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INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT
INTERNATIONAL DEVELOPMENT ASSOCIATION

POLICY REVIEW COMMITTEE

PRC/s/M/74-13a

September 19, 1974

ENVIRONMENTAL POLICY PAPER

STAFF REVIEW - MINUTES

Attendance:
Messrs. van der Tak (Chairman), Blaxall, Burki, Dosik, Finzi, Hablutzel, Haq, Hilton, Howell, Kalmanoff, J. Lee, Mackay, Maiss, Overby, Pollan, Reutlinger, J. A. Simmons, Tolbert, van der Meer, Wyatt, Vibert (Secretary)

1. A staff review of the Environmental Policy Paper was held on Friday, September 6, 1974.

2. The Chairman suggested that the discussion of the paper should focus on the analysis of the Bank's experience in incorporating environmental concerns into its projects and the implications for the Bank Group's future approach.

3. In the ensuing discussion it was suggested that the Bank's experience of the incremental costs of incorporating environmental safeguards (estimated at 0-3%) should be defined more precisely. The costs appeared low against earlier estimates. In addition there should be some discussion as to whether costs were not likely to rise in future as higher environmental standards become necessary. It was also suggested that the paper clarify that while the Bank would provide additional project financing to cover the cost of environmental safeguards this would not be additional to the total country program which would continue to be set by the Bank's usual standards.

4. In discussing the question of determining and imposing environmental standards, some participants suggested that the differences in the approach of the Bank and other development agencies should be brought out more clearly. For instance, AID is obliged to follow U.S. environment standards while SIDA and CIDA have adopted a more flexible approach. The Bank favors environmental standards geared to each country's specific needs but subscribes to international standards where they have been agreed.

5. It was also suggested that the paper should discuss the issue of who pays the cost when the beneficiaries of environment-oriented components are non-residents or when pollution effects fall outside the country of the project.

6. The Chairman said that in redrafting the authors would take account of these suggestions, as well as any further written comments that would be relevant by c.o.b. September 16.

Frank Vibert
Secretary
Policy Review Committee

cc: Those Attending
PRC Members

Form No. 630
(4–73)

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INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT
INTERNATIONAL DEVELOPMENT ASSOCIATION

POLICY REVIEW COMMITTEE

PRC/s/M/74-~~12~~ 13

September 3, 1974

ENVIRONMENTAL POLICY PAPER
Staff Level Review

Attached is the Environmental Policy Paper prepared by the Office of the Environmental Adviser, Central Projects Staff. A meeting will be held on the paper at 2:30 p.m., Friday, September 6, in Conference Room E1026.

The short notice for the meeting is due to the unavoidable absence of Mr. James A. Lee next week. In order to allow further time for reactions to the paper, comments may be sent in writing to the Environmental Adviser not later than close of business, September 16, 1974.

Frank Vibert
Secretary
Policy Review Committee

DISTRIBUTION

Attendance

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ENVIRONMENTAL

POLICY PAPER

August 15, 1974

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I. SUMMARY AND CONCLUSIONS

1. International development assistance has historically addressed problems of the human environment -- its principal focus being the poverty, disease, hunger, and illiteracy associated with the lack of economic development. Worldwide concern, however, has steadily mounted over other aspects of environmental problems -- those which emerge as undesirable secondary effects of the very processes of development itself. As a result, the responsibility and procedures for addressing the potentially damaging environmental and related health/socio-cultural side effects of development schemes and projects have become the focus of increased concern for developing countries and for the institutions which provide development assistance.

2. The environmental problems and issues confronting both the developed and developing countries have been articulated and documented in considerable detail, owing, in great measure, to the historic 1972 United Nations Conference on the Human Environment in Stockholm. Developing countries assign the highest priority to finding solutions to their perceived environmental problems which they principally attribute to the lack of development. The industrialized developed countries meanwhile are becoming increasingly concerned and preoccupied with the environmental degradation that accompanies their economic growth. It is widely agreed, however, that virtually all nations share both classes of problems, the essential differences are in the mix and intensity.

3. Sharing in the concern of international development assistance for the threats and hazards posed to vital ecological systems, human health, and social well-being, the World Bank Group institutionalized systematic efforts to identify and prevent their occurrence in the development projects for which it makes loans. With the establishment in 1970 of an organizational "focus" for environmental matters, the Bank Group intensified its forward movement on a broad front to purposefully include the "environmental" dimension in all its development endeavors; and, to encourage, through its own actions and leadership, other development finance institutions and its members countries to minimize the disruptive side effects of development on the human environment. The impact of this policy has been felt far beyond that associated with the direct effects of its projects.

4. Its experiences to date have shown the wisdom of this policy and have given encouragement to those who on the one hand despaired that development and concern for the environment could find accommodation, and those on the other hand who feared their hopes for a way out of pervasive poverty through development would be dashed over the mounting concern for environmental degradation.

5. In its continuing efforts to help the world's two and three-quarter billion poor achieve a level of life in accord with fundamental human dignity, the Bank Group remains unalterably persuaded that such help is simply not possible without the continued economic growth of the developing nations -- and the developed nations as well. But -- not economic growth on the pattern of the past, however, wherein threats to the environment and the health and well-being of man are undeniable, but, rather, on patterns that strive to be in accord with the tolerances of the environment to the stress of development, as well as with the physiological thresholds that dictate man's status on the health-disease continuum.

6. Resolved that there can be no question whether the impact of economic growth on the environment must be respected, the Bank Group seeks to increase and expand its assistance to developing countries in ways minimally disruptive of the environment and maximally promising of an improved quality of life for the affected peoples.

7. To do this requires a continuation, improvement, and strengthening of its current policies and practices and, also, innovative initiatives designed to assist in the important tasks of environmental rehabilitation.

In summary, these are seen as follows:

(a) A continued strong emphasis on its earlier espoused mandate " ... to review and evaluate every investment project from the standpoint of its potential effects on the environment."

(b) A continuation of its policy to assess such effects with conscious regard and attention to the setting of each investment project, applying such criteria and standards for the protection of environmental, health, and socio-cultural values as are seen to be best tailored to the affected milieu, and rejecting across-the-board application of fixed, common standards, except those applicable to highly toxic hazards demonstrated to be a threat to life processes.

(c) A continuation of its policy to provide guidelines for the consideration of the environmental dimensions in project formulation, and implementation, and to encourage their use not only with the Bank Group but also by other institutions, individuals, organizations, and governments, having responsibilities for economic development and its consequences.

(d) A furtherance of its earlier acceptance of environmental and human ecologic safeguards as constituting integral elements of development projects, and thus their eligibility for financing on equal terms with other long accepted and essential components of a "Bank-worthy" project.

(e) Extension of its requirements, when and where appropriate, that agreed-upon environmental and health safeguard measures, including their establishment and maintenance, be a condition of the loan, utilizing such instruments as are seen appropriate, and making it incumbent on the borrower and/or guarantor to adhere to such conditions.

(f) Initiation of support for projects seen by member countries as being of an "environmental" nature, designed to correct or otherwise improve conditions of the human environment prejudicial to health and social welfare, and/or threatening of the country's natural ambience and its resources.

(g) A furtherance of its efforts to provide technical advice and assistance on environmental matters upon request from its member countries.

8. In accomplishing the above, the Bank Group may wish to consider the following additional measures:

(a) The incorporation in its Country Economic and Sector Reports of salient information and data concerning the state of the human environment and including existent or planned legislation, institutions, regulations, standards, etc., useful in assessing the environmental implications of a country's development strategy.

(b) The provision in the Terms of Reference for consultants, engineering firms, contractors, etc., of appropriate references to the environmental dimensions so as to ensure their incorporation into designs, plans, feasibility studies, and other undertakings relating to the formulation and implementation of projects.

(c) The inclusion of environmental considerations within the purview of supervision missions, to ensure borrower compliance, if warranted, and to otherwise assess the effectiveness of the safeguard measures employed in carrying out the project.

(d) The provision of direct support, where appropriate, of research allied to the operational needs and requirements of the Bank Group as regards the environmental, health, and socio-cultural dimensions of its development assistance activities.

(e) A recognition of the environment-related training needs associated with Bank Group-financed projects, and provision for the support of such training within the framework of the loan. Further, a continuing appraisal of the problems and opportunities associated with environment/health curriculum development and the provision of training opportunities within member countries to meet perceived needs. An expansion and strengthening of the efforts by the Economic Development Institute (EDI) to incorporate the environmental dimensions within its courses and curricula.

(f) A continuation with the regional office and operational department of the primary responsibility for carrying out the Bank Group's policies and practices with regard to the environmental aspects of projects being financed. A continuation, also, of the close operational support provided by the Office of Environmental Affairs and its identification as the "focal point" within the Bank Group for liaison with the myriad of international, national, inter-governmental, and non-governmental organizations having responsibility for, or concern with, the environment.

(g) An increasing emphasis on improving the methodologies and techniques concerned with environmental economics and the analyses associated with the evaluation of projects exhibiting environment-related impacts.

(h) Examining and assessing the opportunities within national strategies for environmental improvement to fix responsibility for and equitably assess costs related to protection of environmental values. (Experience of the kind recently acquired in appraising a proposed national water pollution control project in Finland is especially valuable in this regard.) See attached annex.

NOTE: In awareness that every proposed solution for energy supply problems has environmental implications; and that, furthermore, a close correlation exists between economic growth and energy use in developing countries, the recent advent of an energy crisis on the world scene raises numerous questions relating to the environment and human well-being not specifically addressed in this paper. It is to be expected that in its current continuing efforts to deal with the energy situation, the Bank Group will give due consideration to these relationships.

Economic development, in large measure, has been made possible by the existence of energy resources and man's unique ingenuity for transforming them into usable forms of power -- to fuel the agricultural and industrial sectors, to light cities, to move people and goods, mechanize farms, and -- to give rise to pollution of the environment. Taken on a project-by-project basis, however, the energy/environment relationships do not suggest problems that require separate policy considerations; the Bank Group can be expected to continue its present efforts toward early identification and subsequent provision for the prevention or mitigation of potentially significant environmental problems associated with individual projects.

9. To reconcile its mandate to assist in the economic advance of the developing countries with its responsibility to protect and enhance the human environment, the Bank Group continues to be persuaded that it must:

- Encourage recognition that economic growth in the developing countries is essential if they are to deal with their human environmental problems; and to press vigorously for increasing concessionary aid to levels targeted in the Second Development Decade.

- Act on the evidence that such economic growth, if properly planned, need not cause unacceptable environmental penalties.

- Actively assist developing countries in their choice of a pattern of economic growth yielding a combination of high economic gain with minimal environmental risk.

- Continue the momentum of its leadership in demonstrating that concern for the environment does not handicap the fundamental task of providing development assistance; but, on the contrary, enhances and accelerates that progress.

II. INTRODUCTION

10. Much of the effort to raise the standard of living in the developing countries involves a deliberate modification of the natural environment. Construction of road, dams, airports, irrigation and sewerage systems, power plants and industrial facilities frequently result in the loss of ecological, health or socio-cultural values. Often this is because the consequences for the environment were not adequately considered at the project-planning stage or because information necessary to forecast the eventual impact on the environment was lacking or inadequate. And where adverse ecological consequences are forecast, effective steps to prevent or minimize the damage may sometimes not be taken because data on cost-effective safeguards or on economically competitive project alternatives are lacking or inadequate. Although the magnitudes of the loss in ecological and related values vary, there is a real cost to society over the long run.

11. To the extent that such losses occur, or go unmeasured, estimates of economic progress may be inflated. Often the remedial action must be taken at a later stage of a country's development, at a higher real price. Prudent planning and early preventive measures, such as pollution control or health safeguards, or a redesign or re-siting of the project, might have avoided the high cost of the subsequent remedial measures, or reduced it. It is important, therefore, that those involved with development projects -- planners, decision-makers, engineers, sources of finance, etc. -- keep in mind, from the earliest stages of the project cycle, the potential environmental implications, both positive and negative, of their development activity.

12. There have been repeated warnings, in recent years, that in many regions of the world, in both developed and developing countries, air, water, soil and other resources are deteriorating to an extent which threatens the quality of life and of the environment, perhaps even the future of human life. Such warnings have been sounded before. But their urgency has intensified: the consequences of continued cavalier use, or misuse, of natural resources, and of high rates of population growth, will be realized, not some time in the comfortably distant future, but soon. This was the message of the first (1972) United Nations Conference on the Human Environment, held in Stockholm.

13. The trend toward degradation of the biosphere is global in its dimensions and consequences; it can be reversed only through comparably widespread recognition of the danger and international cooperation in dealing with it. There are encouraging signs in both of these directions. Resolutions of the United Nations General Assembly in 1968, 1969 and 1970 underlined the importance of taking environmental factors into account in economic and social development planning. The International Strategy for

the Second United Nations Development Decade, adopted by acclamation in 1970, declares that "Governments will intensify national and international efforts to arrest the deterioration of the human environment and to take measures towards its improvement, and to promote activities that will help to maintain the ecological balance on which human survival depends."

14. The economic development which the developing countries are determined to achieve, and which the World Bank Group was established to support, will necessarily have an impact on the environment, on both its naturally occurring and its man-made elements. The developing countries are not, and should not be, required to choose between economic and social development, on the one hand, and the preservation of the environment, on the other. The question for them, and for the Bank Group is rather how to achieve economic progress with the least possible disruption of the environment and its ecological life-supporting systems.

III. ENVIRONMENT AND DEVELOPMENT

Definitions

15. It may be useful to begin consideration of the relationship of environment to development, and of the Bank Group's role and policies in relation to these, with some definitions. This is particularly true given the fact that, although the terms "environment" and "ecology" have received so much currency in recent years, there is no single universally accepted definition of either.

16. In this paper, "environment" is used to describe the total setting for economic development activity; it is not confined to the naturally occurring milieu (the ecological systems which surround the collectively support man, the biosphere), but extends to the socio-cultural milieu which man has created to facilitate adaptation to the demands and challenges of his naturally occurring surroundings.

17. "Ecology" is used to refer to the relationship between organisms and their environment, including most especially the man/environment relationship.

18. Environmental problems may be divided into three categories related to their magnitude: global, regional and local.

19. Global problems pertain to the biosphere; they affect all, or nearly all, countries. Into this category fall the most widely discussed and threatening problems, for example, those caused by persistent pesticide residues which find their way into the biosphere processes through the actions of wind, water and living carriers, with effects well beyond the country in which the pesticide was applied; the burning of fossil fuels, which affects the carbon dioxide

balance and the sulphur dioxide loading of the atmosphere, and the particulate content of the stratosphere; the pollution of the oceans from land sources, or from oil spillage or ship dumping on the high seas; and the man-induced or man-influences changes in global climatic patterns. Clearly the resolution of problems in this category calls for heroic measures of international cooperation.

20. Regional problems result from biophysical linkages among a group of countries which have little or no effect beyond the members of the group. A typical example is the effect of river basin development on riparian countries, up or down-stream.

21. Local problems are those whose effects are confined within the boundaries of a particular country, for example, the extirpation of a wild-life resource, the creation of an aesthetic blight, or the eutrophication of a lake from fertilizer runoff or discharge of domestic sewage.

Dimensions of Variation

22. Environmental problems in a given category may differ in their dimensions. For example, while a global problem may eventually result from the gradual build-up of carbon dioxide in the atmosphere over a long period, the effects of pervasive, persistent pesticides can be seen more immediately. Another variant, related to timing, is the degree of certainty. The greater the time span for the cause-effect relationship to be observed and understood, the greater the uncertainty as to its manifestation; whereas the continuation of presently observable consequences is far more certain.

23. Two other variables may be noted: magnitude and degree of reversibility. Magnitudes cannot easily be compared, because effects are of different types, occur in different places and affect different aspects of life systems. "Reversibility" concerns the possibility of returning an ecological system to its former state. For example, a lake in an advanced state of eutrophication is virtually irreversible; the extinction of a species is absolutely so. On the other hand, it is possible to end pollution from particulate matter in the smoke of an industrial plant, and to restore the ambient air quality.

24. The dimensions of time, certainty, magnitude, and degree of reversibility combine to produce the dimension of urgency. Where a problem to be dealt with poses an immediate, serious threat bordering on irreversibility -- such as a present threat of malaria affecting millions of persons -- it is seen as being more urgent than the possible, future, unknown effects to health arising out of the use of a pesticide to combat the malaria-carrying mosquito.

The Environment in Developing Countries

25. Developing countries have an obvious and vital stake in environmental problems which affect the biosphere, themselves, and their economic relations with the developed countries. The environmental problems of the developing

countries are essentially of two kinds. They are the problems associated with rural and urban poverty, characterized by poor housing, nutrition, water supply and sanitation, and by disease. Under these conditions of poverty, in which the biophysical environment often exhibits the ravages of long years of mismanagement (overgrazing, erosion, denuding of forests, surface water pollution, etc.), not merely the "quality" of life, but life itself, is endangered, for it is often very difficult or impossible for the environment to renew its life-supporting capabilities. The developing countries assign the highest priority to finding solutions to problems of this nature, associated with underdevelopment.

26. There are also the growing and serious problems which accompany the very process of development itself: Agricultural growth, for example, calls for construction of irrigation and drainage systems, clearing of forests, use of fertilizers and pesticides; new avenues for disease transmission will be created and new human settlement patterns established. All these developments have environmental and health implications. The process of industrialization will result in the release of pollutants, and in other environmental problems attendant on the extraction and processing of raw materials and the growth of urban trade centers. Urbanization is a serious and growing problem for many developing countries. In the absence of adequate land use planning, industrial pollution control, provision for water supplies and sewage disposal, and adequate housing, the population pressures that have produced unsatisfactory rural land use patterns impinge increasingly on the cities.

27. Economic development cannot proceed without exploitation of natural and human resources. As the pace of development accelerates, the associated hazards and threats to the environment and to human health become greater. The experience of the developed countries, in realizing immediate economic benefits only to become aware, later, of the greater and more lasting social costs attributable to application of new technology, should be kept in mind by the developing countries as they import the technology required for their own economic program. They will, presumably, wish to avoid, insofar as feasible, the development patterns which have led to the present environmental concerns of the industrialized countries.

The Environmental Debate

28. But while environmental concerns have of late been given a high priority in the developed countries of North America and Western Europe, they do not command the same attention in the Third World. This is understandable. Emphasis on the quality of life and the environment may well seem to be a luxury the developing countries cannot afford, preoccupied as they are with malnutrition, disease, high infant mortality, low life expectancy, high levels of illiteracy, unemployment and severely skewed distribution of per capita income, and with the widening gap between their material well-being and that of the developed countries. The difference in values, interest, priorities and capacities between developed and

developing countries is perhaps more marked in matters affecting the environment than in other areas. Developing countries prefer to give priority to projects and programs which promote economic growth; they assign relatively less importance to the need to protect the environment. If the dialogue between the haves and have-nots on such matters is to be productive, it must be based on a recognition that the viewpoints are different and that the solutions to, or ways of dealing with, the world's environmental problems must be complementary to and not at the expense of efforts to advance the economic and social development of the developing countries. 1/ The safeguarding and improvement of the environment should be one of the objectives of an economic development plan. While limitations on development capital are a serious constraint for many developing countries, and may lead to the assignment of a higher priority to other objectives, the fact is, as noted earlier in this paper, that preventive action may be taken now at a fraction of the future cost of remedial action, to the extent such action is still feasible.

29. There are encouraging signs of a growing awareness in the developing countries that "economic growth", narrowly defined, does not necessarily result in an improved quality of life. Concern for the environment and health is coming more and more to be viewed as an integral part of the development process. To an increasing extent development assistance agencies are being asked to help in assessing and combatting the degradation of water, soil and air attendant on industrialization, agricultural development, natural resource exploitation and water development projects. At a regional environmental seminar in Africa, one of a series of such seminars held in preparation for the 1972 Stockholm conference, some 30 countries adopted a resolution calling upon the governments of the region to give consideration to the environmental aspects of proposed development projects. While the resolution was motivated, in part, by concern that a failure to consider those aspects might lead to a reduction in external development assistance, it nevertheless appears that developing countries are increasingly willing to invest scarce resources to ensure that immediate development benefits are not offset by long-term environmental costs.

Development Assistance and Environmental Quality

30. Donor governments appreciate that developing countries regard the formulation of environmental goals as much a matter of national sovereignty as the formulation of economic and social policies generally. They recognize that programs and projects which contribute immediately to economic growth will, in most developing countries, receive a higher priority and be allocated a larger share of financial resources.

1/ For an in-depth treatment of these issues see Development and Environment, a report submitted by a panel of experts convened by the Secretary-General of the United Nations Conference on the Human Environment, Founex, Switzerland, June 4-12, 1971, and published by the Carnegie Endowment for International Peace in International Conciliation, No. 586, January 1972.

31. At the same time, mounting concern over the continuing deterioration of the environment on a global scale and awareness of the transnational environmental effects of development programs, especially at the regional level, are being coupled with pressures, both within and outside governments, to take positive steps to curb pollution and minimize or eliminate the damaging side effects of development. They are requiring donors to take a careful look at the costs and benefits of assistance in environmental terms, and at the alternative means available to minimize the one and maximize the other in the development projects they support. The United States Congress, for example, questioned whether U.S. aid should be made available for undertakings which would be criticized in the United States because of the associated environmental impact (e.g., use of certain pesticides, construction of industrial plants without effluent controls, etc.). The decision becomes more difficult where the proposed project will have undesirable environmental/health effects which will be felt outside the boundaries of the recipient country.

32. A difficult situation could be presented where a donor or development financing institution proposes, for example, that pollution controls should be incorporated into a project to protect the local, regional or global environment, but the prospective recipient disagrees, perhaps on the ground that standards which do not conform to its own development priorities or environmental circumstances are being imposed from abroad, and that this will increase project costs with an adverse effect on the country's development plans. Developing countries reportedly have been worried that increasing donor concern over environmental matters could complicate and slow down the processing of development assistance projects and that the additional resources required to help pay for environmental safeguards will not be forthcoming.

33. Issues such as these are focusing attention on the responsibilities and activities of development assistance institutions. Within the past few years, some major development agencies have made substantial strides toward strengthened environmental responsibility, recognizing that development which ultimately degrades the human environment is neither a sound investment nor a humanitarian one. In most cases, what has been done is to incorporate consideration of environmental factors into agency project review procedures. There has been some examination of the policy issues involved, but no comprehensive policy statements have been forthcoming.

IV. THE WORLD BANK GROUP AND THE ENVIRONMENT

Environmental Guidelines

34. Before 1970, the Bank Group had no systematic procedure for identifying and examining the environmental effects of its activity. Moreover, in may instances, ways of identifying, preventing or mitigating adverse environmental consequences had not been devised. In his 1970

address to the U.N. Economic and Social Council (ECOSOC), Mr. McNamara, President of the World Bank Group, remarked that the problem facing development finance institutions was whether and how they might help the developing countries to avoid or mitigate some of the damage which economic development can do to the environment, without slowing the pace of economic progress. He noted that the costs resulting from adverse environmental change could be tremendous, and that a small investment in prevention would be worth many times what would later have to be spent to repair the damage. He announced to ECOSOC that a unit had been established in the Bank Group to determine, to the extent possible, what would be the environmental consequences of development projects being considered for financing, and said that the Bank Group proposed to work toward concepts which would make possible a consideration of environmental factors in development projects.

35. While this paper addresses the matters of Bank Group policy and activities with respect to the environmental/health implications of projects proposed to it for financing, it in no way describes the breadth of Bank Group involvement in international environment/health activities. These include, among others, technical advice and assistance to member countries; representation on international and inter-governmental bodies concerned with the environment; liaison with national and non-governmental agencies and organizations having environmental roles; and participation in conferences related to the foregoing. The very breadth of this involvement transcends the obvious participation by the Regional offices, and includes many of the Bank Group's organizational components, including mission offices. Even the Bank Group's own internal environment has been the object of studies and measures taken with regard to air pollution, solid wastes, occupational health and safety by the Administrative Services Department. But, remaining at the heart of these multi-faceted activites is that of ensuring to the best of its ability that projects financed by it do not pose an unacceptable threat to the environment and the public health.

36. The position of Environmental Adviser was established in 1970, with a strong mandate " . . . . to review and evaluate every investment project from the standpoint of its potential effects on the environment." A set of staff guidelines was prepared for use in the formulation, appraisal and execution of projects. These were subsequently expanded, and in 1972, a handbook, Environmental, Health, and Human Ecologic Considerations in Economic Development Projects, was published. (A revised and further expanded edition of the Handbook will be made available in French and Spanish (as well as English)) in 1974. The Handbook has been widely distributed to other economic development agencies, governments, engineering, contracting and consulting firms, universities, etc.

Project Operations

37. Experience soon made it clear that the environmental/health dimensions of projects should be addressed at the formulation and design stages, rather than at the "eleventh hour", when changes or modifications prove difficult, if not impossible.

38. The Environmental Adviser (now Office of Environmental Affairs) instituted a procedure which has evolved as follows:

1. Operational department staff review with the Office projects under consideration for Bank or IFC financing with a view to identifying the likely environmental, health, and socio-cultural problems or opportunities associated with them;

2. Where indicated by the initial review, the Office of Environmental Affairs suggests what studies or investigations should be conducted to enable a better identification and understanding of the nature, dimensions, severity and timing of the problems likely to arise, to ensure that appropriate safeguarding or other, perhaps, enhancing measures can be taken. The Office designs the studies and advises on the disciplines needed to conduct them and the terms of reference;

3. When the studies are completed, the Office participates in the review and analysis of the data and information acquired and helps to work out appropriate safeguard measures. It participates in subsequent loan negotiations and, where appropriate, in the presentation to the Board;

4. The Regional Office and the Office of Environmental Affairs monitor the implementation of the project, to ascertain the inclusion and adequacy of the recommended safeguard measures, and to determine what future action may be required. This experience is also useful for subsequent assessment of the accuracy of the forecast of environmental/health consequences and helps to indicate the approaches which should be taken, should similar problems occur in other projects.

Experience With Environmental/Health Considerations

39. It should be kept in mind that during most of the period 1971 to the present, the solo post of Environmental Adviser was largely responsible for the broad range of environmental activities evolving within the Bank Group; hence, the limitation on project statistics as shown below in the results of a screening made of all Bank Group loans, IDA credits, and IFC investments, during the 30-month period July 1, 1971 - December 31, 1973. The data presented reflect past project activities and show that the higher probability project-associated environmental/health concerns is to be found in the power, industrial and agricultural sectors.

(a) Of a total of 376 Bank Group loans and IDA credits reviewed for their environmental/health implications, 245 (65%) revealed "no apparent potential problems:,1/ the same was true for 30 (51.6%) out of 58 IFC investments. There was considerable diversity among

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1/ The expression implies that either no potential problems were apparent to the OEA or that other projects, seen as having a higher potential for more serious environmental/health implications were chosen because of staff and time constraints.

these 434 projects, as they included, for example, Bank Group loans to IFC, which in themselves have no identifiable environmental impact. Others include education, telecommunications, and, especially, population projects which have a large potential for positive environmental benefits, but do not ordinarily require an evaluation in the sense that projects in other sectors must undergo. These types of projects therefore are appropriately not included among the 159 projects that were acted upon.

