development. Both vicious circles of poverty and development are linked to environmental degradation by different patterns of resource utilization. The vicious circle of poverty is usually characterized by low productivity, low per capita income, a low literacy rate and high population density. These characteristics, for example, would discourage poor farmers from employing soil conservation measures, better irrigation methods and agricultural extension, which all are capital- or knowledge-intensive. These conditions also discourage the poor from participating in off-farm income-generating activities that could have contributed to poverty alleviation and environmental improvement, directly or indirectly.

On the other hand, the vicious circle of development and environmental degradation can be characterized by the failure of institutions to undertake conventional growth activities that take into account the regenerative and adaptive capacities of the environment and that

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FIGURE 3
Linkages Between Sustainable Development, Environment and Poverty

SUSTAINABLE DEVELOPMENT

POVERTY

Resource Depletion and Degradation

Vicious Circle I

Pollution of poverty

ENVIRONMENT PROBLEMS
POLLUTION, LAND DEGRADATION, CLIMATE CHANGE

Poverty Alleviation

* Meeting basic needs (health/education/shelter)
* Productive employment
* Control over common property resources
* Population control

DEVELOPMENT

Vicious Circle II

Pollution of affluence

Resource Depletion and Degradation

Integration of Environment into Development

* EIA of development projects
* Technology for development
* Rural-urban migration
* Renewable energy issues
* Regional and international cooperation

Reduction of income gap
integrate in the development process measures to balance the need for development and the need to conserve the resource base. Institutions and individuals fail to recognize that the resources of the environment are also the resources vitally needed to sustain development. They fail to realize that environmental management does not refer to management of the environment per se, but more accurately refers to management of development activities within the assimilative capacity of the environment.

It is worth noting that for more than a decade, the Bank and its DMCs have made significant strides in integrating environmental considerations into major development programs and projects, in protecting the environment from onslaughts of pollution from major industries and urban centers, and in trying to curb deforestation and land degradation in the region. Yet, the number of people in the Asian-Pacific region whose basic needs are not met in terms of proper shelter, clean water, basic sanitation and nutritional levels and who are suffering from environment-related diseases has never been as large as it is today. This suggests that greater attention is needed in dealing with poverty and lack of development as one of the two root causes of environmental problems.

IV. Poverty-Environment Nexus

While the Bank\(^1\) and other international institutions have paid great deal of attention to poverty alleviation, the persistence and severity of poverty continue to confound many analysts. It may be useful to recall some of the basic features of poverty in Asia in order to better appreciate the possibilities for operationalizing the links between poverty alleviation and environment protection. It is generally accepted that environmental degradation, rapid population growth and stagnant production are closely linked with the fast spread of acute poverty in many countries of Asia. In many of these countries poverty has assumed a highly complex character. Most often, a person with a very low income—a poor person—is also a person who is illiterate, in poor health, without decent shelter, and with virtually no access to productive resources.

The rising incidence of unemployment and underemployment, which is the primary cause of rural poverty, is altering the urban landscape of the region. As work opportunities and quality of life in rural areas deteriorate, an increasingly larger number of rural people are compelled to migrate to urban centers, exerting an enormous stress on already limited housing, transport and other basic services. Uprooted from families and traditional ways of life and with skills that are of limited demand in the urban economy, the rural poor merely convert themselves into urban poor.

Rapid population growth and the inability of the rural as well as the urban economy to absorb available labor have also placed pressure on marginal lands and coastal resources. A World Resources Institute study on the Philippines has indicated that during the energy crisis and sluggish growth of the urban economy during the mid-1970s to the early 1980s, large numbers of people migrated to forest lands and coastal areas, causing severe

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\(^{1}\) Two important studies by the Bank include: "Priority Issues and Policy Measures to Alleviate Rural Poverty" and "Critical Issues and Policy Measures to Address Urban Poverty," both being undertaken by EDRC.
degradation of fragile natural resources in those areas. This is an additionally unfortunate situation in that the number of poor households is expected to increase while the exploited resources become increasingly marginalized, eventually providing migrants with low-productivity occupations.

One of the most acute forms of poverty in many developing countries of the region is growing rural landlessness. Land reform introduced in many countries has not been able to arrest the process, partly because the reforms lack seriousness in terms of coverage and legal enforcement. At the same time, the problem remains intractable, as the process of landlessness appears to be quite unaffected by conventional measures to redistribute land. A bad harvest or a pressing social need, or even the so-called "green revolution," because of the associated intensive capital requirement and the increased risk of crop disaster, can overnight turn a marginal landowner into a landless laborer.