(b) In a very small number of cases (4), representing about 1% of all loans and credits signed during the period, some other agency, such as the UNDP or WHO, had determined the need for safeguarding or remedial measures of some character and had taken the requisite action prior to Bank involvement. No IFC projects fell into this category.

(c) In 105 projects for which loans or credits were signed and in 26 IFC projects, the environmental problems identified could be handled adequately by Bank Group staff and the Environmental Office, without the need for outside expertise or special studies. The projects in this category accounted for 28% of the total of Bank or IDA projects screened, but for 80.2% of the Bank/IDA projects on which any action was taken. The 26 IFC projects in this category represented 45% of the IFC projects screened, and 93% of those on which action was taken, leading to the incorporation of appropriate environmental/health measures.

(d) The 22 Bank/IDA projects (including 9 power projects 1/, 6 agriculture 2/, and 3 industrial 3/) and 2 IFC projects (both industrial 4/), which were determined to require special studies by consultants, likewise led to the incorporation or safeguard measures as a condition of Bank/IDA or IFC financing. These represented 5.5% of the total number of Bank Group projects reviewed and 15.1% of the total requiring some action additional to an initial review.

1/ Loan/Credit Numbers 809, 829, 841, 874, 889, 919, 923, 296, 339

2/ Credit Numbers 393, 322, 282, 317, 277, 302

3/ Loan Numbers 787, 817, 934

4/ Investment Numbers 226, 258

40. The foregoing data, suggestive of the probability of environmental implications, are summarized in Tables 1 and 2, following.

TABLE 1

Numerical Distribution of Bank/IDA and IFC Projects
By Categories of Actions Taken. Period 7/1/71-12/31/73

	Bank Group/IDA	IFC
No problems apparent when reviewed	245	30
Problems handled by others prior to Bank Group involvement	4	-
In-house disposition	105	26
Consultants and Special Studies required	22	2
Total Number of Projects	376	58

TABLE 2

Numerical Subdivision of Bank/IDA and IFC Projects Reviewed
And Acted On During The Period July 1, 1971-December 31, 1973

	No. of Projects Signed & Reviewed	No. of Projects Acted Upon
Bank Group/IDA		
Agriculture	104	46
Industry	22	14
Transportation	87	15
Tourism	6	5
Water and Sewerage	15	15
Power	34	22
Urban Projects	7	4
Telecommunications	15	1
Education	38	4
Multipurpose	4	3
Others 1/	44	0
IFC		
Cement	6	4
Chemicals	2	2
Iron and Steel	2	2
Mining	3	3
Motor Vehicles	4	2
Non-ferrous	2	1
Petrochemicals	1	1
Pulp and Paper	5	4
Textiles and Fibers	7	2
Tourism	7	7
Others 2/	19	0
TOTAL	434	159

1/ Population & Nutrition, Loans to IFC, Technical Assistance, Engineering Loans, Development Programs & Export Expansion Lending, DFCs.

2/ Capital Markets, DFCs, Food Industries, General Manufacturing, Housing Financing, Industrial Equipment, Metal Fabricating.

41. The following examples are illustrative of some of the kinds of environmental/health/socio-cultural considerations which may be associated with conventional Bank Group projects.

a. Power

(i) Hydro-Power Projects involve the construction of a dam and the creation of an impoundment behind it. Problems associated with these activities include changes in the biochemical characteristics of the water downstream with its effect on fish populations. The dam may also act as a barrier to fish migration thereby preventing spawning unless a "ladder" arrangement facilitates their passage. The impoundment area, unless properly cleared of trees and vegetation, can become the site of undesirable water quality changes that preclude the establishment of a fishery, encourages aquatic weed infestation and algae blooms, and thereby threatens the power generating facility, and multiple uses of the man-made lake. Improper land use practices in the impoundment's watershed induces siltation while fertilizer/pesticide runoff can be detrimental to the food chains and developing biota in the impounded waters. The creation of new and/or increased habitats for disease vectors, and the opportunity for greater human/water contact raises the specter of new or increased health problems for the affected populace.

Hydro schemes often require the relocation and resettlement of people, villages, and urban centers from the proposed impoundment area. Many socio-cultural problems are thus raised which call for attention if the needs and requirements of such peoples are to receive adequate and humanitarian treatment.

Impoundments can also destroy important wildlife habitats, as can the operating regime wherein water level fluctuates over a wider range. Important historical, archeological, religious, and cultural sites can be obliterated.

The problems and opportunities associated with hydro-power schemes have been intensively studied and, if taken into account, their resolution and enhancement can be effectuated.

The Bank Group-financed Kidatu Hydroelectric Project in Tanzania is a case in point. This project, designed to meet coastal power requirements through 1980, consists of a regulating dam and an underground generating station on the Great Ruaha River, located several hundred miles west of Dar-es-Salaam. An environmental study of the project area was carried out by the borrower. Steps to prevent erosion during the construction and operations stages were strongly recommended. While the project was not expected to have an adverse impact on the environment and its biota, several health hazards were identified and plans made to control them. Unfortunately, however, the initial route selected for the transmission line traversed the Mikumi National Game Park and was destined to pass within view of a recently

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constructed government-operated game lodge, near some of the best wildlife areas in the park. The Bank, in conjunction with the public utility, the borrower and park officials, reexamined the route and selected an alternative which not only preserved the parks's scenic and aesthetic qualities but in the end proved cheaper to construct.

Another example of a successful attempt to reconcile wildlife and conservation interests with economic growth is the second stage of the Kafue Hydroelectric Project in Zambia. At a cost of $138 million, this project was designed to meet the requirements of the Central African Power Corporation's interconnected power system. It consists of a storage dam on the Kafue River and the installation of additional generating units at an existing downstream station. As part of a preinvestment study, an assessment was made of changes in ecology and land-use potential which would be induced on the Kafue Flats through construction of the dam. The report also evaluated potential environmental impacts, dealing with such matters as soil erosion and silting, archaeology, agriculture, animal husbandry, wildlife, fisheries, aquatic nuisance plants and public health.

A Bank appraisal mission subsequently gave further consideration to the environmental implications. It concluded that by far the most significant impact of the project on the environment would be the elimination of the flooding of the Kafue Flats below the dam during dry years. The Kafue Flats, covering some 5,000 km^2, are the home of thousands of zebra, waterbuck, wildebeast and other plains animals. Under natural conditions, extensive flooding occurs each year and the annual cycle of the flood and its recession is responsible for much of the grazing upon which a large number of cattle and wildlife depend. These include some 90,000 lechwe, a species of small antelope unique to the project area, whose movements have been dictated largely by the grazing conditions provided for by the flood cycles, and whose future is a matter of concern to wildlife conservation groups the world over.

Because most of the incoming flood water will be storied in the reservoir, the extent and duration of flooding with regulation would be significantly reduced during low-flow years, compared with natural conditions. To compensate for the loss of natural flooding when the water is most needed, the dam was designed to allow reservoir storage of 750 Mm^3 additional to that required for power discharges. This will permit discharge of 300 Mm^3/s during the critical month of March in dry years. While this is less than the quantity which would occur naturally, it is still significant. Some reduction in the game population and in the number of cattle may be necessary to keep the herds in good condition, but the danger of extirpation or even extinction of yet another rare wildlife species will have been averted.

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Other environmental measures incorporated into the project included a requirement that the contractor establish medical facilities to screen and treat workers, and the institution of modern sanitary arrangements for potable water supply and sewage disposal.

Covering an area of 22,500 km^2, the Kafue National Park is one of the largest game sanctuaries in the world; the loss of park area to the reservoir, being less than 1.5 percent, was therefore not a matter of serious concern to park management.

The dilemmas arising from differing views and value systems related to conservation versus necessary economic growth are numerous and of growing importance around the world.

The Kafue project illustrates a successful attempt made to resolve such important conflicting wildlife conservation development interests.

(ii) Thermal Power projects exhibit many of the problems characteristic of industrial schemes as they relate to air and water pollution. Of especial concern is the effect the thermally-elevated cooling waters will have on the biota of the water body into which they are discharged.

(iii) The problems associated with Transmission Lines have to do with scenery and tourism. The problems can be minimized or avoided if the proposed route is considered in terms of its relationship to these values. Use of herbicides along the right-of-way creates problems for the local flora and fauna.

As earlier stated, hydro-power projects (or series of projects constituting a scheme) often require the relocation and resettlement of people, villages, and even urban centers from the proposed reservoir area. Such man-made lakes have a profound influence not only on the bio-physical system, but also the socio-cultural systems of the affected basin. Relocation and resettlement constitute a traumatic psycho-social experience about which, unfortunately, little systematic research has been conducted. And, while this situation continues to prevail, increasingly planners are becoming aware of the need to deal systematically with resettlement during the initial feasibility studies, and utilizing the input of anthropologists, sociologists, and other behavioral scientists. Such systematic treatment is revealing that the stress of resettlement can be viewed as a multi-dimensional insult with psychological, physiological, and socio-cultural components. Physiological stress is best measured in terms of altered morbidity and mortality rates during the transition period. A priori there is

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reason to expect higher rates following relocation, and hence increased physiological stress. Aside from the psychological stress (crises of cultural identify, grieving for "lost" home, uncertainty of security, etc.) of removal, the increased population density which has characterized most resettlement increases the risk of epidemic diseases. Socio-cultural stress can be inferred from the way in which people have reacted to the implementation of resettlement which, most often, is of a compulsory, government-ordered nature.

Recognition of these problems and the opportunity for minimizing them can be seen in a number of Bank Group-financed projects. In the case of the Accra/Tema Water Supply Project in Ghana, the resettlement of eight villages within the impoundment area with a population of about 2000 was preceded by a detailed socio-economic study, as part of the project feasibility studies. Detailed planning and supervision of the resettlement would be undertaken by the University of Kumasi. While not a hydro-power project, this project presented similar resettlement problems and opportunities, and would seem to have been handled in a model manner. . In the case of the Quae Yai Hydro-electric Project in Thailand, 8000 inhabitants will be resettled out of a reservoir area, and presented classical psycho-socio-cultural problems of the type earlier described. In the environmental studies conducted during the feasibility stage, careful consideration was given to the resettlement sites, changes in occupation, life-styles, physical and social conditions, social services, etc., and these have formed the basis of a resettlement plan to be implemented by the borrower and government. Many other project examples exist such as the Sao Simao, Itumbiara and Paulo Alfonso Hydro-electric Projects in Brazil, wherein resettlement problems were presented and required incorporation as integral aspects of the projects' formulation and implementation.

b. Agriculture

Production of food and fibers requires large-scale manipulation of the naturally occurring environment, and gives rise to numerous ecological and human problems.

(i) Irrigation schemes are designed to provide a dependable, continuing supply of water to water-deficient areas, enabling additional lands to be brought under cultivation and often increasing the opportunity for perennial crop production. The problems of soil salinity and water-logging have long been recognized and addressed by the designers and operators of irrigation projects. But such projects may also result in infestation by undesirable aquatic plants and the creation of new or enlarged habitats for water-associated disease vectors, especially those snail species involved in transmission of Schistosomiasis. Irrigation canals, by increasing the opportunities for human contact with water, also increase the opportunities for transmission of water-borne disease.

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The Upper Egypt Agricultural Drainage Project illustrates some of these problems. The construction of the High Dam at Aswan has allowed for perennial irrigation by stabilizing the flow of the Nile. Perennial irrigation has brought the groundwater table up to or just below the surface and, with it, salts which raise the salinity of the soil and of irrigation waters. As a consequence, land is going out of production and this situation will continue unless and until adequate drainage is provided, as is being done in this project.

The disease of Schistosomiasis (Bilharizia) affects millions of persons; WHO has described it as one of the major diseases of developing countries. It has long been prevalent in Egypt; it was known to the Pharaohs. Perennial irrigation has improved the habitat for the snail vector of the parasitic disease, and increased both its distribution and the chance for human reinfection (resulting in greater clinical severity of the disease). How to control the snail over large areas and arrest the clinical severity of the disease poses a formidable problem for Egypt's agricultural and public health authorities.

The Bank Group-financed drainage project in Upper Egypt provided an opportunity to study and deal with the problem. An internationally recognized Bilharizia expert, after a field survey, made recommendations for chemical control of the snails and treatment of infected individuals; these were incorporated into the project. The control effort is designed to fit into a national plan for tackling the environmental and clinical aspects of this important disease.

(ii) Forestry projects present problems associated with ensuring a sustained timber yield through regulation of annual allowable cuts, prescription of cutting cycles appropriate to the species harvested, reforestation of cut-over areas, prevention of erosion and fire, and maintenance of stream flows in the areas being harvested. Problems can also arise in connection with the scope and extent of enforcement of forestry laws and regulations, the competence of forest management institutions, and the award of lumbering concessions. The transport and industrial aspects of forestry projects may also require examination.

The Antalya Forest Utilization Project in Turkey is a recent case in point. This project, at an aggregated cost of $164.3 million, included a forestry development program, an integrated sawmill and pulp and paper mill, and forest industries feasibility studies. A large reforestation and afforestation program of 11,000 hectares per year was included in the forestry component, and modern forest management is expected to ensure sound silvicultural and cutting practices based on the principle of sustained yield and with due regard for erosion and fire control.

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The integrated mill will analogously be designed and equipped in full consideration of environmental and health needs. Gaseous and liquid effluents will be minimized through maximum in-plant recycling and provisions made for advanced end-of-the-line treatment before final discharge.

The Antalya area is well known for its natural beauty, historical sites, and delightful climate. Consequently, it holds great promise from a touristic point of view and the development of a large pulp and paper plant would seem to be on a collision course with future development of tourism in the area. At an early stage, therefore, the inclusion of extensive environmental protection measures was recognized as a requisite for project implementation; and that such measures would have to include scenic considerations as well as careful architectural planning and landscaping in addition to advanced effluent treatment facilities. In particular, detailed studies were necessary to determine a site location compatible with conflicting interests.

The first study undertaken by the consultants recommended a site at the Mediterranean waterfront near the Manavgat River. Topographical constraints and scarcity of water put primary emphasis on eight possible plant sites along a 90 km belt of coastal land, and of these the Manavgat site was seen as offering the best balance between economic and ecological considerations. The premise that harmonious industrial and tourism development was possible in that area needed to be carefully examined by the Bank Group, when at each stage of the project's further development the Government became increasingly aware of the socio-economic benefits of the industrial plant.

The Turkish Government, however, did agree to a suggestion of the Bank group to review again the matter of plant location and established an inter-ministerial committee to conduct a detailed comparison of the site alternatives.

The least-cost site initially chosen was abandoned in favor of an off-beach location removed from areas of high tourism potential and at a grezter distance from the coastal highway.

The problem of heavy truck traffic in the area will required further study and the Government intends to provide measures for improved handling of the increased vehicular traffic. Oceanographic studies will determine the exact location of the liquid effluent pipeline outfall into the sea which will minimize any future adverse impacts. Finally, zoning measures were agreed upon with the ministries involved to prohibit future encroachment from industrial development upon tourism, and vice versa.

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The handling of the project by the Turkish authorities demonstrated an appreciation for and understanding of the perceived environmental problems.

In the case of the Antalya project, foresight, resulting in significant precautionary measures, would seem to have efficiently mitigated present and future problems.

(iii) Other types of projects in this sector present problems or opportunities peculiar to their nature and setting. In the case of marine Fishery projects, concern is evidenced for the stocks to be exploited, and the manner in which they will be harvested to ensure conformance to the concept of sustained yield. The institutional capacity for overseeing and regulating the harvesting of this resource, as well as conducting the necessary studies, investigations, and research is examined. Pollution with respect to its impact on the fisheris, especially estuarine and coastal stocks, is a matter of continuing concern. Fresh water fishery development schemes can be threatened by fertilizer and pesticide runoff, weed and algae infestation, and water-borne diseases.

(iv) Livestock projects require consideration of range conditions and carrying capacity, and the prevention of over-grazing. Livestock/wildlife competition, encroachment on game preserves, barriers to wildlife migration routes and the adequacy of water supplies are associated issues. In semi-arid areas, the potential for contributing to desertization, a phenomenon affecting large areas of the Sahel zone in Africa, must be taken into account.

(v) Rural Development projects may require consideration of health-care delivery and environmental sanitation. New water supplies need to be protected against surface and sub-surface contamination. The problems presented by small sub-projects -- impoundments, irrigated areas, fish ponds, etc. -- are local in character and can readily be handled, often on a self-help basis. Rural development projects under way or proposed in Malawi, Upper Volta and Mauritius, for example, have been examined for their environmental/health implication; and problems associated with erosion, soil conservation, afforestation, crop depredations, water-borne diseases and environmental sanitation have been identified, and provision made for appropriate remedial action.

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(vi) Pest Control activities may involve the use of toxic pesticides and herbicides, including their aerial application. Selecting chemicals which are the least harmful for non-target species and which do not become persistent and pervasive in the several ecological systems being affected is important. Of similar importance is ensuring that the formulation of pesticides is supervised to preclude using incorrect concentrations thereby posing a threat to applicators, the biota, and public health.

c. Industrial Projects

Few, if any, industrial projects are free of potentially troublesome environmental problems. Most common, as would be expected, are those associated with air and water pollution, solid wastes disposal, noise, in-plant industrial hygiene, plant siting, and subsequent related land use and settlement patterns. The capacity of the environment to withstand the injection of industrial wastes without serious undesirable consequences must be carefully considered. It is also important to identify specific pollutants, known to pose a demonstrable threat to human health or ecological systems (e.g., mercury, fluorine, arsenic, etc.) even in very low concentrations; their release must be prevented or carefully controlled and monitored.

Fortunately, the pollution resulting from industrial processes is susceptible to control. The degree of control appropriate will depend upon the environmental setting and the quality of the ambience to be achieved. Conditions in many developing countries permit more liberal effluent and emission standards than can be tolerated in the more highly industrialized countries. But it is important not to foreclose potentially important future resource options; hence, the need for projecting the cumulative consequences of industrial pollution.

An example of a Bank Group-financed industrial project posing a number of potentially serious problems is the MBR Iron Ore Project in Brazil. The project contemplated the exploitation of high-grade iron ore near Belo Horizonte and construction of a 640 km rail transportation line to an insular marine terminal on Sepetiba Bay, a recreational/tourist resource of great potential value.

An in-house examination by the Office of Environmental Affairs, in cooperation with the Industrial, Transportation, and Urban Projects Departments, revealed a number of potentially significant environmental problems at the mine site, along the rail line, and at the location of the terminal. It was decided to proceed with an on-site study, and a team of environmental consultants was engaged to identify likely problems and recommend preventive or mitigating measures. Partly as a result of the consultants' recommendations, arrangements were made for safe handling of the berthing ships' slops; an improved navigation system; a contingency plan for handling accidental oil spills; improved landscaping and rail trestle design; erosion and dust control; and solid waste handling and liquid-waste treatment. At the mine site steps are being taken to prevent pollution of nearby surface waters, to stop erosion and to restore the landscape through plantings and contouring.

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The rail line will pass through urban areas. The frequency of heavily loaded ore trains will create noise and safety problems. Although less than fully satisfactory solutions could be found, the undesirable consequences were accepted because of the overall importance of the project.

Sepetiba Bay, a largely, as yet, unspoiled estuary of great beauty, represents a recreational/tourism resource of great potential value. In addition, it has a significant shell and fin fishery, as well as a nursery ground for important coastal fish stocks. The fate of this estuary is uncertain in view of planned industrial activities along its shores. But, the joint concern shown by the Bank Group and the Borrower for the future of this area, has set an example. Another industrial project on this Bay, financed in part by the IFC, has received similar treatment of its environmental aspects to ensure its not representing a threat to the Bay's future resource options.

Examination of the plans for the Erdemir Steel Expansion Project in Turkey revealed that little or no provision had been made to control the liquid and gaseous effluents which would be released into the environment in relatively large quantities. Of particular concern was the possible effect of air pollution on public health and on livestock and vegetation in and around the project site. Further, the liquid wastes, containing toxic ingredients, were to be released directly into the offshore waters of the Black Sea, which already shows signs of increasingly heavy pollution. It was decided that an industrial pollution study should be made, and a team of industrial pollution control experts was engaged by the Bank Group. The team recommended controls to achieve reasonable standards governing the release of effluents in keeping with conditions peculiar to the project site. The sum of $5 million, representing 1.7% of total cost, was included in the project cost estimate for this purpose.

The Cuajone Mining Project in Peru, a large copper mining and smelting operation for which IFC is providing slightly more than 2% of the total cost of $550 million, will involve the development of a new copper mine, installation of a concentrator, and expansion of smelting and supporting infrastructure facilities. The project, which will produce 186,000 tons of blister copper annually, is located in a sparsely inhabited largely semi-arid area of southern Peru immediately adjacent to the Pacific coast.

Examination revealed that effluents and emission created by the mining and smelting operations already being carried on at the project site would be doubled, causing 30 million tons of tailings to be discharged into the sea and 600,000 tons of sulfur oxides to be released into the air annually. Population centers and surrounding agriculture would be exposed to marked increases in air pollution. Experience during the prior 14 years of operation indicated that the pollution had on occasion reached as far as 60 km upwind from the smelter, with adverse effects on sugar cane and vegetable production.

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In addition to problems attributable to the gaseous effluents, there was the question of the effect of tailings in the offshore waters; the waters are associated with the large-scale "upwelling phenomena" along the Peruvian coastline which gives rise to an abundance of phytoplankton, on which the anchovy feed. The annual anchovy catch has been estimated at about 10 million tons per year, making it the world's largest fishery in terms of weight of catch of a single species. The fishing grounds also sustain a large but fluctuating bird population (10-30 million) which includes the important guano-producing species (cormorant, piquero and alcatraz).

Because of the magnitude of the mining project, the limited availability of data and the potential environmental/health impact, and industrial/environmental pollution control expert was sent to the area. His report recognized the very significant economic/social benefits that Peru would realize from the proposed operations, and attempted to weigh these against the possible adverse environmental/health effects.

Ultimately the decision was to proceed with the project, when the borrower agreed to implement the Bank Group's recommendations on environmental/health safeguards. Qualified consultants, acceptable to IFC, will conduct studies on mine tailings disposal and air pollution. The project's sponsor has agreed to carry out its operations with due regard for the environmental, occupational health and safety, public health, and agricultural consequences attributable to the presence and operation of the mine, smelter and supporting or associated facilities. In particular, it will take whatever steps are agreed to be necessary to alter its present tailings disposal practices should this prove necessary, and will monitor air pollution in and around the smelter site to preclude any threat to the public health or to agricultural interests.

d. Other Bank Group Projects

(i) Environment/health requirements are usually taken into consideration in design and implementation of water and sewerage projects. Occasionally, it is necessary to examine the waters into which treated sewage will be discharged to ensure correct placement of the outfall and the adequacy of treatment. Data on currents, tidal action, flushing rates and fisheries resources are important in this connection.

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The Sao Paulo Water and Sewerage Project in Brazil may be taken as an example of environmental problems being reduced by this type of project. Rapid urbanization has occurred nearly everywhere in Latin America; typically, Sao Paulo has tripled its population in the past two decades. Half of the houses in the metropolitan area have no water connection and two-thirds have no sewer connection. This leads to contamination of groundwater, and endangers environmental health. Moreover, industrial plants draw 70 percent of their water needs from polluted waterways and have little incentive to refrain from dumping waste waters into nearby rivers.

Two Bank loans ($22 million for water supply and $15 million for pollution control) are designed to expand bulk facilities for water distribution and sewage disposal. Altogether, projects costing a total of $750 million are planned for the 1970s. Two million city dwellers should be able to have piped water. The pollution control component, representing $82 million in construction costs by 1974, will be the first stage of a long-range program to free the rivers of 70 percent of their present load of solids and 45 percent of the biochemical pollutants.

(ii) Transport projects of all kinds can present environmental problems.

Highway projects may change surface water drainage patterns and lead to erosion; open new pathways for transmission of human and animal disease; lead to unregulated settlement along the route, and create aesthetic problems in areas with high tourism potential; adversely affect wildlife habitats; and pose safety problems for people and animals. Highway design engineers and contractors are, however, becoming increasingly aware of the problems posed for the physical environment, while development planners are becoming aware of the secondary impact of new roads. The problems presented by railways are similar to those posed by highways. The principal problem associated with airports is noise, which affects decisions concerning runway orientation, flight paths and aircraft schedules. Siting and land use zoning assume importance, as means of minimizing the undesirable consequences of congestion from development associated with or triggered by the airport.

Port development and inland waterway projects pose problems of dredging and the disposition of spoil material, the possible disruption of fish habitats, the potential for accidental oil spills, pollution of water, changes in sediment transport which may alter beaches and other land forms, undesirable urban development, marine accidents and solid wastes management.

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Pipelines which are not properly sited can become a barrier to wildlife movement, create an aesthetic blight, constitute a hazard if ruptured by an earthquake and may encourage improper use of herbicides along the right-of-way.

(iii) Because Urban Centers in developing areas suffer from too rapid growth and the continuing impact of rural/urban migration, they are the focus of major problems concerned with air and water pollution, environmental sanitation, solid wastes management, congestion, noise, health care services, open spaces and recreational areas. While virtually every city exhibit all these problems, the mix and intensity varies, and solutions must be designed for the particular socio-economic-political milieu. A case in point is the Istanbul Urban Development Technical Assistance Project.

This centuries-old city has been, in later years, undergoing rapid, unplanned, and uncontrolled growth. The provision of urban services and amenities has not kept pace with growing demands. Installed water systems lack capacity to meet present demands and service is intermittent. Only one-third of the city is served by a water-borne waste disposal system. Contamination of surface and ground water eventually used for domestic purposes is widespread and was linked to a cholera outbreak in 1970. Storm sewers are lacking and standing water is a problem in areas of the city. Pollution of the Golden Horn has reached alarming proportions, while the Bosphorous and Sea of Marmara are grossly polluted from domestic and industrial wastes, and ships. Solid wastes management and disposal are inadequately handled, including open burning dumps, infested with vermin. Health services, particularly those serving the explosively growing squatters settlements are inadequate and insufficient, and ancillary health services (diagnostic laboratory, food inspection, etc.) are antiquated and insufficent as well. Compounding these urban environmental/health problems is the diffusion of responsibility for local administration among multiple agencies, and the diffused relationships existing between metropolitan, regional, and central government bureaucracies.

This project seeks, among other things, to work toward a correction of the deficiencies and builds upon its predecessor projects, Istanbul Urban Development and Water Supply. The project aims toward achieving comprehensiveness and coordination of the policies, plans, and programs among and between levels of government; and leading to the formulation and execution of a sound metropolitan development program. The quality of life as well as the quality of the environment in Istanbul and its environs is to be directly affected by the outcome of this project. The problems cited in Istanbul can be seen in many cities in the developing countries, and their solutions increasingly call for a multidisciplinary

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approach to the many interlinkages that characterize the rapidly changing man-environment relationships in the urban setting. The UNDP has been called upon by the Turkish Government to assist in its development of a national environmental policy and to finance specific studies aimed to resolve pressing existing problems. The Bank Group has encouraged these moves, works in close cooperation with the UNDP, and stands ready to assist in financing suitable projects among those identified.

(iv) All Tourism projects are a potential scenic and aesthetic threat. Architectural design and proper utilization of the land/water areas being developed are critical, as is the continued prevention of pollution in water bodies associated with the project. The impact of the project on nearby urban areas, their peoples and cultures must be taken into consideration. Zoning and land-use planning are important. The Babin Kuk Tourism Project in Dubrovnik, Yugoslavia, comprised of nine hotels (2,500 rooms) plus services, shops, transportation and related infrastructure, is one of the largest tourist complexes in the world. A prime objective of the project's design was the preservation of the area's scenic beauty; the project was skillfully blended into the natural surroundings. Collection and treatment of human wastes posed a problem, particularly since Dubrovnik's sewage had to be taken into account. Marine biology and oceanographic studies were conducted to assure that beaches and offshore waters were protected against pollution from the tourist facility. The studies, carried out in cooperation with Yugoslavian biologists, fisheries specialists and hydrographic authorities, produced recommendations for the treatment of wastes and for locating the sewage outfall so as not to endanger public health, tourism and the marine biota. In addition, a modern urban sewage collection and treatment system is planned for Dubrovnik.

The problems associated with the potential incompatibility of industrial and tourism development were examined in the case of the Antalya Forest Utilization Project in Turkey (see p. 20).

(v) Additional Project Types. Such projects as those concerned with education, population and nutrition, and telecommunications rarely present environmental problems of any significance. The objectives and purposes of the population/nutrition projects are clearly consonant with reducing the impact of a burgeoning population on the environment and its resources, while at the same time improving the human condition.

Lessons Learned

42. Experience with the environmental dimension of development projects has been highly encouraging. Thanks in large measure to the preparatory work for the Stockholm Conference on the Human Environment, and to the Conference itself, developing countries have, by and large, responded positively to Bank Group initiatives. Indeed, it is not uncommon for developing countries to assume the initiative themselves, not only in anticipation of the Bank Group's requirements but in response to their own perception of the problems. Other development financing institutions are now taking an approach similar to that of the Bank Group. The activities of the United Nations Environment Programme can be expected to support and to encourage further efforts in this direction.

43. A growing number of countries are adopting environmental legislation and pollution standards, and setting up regulatory and enforcement agencies. The Bank Group now frequently receives requests for advice, consultion and technical assistance in the environmental field. Further evidence of a spin-off from the Bank Group's environmental activities has been the development of an ecological conscience in the private lending sector; financing institutions are incorporating environmental considerations into their operations.

44. Some environmentalists may say that the Bank Group is not doing enough, that it should conduct extensive preinvestment studies to assure that all alternatives have been considered before making its investment decisions. Others will appreciate, however, that a long delay in the provision of development assistance attributable to environmental considerations would not be acceptable to the developing countries; they are likely to reject all environmental considerations, in an effort to expedite the financing they seek.

45. The fact is that by and large the environmental critics of the Bank are becoming fewer, as the actions which the Bank Group has taken and the results achieved become known and understood. Among the international health community, critics of the Bank Group on the grounds that it paid little attention to the health implications of its projects have also now come to acknowledge with approval the initiatives put forth by it in recent years, and to applaud especially its spearheading of the Onchocerciasis Control Programme in West Africa and its concern with Schistosomiasis.

46. So far as concerns the Bank Group's own procedures, the emphasis on early consideration of a project's environmental dimensions has been fully justified by experience. Often the initially available data essential for an informed judgment and reasonable projections (e.g., on wind direction and frequency, temperature inversions, river flow, offshore currents, etc.) are insufficient; they may be entirely lacking. It takes time to put together the requisite information, to analyze it and to formulate recommendations. Moreover, timing becomes a critical factor when dealing with natural systems or the human organism, so it is highly desirable that problems be identified early, and that steps be taken to resolve them as the project cycle proceeds. If a project's environmental implications have not been thoroughly reviewed before the appraisal stage, the opportunity for any significant action will have been appreciably diminished.

47. It may prove easier to project a project's economic and financial rates of return than to forecast its direct and secondary effects on the environment. For example, to judge the risk of Schistosomiasis from an irrigation project it is necessary to make some assumptions concerning the manner in which natural systems will develop so as to provide a micro-environment congenial to the establishment and/or further distribtuion of the vector, a particular species of snail. In the absence of data from the project, site, judgements must be based upon observation and study of similar systems. The degree of risk and the related social costs must be weighed against the expected benefits from the project. If it does not seem likely that the incidence of the disease will be stimulated to any great extent by the project, or that it will become more widespread, it may be acceptable to take the risk and make no provision for any counter-vailing measures. On the other hand, if there is a strong likelihood that these undesirable health consequences will be realized, it will prove necessary to incorporate into the project measures for the control of the vector and treatment of afflicted individuals.

48. A hydro-power dam may cause the demise of riverine fish species by changing the character of the downstream aquatic environment by barring movement to upstream spawning grounds. The fishery may represent an important local source of food, or have considerable use for sporting purposes. It might well be possible to establish, in the inpoundment, a fishery of equal or greater value. But if no consideration is given to the affected fishery resources in the preparation of the project, the result will be the loss of an existing resource without provision for replacement.

49. The risks to the environment and to health should be included among those to which consideration is given in the course of appraising a project's expected contribution to improvement in the human condition. The problems that arise in identifying and evaluating these risks and the remedial actions that may be possible are discussed in the next section.

Costs of Environmental Safeguards

50. When the Bank Group first determined to incorporate environmental protection measures in its lending operations, some concern was expressed about the cost of such measures and the burden that would be imposed on borrowers. Estimates ranged as high as 25-50% of total project cost, which would have been wholly unacceptable to the developing countries.

51. It is difficult to separate out those costs and benefits which are attributable exclusively to environmental measures, and in any event the quantification of those costs and benefits will depend largely on how the environmental dimension is defined. In the case of a sewerage treatment project the cost would be 100% under most definitions. As public health is a most important part of our environmental considerations, most water supply and sewerage projects fall in this category. In FY73, the aggregate total for such projects financed by the Bank amounted to $278.8 million in 9 countries.

The Bank Group's experience to date, however, when disregarding such projects, appears to be consistent with that of other aid agencies and suggests that those early estimates were much too high. The additional cost attributable to environment/health safeguards in "non-environmental" projects has ranged from 0-3% of total project cost, the high end of the range applying where precautionary measures were added on to projects already well advanced. Exact data on environmental expenditures are not easily furnished for several reasons.

52. Environmental measures are often productive, and it is questionable whether a project's environmental dimension gainfully should be separated out. Project components are all intimately related, as is the project itself to other projects, the external environment and the society at large. The Bank Group operates under a broad definition of what is environmental, and seeks to incorporate a project's internal environment and its public health and socio-cultural aspects in its evaluations. This mode of operation calls for improvement of human ecologic conditions frequently not conceived of as environmental, while at the same time attempting to circumvent or mitigate errors made through development on the patterns of the past. The idea that well-defined anti-pollution measures are to be added to a project at a cost is not seen as especially productive or desirable. Frequently this is still the only solution available for industry, but often, and more so in the future, pollution is, and will be, overcome through redesign, recirculation, product changes, etc., a style of planning and production in which steps taken specifically for reasons of environmental protection will be indistinguishable from, and a true part of the entire process. The Bank Group, furthermore, does not ordinarily separate out environmental expenditures as such on projects it finances; it frequently pays for part of studies undertaken and subsequently finances the foreign exchange component of a project, or parts thereof, alone or in cooperation with others. In other instances environmental expenditures relating to a project are financed from other sources entirely. Also, at the time of project appraisal only estimates are made of expenditures to be incurred regarding resettlement, cost of land at new locations, training, occupational health measures, medical facilities, water supply and sewerage, landscaping, studies on how best to minimize industrial pollution, and subsequent cost of treatment facilities and final disposal. Additional money may in time be transferred for these and related environmental purposes or vice versa, depending on progress made toward project realization.

53. It can be expected, however, that as economic development proceeds the cumulative impact of the environment/health-threating effects will lead the developing countries themselves to adopt higher standards and impose tighter controls. This is already being done, for example, with respect

to urban industrial locations where air quality is deteriorating; the installation of controls on existing plants is being required and stricter regulations governing the operation of new plants have been promulgated. As the assimilative capacity of ecological systems in developing countries become severely strained, it will be necessary to employ additional measures and to strengthen existing measures; at the same time, the cost of these measures will be greater. Reports on air pollution in, for example, Sao Paulo, Ankara and Mexico City indicate that the requisite control measures will be both costly and technically difficult. In general, the cost of removing a pollutant from a waste stream is proportional to the amount already removed and this trend produces increasingly higher costs for additional incremental improvement. A zero discharge, often referred to as an appropriate goal for adequate industrial pollution control, does not, however, imply an astronomical cost, but instead a "closed" system wherein recycling is extensive and only non-problem waste, if any, is leaving the plant.

54. A further case in point illustrating the need to consider the assimilative capacity of ecological systems when evaluating the environmental impact of a project is to be seen in the Pan African Pulp and Paper Project on the Nzoia River in Kenya which flows into Lake Victoria. In considering the impact of an IFC-financed pulp and paper mill on the river, its downstream uses, and the Lake, the expected municipal and industrial development of the watershed needed also to be examined. The nature and degree of control over the effluent of the pulp and paper mill could only be gauged when its relationship to all other pollutants entering the river system was understood. This examination revealed the critical necessity for requiring a high level of treatement of the plant's effluent and at the same time encouraging the Government of Kenya to monitor the river's condition and plan further development with careful regard to cumulative threat to downstream uses posed by such development. If adequate control over the municipal, industrial, and agricultural wastes entering the river system is not maintained, the river's already precarious ecological integrity will be lost with disastrous consequences for important downstream uses.

55. Thus, while costs for environmental/health protection associated with individual projects remain an acceptably small part of the total investment, it should be stressed that increased development will contribute to the need for developing countries to assess the cumulative impact and the need for more stringent standards governing the design and execution of development schemes with resulting cost increases.

56. International surveys have been conducted in an effort to obtain information on the magnitude of the costs of national programs for environmental pollution control, particularly from industrial sources. Such projections of national costs as are currently available, however, are notoriously unreliable. Problems exist with respect to cost calculations

that assume only "end of pipe" treatment strategies will be adopted rather than internal process changes or product modifications; indirect costs that are inconsistently handled; a pattern of demand that are assumed to be constant.

57. The figures that are available, however, for some of the more advanced OECD countries suggest that for these countries, total investment plus operating costs might vary from one-half of a percent to about two and one-half percent of the GNP. The U.S. has undertaken perhaps the most extensive data collection effort with regard to cost estimates. Cumulative estimated total pollution control expenditures for the period 1972-1981 was published in the fourth annual report of the U.S. Council on Environmental Quality, 1973. They amounted to 275 billion of 1972 dollars, or about 2.5 percent of the GNP during the same period. Any lower level of expenditures, it was stated, would likely result in even greater economic penalties as reflected in adverse environmental/health effects. The estimates covered air and water pollution, land reclamation, radiation and solid waste. No further details of estimates made on individual industries are furnished here. Marked variations exist in estimates made from year to year and the above percentages are included only to indicate the order of magnitudes for illustrative purposes.

58. In particular cases, a country's decision to impose environmental control measures on its producers may alter the terms of trade for the country's exports. This should be expected because different countries will face different costs even for the same level of environmental standards. Furthermore, the implicit tradeoff between a healthier, more amenable environment, and additional financial resources will be resolved differently by different countries. While data which would predict the magnitude of shifts in inter-national terms of trade are not available, few independent experts feel that widespread dislocations should be expected. Rather, effects are more likely to be felt in individual industries, plant and/or localities. (See paras. 104, 105) where the subject of adjustment assistance is discussed).

Other Development Assistance Organizations

59. It was earlier mentioned (p. 33) that other development assistance agencies have incorporated environmental dimensions into their activities. It can fairly be said that the Bank Group's policy and practice has had some influences in this regard. The U.S. (AID) program, for example, has adopted environmental guidelines governing project formulation and implementation. Under the terms of the U.S. National Environmental Policy Act, which has been applied to U.S. (AID)-financed projects abroad, all such projects are subjected to an environmental impact appraisal, which considers the likely consequences and proposed how they can best be handled.

60. The Swedish International Development Authority (SIDA) has established a Secretariat for International Ecology, with responsibility for reviewing all projects for their environmental implications. The impact of this review has already been felt in several projects jointly financed by IBRD/SIDA.

61. The United Kingdom Overseas Development Administration (ODA) and the Canadian International Development Administration (CIDA) are also incorporating environmental assessments in their lending activities.

62. There are indications that development assistance agencies in Germany, France and Japan may adopt a similar policy.

63. In November 1972, the Bank Group organized a conference on development/environment issues and problems attended by officials from the principal development assistance agencies. The conference, which is expected to be repeated in 1975, revealed a growing sensitivity to environmental matters and a disposition to take account of these matters in the programs of the agencies.

64. The U.N. Environment Programme (UNEP) will be working closely with developing countries in identifying environment/development problems, and assisting them in preparing appropriate legislation and standards, institution-building, research and training. Through its information referral system, in which the Bank Group cooperates, the UNEP will be providing developing countries with information, data and advice on a broad range of environmental and related health matters, as well as on related development planning efforts.

V. COST-BENEFIT EVALUATION PROBLEMS AND NATIONAL ENVIRONMENTAL POLICIES

Project Considerations

65. As earlier pointed out, efforts are being made increasingly to include environmental considerations as integral parts of development strategy and action, and Bank Group operations. This raises difficult problems of evaluation as to the various costs and benefits involved in alternative ways of dealing with such environmental considerations. This section considers, first, the general criteria for making cost-benefit project decisions where a project involves significant environmental considerations; and, second, approaches to the formulation of national environmental policies. It attempts to identify the relevant principles involved, recognizing that both within the Bank Group and elsewhere, experience to date has shown quantification of the relevant tradeoffs to be an elusive goal.

66. In general, the methodologies and criteria applicable to projects with environmental aspects are similar to those applicable to other kinds of projects: the benefits (broadly considered) which could be expected to be realized from incremental environmental expenditures should be determined to be greater than those which flow from alternative uses of the resources

involved. There are, however, uniquely troublesome aspects of measurement and quantification associated with environmental matters which make application of such a concept at present more of an art than a science. It is difficult to predict the extent and type of environmental change that will result from a particular activity. It is even more difficult to value a predicted change in cost-benefit terms.

67. When the extent and character of environmental change can be predicted, often existing markets will provide a measure of the monetary value of some of the effects, at least. For example, the value of fish protein gained or lost through a change in water quality, and the repair and maintenance costs for physical structures subject to air or water pollution, can usually be adequately measured in this way. But it is not possible to directly establish a market value for the health effects of a change in amounts of air-borne particulates or a change in drinking water quality. In such cases indirect methods must suffice; an attempt must be made to infer from the prices of things which do have a market value, the value placed upon things for which no market has been established.

68. This concept of cost-benefit evaluation has been termed the "willingness to pay" concept. For example, a Bank Group appraisal mission on a sewerage project in Brazil was able to quantify some of the aesthetic and health benefits associated with a clean-up of the river through measurements of increases in nearby land values. In principle, this is the concept that the Bank Group currently attempts to employ in projects, such as water supply and sewerage, with direct health and environmentl consequences. While the concept presents measurement difficulties, it is in principle applicable to any project with environmental implications. Where markets fail or do not exist, an inference is drawn concerning the amount that individuals would be willing to pay were there a market. The measurement of willingness to pay should of course include the value of benefits which actually accrue to the individual, whether or not he is in fact charged with the cost of providing them.

69. Several factors with a special bearing on discussions of environmental matters, and which influence willingness to pay in particular instances, should be noted. First, willingness to pay for alternative items is a function of resource endowments, e.g., national wealth, and also of individual preferences and tastes. Consequently, different countries will make different choices as between environmental goods and other goods.

70. Second, willingness to pay will be to some extent a function of the options available within the area. For example, the value of cleaning a particular river or stream will depend upon the number of other clean bodies of water in close proximity and the extent to which they offer suitable alternative facilities. In an area with an abundance of clean water bodies, the marginal benefit of providing one more is likely to be substantially smaller than would be the case where there were very few water bodies or where most existing bodies were fouled.

71. A third factor affecting willingness to pay falls under heading of "non-user" benefits. Persons who are not and may never be users of a facility may nevertheless receive some benefit from the knowledge that the opportunity for use exists. In principle, that benefit should be measured by the sum of all such "non-user" beneficiaries' willingness to pay.

Approaches to Project Analysis

72. Least Cost. A "least-cost" analysis evaluates alternative proposals for achieving a particular environmental target, with the solution that achieves both the environmental (and productive) targets at least cost being selected. Least cost analyses are frequently used in power and other public utility projects where benefits are difficult to quantify. It is important in any such analysis to assess the sensitivity of costs to variations in the environmental target level, so that tradeoffs between levels of expenditure and the environmental quality obtained thereby can be evaluated. Although this approach provides only a partial analysis; if the proper sensitivity tests are made it can at least demonstrate, in physical and in cost terms, what are the relevant tradeoffs.

73. Switching Values. Another technique has been used in a few Bank projects which have environmental aspects, where some but not all benefits are quantifiable. It deserves wider attention. The approach involves providing an answer to the question "How large would the value of residual environmental benefits (those benefits not quantified) have to be to justify the project?" (The procedure is described in terms of benefits, rather than costs, because the valuation of benefits is likely to be more uncertain; costs may, however, be similarly treated.)

74. In using this approach, it is assumed that the cost stream, the discount rate and certain other benefits are known. One can thus solve for the unknown value of residual environmental benefits which would equalize the stream of total benefits and total cost at the given discount rate. Since benefits occurring in multiple years are involved, future-year residual benefits must be expressed as a function of first-year benefits.

75. When a value showing what the first-year benefit would have to be in order to justify the project is obtained, the decision whether to proceed with the project will depend on a judgment about the reasonableness of the result. The computed value of first-year benefits serves as a "switching value" for the decision. If a higher amount is ascribed to actual willingness to pay for these benefits, the project will be accepted; if willingness to pay is lower, it will be rejected. The greater the difference between the judgment concerning actual willingness and the computed value of first-year benefits, the greater can be the confidence with which a project is accepted or rejected. This kind of analysis is appropriate for gains or losses in recreation and aesthetic benefits, for example, the value of a man-day of recreation under the project being the unknown to be solved.

76. The "switching values" technique also has special relevance to problems involving the permanent loss of a unique natural or cultural asset. The fact of uniqueness will of itself make any kind of "market" pricing difficult, if not impossible. 1/

Use of Qualitative/Descriptive Analyses

77. If the environmental impact is significant, and all attempts at quantification fail, it will nevertheless often be possible to describe in qualitative terms the nature of the effects of alternative courses of action. A decision on project acceptability will typically be facilitated if, for example, in a project involving air pollution, a statement describing the benefits (or costs) of reducing (or increasing) the level of sulfur dioxide in a section of an industrial city accompanies the data on the quantifiable costs and benefits. The descriptive statement should attempt to characterize all aspects of the effects of the pollutants -- on sight, smell, taste, health, recreation, attitudes, animal and vegetative life, etc.

78. It is as important in a qualitative presentation as in a quantitative one to provide information in terms of incremental differences, i.e., to show the differences between the "with" or "without" cases, as well as the differences among project alternatives. Unfortunately, projects that produce only marginal changes may be harder to describe than projects with a large non-marginal impact.

National Environmental Policies

79. In lending for a project with significant environmental implications, the Bank Group often has an opportunity to influence the larger institutional framework within which decisions will be made. This has been the case with projects now in the preparatory stages in Finland, Yugoslavia and Turkey. It is useful, therefore, to consider the economic and social implications of alternative policy instruments available to governments. It should be kept in mind, however, that this is a new field in which views are still rapidly evolving and Bank Group staff experience is still fairly limited.

1/ A recent attempt at computing such switching values for a unique scenic canyon located in the United States made an assumption which is probably of wide general applicability: because the supply of substitute assets was fixed, the population and per capita income were increasing, and the income elasticity of demand for unique cultural or recreational assets was greater than for other goods, the price of the unique goods will increase, over time, relative to prices of other products.

80. Of the many national or regional strategies that have been proposed, most can be classified as involving regulations, subsidy or charges. 1/ These different approaches create different incentives and have different effects on resources allocation and on the distribution of the gains and losses resulting from governmental intervention.

81. Subsidies. The use of environmental resources can be effected by a program of subsidies. However, subsidies may give rise to certain practical difficulties, the nature of which depends on the basis of the subsidy. First, unless all productive investment is to be subsidized, the regulatory agency must isolate the costs incurred by enterprises for purely environmental purposes from those costs that would be incurred in any case in the interests of increasing production or improving efficiency. This will frequently be too complex for a regulatory agency to handle since an enterprise's least-cost response to regulatory requirements will often involve changes in internal processes which simultaneously result in usable or marketable outputs. This complexity is illustrated by information received during the preparation of a proposed project in Finland where it was estimated that it would cost as much as $100,000 simply to carry out a study of the net difference in cost to build a modern pulp and paper mill, with and without pollution control. As a result, in negotiating with authorities on the amount of the subsidy, the enterprises have all the advantages since only they have all the facts.

82. In consequence of the difficulty in separating out costs according to purpose, proposals involving subsidies tend to either encompass "productive" investment along with strictly pollution control investments and enterprises prefer investment toward "end-of-pipe" treatment facilities over internal process changes. The latter tendency occurs because while internal process treatment facility changes are often far superior to "add-on" treatment facilities, the latter can more easily be claimed to have been adopted exclusively for pollution control purposes.

83. Even if the level of subsidy could be related to actual reductions in effluents, rather than the cost of the preventive or ameliorative measures (i.e., payments to "clean" industries), other problems would arise. Subsidy payments would have to be adjusted as demand for a product changed over time, and to take account of obsolescence, modification and the introduction of new products; this would be extremely difficult to calculate and administer.

1/ The policy instruments discussed in this section are in general limited in their applicability to the pervasive problem of residuals generation (i.e., the generation of waste products from productive facilities), rather than the quite different problem of the loss of a unique natural or cultural resource. Moreover, they are not directed at the question of highly toxic substances, such as mercury or fluorine, which can be dangerous even in minute quantities. Problems of unique resources and of toxic substances can more usefully be considered in the context of special studies.

84. Assuming that the costs of the appropriate environmental measures could be identified, a subsidy which met less than 100% of those costs would provide insufficient incentive, unless it was associated with, for example, a requirement that certain standards be met. On the other hand, if 100% of costs were reimbursed, a producer would have no incentive at all to determine which of the many possible approaches to effluent reduction is the most efficient.

85. With any kind of subsidy, optimal substitution by users of products that have different environmental effects will not take place, because the total payment for the use of products (including an income or other tax necessary to pay the subsidy) is not related to the social cost of the particular products consumed. Demand for and production of highly polluting products will be greater than optimal.

86. The difficulties cited refer only to questions of efficiency. There would also be the considerable problem of financing the enormous funds required, were subsidies to be a principal component of an environmental control strategy.

87. Regulation/Standards/Licenses. Environmental resources use may also be controlled through regulation; for example, through issuance of permits (e.g., allowing a given volume of effluent discharge per time period); establishment of minimum standards of quality; or specification of equipment to be employed in treatment.

88. The easiest kind of regulation to draw up and enforce is one which is uniformly applied. A national or regional requirement that all effluent be of specified quality is attractive from an administrative point of view. However, the inefficiencies associated with uniform regulations are substantial. Uniform effluent standards take no advantage of local absorptive or regenerative capacities, nor do they take into consideration the differences in marginal costs faced by different enterprises in adjusting the amount or quality of their effluents.

89. In addition, a system of uniform regulations and standards, by not allowing any flexibility in pollution control requirements, makes almost inevitable a complex and long-drawn-out system of appeals to avoid extreme inequities and inefficiencies (for example, where a particular enterprise's costs of control actually exceed the benefits to society of the effluent reduction). However, the process of appeals and litigation is usually self-defeating, since the industry always has the advantage in arguments abouts its costs and technology.

90. Individually Adjusted Standards. In view of the inefficiencies of uniform effluent standards, the adoption of effluent standards tailored to each enterprise is often proposed. In theory, a governmental body could appraise each enterprise and issue individualized regulations which would require the enterprise to reduce emissions to the point at which the marginal cost of an additional unit reduction among all enterprises is equalized and/or the desired level of total region-wide reduction is achieved. The administrative costs of obtaining the information required to institute such a system would, of course, be enormous. Furthermore, the potential for delays through appeals and litigation, which is a disadvantage of a uniform standards system, is even greater when individual standards are set for each enterprise.

91. Effluent Charges. Another technique is a system of effluent charges, under which a fee is levied on the use of publicly-owned environmental media for disposal of wastes. The amount of the fee is based on the total load of the harmful pollutant discharged. Where the data are less than complete and reliable, this approach may have certain advantages over those discussed above. For example, if a decision is taken to achieve a given level of reduction in effluent for some particular air-or-watershed, a unit effluent charge, at the proper level, will achieve the desired reduction at a lower total cost to the economy than a regulation calling for uniform reductions in levels of emissions or setting uniform quality standards. This is so because an effluent charge, unlike a uniform regulation, will induce the greatest reduction from those enterprises which can accomplish the reduction most efficiently. Self-interest in maximizing profits will lead each enterprise to invest in process changes or effluent treatment up to the point at which the cost of a unit reduction in effluent is equal to the amount of the charge. Producers with different cost curves will therefore respond differently. Uniform regulations, on the other hand, require a uniform response regardless of the cost to the individual enterprise.

92. International experience with effluent charge systems is limited. Several European countries, among them France, Holland, Czechoslovakia, Germany and the United Kingdom, which have employed license systems, have replaced or supplemented these systems with effluent charges or are considering doing so.

93. Because absorptive/regenerative capacities, and therefore the harm caused, will be different for different air shed or water basins, an effluent charge should be set on a regional basis. The level at which the charge is set is critical. In principle, the rate per unit of discharge should be equal to the estimated cost to society of an additional unit of pollutant discharged. Such an estimate would also have to be made to

rationalize a system of regulation. While determination of an ideal level of effluent charge may be beyond the current state of the art, several methods have been proposed for arriving at rough approximations of the proper charge. 1/

94. The question is whether an inexact level of effluent charge is more, or less, acceptable than an inexact standard. With the "wrong" level of charges, the level of effluent production will be higher or lower than the target. The reduction that is achieved, however, is achieved by means of the "least cost" procedure. Furthermore, the level of charges may be raised or reduced over time to bring results in line with the target. If a uniform standard is adopted, whatever the standard, it can be shown to be inefficient with respect to particular enterprises with differing marginal costs. Individually adjusted standards avoid the latter difficulty but, as noted above, the informational requirements and the administrative machinery necessary to set the individual standards and to avoid claims of discrimination may be overwhelming.