In Asia, at least four target groups of poor can be identified with programs that can be designed specifically to alleviate poverty in these groups. These are: (i) the poor who are dependent on fragile lands, where the needs are improved management of common property resources and a combination of traditional wisdom with modern science and technology for increased biomass production and diversity; (ii) the poor enclaved in areas of good agricultural potential, where the needs are land redistribution, water resources in the control of the poor, and development of sustainable methods of pest and soil fertility management; (iii) the urban poor, for whom the needs are environmental sanitation and enhanced livelihood possibilities; and (iv) the coastal poor, for whom the needs are improved management of mangroves and fishery resources in the interest of sustainable livelihood.

For each of the above categories, projects should be designed to respond to people’s actual needs, focusing on at least three specific issues: (i) sector planning and project design to incorporate women’s concerns, institutional development, management skills, information dissemination, and a holistic view of resource management; (ii) resource mobilization, efficiency of project implementation and information dissemination; and (iii) technology development, building on traditional wisdom and a holistic view for low-cost urban sanitation, clean rural industry, water control and management, mangrove management, sustainable pest management, composting, etc.

A 1992 Bank study proposed poverty alleviation measures along the lines of several groups of public policies. One group of policies includes special credit programs, guaranteed producer support prices, and food subsidies and targeted nutrition programs aimed at reducing the dependence of the poor on the natural resource base of their immediate environment alone. A second group includes investment in social infrastructure, i.e., education, skill formation, and preventive health care to increase labor productivity of poor communities and thus contribute to lifting the poor out of the vicious cycle of poverty. A third group includes policies that improve the physical infrastructure of rural communities and link them more closely to market centers and increase the mobility of rural labor and capital, and thus reduce the direct economic dependence of the rural poor on their immediate natural resource base. A final group includes policies aimed at removing or reducing institutional constraints and market imperfections that prevent or reduce the access

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of the rural poor to productive natural resources. Land reforms, land distribution, input delivery systems, construction of neighborhood farm service centers, and systems to provide credit at reasonable rates to poor farmers and landless entrepreneurs are examples of such policies.

Current approaches to poverty alleviation have not always been successful. Land reform has not worked well in many countries, including India (except Kerala and West Bengal), Nepal, Pakistan and the Philippines. In many DMCs, efforts such as the Integrated Rural Development Program (IRDP) and the Green Revolution have failed to benefit small farmers and landholders, with the result that as total agricultural production increased, so did the number of landless laborers. Similarly, rural cooperatives have also been captured by the better-offs. Rural works and food-for-work programs frequently have neither alleviated poverty nor built any durable infrastructure, resulting in an increase in poor people's dependence on external assistance. Social forestry has in most instances been narrowly interpreted to mean tree plantations, such that those with larger landholdings have benefitted the most.

The Bank's 1992 Asian Development Outlook summarizes rural poverty as being associated with limited access to land and irrigation facilities; slowness of rural folks to adopt modern agricultural techniques; possibly the result of institutional barriers that limit access to appropriate technologies as well as lack of information and lack of access to credit; large family size with high dependency ratio; lack of assets such as human resources among poor families; concentration of the poor in areas with low quality of land; inadequate water control and limited integration into the market; and high incidence of poverty among minority and ethnic groups.

Having substantially discussed the matter of poverty in rural Asia and its characteristics, the Bank is committed to pursuing policies that will ensure poverty reduction. These policies include ensuring that there is no anti-labor bias built into DMCs' policies or the Bank's project designs, so that employment opportunities are generated from growth, and giving target groups access to human resource development opportunities such as education, health and family planning services and making markets and credit available so that their opportunities for employment and thus income generation are improved, while at the same time increasing their productivity and the returns from their activity.

The above implies that to achieve the goal of poverty alleviation and sustainable development, a new set of planning criteria and approaches are necessary. There is a need to determine new indicators of progress that will help in overcoming the drawbacks of GNP as a traditional measure of human welfare. It is also necessary to establish a stronger linkage between poverty alleviation and environment protection and environmental management concepts.