95. The conventional wisdom is that with an effluent standard, the target for environmental quality is sure to be met, even though inefficiencies are involved, while with effluent charges the results are uncertain. Experience, however, has convinced many observers that almost exactly the opposite is true. Reductions in industrial waste loads where even modest sewer charges have been imposed by municipalities have often been rapid and spectacular; on the other hand, regulatory processes are frequently not only time-consuming, but also quite uncertain in result.

1/ A practical method for arriving at a rough estimate of the proper charge, using average, rather than marginal, considerations, might be as follows: First, an estimate is made of the total harm in a region being caused by a particular affluent, e.g., biochemical oxygen demand (BOD) or suspended solids in water, sulfates in air. Second, the total quantity in kilograms of the effluent currently being discharged by all sources into the air or watershed is determined. The damage estimate is then divided by the quantity to give an average cost that could be used as the effluent charge. Where more than one pollutant is involved a charge must, of course, be levied on each. In countries experimenting with such systems, formulas have been devised for computing the charges based upon a combination of different pollutants. There is an alternative, somewhat less desirable, approach, which does not require an estimate of social damages. If one of the goals of a national or regional program is a reduction by a certain percent of the amount of a harmful effluent, the amount of target reduction in kilograms could be estimated, and divided by the estimated total industry-wide cost of achieving the reduction. It may also be possible to obtain an independent estimate of the average per unit marginal cost of the target reduction across industries.

96. For very low levels of control, the appropriate remedies for a particular industry may be obvious both to the regulatory agency and to the industry. In such cases, there may be no great difference in result between a system of individually specified standards and a system of effluent charges. As the desired level of environmental improvement rises, however, marginal costs typically increase in a sharply non-linear fashion 1/ and the difference in results can be substantial.

97. One of the most detailed studies yet attempted for determining the cost of reducing pollution in a waterway was conducted almost a decade ago for the Delaware Estuary area of the United States. The study estimated costs of achieving a given level of reduction in water pollution through several different approaches, including uniform treatment standards and a unit effluent charge. It showed, among other things, that a program involving a uniform effluent standard resulted in costs from 70% to 100% higher than one involving a unit effluent charge, depending upon the specified quality level. (The difference in cost between the charge and the uniform standard was estimated at the time to be approximately $8 million annually for the higher quality level.)

98. The overall implementation strategy, whether regulation or effluent charge, must be augmented by other tools of public policy. The strategies discussed above apply chiefly to producers of goods, rather than to consumers. Moreover, they are directed at reducing future loads of pollutants, rather than improving already contaminated environments. Certain kinds of environmental activities, however, because of economies of scale, are most efficiently implemented through public initiative, often through "public utility" type organizations. Examples of such activities are urban sewerage, waste collection and treatment, and efforts to improve water bodies through artificial aeration, sludge removal or low flow augmentation.

Equity Considerations

99. Different forms of government intervention may have fundamentally different effects on the distribution of gains and losses from environmental improvement. Selection of the most appropriate strategy in terms of both efficiency and distributional implications can best be assured through a cost-benefit analysis which compares alternative strategies and takes account of the income position of those who gain and those who lose.

100. Under a system of charges, to the extent that the charges are reflected in a price increase, the additional costs are borne by the consumers of higher-polluting products; to the extent that producer costs increase,

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1/ See Annex 5 of IBRD "Finland's Water Pollution Control Program; The Role of Economic Analysis", Public Utilities Department, PUN 8--February 20, 1974.

those producers most efficient in reducing pollution will suffer the least reduction in profits. Charges are also a source of additional public revenue available to compensate those damaged by emissions which are not reduced, and for investment in publicly-owned treatment facilities where economies of scale make these appropriate.

101. Adoption of a uniform regulation rather than an effluent charge will cause a shift in economic burden from those efficient producers most capable of making an incremental reduction in pollution to the inefficient producers least capable of doing so. The shift will generally be accompanied by higher total costs Under a system of non-uniform regulations the distributional effects will depend upon the amount of information available to regulatory bodies (and to some extent upon the relative political or economic influence of particular enterprises).

102. A subsidy paid out of general tax revenues shifts the burden from the producers and consumers of polluting products to society as a whole.

103. A principle gaining increasing attention is that "the polluter pays". This principle, recently adopted by the OECD, is vague in application, but serves to bring to popular notice the economic concept that a producer forced to bear external costs imposed on others will adjust production activity to minimize such external consequences relative to overall profit levels. Different forms of governmental intervention can have different distributional implications and still be generally consistent with this principle, as is evident in the preceding comparison of the distributional effects of a system of uniform regulation and a system of effluent charges, under both of which "the polluter pays". A policy of subsidization out of general tax revenues would, however, appear to violate the prescription.

104. In some situations, the principle that the polluter pays may run counter to other social objectives. Where an important industry is forced out of business by newly-enacted environmental controls, society may wish, for equity considerations, to compensate those adversely affected. This kind of "adjustment assistance" is a relatively common type of governmental policy tool. Thus, to compensate for the economic impact of new environmental policies in economically depressed regions, some part of the adjustment costs may be borne out of general tax revenues. It is important, however, that such assistance be based upon demonstrated need, since distortions can result from across-the-board subsidies.

105. In assessing alternative strategies, whether or not adjustment assistance is actually provided, the social costs involved when factors of production are taken out of employment should be taken into account. The "lumpiness" of these social costs can, in fact, considerably complicate the problems of selection of the best strategy. In regions where pollution is caused by relatively few sources, and these few are important to the local economy, a curve relating total social costs to different levels of improvement in the environmental media could exhibit marked discontinuities. This would be the case where the strategy selected would force some of the important

enterprises out of production at a given level of environmental improvement. In such a situation, it would most likely be preferable to appraise separately the effects of the proposed program on each enterprise and to determine the impact of each enterprise's adjustment on the economy as a whole.

106. While no single national strategy is likely to be suitable in all contexts, a strategy of effluent charges based generally upon social damage caused and combined, where appropriate, with public works, commends itself from the standpoint of economic and institutional efficiency. Governments wishing Bank support in specifically environmental projects should therefore be encouraged to determine whether such an approach is appropriate for them. Where economic dislocations are likely to occur as a result of a change in domestic policies towards the environment, adjustment assistance based upon demonstrated need may be warranted. Such assistance would be preferable to across-the-board subsidies because of the distortions in investment to which the latter are likely to lead.

VI. IMPLICATIONS FOR BANK GROUP OPERATIONS

107. This chapter focuses on the Bank's policies and procedures in the light of its recent experiences in dealing with environmental questions.

Environmental Impact Assessment

108. Some development assistance organizations require that a formal assessment of the expected environmental impact be included in all project appraisal reports.

109. Given the Bank Group's comprehensive definition of "environment" and the wide variety in Bank Group activities, programs and projects, it would be impracticable for the Bank Group to institute such a requirement. The degree of importance or relevance of actually or potentially adverse environmental factors or effects will range across a very broad spectrum, from none or insignificant to highly critical. There is, in any event, a presumption that all projects under consideration, being intended to improve the human condition, will on balance have a beneficial impact on the environment as broadly conceived. Moreover, while a project's environmental, health and socio-cultural implications may be analyzed separately in an environmental impact statement, they are not in fact independent and separate elements of the project. The growing attention now being given to environmental/health impacts has simply enlarged the scope of project appraisal by focusing on a project dimension which, being difficult to quantify, has often been neglected in the past. It is important that adequate attention be given to activities which do have identifiable environmental implications, whether short or long-term, that an assessment be made of the significance of those implications and that, where warranted, they be fully analyzed.

110. The Bank Group should, therefore, adhere to its current policy of reviewing every investment project from the standpoint of the potential effects on the environment. It should encourage its member governments, both donors and recipients, to consider whether proposed projects have a potential for adverse environmental consequences, to arrange for further analysis and appropriate action where the nature and severity of those consequences warrant it, and to assure that project planning and execution takes due account of the results of that analysis. In this connection, the guidelines which the Bank Group has developed should be made available to governments, international organizations and individuals concerned with economic development.

Pre-investment Environmental Studies

111. In an increasing number of cases, the borrower finances environmental studies in much the same manner as it finances studies of other aspects of the project, a logical extension of the view that environmental, health and socio-cultural implications are as much a true dimension of a project as, e.g., the marketing aspects. Experience has shown, for example as noted earlier, that engineered changes in process design often produce results both superior to those obtained from end-of-the-line treatment and less costly. Process changes (often based on recycling) and new processes are constantly being developed to save resources and reduce treatment expenditures and disposal problems. An environmental study may also suggest selection of a different site, to avoid potential health hazards, reduce the likelihood of adverse impacts from effluents, avoid a conflict in resource use, etc. Under certain circumstances, the Bank Group itself will carry out and analyze the results of such studies. Where the Bank Group will not be carrying out the study, borrowers often ask for its help and advice, for example in drawing up terms of reference, or in making arrangements to have the studies carried out at the borrower's expense. The Bank Group should normally encourage borrowers to finance and carry out environmental project preparation studies themselves. However, in view of the importance of assuring that such studies are undertaken, the Bank Group should also be prepared, in appropriate cases, to include the cost of such studies in the expenditures to be retroactively financed out of a subsequent project loan.

Additional Transfer of Resources for Environmental Protection Measures

112. The question of "who pays" for environmental protection measures in the developing countries has already arisen in international discussions and promised to be one of the more controversial aspects of the environment/development debate. A strong effort by the developing countries was launched in preparation for the U.N. environmental conference to establish the concept of a net additional amount of assistance from the developed countries, additive to the 0.7 percent of GNP target established for the Second Development Decade, to cover the added costs of environmentally sound

development projects. The Development Assistance Committee of OECD expressed its reservations concerning the concept of "additionality," as it has come to be called. It indicated that it considers it is unrealistic and misleading to accept the notion of an increase in the gross total of resources available for development assistance to cover environmental costs, but it has accepted the principle that the added costs of development projects necessitated by environmental protection measures are a legitimate part of the project cost structure and the amount of assistance provided to projects requiring such added factors should take these costs into account. In this latter sense, the notion of "additionality" is acceptable; in the former sense, it is not. Further the OECD (DAC) donor countries rejected the concept of "additionality," (attributable to incorporating environmental protection measures in development projects). They did agree, however, that should developing countries have "environmental projects" among their priority investments, donor countries should finance them (e.g., urban water and sewage, erosion control, forest management, etc.).

113. It is possible that with a separate U.N. Fund for the Environment established it might be anticipated that there will be some suggestion by the developing countries to use this fund as a source for augmenting other development assistance flows. In its present conception, however, the donors to the Fund have made it clear that it should not be considered as another source of assistance for development projects in developing countries, but rather, as a source of funding for activities which address global problems of environmental protection of concern to both the developed and developing countries; (e.g., global environmental monitoring systems, research projects, costs of developing international conventions and agreements on protection of the oceans and the atmosphere, etc.).

114. The Bank Group should maintain the policy which its management has taken to date in international discussions of the "additionality" issue, which has been to urge acceptance of the idea that added costs in specific projects or activities for environmental protection reasons should be taken into account and, where necessary, assistance to such projects increased to cover all or appropriate portions of such costs.

Loan Conditions

115. Given the Bank Group's concern that projects be "environmentally sound", question arises whether country performance in establishing and following a sound environmental policy should be a "condition" of Bank Group support.

116. The question of "conditions" or "strings" attached by donors has long been a contentious issue. The growing concern with environmental implications has added a new facet to the problem. Developing countries are worried that developing assistance agencies, reflecting the donors' viewpoint, will translate this concern into additional criteria of eligibility for support. This is closely linked to developing country fears that developed countries may agree on environmental standards for particular types of projects, insisting that these standards be met as a precondition to the provision of assistance.

117. Since the issue of "conditions" is not new, its resolution in respect of environmental issues should be arrived at by applying the policy which has been followed with respect to "conditions" relating to economic or technical feasibility, engineering adequacy, financial soundness, etc. Without mutual agreement and cooperation among the parties, a project or program is unlikely to be successful, or at least will not be so for very long. Unilateral attempts by one party to impose or force compliance with requirements, restrictions or conditions will not work and are likely to impair the relationship. This is not to say that conditions should never be imposed; it is as unrealistic to expect assistance agencies, bilateral or multilateral, to extend aid unconditionally as it is to expect a recipient to accept the directives of an external authority concerning matters it considers to be within its own prerogative. The solution is not to eschew "conditions," but rather to seek agreement on conditions which are sensible and satisfactory.

118. One of the most useful roles which the Bank Group could play in the environmental field would be to establish a dialogue on the subject with member countries. The most effective vehicle to this end would be project appraisal, where the Bank Group's own work could provide the example of a proper balancing of all relevant factors. Bank Group financing of industrial projects in countries whose national environmental policy permits other enterprises in the vicinity to operate without emission controls justifies examination of the need for policy changes. In many countries there are no laws, rules or regulations governing environmental matters; the Bank Group may, in these countries, encourage and advise on promulgation and implementation of appropriate legislation. Where environmental conditions have deteriorated significantly and are causing severe problems through their negative feedback upon man, they were seldom caused by any single enterprise or project. Air, land and water as recipient media must cope with cumulative impacts over time, and the Bank Group having information on national development plans, may be able to identify areas in which problems are likely to arise in the absence of precautionary measures and prudent planning. If donor and recipient cannot agree on terms and conditions relating to environmental factors, donors will have to decide whether to provide the assistance on the terms and conditions proposed.

Common Environmental Standards

119. Development assistance agencies recognize that developing countries want to give priority to programs and projects which will promote economic growth, and will assign less importance to the need to protect the environment and health. They also recognize that the choice of development goals, priorities and alternatives is the sovereign responsibility of each developing nation.

120. At the same time, there is growing concern over the continuing deterioration of the environment on a global scale, the transnational environmental effects of development programs, especially at the regional level, and pressure, both within and outside governments, for steps to curb the growth of pollution and to minimize or eliminate the damaging side effects of development. In consequence, donors are tending to take a careful look at costs and benefits in environmental terms, and at alternative ways of selecting and implementing the development projects they agree to support. When, as will happen, a developing country opts for sacrificing the environmental protection aspects of development activities in favor of greater, or less costly, immediate economic growth, development assistance agencies must decide whether to provide assistance to a project of the latter character.

121. It has been suggested in some quarters that the potential for conflict could be reduced if all development assistance agencies were to adopt common environmental standards or criteria which development projects must satisfy to qualify for assistance. Developing countries, however, see such an approach as an infringement of their right to set their own priorities and standards, a form of "environmental imperialism". And in development assistance agencies there is some opposition to the "standards" approach, on the ground that it may lead to insistence on impracticable and excessively costly solutions, and fail to take due account of the wide variety of circumstances and situations and the multiplicity of variables in project design and implementation.

122. Since each country decides for itself whether to allocate limited resources to environmental protection as against education, housing, etc., and, if so, in what amount, and since levels of income, costs, local environmental absorptive capacities, tastes and cultural values differ from country to country, decisions concerning the allocation of resources will also differ. Uniform international standards, therefore, are not in general appropriate (except perhaps to the extent that they can be demonstrated to be physiological minimum standards, i.e., international health standards). Developing countries, however, while rejecting the automaticity and rigidity of uniform standards, appear to regard "guidelines" of the Bank Group type, characterized by flexibility and adaptability, as acceptable. Understandably and commendably, they wish to participate in the formulation and application of any such guidelines, and they emphasize the need for consultation between donors and recipients on these matters.

123. At the same time, in addition to the objections, noted above, to the setting of standards and criteria for project appraisal, developing countries have expressed concern that the application of guidelines may lead to "bottlenecks" in the implementation of development projects, and, in addition, to involvement in irrelevant detail. Nevertheless, it seems highly probable that agreements setting international standards on hazardous and toxic material, and environmental agreements related to the oceans, will be worked out. Extensive research is under way to evaluate the extent of man's global impact on the earth's air mantle; these efforts may likewise lead to agreements on international standards.

124. The Bank Group does not now, and should not, encourage development of common environmental standards or criteria for support of development assistance projects or activities. But should international financial assistance organizations agree on "guidelines" or standards or should international agreement be reached in certain environmental areas, the Bank Group should assure that its project financing is consistent with their terms.

125. The Bank Group should also help to bring to the attention of its member governments information, guidelines, instructional materials, technical data, etc., on environmental impact analyses available from public and private organizations concerned with environmental affairs. In doing so, however, the Bank Group should make plain that it is not imposing on its members its own views about environmental protection or attempting to legislative environmental virtue.

Funding "Environmental" Projects

126. An important issue is whether the Bank should finance "environmental" projects (a term which can be applied to a great variety of projects, including air and water pollution control, control of erosion, solid wastes disposal, reforestation, and pest and disease vector control) or should merely concern itself with the environmental/health dimensions of traditional projects.

127. The economic and social returns of "environmental/health" projects can be quite substantial relative to other projects in a particular country. The Bank should consider lending for projects of this character where the project in question satisfies the Bank Group's other project criteria. Such a policy will not represent a significant change of position since there is already a long history of involvement in sectors with direct environmental/health consequences, such as water supply and sewerage, afforestation, etc.

Other Suggested Steps

128. Several additional steps can be taken by the Bank Group to help assure that all projects are environmentally sound.

129. Country economic and sector reports should, where appropriate, include a survey of environmental conditions, highlighting any which are particularly relevant to project selection, location and design. The survey should include reference to existing or pending legislation, institutions charged with environmental/health responsibilities, pollution standards, and other matters associated with environment and health.

130. Terms of reference for consultants, and project preparation guidelines, should emphasize the importance of considering environmental issues and of reaching a judgment as to whether additional analysis or action is warranted. It is particularly important that engineering consultants be made aware of the Bank Group's concern and that they be required to incorporate in project design measures to prevent or minimize adverse environmental/health problems.

131. The Bank Group should undertake or sponsor research (e.g., on the problems of cost-benefit analysis in the environmental field) which will facilitate appraisal of projects with an environmental impact or will be otherwise related to its operational requirements.

132. Having had three years of experience with environmental/health aspects in its lending program, the Bank Group is now in a position to "audit" these aspects in an increasing number of projects. The accuracy of environmental/health forecasts, the adequacy of the safeguard measures employed, and the consequences for the affected ecological systems and human health can usefully be assessed; the results can be drawn on in the design of similar projects in the future. While this assessment can be carried out for many projects by a supervision mission (perhaps with the addition of an appropriate expert), others will require a multi-disciplinary examination. The Bank Group should continue to strengthen its capacity to review the environmental/health aspects of projects in the course of supervision missions; the mission reports should include an assessment of the extent to which environmental safeguards were taken and the appropriateness of the project's design; operations evaluation reports should similarly deal with environmental aspects. Studies of selected projects by multidisciplinary teams should also be undertaken.

133. The Bank Group should encourage, perhaps even require, staff members to take courses relevant to, or specifically designed for, operational needs. The Bank Group's EDI should emphasize environmental considerations to an even greater extent that it does at present.

Responsibility for Environment-Related Operational Work

134. Consideration has been given to the question whether a separate organizational entity should be established within the Bank Group to handle the increasing operational workload resulting from concern with the environment.

135. The conclusion reached is that this would be undesirable, both as regards projects in which the environmental aspect is only one of several, and as regards projects with specifically environmental objectives. With regard to the former, the initial stages of project design and location are the most critical from an environmental point of view. The Country Programs and existing Projects Departments clearly must retain principal responsibility for such matters. As for specifically environmental projects, neither the expected number of these nor the Bank Group's technical appraisal requirements is such as to suggest at this time the necessity of a separate organizational entity. The differing expertise that would be required for the varied kinds of environmental projects leads to the conclusion that they can best be handled either within existing departments or by ad hoc teams seconded from existing departments. The Office of Environmental Affairs should continue to provide overall guidance and assistance, and to serve as the focal point for liaison between the Bank Group and other international and national, governmental and non-governmental, agencies concerned with the environment.

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT
INTERNATIONAL DEVELOPMENT ASSOCIATION

POLICY REVIEW COMMITTEE

PRC/M/74-13a

October 15, 1974

ENVIRONMENTAL POLICY PAPER

MINUTES

Attendance:
Messrs. McNamara, Knapp, Baum, von Hoffman, Alter, Bell, Benjenk, Chaufournier, Husain, Weiner, Chadenet, Adler, Haq, Nurick, Stern, van der Tak, Lee

1. The meeting of the Policy Review Committee on the 'Environmental Policy Paper' was held on Thursday, October 10, 1974, at 5 p.m. in the President's office.

2. Mr. McNamara said that the paper indicated that the Bank's pragmatic approach of examining the environmental impact on a project-by-project basis was proving very suceessful. The fact that the Bank had accomplished significant environmental protection with additional costs of only 0 to 3 percent of total project costs meant that much controversy had been avoided. While the Bank's experience might not always hold in the future, to date the Bank had been able to avoid theoretical debates, for example, on who pays the additional costs of environmental protection.

3. In the discussion there was general agreement that the Bank's approach was working well. There was some doubt, however, whether the low range of 0-3 percent for additional environmental costs was an under estimate and whether it had been achieved by accepting lower environmental standards in developing countries. It was agreed that the report should be revised to focus on the factual record of the Bank's experience; the sections on the general controversies about the sharing of additional costs and the imposition of standards on recipients should be removed. The revised paper will be sent to the Board.

Frank Vibert
Secretary
Policy Review Committee

cc: Those Attending

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(4–73)

Blue Book

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INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT
INTERNATIONAL DEVELOPMENT ASSOCIATION

POLICY REVIEW COMMITTEE

PRC/M/74-13

October 9, 1974

ENVIRONMENTAL POLICY PAPER

CONFIRMATION OF MEETING

The Policy Review Committee meeting on the 'Environmental Policy Paper' will be held tomorrow, October 10, 1974, at 5 p.m. in the President's office (E-1227).

The paper was distributed yesterday, October 8 (PRC/C/74-13).

Frank Vibert
Secretary
Policy Review Committee

DISTRIBUTION

Attendance

Messrs.

McNamara	Chenery
Knapp	Husain
Alter	Weiner
Baum	von Hoffman
Bell	Adler, J.H.
Benjenk	Stern
Broches	Haq
Chadenet	van der Tak
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INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT
INTERNATIONAL DEVELOPMENT ASSOCIATION

POLICY REVIEW COMMITTEE

PRC/C/74-13

October 8, 1974

ENVIRONMENTAL POLICY PAPER

Attached is a copy of the 'Environmental Policy Paper' prepared by the Office of the Environmental Adviser (VP - CPS). The paper is due to be considered by the Executive Directors on November 12, 1974.

The paper is being distributed in case it is decided to hold a Policy Review Committee meeting, at short notice, before the paper is distributed to the Executive Directors.

Frank Vibert
Secretary
Policy Review Committee

DISTRIBUTION

Attendance

Messrs.
McNamara
Knapp
Alter
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ENVIRONMENTAL

POLICY

PAPER

October 1, 1974

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Chapter 1

SUMMARY AND CONCLUSIONS

1.1 International development assistance has always addressed problems of the human environment -- its principal focus being the poverty, disease, hunger, and illiteracy associated with the lack of economic development. Worldwide concern, however, has steadily mounted over other aspects of environmental problems -- those which emerge as undesirable secondary effects of the very processes of development itself. As a result, the responsibility and procedures for dealing with the potentially damaging environmental and related health/socio-cultural side effects of development schemes and projects have become serious issues for developing countries and for the institutions which provide development assistance.

1.2 The environmental problems confronting both the developed and developing countries have been articulated and documented in considerable detail, owing, in great measure, to the historic 1972 United Nations Conference on the Human Environment in Stockholm. Developing countries assign the highest priority to finding solutions to their environmental problems as they perceive them and which they principally attribute to the lack of development. The industrialized developed countries meanwhile are becoming increasingly concerned and preoccupied with the environmental degradation that accompanies their economic growth. It is widely agreed, however, that virtually all nations share both classes or problems, the essential differences being in the mix and intensity.

1.3 Sharing in the concern of the international development community for the threats and hazards to vital ecological systems, human health, and social well-being, the World Bank Group has made a systematic effort to identify and prevent their occurrence in the development projects for which it makes loans. With the establishment in 1970 of an organizational "focus" for environmental matters, the Bank Group is now in a position to encourage its member countries to minimize the disruptive side effects of development on the human environment. The impact of this policy has been felt far beyond that associated with the direct effects of its projects.

1.4 Its experiences to date have shown the wisdom of this policy and have given encouragement to those who despaired that promoting development and safeguarding the environment could find accommodation, as well as those who feared that their hopes for eliminating poverty through development would be dashed by the preoccupation with its adverse effects on environment.

1.5 The Bank Group remains convinced that it is not possible for the world's three-quarter billion poor to achieve a level of life in accord with fundamental human dignity without the continued economic growth of the developing nations -- and the developed nations as well. However, not economic growth on the pattern of the past wherein threats to the environment and the health and well-being of man are undeniable, but, rather, on patterns that strive to respect the tolerances of the environment to the stress of development, and the physiological thresholds that dictate man's status on the health-disease continuum.

1.6 Since there can be no question whether the impact of economic growth on the environment must be taken into account, the Bank Group seeks to increase and expand its assistance to developing countries in ways which are minimally disruptive of the environment while providing an improved quality of life for the affected peoples.

1.7 The World Bank's Office of Environmental Affairs was established in 1970 to review and evaluate every investment project from the standpoints of its potential effect on the environment. In the thirty-month period between July 1, 1971, and December 31, 1973, the Office reviewed 376 Bank loans and IDA credits. Of these, 245 revealed "no apparent potential problems." The same was true for 30 out of 58 IFC investments. For 131 projects, the environmental problems identified could be handled by Bank Group Staff without the need for outside expertise or special studies. However, 24 projects required special studies by consultants.

1.8 The project-by-project approach followed by the Bank Group in its environmental work has led to the following important conclusions:

(a) When the Bank Group first determined to incorporate environmental work into its lending operations, some concern was expressed about the cost of environmental measures and the burden that would be imposed on borrowers. The Bank Group's experience to date suggests that those early estimates were much too high. The additional cost attributed to the environmental/health safeguards which have been incorporated into projects has ranged from 0 - 3% of total project cost when realistic standards are adopted.

(b) Environmental problems have a cumulative impact. If remedial action is taken at a later stage, cost incurred would be considerably higher. The high end of the range (0-3%) applied where precautionary measures were added to projects already well advanced.

(c) Concern with environment is resulting in progressive incorporation of environmental safeguards in technology. This is particularly so in industry, a sector in which environmental issues first attracted attention. Incorporation of environmental technology means that environmental and non-environmental costs cannot be separated in the processes in which this development has occurred.

(d) In the initial stages of the development of what may be called environmental technology, emphasis was on the treatment of waste matter. The Bank Group's experience has underscored the need to treat the environmental problem as a multifaceted one.

(e) The Bank Group's project-by-project approach has pointed to a number of sector-specific environmental problems. This means that there is some scope for developing sectoral guidelines that could help improve project design with regard to their environmental impact.

(f) In evaluating various costs and benefits involved in alternative ways of dealing with environmental considerations, the Bank's experience to date has shown quantification of the relevant trade-offs to be particularly difficult.

1.9 The Bank Group has acquired considerable operational experience in its environmental work. The experience gained thus far has led to the identification of

a number of important policy issues.

(a) Should the Bank Group advocate determination of universal standards or should it continue to follow the project-by-project approach and recommend measures that are specific to the environment in which the project is to be located?

(b) To what extent should the Bank insist on accepting environmental performance as condition for lending? Should it relate environmental performance only to specific projects or should it encourage the country to take more general environmental measures?

(c) Who should meet additional costs that would result from projects designed to meet environmental considerations? Should these costs be met by the donor agencies/countries or by the recipient nations?

1.10 In recommending the Bank Group's approach to these important issues, we have taken into account not only our own experience, but that of other agencies who have concerned themselves with environmental matters.

1.11 Recommendations

(i) Environmental Standards:

(a) Developing countries fear that uniform environmental standards or criteria applied to both developed and developing countries alike, if used in support of development assistance projects or activities, will discriminate against them. Uniform standards may also be difficult to develop and may also prove very costly for the developing countries. It is therefore appropriate for the Bank Group to follow a project-by-project approach and incorporate only those environmental measures that are considered essential. But should international agreement be reached in certain environment areas, the Bank Group should assure that its project financing is consistent with their terms.

(b) The Bank Group should also help to bring to the attention of its member governments information, guidelines, instructional materials, technical data, etc., on environmental impact analyses available from public and private ogranizations

concerned with environmental affairs. In doing so, however, the Bank Group should make plain that it is not imposing on its members its own views about environmental protection or attempting to legislate environmental virtue.

(ii) Environmental Performance:

(a) In many countries there are no laws, rules or regulations governing environmental matters; the Bank Group may, in these countries, encourage and advise on promulgation and implementation of appropriate legislation.

(b) The Bank Group should continue its current policy of reviewing every investment project from the standpoint of the potential effects on the environment, and agreeing with the borrower on remedial steps, if necessary. It should encourage its member governments, both donors and recipients, to consider whether proposed projects have a potential for adverse environmental consequences, to arrange for further analysis and appropriate action where the nature and severity of those consequences warrant it, and to assure that project planning and execution takes due account of the results of that analysis. In this connection, the guidelines which the Bank Group has developed should be made available to governments, international organizations and individuals concerned with economic development.

(iii) Funds for environment-oriented projects:

(a) The Bank Group should maintain the policy which it has stated in international discussions of the "additionality" issue, which has been to urge acceptance of the idea that added costs in specific projects of activities for environmental protection reasons should be taken into account and, where necessary, assistance to such projects increased to cover all or appropriate portions of such costs. Whether or not such additions would increase the total flow of Bank Group assistance to the country would depend on a number of other considerations.

(b) The Bank Group should normally encourage borrowers to finance and carry out environmental project preparation studies themselves. However, in view of the importance of assuring that such studies are undertaken, the Bank Group should

also be prepared, in appropriate cases, to include the cost of such studies in the expenditures to be retroactively financed out of a subsequent project loan.

(c) The Bank should consider lending for "environmental" projects (a term which can be applied to a great variety of projects, including air and water pollution control, control of erosion, solid wastes disposal, reforestation and pest and disease vector control) where the project in question satisfied the Bank Group's normal project criteria.

Chapter II

INTRODUCTION

2.1 Much of the effort to raise the standard of living in the developing countries involves a deliberate modification of the natural environment. Construction of road, dams, airports, irrigation and sewerage systems, power plants and industrial facilities frequently results in the loss of ecological, health or socio-cultural values. Often this is because the consequences for the environment were not adequately considered at the project-planning stage or because information necessary to forecast the eventual impact on the environment was lacking or inadequate. And where adverse ecological consequences are forecast, effective steps to prevent or minimize the damage may sometimes not be taken because data on cost-effective safeguards or on economically competitive project alternatives are lacking or inadequate. Although the magnitudes of the loss in ecological and related values vary, there is a real cost to society over the long run.

2.2 In recent years, there have been repeated warnings that in many regions of the world, in both developed and developing countries, air, water, soil and other resources are deteriorating to an extent which threatens the quality of life and of the environment, perhaps even the future of human life. Such warnings have been sounded before. But their urgency has intensified: the consequences of continued cavalier use, or misuse, of natural resources, and of high rates of population growth, will be realized,

not some time in the comfortably distant future, but soon. This was the message of the first (1972) United Nations Conference on the Human Environment, held in Stockholm.

2.3 The trend toward degradation of the biosphere is global in its dimensions and consequences; it can be reversed only through comparably widespread recognition of the danger and international cooperation in dealing with it. There are encouraging signs in both of these directions. Resolutions of the United Nations General Assembly in 1968, 1969 and 1970 underlined the importance of taking environmental factors into account in economic and social development planning. The International Strategy for the Second United Nations Development Decade, adopted in 1970, declares that "Governments will intensify national and international efforts to arrest the deterioration of the human environment and to take measures towards its improvement, and to promote activities that will help to maintain the ecological balance on which human survival depends."

2.4 The economic development which the developing countries are determined to achieve, and which the World Bank Group was established to support, will necessarily have an impact on the environment, on both its naturally occurring and its man-made elements. The developing countries are not, and should not be, required to choose between economic and social development, on the one hand, and the preservation of the environment, on the other. The question for them, and for the Bank Group is rather how to achieve economic progress with the least possible disruption of the environment and its ecological life-supporting systems.

2.5 Although "environment" and "ecology" have received so much currency in recent years, there is no single universally accepted definition of either.

In this paper, environment is used to describe the total setting for economic development activity; it is not confined to the naturally occurring milieu (the ecological systems which surround and collectively support man), but extends to the socio-cultural milieu which man has created to facilitate adaptation to the demands and challenges of his naturally occurring surroundings. "Ecology" is used to refer to the relationship between organisms and their environment, including most especially the man/environment relationship.

2.6 Environmental problems may be divided into three categories related to their magnitude: global, regional and local.

2.7 Global problems pertain to the biosphere; they affect all, or nearly all, countries. Into this category fall the most widely discussed and threatening problems; for example, those caused by persistent **pesticide** residues which find their way into the biosphere processes through the actions of wind, water and living carriers, with effects well beyond the country in which the pesticide was applied; the burning of fossil fuels, which affects the carbon dioxide balance and the sulphur dioxide loading of the atmosphere, and the particulate content of the stratosphere; the pollution of the oceans from land sources, or from oil spillage or ship dumping on the high seas; and the man-induced or man- influenced changes in global climatic patterns. Clearly the resolution of problems in this category calls for heroic measures of international cooperation.

2.8 Regional problems result from biophysical linkages among a group of countries which have little or no effect beyond the members of the group. A typical example is the effect of river basin development on riparian countries, up or down-stream.

2.9 Local problems are those whose effects are confined within the boundaries of a particular country, for example, the extirpation of a wild-life resource, the creation of an aesthetic blight, or the eutrophication of a lake from fertilizer runoff or discharge of domestic sewage.

2.10 Environmental problems in a given category may differ in their dimensions. For example, while a global problem may eventually result from the gradual build-up of carbon dioxide in the atmosphere over a long period, the effects of pervasive, persistent pesticides can be seen more immediately. Another variant, related to timing, is the degree of certainty. The greater the time span for the cause-effect relationship to be observed and understood, the greater the uncertainty as to its manifestation; whereas the continuation of presently observable consequences is far more certain.

2.11 Two other variables may be noted: magnitude and degree of reversibility. Magnitudes cannot easily be compared, because effects are of different types, occur in different places and affect different aspects of life systems. "Reversibility" concerns the possibility of returning an ecological system to its former state. For example, a lake in an advanced state of eutrophication is virtually irreversible; the extinction of a species is absolutely so. On the other hand, it is possible to end pollution from particulate matter in the smoke of an industrial plant, and to restore the ambient air quality. **The dimensions of time, certainty, magnitude, and degree of reversibility combine to produce the dimension of urgency.**

2.12 The environment problems of the developing countries can be divided into two categories. To the first belong the problems associated with poverty. Under conditions of poverty the biophysical environment often exhibits the ravages of long years of mismanagement (overgrazing, erosion, denuding of forests, surface water pollution, etc.). Not merely the "quality" of life but life itself, is endangered, for it is often very difficult and sometimes impossible for the environment to renew its life-supporting capabilities. The developing countries assign the highest priority to finding solutions to problems of this nature. Here the principal concern is to correct the environment that has gone through a long period of deterioration.

2.13 The other set of problems accompanies the very process of development itself. Agricultural growth, for example, calls for construction of irrigation and drainage systems, clearing of forests, use of fertilizers and pesticides, all of which have environmental and health implications. Similarly, the process of industrialization could well result in the release of pollutants and in other environmental problems attendant on the extraction and processing of raw materials.

2.14 In summary, the developing countries are now beginning to be concerned with two different types of environmental problems. In the first, they have to alleviate poverty. In the other, they have to seek ways to prevent the deterioration in man's environment that has often been associated with development. The first task is immensely more difficult than the second. The second could also be come difficult if the present concern for environment is not translated into action. The Bank Group is concerned with both aspects

of the problem. Some other policy papers[1/] have addressed themselves to the problem of poverty. In this paper, we will be concerned mostly with the environmental problems that often arise with development unless precautionary measures are taken.

1/ The following policy papers have dealt with the Bank's approach to the problem of poverty: Bank Policy on Agricultural Credit (Report No. 436), Bank Policy on Land Reform, (Report No. 440), **Population Policies and Economic Development** (Report No. 481).

Chapter III

THE LESSONS FROM THE BANK'S EXPERIENCE[1/]

3.1 The concern with environmental problems has persuaded several donors to take a careful look at their programs of assistance. The United States Congress, for example, has questioned whether US aid should be made available for projects which would be criticized in the United States because of their impact on environment (e.g., use of certain pesticides, construction of industrial plants without effluent controls, etc.). There are even greater **reservations about aiding those projects of which the undesirable environmental and health impact of which could spill over national boundaries.**

3.2 At the same time prospective recipients of foreign assistance are concerned that the real value of capital inflows to them may decrease because of the donor countries' preoccupation with environmental problems. For instance, developing countries presented the concept of "additionality" to the 1972 United Nations Conference on the Human Environment. According to this added costs or activities for environmental protection should be **borne by the donor countries,[2/] beyond the internationally accepted targets for foreign assistance (e.g., 0.7% of GNP during the Second Development Decade).**

3.3 In recent years, some major development agencies have given concrete definition to what may be called environmental responsibility. They now recognize that development which ultimately degrades the human environment is not a sound investment. They have, accordingly, incorporated consideration of environmental factors into agency project review procedures.

1/ While most of the discussion in this Chapter focuses on the experience of the Bank Group, some references will be made to the work of other donor agencies.

2/ **For a detailed discussion of the "additionality" concept see Chapter IV, paragraph 4.14 ff.**

3.4 The Bank Group's involvement in environmental affairs started in earnest in 1970. In his 1970 address to the UN Economic and Social Council (ECOSOC), Mr. McNamara remarked that the problem facing development finance institutions was whether and how they might help the developing countries to avoid or mitigate some of the damage which economic development can do to the environment, without slowing the pace of economic progress. He noted that the costs resulting from adverse environmental change could be tremendous, and that a small investment in prevention would be worth many times what would later have to be spent to repair the damage. He announced to ECOSOC that a unit had been established in the Bank Group to determine, to the extent possible, what would be the environmental consequences of development projects being considered for financing, and said that the Bank Group proposed to work toward concepts which would make possible a consideration of environmental factors in development projects.

3.5 This paper deals with the Bank Group activities in the field of environment with focus on the lessons learned from this experience. **The following discussion is divided into two sections. The first section is concerned with the extent of the Bank Group's involvement in environmental work; the second with the lessons gained from this experience.**

A. Bank's Approach

3.6 **At the heart of the Bank's approach toward environmental issues is** the concern that the projects financed by it should not pose an unacceptable threat to the environment and public health. In order to ensure this, the position of Environmental Adviser was established in 1970

"...to review and evaluate every investment project from the standpoint of

its potential effects on the environment." A set of staff guidelines was prepared for use in the formulation, appraisal and execution of projects.[1/] Experience soon made it clear that the environmental/health aspects of projects should be handled at the formulation and design stages, rather than at the "eleventh hour," when changes or modifications prove difficult, if not impossible.

3.7 The Environmental Adviser (now Office of Environmental Affairs) instituted a procedure which has evolved as follows:

1. Operational department staff review with the Office projects under consideration for Bank or IFC financing with a view to identifying the likely environmental, health, and socio-cultural problems or opportunities associated with them;
2. Where indicated by the initial review, the Office of Environmental Affairs suggests what studies or investigations should be conducted to enable a better identification and understanding of the nature, dimensions, severity and timing of the problems likely to arise, to ensure that appropriate safeguarding or other, perhaps, enhancing measures can be taken. The Office designs the studies and advises on the disciplines needed to conduct them and the terms of reference;
3. When the studies are completed, the Office participates in the review and analysis of the data and information acquired and helps to work out appropriate safeguard measures. It

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1/ These guidelines were subsequently expanded and in 1972 a handbook, Environmental, Health, and Human Ecologic Considerations in Economic Projects, was published. (A revised and further expanded edition of the Handbook will be made available in French and Spanish (as well as English) in 1974.) The Handbook has been widely distributed to other economic development agencies, governments, engineering, contracting and consulting firms, universities, etc.

participates where appropriate in subsequent loan negotiations and in the presentation to the Board;

4. The Regional Office and the Office of Environmental Affairs monitor the implementation of the project, to ascertain the inclusion and adequacy of the recommended safeguard measures, and to determine what future action may be required. This experience is also useful for subsequent assessment of the accuracy of the forecast of environmental/health consequences and helps to indicate the approaches which should be taken, should similar problems occur in other projects.

3.8 **The data presented below are for the period July 1, 1971 to December 31, 1973 and give an indication of the nature and extent of the Bank's involvement in environmental matters.**

(a) Of a total of 376 Bank Group loans and IDA credits reviewed 245 (65%) revealed no apparent or potential environmental problems.[1/] The same was true for 30 (52%) of 58 IFC projects. There was considerable diversity among these 434 projects, as they included, for example, Bank loans to IFC, which in themselves have no identifiable environmental impact. Others include education, telecommunications, and, especially, population projects which have a large potential for positive environmental benefits, but do not ordinarily require an evaluation in the sense that projects in other sectors must undergo. These types of projects therefore are appropriately not included among the 159 projects that were acted upon.

1/ This means that either no potential problems were apparent to the OEA or that other projects, seen as having a higher potential for more serious environmental/health implications, were chosen, for further scrutiny because of staff and time constraints.

(b) In four cases representing about 1% of all loans and credits signed during the period, some other agency, such as the UNDP or WHO, had determined the need for safeguarding or remedial measures of some character and had taken appropriate action prior to Bank involvement. No IFC projects fell into this category.

(c) In the case of 105 projects for which loans or credits were signed, the environmental problems identified could be handled adequately by Bank Group staff and the Environmental Office, without the need for outside expertise or special studies. The projects in this category accounted for 28% of the total of Bank or IDA projects screened, but for 80% of the Bank/IDA projects on which any action was taken. The 26 IFC projects in this category represented 45% of the IFC projects screened, and 93% of those on which action was taken, leading to the incorporation of appropriate environmental/health measures.

(d) **The 22 Bank/IDA projects (including 9 in power,[1] 6 in agriculture,[2] and 3 in industrial[3]) and 2 IFC projects (both industrial[4]), which were found to require special studies by consultants, led to the incorporation of safeguard measures as a condition of Bank/IDA or IFC financing. These**

1/ Loan/Credit Numbers 809, 829, 841, 874, 889, 919, 923, 296, 339.

2/ Credit Numbers 393, 322, 282, 317, 277, 302.

3/ Loan Numbers 787, 817, 934.

4/ Investment Numbers 226, 258.

represented about 5% of the total number of Bank Group projects reviewed and 15% of the total requiring some action additional to an initial review.

3.9 The foregoing data, suggestive of the probability of environmental implications, are summarized in Tables 1 and 2.

Table 1: DISTRIBUTION OF BANK/IDA AND IFC ENVIRONMENTAL PROJECTS BY CATEGORIES OF ACTIONS TAKEN
(July 1, 1971-December 31, 1973)

	Bank Group/IDA	IFC
No problems apparent when reviewed	245	30
Problems handled by others prior to Bank Group involvement	4	-
In-house disposition	105	26
Consultants and Special Studies required	22	2
Total Number of Projects	376	58

BANK/IDA AND IFC PROJECTS REVIEWED AND ACTED ON DURING JULY 1, 1971 TO DECEMBER 31, 1973

TABLE 2

	No. of Projects Signed & Reviewed	No. of Projects Acted Upon
Bank Group/IDA		
Agriculture	104	46
Industry	22	14
Transportation	87	15
Tourism	6	5
Water and Sewerage	15	15
Power	34	22
Urban Projects	7	4
Telecommunications	15	1
Education	38	4
Multipurpose	4	3
Others 1/	44	0
IFC		
Cement	6	4
Chemicals	2	2
Iron and Steel	2	2
Mining	3	3
Motor Vehicles	4	2
Non-ferrous	2	1
Petrochemicals	1	1
Pulp and Paper	5	4
Textiles and Fibers	7	2
Tourism	7	7
Others 2/	19	0
TOTAL	434	159

1/ Population & Nutrition, Loans to IFC, Technical Assistance, Engineering Loans, Development Programs & Export Expansion Lending, DFCs.

2/ Capital Markets, DFCs, Food Industries, General Manufacturing, Housing

B. Lessons from the Bank Group's Experience

3.10 The lessons from the Bank's experience are summarized in five sections dealing with (i) incremental costs, (ii) cost sharing, (iii) cumulative impact of the problem, (iv) linkages between different aspects of the problem and (v) sector-specificity of some environmental problems.

(i) Incremental Cost

3.11 When the Bank Group began to incorporate environmental protection measures in its lending operations, some concern was expressed about the cost of such measures and the burden that would be imposed on borrowers. Estimates ranged as high as 25-50% of total project cost, which would have been wholly unacceptable to the developing countries.

3.12 It is difficult to separate out those costs and benefits which are attributable exclusively to environmental measures, and in any event the quantification of those costs and benefits will depend largely on how the environmental dimension is defined. For example, in the case of a sewerage treatment project the cost would be 100 percent. As public health is a most important part of our environmental considerations, most water supply and sewerage projects will fall in this category. In FY73, the aggregate total for such projects financed by the Bank/IDA amounted to $278.8 million in nine countries. These projects aside, the Bank Group's experience to date appears to be consistent with that of other aid agencies and suggests that those early estimates were much too high. The additional cost attributable to environment/health safeguards in "non-environmental" projects has ranged from 0-3% of total project cost, the high end of the range applying where precautionary measures were added on to projects already well advanced.

3.13 The 0-3 percent range may not be operative in the future. This is for two reasons. First, what is now regarded as environmental expenditure may in the future get incorporated in the technology chosen for projects. In that case it will not be possible to separate out environmental costs. Second, as economic development proceeds the cumulative impact of the environment/health-threatening effects will lead the developing countries to adopt higher standards and impose tighter controls. This is already being done in the case of urban industrial projects. Several developing countries now require installation of controls on existing plants, while stricter regulations governing the operation of new plants are being promulgated. As the assimilative capacity of ecological systems in developing countries becomes severely strained, it will be necessary to take additional measures and to strengthen existing ones. The cost of these measures will be greater and may exceed 3% of the total project costs.

3.14 Reports on air pollution in Sao Paulo, Ankara and Mexico City indicate that the requisite control measures will be both costly and technically difficult. In general, the cost of removing a pollutant from a waste stream is proportional to the amount already removed and this trend produces increasingly higher costs for additional incremental improvement. We therefore expect the cost of adding environmental measures to industrial projects designed for cities such as Sao Paulo, Ankara and Mesico City to be greater than 3 percent of the cost of the project.

3.15 While costs for environmental/health protection associated with individual projects remain an acceptably small part of the total investment, it should be stressed that increased development will contribute to the need for developing countries to assess the cumulative impact on the environment and the need for more stringent standards governing the design and execution of development schemes with resulting cost increases.

3.16 Some international surveys have been conducted to estimate the costs of national programs for environmental pollution control. However, such projections of national costs as are currently available are not very reliable. These estimates (available from advanced industrial countries) suggest that total investment plus operating costs for cleaning up a polluted environment and maintaining it at some suitable standard might vary from upward of one-half percent of the GNP. Perhaps the most extensive data collection effort with regard to cost estimates has been made in the US. Cumulative total pollution control expenditure for the period 1972-1981 were published in the fourth annual report of the US Council on Environmental Quality, 1973. They were estimated to be $275 billion (1972 dollars), or about 2.5 percent of the GNP. Any lower level of expenditures, it was stated, would likely result in even greater economic penalties as reflected in adverse environmental/health effects. The estimates covered air and water pollution, land reclamation, radiation and solid waste. This means that by postponing action on environment, the developing countries can expect to incur very large expenditures in the not too distant future.

3.17 It is appropriate to mention here another type of cost that the adoption of environmental measures may well impose on the developing countries. Developing countries fear that imposition of environmental control measures on their producers may alter their terms of trade with the developed world. This may happen since different countries will face different costs even for the same level of environmental standards. Furthermore, the implicit tradeoff between a healthier, more amenable environment and additional financial resources will be resolved differently by different countries. While data to predict the magnitude of any resulting shifts in inter-national terms of trade are not available, some independent experts feel that these effects may be substantial.

(ii) Sharing of Costs

3.18 A discussion of the question of sharing of costs for including environmental safeguards in project design should necessarily begin with a brief examination of the issue of additionality. This issue received considerable attention at the Stockholm Conference where it was given a variety of interpretations.

3.19 In its original sense, additionality meant that additional funding should be made available to developing countries to cover the costs incurred specifically or primarily to protect or enhance the environment. The motivation in this interpretation was that new environmental measures should not constitute an additional burden on the limited resources of the developing countries. This interpretation of additionality was not accepted by the developed world. While the debate goes on, the donor agencies have had to face the problem of cost sharing.

3.20 The Bank Group's approach has been to include in project financing those additional costs made necessary by the incorporation of environmental safeguards. This was done within the overall country allocations/ as determined by many other consideration. In this respect, the Bank has followed the interpretation of additionality as provided by OECD. But important issues remain, particularly for those projects in which benefits are not realized by the residents of the country in which the investment is being made. Wild life preservation components fall in this category. For instance, the Kafue Hydroelectric Project in Zambia, in its original design, would have had a serious impact on wild life in the area. These include some 90,000 lechwe, a species of small antelope unique to the project area, whose movements have been dictated largely by the grazing conditions provided for by the flood cycles and whose future is a matter of concern to wild life conservation groups the world over. By interfering with these flood cycles, the dam would have provided a grave threat to this already endangered species. To compensate for the loss of natural flooding when the water is most needed, the dam was redesigned to allow additional reservoir storage. This will permit discharge of water needed by wild life during the critical months of March and April in dry years.

The issue that arises then is: should this additional cost be borne by the recipient country or should it be the responsibility of those who urged the preservation of a particular species of animal as mankind's heritage.

3.21 Another example of the need to consider the assimilative capacity of ecological systems when evaluating the environmental impact of a project is to be found in the IFC financed Pan African Pulp and Papaer Project on the Nzoia River in Kenya which flows into Lake Victoria. The effluents carried by it therefore affect not only Kenya but also Uganda and Tanzania.[1] In evaluating the environmental impact of this project, the impact of the down stream of the river and the Lake, and the expected municipal and industrial development of the watershed needed to be examined. The nature and degree control over the effluent of the pulp and paper mill could only be gauged when its relationship to all other pollutants entering the river system was well understood. This examination revealed the critical necessity for requiring a high level of treatment of the plant's effluent and for encouraging the Government of Kenya to monitor the river's condition and plan further development with careful regard to cumulative threat to downstream uses. If adequate control over the municipal, industrial, and agricultural wastes entering the river system is not maintained, the river's already precarious ecological integrity will be lost with disastrous consequences for important downstream uses.

(iii) Cumulative Impact of the Problem:

3.22 As pointed out above environmental problems have a cumulative impact. If remedial action is taken at a later stage of a country's development, costs incurred will be considerably higher. Prudent planning and early preventive measures would avoid or reduce the high cost of subsequent remedial measures. There are a number of examples from the Bank Group's experience in which action at the planning stage prevented the occurrence of a serious environmental problem.

3.23 Turkey's Antalya Forest Utilization Project (cost $164.3 million) is one case in point. The Antalya area is well known for its natural beauty, historical sites, and good climate. These factors make the area an attractive place for tourists. Setting up of a large pulp and paper plant would seem to conflict with the development of tourism in the area. At an early stage, therefore, the inclusion/ of extensive

1/ This project also provides a good illustration of the transnational impact of environment.

environmental protection measures was recognized as a requisite for project implementation. It was seen that such measures would have to include careful architectural planning, landscaping, and effluent treatment facilities. This meant that detailed studies were necessary to determine the location of a suitable site.

3.24 The first study undertaken by the consultants recommended a number of sites on the Mediterranean. Topographical constraints and scarcity of water limited choice to eight possible locations along a 90 km belt of coastal land, and of these the one near the Manavgat River was seen as offering the best balance between economic and ecological considerations. Locating the plant at this site promised harmonious industrial and tourism development. However, the Bank expressed reservations and the Government established an inter-ministerial committee to conduct a detailed comparison of various alternative sites. The least-cost site initially chosen was abandoned in favor of some off-beach location removed from areas of high tourism potential and at a greater distance from the coastal highway.

3.25 With environmental concerns now incorporated in the site selection, some further investigations are being carried out. For instance, the problem of heavy truck traffic in the area requires further study and the Government intends to provide measures for improved handling of this traffic. Oceanographic studies are to determine the exact location of the liquid effluent pipeline outfall into the sea so as to minimize any future adverse impacts. Gaseous and liquid effluents will be minimized through maximum in-plant recycling and provisions made for advanced end-of-the-line treatment before final discharge. Finally,

zoning measures are being worked out with the ministries involved to prohibit future encroachment from industrial development upon tourism, and vice versa.[1/]

3.26 Brazil's MBR Iron Ore Project is another example of a Bank Group financed activity that, without adequate environmental planning, could have posed serious problems. The project contemplates the exploitation of high-grade iron ore near Belo Horizonte and construction of a 640 km rail transportation line to an insular marine terminal on Sepetiba Bay, a recreational/tourist resource of great potential value.

3.27 An examination of the project design revealed a number of potentially significant environmental problems at the mine site, along the rail line, and at the location of the terminal. It was decided to proceed with an on-site study, and a team of environmental consultants was engaged to identify likely problems and recommend preventive or mitigating measures. Partly as a result of the consultants' recommendations, arrangements were made for safe handling of the berthing ships' slops; an improved navigation system; a contingency plan for handling accidental oil spills; improved landscaping and rail trestle design; erosion and dust control; and solid waste handling and liquid waste treatment. At the mine site steps are being taken to prevent pollution of nearby surface waters, to stop erosion and to restore the landscape through plantings and contouring.