Natural resource accounting is one step which when coupled with environmental pollution accounting can help strengthen the measure of economic growth as an indicator of a society's well-being. It must be recognized, however, that this approach depends upon

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* Natural resource accounting is a system of accounts that attempts to reflect pollution and degradation of the environment and depletion of natural resources in national income accounting, i.e., resource extraction will be subtracted from net national product with depletion of capital and environmental clean-up costs being counted as intermediate expenditures.
* Environmental pollution accounting is a system of calculating the economic costs of pollution to environmental values and resources.
monetization of certain environmental costs and benefits, some of which are fundamentally at variance with basic human values. As a consequence, there are severe limits to the utility of the natural resource accounting approach.

In addition to adjustments to the national income accounts, indicators such as the Human Development Index (HDI) and the Environmental Quality Index (EQI)\textsuperscript{12} can refocus attention on the quality of life, away from the exclusive concern for quantitative aspects of economic activity. Furthermore, making these indicators gender-specific and poverty-focused can spotlight progress in poverty alleviation.

A basic needs approach\textsuperscript{13} that invests surpluses in social infrastructure to alleviate poverty, improve quality of life, and reduce dependence on the world economy, with all its fluctuations and uncertainties, is also environmentally sound and sustainable. A growth-first strategy may not lead to improvements in the quality of life for the poor; this in turn can lead to environmental destruction.

It would be worth noting that except perhaps for Thailand, the countries in Asia and the Pacific with the most severe environmental problems are also the countries with the largest concentrations of poor people. As noted earlier, poverty alleviation and environmental protection generally go hand in hand, as income gap and environmental stress are closely linked. However, there may be cases in which poverty alleviation and environmental stress may appear to be in conflict. For example, transport and power projects may have a significant potential impact on the environment, and yet they provide the most effective opportunities for poverty alleviation through increasing opportunities for both on-farm and off-farm employment due to new possibilities for development of rural industries, price leverage for local commodities and better opportunities for marketing, and higher standards of living and reduced possibility for fuelwood depletion.

One desirable policy would be attaching priority to traditional growth projects and carrying them out in complementarity with environmental and social norms. For the Bank this implies that projects such as those referred to above must fully integrate environmental considerations following the guidelines and procedures established by the Bank in order to minimize all types of adverse environmental effects of transport and power projects. It also means that public participation should be made an integral and important part of project planning and decision-making.

An important aspect in operationalizing the link between poverty alleviation and environment protection relates to the question of financing environmental programs and projects. A concern that emerges in all infrastructure and social development projects is whether they produce explicit and steady monetary benefits. The problem is compounded when these projects need huge investments, financed through development assistance, but do not generate corresponding foreign exchange earnings to repay external debt. A similar argument could also be used against projects designed to alleviate poverty and promote environmental sustainability.

Such an argument, however, would miss the basic objective of all development assistance to developing countries. While a project-by-project approach in generating sufficient foreign exchange earnings may be useful and necessary in many instances, this approach should not be extended to environmental protection projects. It is not too difficult

\textsuperscript{12} Peter P. Rogers, Environmental Quality Index, Staff Consultancy Report submitted to OENV in February 1993.

\textsuperscript{13} A basic needs approach tackles the issue of poverty with a more focused objective of providing basic goods and social services through investments in appropriate social infrastructure to poverty groups.
to see that long-term measures to protect the environment are bound to contribute to an increase in the overall efficiency and productivity in a given economy. Indirectly, therefore, such an economy should be able to meet all its future obligations, including repayment of external debts. In view of the above, the Bank should remain committed wherever possible and feasible to exploring and devising innovative financing mechanisms in meeting the resource requirements for formulating and implementing environment protection projects.

V. Development-Environment Nexus

In recent years, one paradigm that has emerged in the development-environment nexus essentially supports careful integration of environmental considerations into conventional growth-oriented projects in DMCs. The relationship between the level of environmental degradation and GNP per capita is best described as an inverted U-shaped curve known as the environmental Kuznets curve. The hypothesis, which has since been supported by data collected from both developed and developing countries, is that the level of environmental degradation first rises as GNP per capita rises, due to inadequate attention to environmental concerns, and then falls as more resources and greater attention are given to environmental concerns. As is well known today, the cities of Bangkok and Jakarta are more polluted now than 10-20 years ago, due to inadequate environmental controls. At the same time, cities in developed countries, such as Tokyo, Washington D.C., San Francisco, Geneva and Paris, are cleaner now than they were 10-20 years ago, due to public and private investment in environmental controls and technologies.