3.28 Sepetiba Bay, a largely, as yet unspoiled estuary of great beauty, represents a recreational/tourism resource of great potential value. In addition, it has a significant shell and fin fishery, as well as a nursery ground for important coastal fish stocks. The fate of this estuary is

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1/ Till the writing of this report, final site selection for the project had not been made.

uncertain in view of the planned industrial activities along its shores. But, the joint concern shown by the Bank Group and the borrower for the future of this area has set an example. Another industrial project on this Bay, financed in part by the IFC, has received similar treatment of its environmental aspects to ensure its not representing a threat to the Bay's future resource options.

3.29 Turkey's Antalya project and Brazil's MBR Iron Ore project are therefore examples of investment activities that would have caused major environmental problems if no changes had been made in siting and design. This does not mean that these projects will not result in any environmental deterioration. For instance, the railway to the MBR mines passes through some fairly high congested urban areas. The frequency of heavily loaded ore trains will create noise and safety problems. Since no fully satisfactory solution to the environmental problem could be found, these undesirable consequences were accepted. This notwithstanding, the redesigned project will produce considerably less adverse environmental impact. All those features that would have produced a progressive deterioration in the environment have been eliminated from the project design.

(iv) Linkages Between Environmental Problems

3.30 In the initial stages of the development of what may be called environmental technology, the emphasis was on the treatment of waste matter before it was introduced into the environment. Our experience with the impact on ecology of development projects has underscored the need to treat the environmental problem as a multifaceted one. The best examples of development leading to a wide range of environmental problems are to be found in the large urban areas of the developing countries. These centers suffer from too rapid growth and the continuing impact of rural/urban migration;

they are the focus of major problems concerned with air and water pollution, environmental sanitation, solid wastes management, congestion, noise, and lack of open spaces and recreational areas. Since the mix and intensity of these problems vary between cities, solutions must be designed for the particular socio-economic-political milieu. A case in point is the Istanbul Urban Development Technical Assistance Project.

3.31 This centuries-old city has been, in recent years, undergoing rapid, unplanned, and uncontrolled growth. The provision of urban services and amenities has not kept pace with growing demand. For instance, the water system lacks capacity to meet the present demand and service is intermittent. Only one-third of the city is served by a water-borne disposal system. Contamination of surface and ground water eventually used for domestic purposes is widespread and was linked to a cholera outbreak in 1970. Storm sewers are lacking and standing water is a problem in several areas of the city. Pollution of the Golden Horn has reached alarming proportions, while the Bosphorous and Sea of Marmara are grossly polluted from domestic and industrial wastes. Solid wastes management and disposal are inadequately handled, including open burning dumps, infested with vermin. Health service, particularly those serving the rapidly growing squatter settlements are less than adequate and ancillary health services (diagnostic laboratory, food inspection, etc.) are antiquated. Diffusion of responsibility for local administration among multiple agencies, and between different layers of government (metropolitan, regional and central government bureaucracies) has compounded urban environmental health problems.

3.32 The Bank-financed project seeks to address itself to some of these environmental problems. It aims toward achieving comprehensive and coordinated

policies, plans, and programs among and between levels of government leading to the formulation and execution of a sound metropolitan development program. The quality of life as well as the quality of the environment in Istanbul and its environs is to be directly affected by the outcome of this project. The problems being faced by Istanbul can be seen in many other cities of the developing world. The solution to these problems calls for a good understanding of the rapidly changing man-environment relationships in the urban setting. It is recognition of these linkages that has convinced the Turkish Government to seek assistance from a number of agencies. For instance, the UNDP has been called upon to help draft a national environmental policy while WHO is working on a comprehensive urban health program. The Bank has encouraged these moves, and is working in close cooperation with the UNDP and WHO. It stands ready to assist in financing suitable projects among those identified.

3.33 Large mining, industrial and irrigation projects provide other examples of the way development can produce a serious environmental imbalance. The Cuajone Mining Project in Peru, a large copper mining and smelting operation for which IFC is providing slightly more than 2 percent of the total cost of $550 million, will involve the development of a new copper mine, installation of a concentrator, and expansion of smelting and supporting infrastructure facilities. The project, which will produce 186,000 tons of blister copper annually, is located in a sparsely inhabited, largely semi-arid area of southern Peru immediately adjacent to the Pacific coast.

3.34 Examination revealed that effluents and emission created by the mining and smelting operations already being carried on at the project site would be doubled, causing 30 million tons of tailings to be annually discharged into the sea and 600,000 tons of sulfur oxides to be released into the air.

Population centers and surrounding agriculture would be exposed to marked increases in air pollution. Experience during the prior 14 years of operation indicated that the pollution had on occasion reached as far as 60 km upwind from the smelter, with adverse effects on sugar cane and vegetable production.

3.35 In addition to problems attributable to gaseous effluents, there was the question of the effect of tailings in the offshore waters. The waters are associated with the large-scale "upwelling phenomena" along the Peruvian coastline which gives rise to an abundance of phytoplankton, on which the anchovy feed. The annual anchovy catch has been estimated at about 10 million tons per year, making it the world's largest fishery in terms of weight of catch of a single species. The fishing grounds also sustain a large but fluctuating bird population (10-30 million) which includes the important guano-producing species (cormorant, piquero and alcatraz). The project without adequate environment safeguards therefore could have/a far reaching impact on Peruvian agriculture and fishing industries and on the health of the residents in nearby urban centers.

3.36 The magnitude of the mining project, the limited availability of data and the potential environmental/health impact, persuaded the Bank Group to engage an environmental pollution control expert. His report from the field, while recognizing the very significant economic/social benefits that Peru would realize from the proposed operations, weighed them against/the adverse environmental/health effects. Based on these findings, the Bank Group persuaded the borrower to accept in principle the incorporation of a number of environmental safeguards in project design.

3.37 In particular, it will take whatever steps are agreed to be necessary to alter its present tailings disposal practices, should this prove necessary,

and will monitor air pollution in and around the smelter site to preclude any threat to public health or to agricultural interests. Qualified consultants, acceptable to IFC, will conduct detailed studies on mine tailings disposal and air pollution.

3.38 / In another case, examination of the plans for the Erdemir Steel Expansion Project in Turkey revealed that little or no provision had been made to control the liquid and gaseous effluents which would be released intc the environment in relatively large quantities. Of particular concern was the possible effect of air pollution on public health and on livestock and vegetation in and around the project site. Further, the liquid wastes, containing toxic ingredients, were to be released directly into the offshore waters of the Black Sea, which already shows signs of heavy pollution. It was decided that an industrial pollution study should be made, and a team of industrial pollution control experts was engaged by the Bank Group. The team recommended controls to achieve reasonable standards governing the release of effluents in keeping with conditions peculiar to the project site. The sum of $5 million, representing 1.7% of total cost, was included in the project cost estimate for this purpose.

3.39 Irrigation projects may not only result in soil salinity and water-logging, they may also produce infestation by undesirable aquatic plants and the creation of new or enlarged habitats for water-associated disease vectors, especially those snail species involved in transmission of Schistosomiasis. Irrigation canals, by increasing the opportunities for human contact with water, also increase the opportunities for transmission of water-borne disease.

3.40 The Upper Egypt Agricultural Drainage Project illustrates some of those problems. The construction of the High Dam at Aswan has allowed for perennial irrigation by stabilizing the flow of the Nile. Perennial irrigation has brought the groundwater table up to or just below the surface and, with it, salts which raise the salinity of the soil and of irrigation waters. As a consequence, land is going out of production and this situation will continue unless and until adequate drainage is provided, as is being done in this project.

3.41 The disease of Schistosomiasis (Bilharizia), long known to Egypt, affects millions of persons. WHO has described it as one of the major crippling diseases of developing countries. Perennial irrigation has improved the habitat for the snail vector of the parasitic disease, and increased both its distribution and the chance for human infection (resulting in greater clinical severity of the disease). How to control the snail over large areas and arrest the clinical severity of the disease poses a formidable problem for Egypt's agricultural and public health authorities.

3.42 The Bank Group-financed drainage project in Upper Egypt provided an opportunity to study and deal with the problem. An internationally recognized Bilharizia expert, after a field survey, made recommendations for chemical control of the snails and treatment of infected individuals; these recommendations were incorporated into the project. The control effort is designed to fit into a national plan for tackling the environmental and clinical aspects of this disease.

3.43 Ecological problems also have psychological, physiological and socio-cultural components. Recognition of these problems and the opportunity

for minimizing them can be seen in a number of Bank Group-financed projects. In the case of the Accra/Tema Water Supply Project in Ghana, the resettlement of eight villages within the impoundment area with a population of about 2,000 was preceded by a detailed socio-economic study, as part of the project feasibility studies. Detailed planning and supervision of the resettlement would be undertaken by the University of Kumasi. While not a hydro-power project, this project presented similar resettlement problems and opportunities, and would seem to have been handled in a model manner. In the case of the Quae Yai Hydro-electric Project in Thailand, 8,000 inhabitants will be resettled out of a reservoir area, and presenting classical psycho-socio-cultural problems. In the environmental studies conducted during the feasibility stage, careful consideration was given to resettlement sites, changes in occupation, life-styles, physical and social conditions, social services, etc., and these have formed the basis of a resettlement plan to be implemented by the borrower and government. Many other project examples exist, such as the Sao Simao, Itumbiara and Paulo Alfonso Hydro-electric Projects in Brazil, wherein resettlement problems were presented and required incorporation as integral aspects of the projects' formulation and implementation.

3.44 These illustrations from the Bank's experience in environmental work underscore the important point that remedial measures have to be spread over a number of sectors. As pointed out, often the secondary impact on environment can be much more serious than the primary. This means that in evaluating the environmental impact of the projects financed by it, the Bank Group should spread its net as wide as possible, calling in other international agencies in cases where the comparative advantage lies with them.

(v) Sector-specific problems

3.45 In looking at environmental problems, the Bank Group has followed what may be described as the project approach. As indicated in Section B, the Office of Environmental Affairs first identified those projects that, for reasons of chosen technology or siting, had potential environmental problems and then suggested changes that were deemed necessary in order to reduce their impact on the ecology. This project-by-project approach notwithstanding the Bank's experience shows that different countries and different sectors of the economy are each faced with their own specific set of problems. Some of the potential problems are described below.

3.46 Industry: Few if any industrial projects are free of potentially troublesome environmental problems. Most common, as would be expected, are those associated with air and water pollution, solid wastes disposal, noise, in-plant industrial hygiene, plant siting, and subsequent related land use and settlement patterns. The capacity of the environment to withstand the injection of industrial wastes without serious undesirable consequences must be carefully considered. It is also important to identify specific pollutants, known to pose a demonstrable threat to human health or ecological systems (e.g., mercury, fluorine, arsenic, etc.) even in very low concentrations; their release must be prevented or carefully controlled and monitored. Fortunately, the pollution resulting from industrial processes is susceptible to control. The degree of control appropriate will depend upon the environmental setting and the quality of the ambience to be achieved. Conditions in many developing countries permit more liberal effluent and emission standards than can be tolerated in the more highly industrialized countries. But it is important not to foreclose potentially important future resource options; hence, the need for projecting the cumulative consequences of industrial pollution.

3.47 Power: Thermal power projects exhibit many of the problems characteristic of industrial schemes as they relate to air and water pollution. Of especial concern is the effect the heated cooling waters will have on the biota of the water body into which they are discharged.

The problems associated with transmission lines have to do with scenery and tourism. The problems can be minimized or avoided if the proposed route is considered in relation to these values. Use of herbicides along the right-of-way creates problems for the local flora and fauna.

3.48 Forestry: Forestry projects present problems associated with ensuring a sustained timber yield through regulation of annual allowable cuts, prescription of cutting cycles appropriate to the species harvested, reforestration of cut-over areas, prevention of erosion and fire, and maintenance of stream flows in the areas being harvested. Problems can also arise in connection with the scope and extent of enforcement of forestry laws and regulations, the competence of forest management institutions, and the award of lumbering concessions. The transport and industrial aspects of forestry projects may also require examination.

3.49 Fishing: In marine fishing projects problems concern the stocks to be exploited, and the manner in which they will be harvested to ensure a sustained yield. This leads to examination of the institutional capacity for overseeing and regulating the harvesting of this resource, as well as for conducting the necessary studies, investigations, and research.

Pollution with respect to its impact on the fisheries, especially estuarine and coastal stocks, is a matter of continuing concern.

Fresh water fishery development schemes can be threatened by fertilizer and pesticide runoff, weed and algae infestation, and water-borne diseases.

3.50 Livestock: Livestock projects require considerations of range conditions and carrying capacity, and the prevention of over-grazing. Livestock/wildlife competition, encroachment on game preserves, barriers to wildlife migration routes and the adequacy of water supplies are associated issues. In semi-arid areas, the potential for contributing to desertization, a phenomenon affecting large areas of the Sahel zone in Africa, must be taken into account.

3.51 Rural Development: Rural Development projects may require consideration of health-care delivery and environmental sanitation. New water supplies need to be protected against surface and sub-surface contamination. The problems presented by small sub-projects--impoundments, irrigated areas, fish ponds, etc.--are local in character and can readily be handled, often on a self-help basis.

3.52 Transport: Highway projects may at times change surface water drainage patterns and lead to erosion. If not properly planned they may open new pathways for transmission of human and animal disease; lead to unregulated settlement along the route, and create aesthetic problems in areas with high tourism potential; adversely affect wildlife habitats; and pose safety problems for people and animals. Highway design engineers and contractors are, however, becoming increasingly aware of the problems posed for the physical environment, while development planners are becoming aware of the secondary impact of new roads. The problems presented by railways are similar to those posed by highways. The principal problem associated with airports is noise, which affects decisions concerning runway orientation,

flight paths and aircraft schedules. Siting and land use zoning assume importance, as means of minimizing the undesirable consequences of congestion from development associated with or triggered by the airport. Port development and inland waterway projects may pose problems of dredging and the disposition of spoil material, the possible disruption of fish habitats, the potential for accidental oil spills, pollution of water, changes in sediment transport which may alter beaches and other land forms, undesirable urban development, marine accidents and solid wastes management. Pipelines which are not properly sited can become a barrier to wildlife movement, create an aesthetic blight, constitute a hazard if ruptured by an earthquake and may encourage improper use of herbicides along the right-of-way.

3.53 Tourism: Tourism projects often constitute an aesthetic threat to the local scenery. Architectural design and proper utilization of the land/water areas being developed are critical as is the continued prevention of pollution in water bodies associated with the project. The impact of such projects on nearby urban areas and on people and cultures should be taken into consideration.

3.54 The foregoing discussion suggests that it is possible to move away a little from the project-by-project approach that the Bank Group has followed to-date. It is possible, for instance, to develop environmental guidelines that would be sector-specific. While this would not do away with the need for detailed project analysis; it would help the development agencies to focus attention on potential environmental

Awareness of problems associated with certain sectors can help to improve project design with regard to its environmental impact.

Chapter IV

IMPLICATIONS FOR BANK GROUP OPERATIONS

4.1 The Bank Group has acquired considerable operational experience in its environmental work. In the experience gained thus far, the following have been identified as policy issues of some importance. First, the question of environmental standards. Should the Bank Group advocate the determination and enforcement of universal standards or should it continue to follow the project-by-project approach and recommend measures that are specific to the environment in which the project is to be located. Second, to what extent should satisfactory environmental performance be a condition for bank loans. Third, who should meet additional costs that would result from this environment constraint. Each of these issues is discussed below.

Environmental Standards

4.2 Development assistance agencies recognize that developing countries want to give priority to programs and projects which will promote economic growth, and will assign less importance to environmental concerns. They also recognize that the choice of development goals, priorities and alternatives is the sovereign responsibility of each developing nation.

4.3 At the same time, there is growing concern over the continuing deterioration of the environment on a global scale, the transnational environmental effects of development programs, especially at the regional level, and pressure, both within and outside governments, for steps to curb the growth of pollution and to minimize or eliminate the damaging side effects of development. Consequently, donors are tending to take a careful look at costs and benefits in environmental terms and at alternative ways of selecting and implementing the development projects they agree to support.

When, as will happen, a developing country opts for sacrificing the environmental protection aspects of development activities in favor of greater, or less costly, immediate economic growth, development assistance agencies must decide whether to provide assistance to a project of this character.

4.4 It has been suggested in some quarters that the potential for conflict could be reduced if all development assistance agencies were to adopt common environmental standards or criteria which development projects must satisfy to qualify for assistance. Developing countries, however, see such an approach as an infringement of their right to set their own priorities and standards, a form of "environmental imperialism." And in development assistance agencies there is some opposition to the "standards" approach, on the ground that it may lead to insistence on impracticable and excessively costly solutions, and fail to take due account of the wide variety of circumstances and situations and the multiplicity of variables in project design and implementation.

4.5 Since each country decides for itself how to allocate limited resources to environmental protection as against education, housing, etc., and since levels of income, costs, local environmental absorptive capacities, tastes and cultural values differ from country to country, decisions concerning the allocation of resources will also differ. Uniform international standards, therefore, are in general inappropriate (except perhaps to the extent that they can be demonstrated to be physiological minimum standards, i.e., international health standards). While rejecting the automaticity and rigidity of uniform standards, the developing countries appear to regard "guidelines" of the Bank Group type, as acceptable. However, the developing countries wish to participate in the formulation and application of any such guidelines,

and they emphasize the need for consultation between donors and recipients on these matters.

4.6 At the same time, in addition to the objections noted above, developing countries have expressed concern that the application of guide-lines may lead to "bottlenecks" in the implementation of development projects. There is also some concern that environmental standards are being proposed by developed countries to maintain comparative technological advantage over the developing nations. Nevertheless, it seems probable that agreements setting international standards on hazardous and toxic material, and environmental agreements related to the oceans, will be worked out. Extensive research is uder way to evaluate the extent of man's global impact on the earth's air mantle; these efforts may also lead to agreements on international standards.

4.7 Reccomended approach for the Bank Group: Developing countries fear that uniform environmental standards or criteria applied to both developed and developing countries alike, if used in support of development assistance projects or activities will discriminate against them. Uniform standards may also be difficult to develop and may prove very costly for the developing countries. It is therefore appropriate for the Bank Group to follow a project by project approach and incorporate only those environmental measures that are considered essential. But should international agreement be reached in certain environmental areas, the Bank Group should assure that its project financing is consistent with their terms.

4.8 The Bank Group should also help to bring to the attention of its member governments information, guidelines, instructional materials, technical data, etc., on environmental affairs. In doing so, however, the Bank Group should make plain that it is not imposing on its members its own views about environmental protection.

Enforcing Environmental Performance

4.9 Given the concern that development projects be "environmentally sound", the question arises whether country performance in establishing and following a sound environmental policy should be a condition of lending.

4.10 The question of "conditions" or "strings" attached by donors has long been a contentious issue. The growing concern with environmental implications has added a new facet to the problem. Developing countries are worried that development assistance agencies, reflecting the donors' viewpoint, will translate this concern into additional criteria of eligibility for support. This is closely linked to developing country fears that developed countries may agree on environmental standards for particular types of projects, insisting that these standards be met as a precondition to the provision of assistance.

4.11 Since the issue of "conditions" is not new, its resolution in respect of environmental issues should be arrived at by applying the policy which has been followed with respect to "conditions" relating to economic or technical feasibility, engineering adequacy, financial soundness, etc. Without mutual agreement and cooperation among the parties, a project or program is unlikely to be successful, or at least will not be so for very long. Unilateral attempts by one party to impose or force compliance with requirements, restrictions or conditions will not work and are likely to impair the relationship. This is not to say that conditions should never be imposed; it is as unrealistic to expect assistance agencies, bilateral or multilateral, to extend aid unconditionally as it is to expect a recipient to accept the directives of an external authority concerning matters it considers to be within its own prerogative. The solution is not to eschew

"conditions", but rather to seek agreement on conditions which are sensible and satisfactory.

4.12 Recommended approach for the Bank Group: One of the most useful roles which the Bank Group could play in the environmental field would be to establish a dialogue on the subject with member countries. The most effective vehicle to this end would be project appraisal, where the Bank Group's own work could provide the example of a proper balancing of all relevant factors.[1/] Bank Group financing of industrial projects in countries whose national environmental policy permits other enterprises in the vicinity to operate without emission controls justifies examination of the need for policy changes.

In many countries there are no laws, rules or regulations governing environmental matters; the Bank Group may, in these countries, encourage and advise on promulgation and implementation of appropriate legislation. Where environmental conditions have deteriorate significantly and are causing severe problems through their negative feedback upon man, they were seldom caused by any single enterprise or project. Air, land and water as recipient media must cope with cumulative impacts over time, and the Bank Group having information on national development plans, may be able to identify areas in which problems are likely to arise in the absence of precautionary measures and prudent planning. If the Bank & the borrower cannot agree on terms and conditions relating to environmental factors, the Bank will have to decide whether to provide the assistance proposed without environmental safeguards which it considers essential.

4.13 Also, the Bank Group should continue its current policy of reviewing every investment project from the standpoint of the potential

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1/ For a discussion of this see the Appendix on "Cost-Benefit Evaluation Problems and National Environmental Policies."

effects on the environment and agreeing with the borrower on remedial measures that may be considered necessary. It should encourage its member governments, both donors and recipients, to consider whether proposed projects have a potential for adverse environmental consequences, to arrange for further analysis and appropriate action where the nature and severity of those consequences warrant it, and to assure that project planning and execution takes due account of the results of that analysis. In this connection, the guidelines which the Bank Group has developed should be made available to governments, international organizations and individuals concerned with economic development.

Financing Environmental Protection

4.14 The question of "who pays" for environmental protection measures in the developing countries has already arisen in international discussions and promises to lend a controversial dimension to the environmental/development debate. In preparation for the U.N. environmental conference, the developing countries sought to establish the concept of "additionality", which means that/net additional amount of assistance from the developed countries, in addition to the 0.7 percent of GNP target established for the Second Development Decade, should be made available to cover the added costs of environmentally sound development projects. The Development Assistance Committee of OECD expressed its reservations concerning this concept, considering it unrealistic and misleading to accept the notion of an increase in the gross total of resources available for development assistance to cover environmental costs. OECD has, however, accepted the principle that the added costs of development projects necessitated by environmental protection measures are a legitimate part of the project cost and should be taken into account by the donor countries. In this latter, albeit much weaker, sense the notion of "additionality" is acceptable to OECD countries; in the former

sense, it is not. The donor countries have also suggested that, should developing countries have "environmental projects" among their priority investments, they would,be willing to finance them(e.g., urban water and sewage, erosion control, forest management, etc.).

4.15 The question of additionality was raised again at the time of the setting up of the United Nations Environmental Fund (UNEF), as part of the United Nations Environmental Program(UNEF) which administers the Fund under the guidance of its 58 member Governing Council. UNEF was established in 1972 to provide "additional financing for environmental programmes".[1/] In order to enable UNEF to fulfill its policy-guidance role for the direction and co-ordination of environmental activities, the Environmental Fund will finance wholly or partly the costs of the new environmental initiatives undertaken within the United Nations system, including those envisaged in the Action Plan adopted by the United Nations Conference on the Human Environment. As originally conceived, the program sought to make additional resourdes available for global and transnational environmental projects. It was envisaged as a $100 million, 5 year program.

4.16 With the establishment of a separate UN Fund, some suggestion by the developing countries to use it as a source for augmenting other development assistance flows can be anticipated. In its present conception, however, the donors to the Fund have made it clear that it should not be considered as another source of assistance for development projects in developing countries, but rather, as a source of funding for activities which address global problems of environmental protection of concern to both the developed and developing countries. Examples of such activities are global environmental monitoring systems, research projects aimed at environment, international conventions and agreements on protection of the oceans and the atmosphere.

1/ United Nations, Report of the United Nations Conference on the Human Environment, document no. A/CONF. 48/141. Rev.1,p.30.

4.17 The concept of additionality, therefore, has acquired a number of different meanings. For the developing countries it means resources in addition to those promised for meeting the UN Second Development Decade Target. For the developed countries it means meeting additional project costs to be incurred for environmental reasons, without increasing the total flow of resources to the developing countries. The United Nations sought to take a position somewhere in between, where some additional resources will be made available for global and transnational environmental activities.

4.18 Recommended approach for the Bank Group: The Bank Group should maintain the position which it has taken to date in international discussions of the "aditionality" issue. According to this added costs in specific projects or activities for environmental protection reasons should be taken into account and, where necessary, assistance to such projects increased to cover all or appropriate portions of such costs. Whether or not such additions would increase the total flow of Bank Group assistance to the country would depend on a number of other considerations.

4.19 In an increasing number of cases, the borrower finances environmental studies in much of the same manner as it finances studies of other aspects of the project, a logical extension of the view that environmental, health and socio-cultural implications are as much a true dimension of a project as, e.g., the marketing aspects. Experience has shown, for example as noted earlier, that engineered changes in process design often produce results both superior to those obtained from end-of-the-line treatment, and less costly process changes (often based on recycling) and new processes are

constantly being developed to save resources and reduce treatment expenditures and disposal problems. An environmental study may also suggest selection of a different site, to avoid potential health hazards, reduce likelihood of adverse impact from effluents, avoid a conflict in resource use, etc. Under certain circumstances, the Bank Group itself will carry out and analyze the results of such studies. Where the Bank Group will not be carrying out the study, borrowers often ask for its help and advice, for example in drawing up terms of reference, or in making arrangements to have the studies carried out at the borrower's expense. The Bank should normally encourage borrowers to finance and carry out environmental project preparation studies themselves. However, in view of the importance of assuring that such studies are undertaken, the Bank Group should also be prepared, in appropriate cases, to include the cost of such studies in the expenditures to be retroactively financed out of a subsequent project loan.

4.20 An important issue is whether the Bank should finance "environmental" projects (a terms which can be applied to a great variety of projects, including air and water pollution control, control of erosion, solid wastes disposal, reforestation and pest and disease vector control) or should merely concern itself with the environmental/health dimensions of traditional projects. The economic and social returns of "environmental/health" projects can be quite substantial relative to other projects in a particular country. Such projects should be considered for Bank lending provided they meet the Bank Group's normal project criteria. Such a policy will not represent a significant change of position since there is already a long history of involvement in sectors with direct environmental/health consequences, such as water supply and sewerage, afforestation, etc.

4.21 In summary, this paper proposes the continuation of the Bank's present approach toward environmental problems. Some advances have been suggested in project design, implementation and finance. If these are adopted, the Bank Group can expect to play an increasingly fruitful role in improving and/or helping to retard the deterioration of man's physical environment.

Appendix

ECONOMIC EVALUATION OF NATIONAL ENVIRONMENTAL POLICIES AND PROJECTS

Project Considerations

1. As pointed out in the text of the paper, efforts are increasingly being made to include environmental considerations as integral parts of development strategy and action. This raises difficult problems of evaluating the various costs and benefits of alternative ways of dealing with environmental considerations. This appendix considers, first, the general criteria to be employed in cost-benefit analysis of projects involving significant environmental considerations; and, second, approaches to the formulation of national environmental policies. It attempts to identify the relevant principles involved, recognizing that both within the Bank Group and elsewhere, experience to date has shown quantification of both costs and benefits to be particularly difficult.

2. In principle, the methodologies and criteria applicable to projects with environmental aspects are similar to those applicable to other kinds of projects; the benefits (broadly considered) which could be expected to be realized from incremental environmental expenditures should be determined to be greater than those which flow from the best alternative use of the resources involved. There are, however, uniquely troublesome aspects of measurement and quantification associated with environmental matters which make application of such a concept at present more of an art than a science. It is difficult to predict the extent and type of environmental change that will result from a particular activity. It is even more difficult to value a predicted change in cost-benefit terms.

The Concept of "Willingness to Pay"

3. When the extent and character of environmental change can be predicted, existing markets will often provide a measure of the monetary value of

some of the effects. For example, the value of fish protein gained or lost through a change in water quality, and the repair and maintenance costs for physical structures subject to air or water pollution, can usually be adequately measured in this way. But it is not possible to directly establish a market value for the health effects of a change in amounts of air-borne particulates or a change in drinking water quality. In such cases indirect methods must suffice; an attempt must be made to infer from the prices of things which do have a market value, the value placed upon things for which no market has been established. For example, a Bank Group appraisal mission on a sewerage project in Brazil estimated some of the aesthetic and health benefits associated with a clean-up of the river on the basis of a predicted increase in nearby land values.

4. This approach to cost-benefit evaluation is based on the "willingness to pay." In principle, this is the concept that the Bank Group currently attempts to employ in projects with direct health and environmental consequences. While the concept presents measurement difficulties, it is in principle applicable to any project with environmental implications. Where markets fail or do not exist, an inference is drawn concerning the amount that individuals would be willing to pay were there a market. The measurement of willingness to pay should of course include the value of benefits which actuallly accrue to the individual, whether or not he is in fact charged with the cost of providing them.

5. Several factors with a special bearing on discussions of environmental matters, and which influence willingness to pay in particular instances, should be noted. Willingness to pay for alternative items is a function of resource endowments, e.g., national wealth, and also of individual preferences and tastes. Consequently, different countries will make different choices as between environmental goods and other goods.

6. Willingness to pay may also be a function of the options available within the area. For example, the value of cleaning a particular river or stream will depend upon the number of other clean bodies of water in close proximity and the extent to which they offer suitable alternative facilities. In an area with an abundance of clean water bodies, the marginal benefit of providing one more is likely to be substantially smaller than would be the case where there were very few water bodies or where most of them were fouled.

7. A third factor affecting willingness to pay falls under the heading of "non-user" benefits. Persons who are not and may never be users of a facility may nevertheless receive some benefit from the knowledge that the opportunity for use exists. In principle, that benefit should be measured by the sum of all such "non-user" beneficiaries' willingness to pay.

8. Finally, the use of willingness to pay as an indicator of a project's worth is limited to the extent that it is in part determined by the existing distribution of income. Thus it may be felt that the poor, who often suffer most from environmental pollution, should be protected by expenditures that exceed their capacity to pay.

Approaches to Project Analysis

9. Least Cost. A "least-cost" analysis evaluates alternative proposals for achieving a particular environmental target, with the solution that achieves both the environmental (and productive) targets at least cost being selected. It is important in any such analysis to assess the sensitivity of costs to variations in the environmental target level so that tradeoffs between levels of expenditure and the environmental quality obtained thereby can be evaluated. Although this approach provides only a partial analysis, if the proper sensitivity tests are made it can at least demonstrate, in physical and in cost

terms, what are the relevant tradeoffs. It is important to note that in this regard the project analyst should be concerned with achievement of the least social cost, defined to include costs incurred not only by the pollution control authority, but also by those who cause and by those who suffer from pollution. Achievement of the least social cost solution requires analysis of the financial and administrative approaches to pollution control as well as of the physical means of attaining environmental quality targets.

10. Where some but not all benefits are quantifiable, least cost analysis can usefull be supplemented by the "switching value" approach. This involves providing an answer to the question "How large would the value of residual environmental benefits (those benefits not quantified) have to be to justify the project?" In using this approach, it is assumed that the cost stream, the discount rate and perhaps certain other benefits are known. One can thus solve for the unknown value of residual environmental benefits which would equalize the stream of total benefits and total cost at the given discount rate. Since benefits occurring in multiple years are involved, future-year residual benefits must be expressed as a function of first-year benefits.

11. After obtaining a value showing what the first year benefit would have to be in order to justify the project, the decision whether to proceed will depend on a judgement about the reasonableness of the result. The computed value of first year benefits serves as a "switching value" for the decision. If a higher amount is ascribed to actual willingness to pay for these benefits, the project will be accepted; if willingness to pay is lower, it will be rejected. The greater the difference between the judgement concerning actual willingness to pay and the computed value of first-year benefits, the greater can be the confidence with which a project is accepted or rejected.

12. The foregoing kind of analysis is appropriate for dealing with "intangible" gains or losses, including aesthetic values or recreational activities. It also has special relevance to problems involving the permanent loss of a unique natural or cultural asset, for the fact of uniqueness will of itself make any kind of "market" pricing difficult, if not impossible.

Use of Qualitative/Descriptive Analyses

13. If the environmental impact is significant, and all attempts to quantify it in monetary terms fail, it should be possible to describe in qualitative or numerical terms the nature of the effects of alternative courses of action. A decision on project acceptability will typically be facilitated if, for example, in a project involving air pollution, a statement describing the benefits (or costs) of reducing (or increasing) the level of sulfur dioxide in a section of an industrial city accompanies the data on the costs and benefits quantified in monetary terms. The descriptive statement should attempt to characterize all aspects of the effects of the pollutants -- on sight, smell, taste, health, recreation, attitudes, animal and vegetative life, etc.

14. It is as important in a qualitative presentation as in a quantitative one to provide information in terms of incremental differences, i.e., to show the differences between the "with" and "without" cases, as well as the differences among project alternatives. Unfortunately, projects that produce only marginal changes may be harder to analyze than projects with a large non-marginal impact.

National Environmental Policies

15. In lending for a project with significant environmental implications, the Bank Group often has an opportunity to influence the larger institutional framework within which decisions will be made. This has been the case with projects now in the preparatory stages in Finland, Yugoslavia and Turkey. It is useful, therefore to consider the economic and social implications of alternative policy instruments available to governments. It should be kept in mind, however, that this is a new field in which views are still rapidly evolving and Bank Group staff experience is still fairly limited.

16. Of the many national or regional strategies that have been proposed, most can be classified as involving subsidies, regulations or charges.[1/] These different approaches create different incentives and have different effects on resource allocation and on the distribution of the gains and losses resulting from governmental intervention.[2/]

1/ The policy instruments discussed in this section are in general limited in their applicability to the pervasive problem of residuals generation (i.e., the generation of waste products from productive facilities) rather than the quite different problem of the loss of a unique natural or cultural resource. Moreover, they are not directed at the question of highly toxic substances, such as mercury or flourine, which can be dangerous even in minute quantities. Problems of unique resources and of toxic substances can more usefully be considered in the context of special studies.

2/ A comprehensive discussion of the principles involved is to be found in IBRD, "Finland's Water Pollution Control Program; the Role of Economic Analysis," Public Utilities Department, PUN 8 - February 20, 1974.

17. Subsidies. Subsidies are often used to encourage parties responsible for environmental pollution to install pollution control equipment, or to compensate them for having to meet environmental quality standards. However, by the distortion of relative prices, subsidies can be expected to result in inefficient investment decisions. One problem that arises is that unless all productive investment is to be subsidized, the regulatory agency must isolate the costs incurred by enterprises for purely environmental purposes from those costs that would be incurred in any case in the interests of increasing production or improving efficiency. This will frequently be too complex for a regulatory agency to handle since an enterprise's least-cost response to regulatory-requirements will often involve changes in internal processes which simultaneously result in usable or marketable outputs. This complexity is illustrated by information received during the preparation of a proposed project in Finland where it was estimated that it would cost as much as $100,000 simply to carry out a study of the net difference in cost to build a modern pulp and paper mill, with and without pollution control. As a result, in negotiating with authorities on the amount of the subsidy, the enterprises have all the advantages since only they have all the facts.

18. Due to the difficulty of separating out costs according to purpose, firms causing pollution have an incentive to claim subsidy for investments that strictly speaking are not for pollution control purposes at all. Furthermore, enterprises may be encouraged to invest in "end of pipe" treatment facilities rather than to carry out a less expensive internal process change, because the former can more easily be demonstrated to be an anti-pollution device and therefore qualify for subsidy.

19. Inherent in the provision of subsidies therefore is not only the danger that the least social cost means of achieving environmental quality targets will fail to be selected, but also the strong possibility that decisions to invest in productive equipment will be similarly distorted. As with any kind of subsidy, the optimal rate of consumption of products that have different environmental effects will not take place, because the total payment for the use of products (including an income or other tax necessary to pay the subsidy) is not related to the social cost of the particular products consumed. In particular, the supply of highly polluting products will tend to be greater than optimal.

20. While the distorting effects of subsidies are well known, subsidization of investment in pollution control equipment is commonplace. This may possibly be justified on the grounds that it is necessary to obtain the cooperation of industry in achieving environmental goals. Usually, however, the argument is couched in terms of equity; the establishment of environmental standards may require firms to make quite considerable changes in processes that have been carried on for many years.

21. The foregoing may be an argument in favor of gradualism in enforcing pollution control regulations. It shoud not however be used to justify the continued use of across-the-board subsidies, that do not distinguish between industries on the basis of social need. Furthermore, the fact that enforcement of pollution control standards may make the difference between a firm remaining in business or closing down is not in itself an argument for subsidizing pollution control. For example, assistance to a firm that is the major employer in a community in order to keep it in business may be carried out more efficiently by a system of lump sum payments than by direct subsidization of pollution control equipment. It would however be unreasonbale to expect a water pollution control authority to be able to exercise this kind of judgement.

22. Regulation/Standards/Licenses. The use of environmental resources for the disposal of water may also be controlled through regulation; for example, through issuance of permits (e.g., allowing a given volume of effluent discharge per time period); establishment of minimum standards of quality; or specification of equipment to be employed in treatment.

23. The easiest kind of regulation to draw up and enforce is one which is uniformly applied. A national or regional requirement that all effluent be of a specified quality is attractive from an administrative point of view. However, the inefficiencies associated with uniform regulations are substantial. Uniform effluent standards take no advantage of local absorptive or regenerative capacities, or therefore, of variations in the costs of pollution at different points, nor do they take into consideration the difference in marginal costs faced by different enterprises in adjusting the amount or quality of their effluents.

24. In addition, a aystem of uniform regulations and standards, by not allowing any flexibility in pollution control requirements, makes almost inevitable a complex and long-drawn-out system of appeals to avoid extreme inequities and inefficiencies (for example, where a particular enterprise's costs of control actually exceed the benefits to society of the effluent reduction). However, the process of appeals and litigation is usually self-defeating, since the industry always has the advantage in arguments about its costs and technology.

25. Individually Adjusted Standards. In view of the inefficiencies of uniform effluent standards, the adoption of effluent standards tailored to each enterprise is often proposed. In theory, a governmental body could appraise each enterprise and issue individualized regulations which would require the enterprise to reduce emissions to the point at which the marginal cost of an additional unit reduction among all enterprises is equalized and/or the desired level of total region-wide reduction is achieved. The administrative costs of obtaining the information required to institute such a system would, of course, be enormous. Furthermore, the potential for delays through appeals and litigation, which is a disadvantage of a uniform standards system, is even greater when individual standards are set for each enterprise.

26. Effluent Charges. Another technique is a system of effluent charges, under which a fee is levied on the use of publicly-owned environmental media for disposal of wastes. The amount of the fee is based on the total load of the harmful pollutant discharged. Where the data are less than complete and reliable, this approach may have certain advantages over those discussed above. For example, if a decision is taken to achieve a given level of reduction in effluent for some particular air-or-watershed, a unit effluent charge, at the proper level, will achieve the desired reduction at a lower total cost to the economy than a regulation calling for uniform reductions in levels of emissions or setting uniform quality standards. This is so because an effluent charge, unlike a uniform regulation, will induce the greatest reduction from those enterprises which can accomplish the reduction most efficiently. Self-interest in maximizing profits will lead each enterprise to invest in process changes or effluent treatment up to the point at which the cost of a unit reduction in effluent is equal to the amount of the charge. Producers with different cost characteristics will therefore respond differently. Uniform regulations, on the other hand, require a uniform response regardless of the cost to the individual enterprise.

27. International experience with effluent charge systems is limited. Several European countries, among them France, Holland, Czechoslovakia, Germany and the United Kingdom, which have employed license systems, have replaced or supplemented these systems with effluent charges or are considering doing so.

28. Because absorptive/regenerative capacities, and therefore the harm cause, will be different for different air shed or water basins, an effluent charge should be set on a regional basis. The level at which the charge is set is critical. In principle, the rate per unit of discharge should be equal to the estimated cost to society of an additional unit of pollutant discharged. While the informational difficulties involved in achieving this result are immense, it should be noted that such an estimate would also have to be made to rationalize a system of regulation. While determination of an ideal level of effluent charge may be beyond the current state of the art, several methods have been proposed for arriving at rough approximations of the proper charge.1/

1/ A practical method for arriving at a rough estimate of the proper charge might be as follows: First, an estimate is made of the total harm in a region being caused by a particular effluent, e.g., biochemical oxygen demand (BOD) or suspended solids in water, sulfates in air. Second, the total quantity in kilograms of the effluent currently being discharged by all sources into the air or watershed is determined. The damage estimate is then divided by the quantity to give an average cost that could be used as the effluent charge. Where more than one pollutant is involved a charge must, of course, be levied on each. In countries experimenting with such systems, formulas have been devised for computing the charges based upon a combination of different pollutants. There is an alternative, somewhat less desirable, approach, which does not require an estimate of social damages. If one of the goals of a national or regional program is a reduction by a certain percent of the amount of a harmful effluent, the amount of target reduction in kilograms could be estimated, and divded by the estimated total industry-wide cost of achieving the reduction. It may also be possible to obtain an independent estimate of the average per unit marginal cost of the target reduction across industries.

29. The question is whether an inexact level of effluent charge is more, or less, acceptable than an inexact effluent standard. With the "wrong" level of charges, the level of effluent production will be higher or lower than the target. The reduction that is achieved, however, is achieved by means of the "least cost" procedure. Furthermore, the level of charges may be raised or reduced over time to bring results in line with the target. If a uniform standard is adopted, whatever the standard, it can be shown to be inefficient with respect to particular enterprises with differing marginal costs. Individually adjusted standards avoid the latter difficulty but, as noted above, the informational requirements and the administrative machinery necessary to set the individual standards and to avoid claims of discrimination may be overwhelming.

30. The conventional wisdom is that with an effluent standard, the target for environmental quality is sure to be met, even though inefficiencies are involved, while with effluent charges the results are uncertain. Experience, however, has convinced many observers that almost exactly the opposite is true. Reductions in industrial waste loads where even modest sewer charges have been imposed by municipalities have often been rapid and spectacular; on the other hand, regulatory processes are frequently not only time-consuming, but also quite uncertain in result.

31. Where environmental pollution is excessive, and the first steps at improvement are being taken, the appropriate remedies for a particular industry may be obvious both to the regulatory agency and to the industry. In such cases, there may be no great difference in result between a system of individually specified standards and a system of effluent charges. As the desired level of environmental improvement rises, however, marginal costs typically increase in

a sharply non-linear fashion[1/] and the case for a rigorous system of charges becomes stronger.

32. Finally, an advantage of an effluent charges system is that it may be a source of funds for certain environmental improvement works that are most efficiently carried out by the public sector. In the water pollution field, for example, economies of scale may be reaped in collective treatment works, while artificial aeration, sludge removal and low flow augmentation would normally best be carried out by a public authority.

1/ See Annex 5 of IBRD, "Finland's Water Pollution Control Program; The Role of Economic Analysis," op.cit. One of the most detailed studies yet attempted for determining the cost of reducing pollution in a waterway was conducted almost a decade ago for the Delaware Estuary area of the United States. The study estimated costs of achieving a given level of reduction in water pollution through several different approaches, including uniform treatment standards and a unit effluent charge. It showed, among other things, that a program involving a uniform effluent standard resulted in costs from 70% to 100% higher than one involving a unit effluent charge, depending upon the specified quality level. (The difference in cost between the charge and the uniform standard was estimated at the time to be approximately $8 million annually for the higher quality level.)

Form No. 630
(4–73)

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INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT
INTERNATIONAL DEVELOPMENT ASSOCIATION

POLICY REVIEW COMMITTEE

PRC/C/74-13

October 8, 1974

ENVIRONMENTAL POLICY PAPER

Attached is a copy of the 'Environmental Policy Paper' prepared by the Office of the Environmental Adviser (VP - CPS). The paper is due to be considered by the Executive Directors on November 12, 1974.

The paper is being distributed in case it is decided to hold a Policy Review Committee meeting, at short notice, before the paper is distributed to the Executive Directors.

Frank Vibert
Secretary
Policy Review Committee

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ENVIRONMENTAL

POLICY

PAPER

October 1, 1974

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Chapter 1

SUMMARY AND CONCLUSIONS

1.1 International development assistance has always addressed problems of the human environment -- its principal focus being the poverty, disease, hunger, and illiteracy associated with the lack of economic development. Worldwide concern, however, has steadily mounted over other aspects of environmental problems -- those which emerge as undesirable secondary effects of the very processes of development itself. As a result, the responsibility and procedures for dealing with the potentially damaging environmental and related health/socio-cultural side effects of development schemes and projects have become serious issues for developing countries and for the institutions which provide development assistance.

1.2 The environmental problems confronting both the developed and developing countries have been articulated and documented in considerable detail, owing, in great measure, to the historic 1972 United Nations Conference on the Human Environment in Stockholm. Developing countries assign the highest priority to finding solutions to their environmental problems as they perceive them and which they principally attribute to the lack of development. The industrialized developed countries meanwhile are becoming increasingly concerned and preoccupied with the environmental degradation that accompanies their economic growth. It is widely agreed, however, that virtually all nations share both classes or problems, the essential differences being in the mix and intensity.

1.3 Sharing in the concern of the international development community for the threats and hazards to vital ecological systems, human health, and social well-being, the World Bank Group has made a systematic effort to identify and prevent their occurrence in the development projects for which it makes loans. With the establishment in 1970 of an organizational "focus" for environmental matters, the Bank Group is now in a position to encourage its member countries to minimize the disruptive side effects of development on the human environment. The impact of this policy has been felt far beyond that associated with the direct effects of its projects.

1.4 Its experiences to date have shown the wisdom of this policy and have given encouragement to those who despaired that promoting development and safeguarding the environment could find accommodation, as well as those who feared that their hopes for eliminating poverty through development would be dashed by the preoccupation with its adverse effects on environment.

1.5 The Bank Group remains convinced that it is not possible for the world's three-quarter billion poor to achieve a level of life in accord with fundamental human dignity without the continued economic growth of the developing nations -- and the developed nations as well. However, not economic growth on the pattern of the past wherein threats to the environment and the health and well-being of man are undeniable, but, rather, on patterns that strive to respect the tolerances of the environment to the stress of development, and the physiological thresholds that dictate man's status on the health-disease continuum.

1.6 Since there can be no question whether the impact of economic growth on the environment must be taken into account, the Bank Group seeks to increase and expand its assistance to developing countries in ways which are minimally disruptive of the environment while providing an improved quality of life for the affected peoples.

1.7 The World Bank's Office of Environmental Affairs was established in 1970 to review and evaluate every investment project from the standpoints of its potential effect on the environment. In the thirty-month period between July 1, 1971, and December 31, 1973, the Office reviewed 376 Bank loans and IDA credits. Of these, 245 revealed "no apparent potential problems." The same was true for 30 out of 58 IFC investments. For 131 projects, the environmental problems identified could be handled by Bank Group Staff without the need for outside expertise or special studies. However, 24 projects required special studies by consultants.

1.8 The project-by-project approach followed by the Bank Group in its environmental work has led to the following important conclusions:

(a) When the Bank Group first determined to incorporate environmental work into its lending operations, some concern was expressed about the cost of environmental measures and the burden that would be imposed on borrowers. The Bank Group's experience to date suggests that those early estimates were much too high. The additional cost attributed to the environmental/health safeguards which have been incorporated into projects has ranged from 0 - 3% of total project cost when realistic standards are adopted.

(b) Environmental problems have a cumulative impact. If remedial action is taken at a later stage, cost incurred would be considerably higher. The high end of the range (0-3%) applied where precautionary measures were added to projects already well advanced.

(c) Concern with environment is resulting in progressive incorporation of environmental safeguards in technology. This is particularly so in industry, a sector in which environmental issues first attracted attention. Incorporation of environmental technology means that environmental and non-environmental costs cannot be separated in the processes in which this development has occurred.

(d) In the initial stages of the development of what may be called environmental technology, emphasis was on the treatment of waste matter. The Bank Group's experience has underscored the need to treat the environmental problem as a multifaceted one.

(e) The Bank Group's project-by-project approach has pointed to a number of sector-specific environmental problems. This means that there is some scope for developing sectoral guidelines that could help improve project design with regard to their environmental impact.

(f) In evaluating various costs and benefits involved in alternative ways of dealing with environmental considerations, the Bank's experience to date has shown quantification of the relevant trade-offs to be particularly difficult.

1.9 The Bank Group has acquired considerable operational experience in its environmental work. The experience gained thus far has led to the identification of

a number of important policy issues.

(a) Should the Bank Group advocate determination of universal standards or should it continue to follow the project-by-project approach and recommend measures that are specific to the environment in which the project is to be located?

(b) To what extent should the Bank insist on accepting environmental performance as condition for lending? Should it relate environmental performance only to specific projects or should it encourage the country to take more general environmental measures?

(c) Who should meet additional costs that would result from projects designed to meet environmental considerations? Should these costs be met by the donor agencies/countries or by the recipient nations?

1.10 In recommending the Bank Group's approach to these important issues, we have taken into account not only our own experience, but that of other agencies who have concerned themselves with environmental matters.

1.11 Recommendations

(i) Environmental Standards:

(a) Developing countries fear that uniform environmental standards or criteria applied to both developed and developing countries alike, if used in support of development assistance projects or activities, will discriminate against them. Uniform standards may also be difficult to develop and may also prove very costly for the developing countries. It is therefore appropriate for the Bank Group to follow a project-by-project approach and incorporate only those environmental measures that are considered essential. But should international agreement be reached in certain environment areas, the Bank Group should assure that its project financing is consistent with their terms.

(b) The Bank Group should also help to bring to the attention of its member governments information, guidelines, instructional materials, technical data, etc., on environmental impact analyses available from public and private ogranizations

concerned with environmental affairs. In doing so, however, the Bank Group should make plain that it is not imposing on its members its own views about environmental protection or attempting to legislate environmental virtue.

(ii) Environmental Performance:

(a) In many countries there are no laws, rules or regulations governing environmental matters; the Bank Group may, in these countries, encourage and advise on promulgation and implementation of appropriate legislation.

(b) The Bank Group should continue its current policy of reviewing every investment project from the standpoint of the potential effects on the environment, and agreeing with the borrower on remedial steps, if necessary. It should encourage its member governments, both donors and recipients, to consider whether proposed projects have a potential for adverse environmental consequences, to arrange for further analysis and appropriate action where the nature and severity of those consequences warrant it, and to assure that project planning and execution takes due account of the results of that analysis. In this connection, the guidelines which the Bank Group has developed should be made available to governments, international organizations and individuals concerned with economic development.

(iii) Funds for environment-oriented projects:

(a) The Bank Group should maintain the policy which it has stated in international discussions of the "additionality" issue, which has been to urge acceptance of the idea that added costs in specific projects of activities for environmental protection reasons should be taken into account and, where necessary, assistance to such projects increased to cover all or appropriate portions of such costs. Whether or not such additions would increase the total flow of Bank Group assistance to the country would depend on a number of other considerations.

(b) The Bank Group should normally encourage borrowers to finance and carry out environmental project preparation studies themselves. However, in view of the importance of assuring that such studies are undertaken, the Bank Group should

also be prepared, in appropriate cases, to include the cost of such studies in the expenditures to be retroactively financed out of a subsequent project loan.

(c) The Bank should consider lending for "environmental" projects (a term which can be applied to a great variety of projects, including air and water pollution control, control of erosion, solid wastes disposal, reforestation and pest and disease vector control) where the project in question satisfied the Bank Group's normal project criteria.

Chapter II

INTRODUCTION

2.1 Much of the effort to raise the standard of living in the developing countries involves a deliberate modification of the natural environment. Construction of road, dams, airports, irrigation and sewerage systems, power plants and industrial facilities frequently results in the loss of ecological, health or socio-cultural values. Often this is because the consequences for the environment were not adequately considered at the project-planning stage or because information necessary to forecast the eventual impact on the environment was lacking or inadequate. And where adverse ecological consequences are forecast, effective steps to prevent or minimize the damage may sometimes not be taken because data on cost-effective safeguards or on economically competitive project alternatives are lacking or inadequate. Although the magnitudes of the loss in ecological and related values vary, there is a real cost to society over the long run.

2.2 In recent years, there have been repeated warnings that in many regions of the world, in both developed and developing countries, air, water, soil and other resources are deteriorating to an extent which threatens the quality of life and of the environment, perhaps even the future of human life. Such warnings have been sounded before. But their urgency has intensified: the consequences of continued cavalier use, or misuse, of natural resources, and of high rates of population growth, will be realized,

not some time in the comfortably distant future, but soon. This was the message of the first (1972) United Nations Conference on the Human Environment, held in Stockholm.

2.3 The trend toward degradation of the biosphere is global in its dimensions and consequences; it can be reversed only through comparably widespread recognition of the danger and international cooperation in dealing with it. There are encouraging signs in both of these directions. Resolutions of the United Nations General Assembly in 1968, 1969 and 1970 underlined the importance of taking environmental factors into account in economic and social development planning. The International Strategy for the Second United Nations Development Decade, adopted in 1970, declares that "Governments will intensify national and international efforts to arrest the deterioration of the human environment and to take measures towards its improvement, and to promote activities that will help to maintain the ecological balance on which human survival depends."

2.4 The economic development which the developing countries are determined to achieve, and which the World Bank Group was established to support, will necessarily have an impact on the environment, on both its naturally occurring and its man-made elements. The developing countries are not, and should not be, required to choose between economic and social development, on the one hand, and the preservation of the environment, on the other. The question for them, and for the Bank Group is rather how to achieve economic progress with the least possible disruption of the environment and its ecological life-supporting systems.