If the above hypothesis is true, the environmental Kuznets curve suggests that the environmental degradation of DMCs during the economic take-off stage could be a temporary phenomenon. Based on this trend, efforts to push the type of development intended to improve environmental situation through stringent environmental control may not be appropriate unless a critical ecological threshold level (Figure 4) is reached, beyond which environmental degradation becomes irreplaceable.

Unfortunately, the absence of long time-series environmental statistics on one hand and a single environmental quality index on the other makes it difficult to determine how the environmental Kuznets curve behaves under the influence of various states of the environment and development. For example, it would be interesting to explore how the shape of the curve changes under the influence of population control, withdrawal of environmentally unsound subsidies such as those on water and agrochemicals, restructuring of industries (in the form of less energy-intensive, more labor and technology-intensive industries), and strict environmental control measures before economic take-off. It would also be significant to determine case-by-case the level of per capita income and the corresponding level of environmental degradation where the hump of the Kuznets lies.

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This information is expected to be available once the two Bank-funded RETAs—one on the development of environmental statistics (EDRC-led) and another on establishment of environmental quality index (OENV-led) are completed.
Panayotou (1992)\textsuperscript{15} and Rogers (1992),\textsuperscript{16} working independently, conducted empirical studies based on cross-sectional data from a sample of developed and developing countries and each came to the conclusion that depending upon the nature of the environmental problem, there is variation in the critical per capita income level at which the environmental situation begins to improve.


Rogers (1992), using World Bank data and sources, identified $3,000 as the critical per capita income level at which sulfur dioxide ($SO_2$) emissions in major cities decreases (see Figure 5). Rogers suggests that analysis of long time series for the emission of one pollutant, e.g., $SO_2$, for a given country may indicate that the initial or rising limb of the curve represents the environmental history of that country during its development phase. Using this example, there are many country situations in which as GNP per capita increases, there is more capital available for environmental purposes and there exists greater public awareness of environmental issues, such that in general the environmental quality of a particular nation improves. It is also suggested that the emission of $SO_2$ for the same level of capita per income is lower with time, indicating the favorable impact of technological advancement and stringent environmental controls. Furthermore, as technology continues to advance, environmental improvement is attained at a relatively lower cost.

![Figure 5: Income per Capita and $SO_2$ Emissions](image)


Panayotou goes further to establish an empirical relationship between economic growth and deforestation (as a measure of environmental degradation) taking sample data from developing countries of the tropical zone. An environmental Kuznets curve (as shown in Figure 6) was derived using ordinary least-square regression technique. The analysis reveals a maximum rate of deforestation of 3.5 per cent that occurs at US$823 GNP per capita per annum; beyond $823 the rate declines slowly. At $3,226 capita per annum the rate
is still a high 2.6 per cent, which could be defined as the ecological threshold rate. In establishing a similar curve for air pollution, focussing on SO₂ concentrations and analyzing sample data from both developed and developing countries, Panayotou found that the critical level of per capita income is the same as observed by Rogers (i.e., $3,000), with corresponding maximum SO₂ emission of about 0.055 tons per capita (see Figure 5). A third study by Grossman and Krueger (1991) found SO₂ concentration and per capita income positively correlated with per capita income level of less than $5,000.

**FIGURE 6**
Environmental Kuznets Curve: Tropical Deforestation

![Diagram of the Environmental Kuznets Curve: Tropical Deforestation](Diagram)


World Bank, Organisation for Economic Co-operation and Development (OECD) and United States Environmental Protection Agency (EPA) data provide deeper insight into the phenomenon. Specific OECD⁵ and EPA data⁶ show that in urban centers of OECD countries, between 1970 and 1988, as GDP grew, the concentration of all air pollutants fell (see Figure 7). Similar patterns can be seen for a mixed group of developing as well as

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developed countries. Taking data from the World Bank, the new paradigm is proven again. With increasing per capita income, sanitation coverage increases significantly up to a certain point and then gradually levels off. For SO$_2$ concentrations, the pollution level increases up to a certain point and then declines sharply. In both examples, the environmental situation improved in 1985 for a given level of per capita income, as compared with the earlier periods of 1976 and 1980 (see Figure 8). This means that people living in urban and industrial areas in countries with given per capita income are expected to breathe cleaner air now than before, indicating the benefit of technology transfer and adoption from one country to another.

**FIGURE 7**
GDP and Air Pollution in OECD Countries

![Diagram showing GDP and Air Pollution in OECD Countries](chart)


The implication of this new paradigm for the poverty-environment nexus is significant. It implies that for poor DMCs, environmental improvement can be achieved through rapid economic growth, as at a certain point of development the environmental situation improves significantly. According to available data, the critical level of income per capita for reduction of the rate of deforestation is $800, while it is approximately $3,000 per capita for the reduction of air pollution (SO$_2$). During the initial period of economic

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growth, some environmental deterioration is expected, even though environmental guidelines are followed; it is in this period that countries would need more external support and assistance to integrate environmental considerations fully into development projects. Once the countries reach the critical level of per capita income, the economic forces and public outcry against environmental degradation will eventually lead to countries taking environmental improvement action more independently of external sources of support. While this kind of "overshoot and correct" approach may not work well for environment considerations such as the restoration of aquatic wildfowl level in the vast wetlands of the Amazonian basin or for the royal Bengal tigers in the Sundarbans in Bangladesh, it is quite obvious that at the current point in history, when a doubling human population is putting major stress on the natural resources and the environment, the "overshoot and correct" approach may be realistic in terms of overall environmental protection and management.

The conclusion that can be drawn from these observations would include the following: It is a reality that even with full integration of environmental considerations into development projects, environmental degradation is likely to occur during the process of rapid economic growth. The objective should be to overcome the problem as soon as possible and at the same time avoid irreversible ecological damage. To overcome the negative effect of initial development efforts in a predominantly agricultural and forestry-based economy, GNP should reach at least $800 per capita. Between $800-55,000 per capita the rate of deforestation drops, but air pollution in major urban and industrial areas would continue to worsen as the country moves from agricultural to industrial economy. At per
capita income of about $3,000, levels of air pollution begin to decline. It should be remembered, however, that the above statistics should not give the impression to DMCs that they should pollute or degrade the environment at stages of rapid economic growth. Instead, the situation poses as a challenge to DMCs and to the Bank to integrate environmental concerns into the development process so that environmental impact is minimal and reversible.

If the new paradigm is correct, it appears that in Asia an environmental turnaround and cleanup could be expected in about 20 years, from 1993 to 2013, when per capita income of the region is expected to reach a respectable level. This would enable developing countries to create the economic impetus and public participation required for environmental protection.

If the population growth rate can be slowed, this change may come about somewhat earlier. The situation may also change favorably if there are important policy changes such as withdrawal of environmentally harmful subsidies on agrochemicals, irrigation water, etc., development and transfer of so-called "green technologies"; and increased availability of concessional funding for environmental improvement and natural resources management. Another significant way of bringing about the desired changes earlier would be to successfully implement poverty alleviation measures earlier presented, bringing into focus the linkages of poverty, environment and development.

VI. Conclusions

This paper discusses three major development problems the Asian-Pacific region currently is experiencing. First, the region's natural resources are being depleted and degraded at an alarming rate, as the statistics presented would attest. Second, the poverty situation is even more alarming and if left unattended will exert greater stress on existing natural resources, aggravating the already precarious condition of the region's environment. Third, the development process has not helped much in curbing environmental degradation and alleviating poverty as it has failed to meet the basic needs of people or to integrate environmental considerations into growth-oriented projects, which in turn failed to reach the intended beneficiaries.

The above problems make it imperative that countries in the region seriously consider the concept of sustainable development—an old development concept but one which only recently gained worldwide recognition through the work of the Brundtland Commission. Sustainable development has been interpreted in so many diverse ways and opinions as to how it can be achieved vary from one institution to another. In this paper, two measures have been identified as essential to promoting sustainable development: alleviating poverty to resolve environmental problems associated with lack of development; and integrating environmental considerations into development programs and projects to resolve environmental problems associated with development.

Recognizing the importance of these measures, the Bank has appropriately assigned a high priority in the areas of economic growth, poverty alleviation, women in development and, environmental protection and natural resources management. If this strategic agenda is implemented by the Bank and its member countries with the degree of seriousness it
deserves, it is believed that in the next 20 years, as the region's per capita income grows to respectable levels, economic forces, public awareness and people's participation in combatting environmental pollution and degradation will change the Asian-Pacific region from one that is poverty-stricken and environmentally malignant to one with a sustainable economy and a cleaner environment. If the developing countries of the region take a more aggressive program of population control, poverty alleviation, reduction of subsidy on natural resources and agrochemicals and are able to mobilize new and additional sources of funding environmental programs and projects, it could be expected that such a change would occur even earlier.