2.5 Although "environment" and "ecology" have received so much currency in recent years, there is no single universally accepted definition of either.

In this paper, environment is used to describe the total setting for economic development activity; it is not confined to the naturally occurring milieu (the ecological systems which surround and collectively support man), but extends to the socio-cultural milieu which man has created to facilitate adaptation to the demands and challenges of his naturally occurring surroundings. "Ecology" is used to refer to the relationship between organisms and their environment, including most especially the man/environment relationship.

2.6 Environmental problems may be divided into three categories related to their magnitude: global, regional and local.

2.7 Global problems pertain to the biosphere; they affect all, or nearly all, countries. Into this category fall the most widely discussed and threatening problems; for example, those caused by persistent pesticide residues which find their way into the biosphere processes through the actions of wind, water and living carriers, with effects well beyond the country in which the pesticide was applied; the burning of fossil fuels, which affects the carbon dioxide balance and the sulphur dioxide loading of the atmosphere, and the particulate content of the stratosphere; the pollution of the oceans from land sources, or from oil spillage or ship dumping on the high seas; and the man-induced or man- influenced changes in global climatic patterns. Clearly the resolution of problems in this category calls for heroic measures of international cooperation.

2.8 Regional problems result from biophysical linkages among a group of countries which have little or no effect beyond the members of the group. A typical example is the effect of river basin development on riparian countries, up or down-stream.

2.9 Local problems are those whose effects are confined within the boundaries of a particular country, for example, the extirpation of a wildlife resource, the creation of an aesthetic blight, or the eutrophication of a lake from fertilizer runoff or discharge of domestic sewage.

2.10 Environmental problems in a given category may differ in their dimensions. For example, while a global problem may eventually result from the gradual build-up of carbon dioxide in the atmosphere over a long period, the effects of pervasive, persistent pesticides can be seen more immediately. Another variant, related to timing, is the degree of certainty. The greater the time span for the cause-effect relationship to be observed and understood, the greater the uncertainty as to its manifestation; whereas the continuation of presently observable consequences is far more certain.

2.11 Two other variables may be noted: magnitude and degree of reversibility. Magnitudes cannot easily be compared, because effects are of different types, occur in different places and affect different aspects of life systems. "Reversibility" concerns the possibility of returning an ecological system to its former state. For example, a lake in an advanced state of eutrophication is virtually irreversible; the extinction of a species is absolutely so. On the other hand, it is possible to end pollution from particulate matter in the smoke of an industrial plant, and to restore the ambient air quality. **The dimensions of time, certainty, magnitude, and degree of reversibility combine to produce the dimension of urgency.**

2.12 The environment problems of the developing countries can be divided into two categories. To the first belong the problems associated with poverty. Under conditions of poverty the biophysical environment often exhibits the ravages of long years of mismanagement (overgrazing, erosion, denuding of forests, surface water pollution, etc.). Not merely the "quality" of life but life itself, is endangered, for it is often very difficult and sometimes impossible for the environment to renew its life-supporting capabilities. The developing countries assign the highest priority to finding solutions to problems of this nature. Here the principal concern is to correct the environment that has gone through a long period of deterioration.

2.13 The other set of problems accompanies the very process of development itself. Agricultural growth, for example, calls for construction of irrigation and drainage systems, clearing of forests, use of fertilizers and pesticides, all of which have environmental and health implications. Similarly, the process of industrialization could well result in the release of pollutants and in other environmental problems attendant on the extraction and processing of raw materials.

2.14 In summary, the developing countries are now beginning to be concerned with two different types of environmental problems. In the first, they have to alleviate poverty. In the other, they have to seek ways to prevent the deterioration in man's environment that has often been associated with development. The first task is immensely more difficult than the second. The second could also be come difficult if the present concern for environment is not translated into action. The Bank Group is concerned with both aspects

of the problem. Some other policy papers[1/] have addressed themselves to the problem of poverty. In this paper, we will be concerned mostly with the environmental problems that often arise with development unless precautionary measures are taken.

1/ The following policy papers have dealt with the Bank's approach to the problem of poverty: Bank Policy on Agricultural Credit (Report No. 436), Bank Policy on Land Reform, (Report No. 440), **Population Policies and Economic Development** (Report No. 481).

Chapter III

THE LESSONS FROM THE BANK'S EXPERIENCE[1/]

3.1 The concern with environmental problems has persuaded several donors to take a careful look at their programs of assistance. The United States Congress, for example, has questioned whether US aid should be made available for projects which would be criticized in the United States because of their impact on environment (e.g., use of certain pesticides, construction of industrial plants without effluent controls, etc.). There are even greater **reservations about aiding those projects of which the undesirable environmental and health impact of which could spill over national boundaries.**

3.2 At the same time prospective recipients of foreign assistance are concerned that the real value of capital inflows to them may decrease because of the donor countries' preoccupation with environmental problems. For instance, developing countries presented the concept of "additionality" to the 1972 United Nations Conference on the Human Environment. According to this added costs or activities for environmental protection should be **borne by the donor countries,[2/] beyond the internationally accepted targets for foreign assistance (e.g., 0.7% of GNP during the Second Development Decade).**

3.3 In recent years, some major development agencies have given concrete definition to what may be called environmental responsibility. They now recognize that development which ultimately degrades the human environment is not a sound investment. They have, accordingly, incorporated consideration of environmental factors into agency project review procedures.

1/ While most of the discussion in this Chapter focuses on the experience of the Bank Group, some references will be made to the work of other donor agencies.

2/ **For a detailed discussion of the "additionality" concept see Chapter IV, paragraph 4.14 ff.**

3.4 The Bank Group's involvement in environmental affairs started in earnest in 1970. In his 1970 address to the UN Economic and Social Council (ECOSOC), Mr. McNamara remarked that the problem facing development finance institutions was whether and how they might help the developing countries to avoid or mitigate some of the damage which economic development can do to the environment, without slowing the pace of economic progress. He noted that the costs resulting from adverse environmental change could be tremendous, and that a small investment in prevention would be worth many times what would later have to be spent to repair the damage. He announced to ECOSOC that a unit had been established in the Bank Group to determine, to the extent possible, what would be the environmental consequences of development projects being considered for financing, and said that the Bank Group proposed to work toward concepts which would make possible a consideration of environmental factors in development projects.

3.5 This paper deals with the Bank Group activities in the field of environment with focus on the lessons learned from this experience. **The following discussion is divided into two sections. The first section is concerned with the extent of the Bank Group's involvement in environmental work; the second with the lessons gained from this experience.**

A. Bank's Approach

3.6 **At the heart of the Bank's approach toward environmental issues is** the concern that the projects financed by it should not pose an unacceptable threat to the environment and public health. In order to ensure this, the position of Environmental Adviser was established in 1970

"...to review and evaluate every investment project from the standpoint of

its potential effects on the environment." A set of staff guidelines was prepared for use in the formulation, appraisal and execution of projects.[1/] Experience soon made it clear that the environmental/health aspects of projects should be handled at the formulation and design stages, rather than at the "eleventh hour," when changes or modifications prove difficult, if not impossible.

3.7 The Environmental Adviser (now Office of Environmental Affairs) instituted a procedure which has evolved as follows:

1. Operational department staff review with the Office projects under consideration for Bank or IFC financing with a view to identifying the likely environmental, health, and socio-cultural problems or opportunities associated with them;
2. Where indicated by the initial review, the Office of Environmental Affairs suggests what studies or investigations should be conducted to enable a better identification and understanding of the nature, dimensions, severity and timing of the problems likely to arise, to ensure that appropriate safeguarding or other, perhaps, enhancing measures can be taken. The Office designs the studies and advises on the disciplines needed to conduct them and the terms of reference;
3. When the studies are completed, the Office participates in the review and analysis of the data and information acquired and helps to work out appropriate safeguard measures. It

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1/ These guidelines were subsequently expanded and in 1972 a handbook, Environmental, Health, and Human Ecologic Considerations in Economic Projects, was published. (A revised and further expanded edition of the Handbook will be made available in French and Spanish (as well as English) in 1974.) The Handbook has been widely distributed to other economic development agencies, governments, engineering, contracting and consulting firms, universities, etc.

participates where appropriate in subsequent loan negotiations and in the presentation to the Board;

4. The Regional Office and the Office of Environmental Affairs monitor the implementation of the project, to ascertain the inclusion and adequacy of the recommended safeguard measures, and to determine what future action may be required. This experience is also useful for subsequent assessment of the accuracy of the forecast of environmental/health consequences and helps to indicate the approaches which should be taken, should similar problems occur in other projects.

3.8 The data presented below are for the period July 1, 1971 to December 31, 1973 and give an indication of the nature and extent of the Bank's involvement in environmental matters.

(a) Of a total of 376 Bank Group loans and IDA credits reviewed 245 (65%) revealed no apparent or potential environmental problems.[1/] The same was true for 30 (52%) of 58 IFC projects. There was considerable diversity among these 434 projects, as they included, for example, Bank loans to IFC, which in themselves have no identifiable environmental impact. Others include education, telecommunications, and, especially, population projects which have a large potential for positive environmental benefits, but do not ordinarily require an evaluation in the sense that projects in other sectors must undergo. These types of projects therefore are appropriately not included among the 159 projects that were acted upon.

1/ This means that either no potential problems were apparent to the OEA or that other projects, seen as having a higher potential for more serious environmental/health implications, were chosen, for further scrutiny because of staff and time constraints.

(b) In four cases representing about 1% of all loans and credits signed during the period, some other agency, such as the UNDP or WHO, had determined the need for safeguarding or remedial measures of some character and had taken appropriate action prior to Bank involvement. No IFC projects fell into this category.

(c) In the case of 105 projects for which loans or credits were signed, the environmental problems identified could be handled adequately by Bank Group staff and the Environmental Office, without the need for outside expertise or special studies. The projects in this category accounted for 28% of the total of Bank or IDA projects screened, but for 80% of the Bank/IDA projects on which any action was taken. The 26 IFC projects in this category represented 45% of the IFC projects screened, and 93% of those on which action was taken, leading to the incorporation of appropriate environmental/health measures.

(d) **The 22 Bank/IDA projects (including 9 in power,[1] 6 in agriculture,[2] and 3 in industrial[3]) and 2 IFC projects (both industrial[4]), which were found to require special studies by consultants, led to the incorporation of safeguard measures as a condition of Bank/IDA or IFC financing. These**

1/ Loan/Credit Numbers 809, 829, 841, 874, 889, 919, 923, 296, 339.

2/ Credit Numbers 393, 322, 282, 317, 277, 302.

3/ Loan Numbers 787, 817, 934.

4/ Investment Numbers 226, 258.

represented about 5% of the total number of Bank Group projects reviewed and 15% of the total requiring some action additional to an initial review.

3.9 The foregoing data, suggestive of the probability of environmental implications, are summarized in Tables 1 and 2.

Table 1: DISTRIBUTION OF BANK/IDA AND IFC ENVIRONMENTAL PROJECTS BY CATEGORIES OF ACTIONS TAKEN
(July 1, 1971-December 31, 1973)

	Bank Group/IDA	IFC
No problems apparent when reviewed	245	30
Problems handled by others prior to Bank Group involvement	4	-
In-house disposition	105	26
Consultants and Special Studies required	22	2
Total Number of Projects	376	58

BANK/IDA AND IFC PROJECTS REVIEWED AND ACTED ON DURING JULY 1, 1971 TO DECEMBER 31, 1973

TABLE 2

	No. of Projects Signed & Reviewed	No. of Projects Acted Upon
Bank Group/IDA		
Agriculture	104	46
Industry	22	14
Transportation	87	15
Tourism	6	5
Water and Sewerage	15	15
Power	34	22
Urban Projects	7	4
Telecommunications	15	1
Education	38	4
Multipurpose	4	3
Others 1/	44	0
IFC		
Cement	6	4
Chemicals	2	2
Iron and Steel	2	2
Mining	3	3
Motor Vehicles	4	2
Non-ferrous	2	1
Petrochemicals	1	1
Pulp and Paper	5	4
Textiles and Fibers	7	2
Tourism	7	7
Others 2/	19	0
TOTAL	434	159

1/ Population & Nutrition, Loans to IFC, Technical Assistance, Engineering Loans, Development Programs & Export Expansion Lending, DFCs.

2/ Capital Markets, DFCs, Food Industries, General Manufacturing, Housing

B. Lessons from the Bank Group's Experience

3.10 The lessons from the Bank's experience are summarized in five sections dealing with (i) incremental costs, (ii) cost sharing, (iii) cumulative impact of the problem, (iv) linkages between different aspects of the problem and (v) sector-specificity of some environmental problems.

(i) Incremental Cost

3.11 When the Bank Group began to incorporate environmental protection measures in its lending operations, some concern was expressed about the cost of such measures and the burden that would be imposed on borrowers. Estimates ranged as high as 25-50% of total project cost, which would have been wholly unacceptable to the developing countries.

3.12 It is difficult to separate out those costs and benefits which are attributable exclusively to environmental measures, and in any event the quantification of those costs and benefits will depend largely on how the environmental dimension is defined. For example, in the case of a sewerage treatment project the cost would be 100 percent. As public health is a most important part of our environmental considerations, most water supply and sewerage projects will fall in this category. In FY73, the aggregate total for such projects financed by the Bank/IDA amounted to $278.8 million in nine countries. These projects aside, the Bank Group's experience to date appears to be consistent with that of other aid agencies and suggests that those early estimates were much too high. The additional cost attributable to environment/health safeguards in "non-environmental" projects has ranged from 0-3% of total project cost, the high end of the range applying where precautionary measures were added on to projects already well advanced.

3.13 The 0-3 percent range may not be operative in the future. This is for two reasons. First, what is now regarded as environmental expenditure may in the future get incorporated in the technology chosen for projects. In that case it will not be possible to separate out environmental costs. Second, as economic development proceeds the cumulative impact of the environment/health-threatening effects will lead the developing countries to adopt higher standards and impose tighter controls. This is already being done in the case of urban industrial projects. Several developing countries now require installation of controls on existing plants, while stricter regulations governing the operation of new plants are being promulgated. As the assimilative capacity of ecological systems in developing countries becomes severely strained, it will be necessary to take additional measures and to strengthen existing ones. The cost of these measures will be greater and may exceed 3% of the total project costs.

3.14 Reports on air pollution in Sao Paulo, Ankara and Mexico City indicate that the requisite control measures will be both costly and technically difficult. In general, the cost of removing a pollutant from a waste stream is proportional to the amount already removed and this trend produces increasingly higher costs for additional incremental improvement. We therefore expect the cost of adding environmental measures to industrial projects designed for cities such as Sao Paulo, Ankara and Mesico City to be greater than 3 percent of the cost of the project.

3.15 While costs for environmental/health protection associated with individual projects remain an acceptably small part of the total investment, it should be stressed that increased development will contribute to the need for developing countries to assess the cumulative impact on the environment and the need for more stringent standards governing the design and execution of development schemes with resulting cost increases.

3.16 Some international surveys have been conducted to estimate the costs of national programs for environmental pollution control. However, such projections of national costs as are currently available are not very reliable. These estimates (available from advanced industrial countries) suggest that total investment plus operating costs for cleaning up a polluted environment and maintaining it at some suitable standard might vary from upward of one-half percent of the GNP. Perhaps the most extensive data collection effort with regard to cost estimates has been made in the US. Cumulative total pollution control expenditure for the period 1972-1981 were published in the fourth annual report of the US Council on Environmental Quality, 1973. They were estimated to be $275 billion (1972 dollars), or about 2.5 percent of the GNP. Any lower level of expenditures, it was stated, would likely result in even greater economic penalties as reflected in adverse environmental/health effects. The estimates covered air and water pollution, land reclamation, radiation and solid waste. This means that by postponing action on environment, the developing countries can expect to incur very large expenditures in the not too distant future.

3.17 It is appropriate to mention here another type of cost that the adoption of environmental measures may well impose on the developing countries. Developing countries fear that imposition of environmental control measures on their producers may alter their terms of trade with the developed world. This may happen since different countries will face different costs even for the same level of environmental standards. Furthermore, the implicit tradeoff between a healthier, more amenable environment and additional financial resources will be resolved differently by different countries. While data to predict the magnitude of any resulting shifts in inter-national terms of trade are not available, some independent experts feel that these effects may be substantial.

(ii) Sharing of Costs

3.18 A discussion of the question of sharing of costs for including environmental safeguards in project design should necessarily begin with a brief examination of the issue of additionality. This issue received considerable attention at the Stockholm Conference where it was given a variety of interpretations.

3.19 In its original sense, additionality meant that additional funding should be made available to developing countries to cover the costs incurred specifically or primarily to protect or enhance the environment. The motivation in this interpretation was that new environmental measures should not constitute an additional burden on the limited resources of the developing countries. This interpretation of additionality was not accepted by the developed world. While the debate goes on, the donor agencies have had to face the problem of cost sharing.

3.20 The Bank Group's approach has been to include in project financing those additional costs made necessary by the incorporation of environmental safeguards. This was done within the overall country allocations/ as determined by many other consideration. In this respect, the Bank has followed the interpretation of additionality as provided by OECD. But important issues remain, particularly for those projects in which benefits are not realized by the residents of the country in which the investment is being made. Wild life preservation components fall in this category. For instance, the Kafue Hydroelectric Project in Zambia, in its original design, would have had a serious impact on wild life in the area. These include some 90,000 lechwe, a species of small antelope unique to the project area, whose movements have been dictated largely by the grazing conditions provided for by the flood cycles and whose future is a matter of concern to wild life conservation groups the world over. By interfering with these flood cycles, the dam would have provided a grave threat to this already endangered species. To compensate for the loss of natural flooding when the water is most needed, the dam was redesigned to allow additional reservoir storage. This will permit discharge of water needed by wild life during the critical months of March and April in dry years.

The issue that arises then is: should this additional cost be borne by the recipient country or should it be the responsibility of those who urged the preservation of a particular species of animal as mankind's heritage.

3.21 Another example of the need to consider the assimilative capacity of ecological systems when evaluating the environmental impact of a project is to be found in the IFC financed Pan African Pulp and Papaer Project on the Nzoia River in Kenya which flows into Lake Victoria. The effluents carried by it therefore affect not only Kenya but also Uganda and Tanzania.[1] In evaluating the environmental impact of this project, the impact of the down stream of the river and the Lake, and the expected municipal and industrial development of the watershed needed to be examined. The nature and degree control over the effluent of the pulp and paper mill could only be gauged when its relationship to all other pollutants entering the river system was well understood. This examination revealed the critical necessity for requiring a high level of treatment of the plant's effluent and for encouraging the Government of Kenya to monitor the river's condition and plan further development with careful regard to cumulative threat to downstream uses. If adequate control over the municipal, industrial, and agricultural wastes entering the river system is not maintained, the river's already precarious ecological integrity will be lost with disastrous consequences for important downstream uses.

(iii) Cumulative Impact of the Problem:

3.22 As pointed out above environmental problems have a cumulative impact. If remedial action is taken at a later stage of a country's development, costs incurred will be considerably higher. Prudent planning and early preventive measures would avoid or reduce the high cost of subsequent remedial measures. There are a number of examples from the Bank Group's experience in which action at the planning stage prevented the occurrence of a serious environmental problem.

3.23 Turkey's Antalya Forest Utilization Project (cost $164.3 million) is one case in point. The Antalya area is well known for its natural beauty, historical sites, and good climate. These factors make the area an attractive place for tourists. Setting up of a large pulp and paper plant would seem to conflict with the development of tourism in the area. At an early stage, therefore, the inclusion/ of extensive

1/ This project also provides a good illustration of the trausnational impact of environment.

environmental protection measures was recognized as a requisite for project implementation. It was seen that such measures would have to include careful architectural planning, landscaping, and effluent treatment facilities. This meant that detailed studies were necessary to determine the location of a suitable site.

3.24 The first study undertaken by the consultants recommended a number of sites on the Mediterranean. Topographical constraints and scarcity of water limited choice to eight possible locations along a 90 km belt of coastal land, and of these the one near the Manavgat River was seen as offering the best balance between economic and ecological considerations. Locating the plant at this site promised harmonious industrial and tourism development. However, the Bank expressed reservations and the Government established an inter-ministerial committee to conduct a detailed comparison of various alternative sites. The least-cost site initially chosen was abandoned in favor of some off-beach location removed from areas of high tourism potential and at a greater distance from the coastal highway.

3.25 With environmental concerns now incorporated in the site selection, some further investigations are being carried out. For instance, the problem of heavy truck traffic in the area requires further study and the Government intends to provide measures for improved handling of this traffic. Oceanographic studies are to determine the exact location of the liquid effluent pipeline outfall into the sea so as to minimize any future adverse impacts. Gaseous and liquid effluents will be minimized through maximum in-plant recycling and provisions made for advanced end-of-the-line treatment before final discharge. Finally,

zoning measures are being worked out with the ministries involved to prohibit future encroachment from industrial development upon tourism, and vice versa.[1/]

3.26 Brazil's MBR Iron Ore Project is another example of a Bank Group financed activity that, without adequate environmental planning, could have posed serious problems. The project contemplates the exploitation of high-grade iron ore near Belo Horizonte and construction of a 640 km rail transportation line to an insular marine terminal on Sepetiba Bay, a recreational/tourist resource of great potential value.

3.27 An examination of the project design revealed a number of potentially significant environmental problems at the mine site, along the rail line, and at the location of the terminal. It was decided to proceed with an on-site study, and a team of environmental consultants was engaged to identify likely problems and recommend preventive or mitigating measures. Partly as a result of the consultants' recommendations, arrangements were made for safe handling of the berthing ships' slops; an improved navigation system; a contingency plan for handling accidental oil spills; improved landscaping and rail trestle design; erosion and dust control; and solid waste handling and liquid waste treatment. At the mine site steps are being taken to prevent pollution of nearby surface waters, to stop erosion and to restore the landscape through plantings and contouring.

3.28 Sepetiba Bay, a largely, as yet unspoiled estuary of great beauty, represents a recreational/tourism resource of great potential value. In addition, it has a significant shell and fin fishery, as well as a nursery ground for important coastal fish stocks. The fate of this estuary is

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1/ Till the writing of this report, final site selection for the project had not been made.

uncertain in view of the planned industrial activities along its shores. But, the joint concern shown by the Bank Group and the borrower for the future of this area has set an example. Another industrial project on this Bay, financed in part by the IFC, has received similar treatment of its environmental aspects to ensure its not representing a threat to the Bay's future resource options.

3.29 Turkey's Antalya project and Brazil's MBR Iron Ore project are therefore examples of investment activities that would have caused major environmental problems if no changes had been made in siting and design. This does not mean that these projects will not result in any environmental deterioration. For instance, the railway to the MBR mines passes through some fairly high congested urban areas. The frequency of heavily loaded ore trains will create noise and safety problems. Since no fully satisfactory solution to the environmental problem could be found, these undesirable consequences were accepted. This notwithstanding, the redesigned project will produce considerably less adverse environmental impact. All those features that would have produced a progressive deterioration in the environment have been eliminated from the project design.

(iv) Linkages Between Environmental Problems

3.30 In the initial stages of the development of what may be called environmental technology, the emphasis was on the treatment of waste matter before it was introduced into the environment. Our experience with the impact on ecology of development projects has underscored the need to treat the environmental problem as a multifaceted one. The best examples of development leading to a wide range of environmental problems are to be found in the large urban areas of the developing countries. These centers suffer from too rapid growth and the continuing impact of rural/urban migration;

they are the focus of major problems concerned with air and water pollution, environmental sanitation, solid wastes management, congestion, noise, and lack of open spaces and recreational areas. Since the mix and intensity of these problems vary between cities, solutions must be designed for the particular socio-economic-political milieu. A case in point is the Istanbul Urban Development Technical Assistance Project.

3.31 This centuries-old city has been, in recent years, undergoing rapid, unplanned, and uncontrolled growth. The provision of urban services and amenities has not kept pace with growing demand. For instance, the water system lacks capacity to meet the present demand and service is intermittent. Only one-third of the city is served by a water-borne disposal system. Contamination of surface and ground water eventually used for domestic purposes is widespread and was linked to a cholera outbreak in 1970. Storm sewers are lacking and standing water is a problem in several areas of the city. Pollution of the Golden Horn has reached alarming proportions, while the Bosphorous and Sea of Marmara are grossly polluted from domestic and industrial wastes. Solid wastes management and disposal are inadequately handled, including open burning dumps, infested with vermin. Health service, particularly those serving the rapidly growing squatter settlements are less than adequate and ancillary health services (diagnostic laboratory, food inspection, etc.) are antiquated. Diffusion of responsibility for local administration among multiple agencies, and between different layers of government (metropolitan, regional and central government bureaucracies) has compounded urban environmental health problems.

3.32 The Bank-financed project seeks to address itself to some of these environmental problems. It aims toward achieving comprehensive and coordinated

policies, plans, and programs among and between levels of government leading to the formulation and execution of a sound metropolitan development program. The quality of life as well as the quality of the environment in Istanbul and its environs is to be directly affected by the outcome of this project. The problems being faced by Istanbul can be seen in many other cities of the developing world. The solution to these problems calls for a good understanding of the rapidly changing man-environment relationships in the urban setting. It is recognition of these linkages that has convinced the Turkish Government to seek assistance from a number of agencies. For instance, the UNDP has been called upon to help draft a national environmental policy while WHO is working on a comprehensive urban health program. The Bank has encouraged these moves, and is working in close cooperation with the UNDP and WHO. It stands ready to assist in financing suitable projects among those identified.

3.33 Large mining, industrial and irrigation projects provide other examples of the way development can produce a serious environmental imbalance. The Cuajone Mining Project in Peru, a large copper mining and smelting operation for which IFC is providing slightly more than 2 percent of the total cost of $550 million, will involve the development of a new copper mine, installation of a concentrator, and expansion of smelting and supporting infrastructure facilities. The project, which will produce 186,000 tons of blister copper annually, is located in a sparsely inhabited, largely semi-arid area of southern Peru immediately adjacent to the Pacific coast.

3.34 Examination revealed that effluents and emission created by the mining and smelting operations already being carried on at the project site would be doubled, causing 30 million tons of tailings to be annually discharged into the sea and 600,000 tons of sulfur oxides to be released into the air.

Population centers and surrounding agriculture would be exposed to marked increases in air pollution. Experience during the prior 14 years of operation indicated that the pollution had on occasion reached as far as 60 km upwind from the smelter, with adverse effects on sugar cane and vegetable production.

3.35 In addition to problems attributable to gaseous effluents, there was the question of the effect of tailings in the offshore waters. The waters are associated with the large-scale "upwelling phenomena" along the Peruvian coastline which gives rise to an abundance of phytoplankton, on which the anchovy feed. The annual anchovy catch has been estimated at about 10 million tons per year, making it the world's largest fishery in terms of weight of catch of a single species. The fishing grounds also sustain a large but fluctuating bird population (10-30 million) which includes the important guano-producing species (cormorant, piquero and alcatraz). The project without adequate environment safeguards therefore could have/a far reaching impact on Peruvian agriculture and fishing industries and on the health of the residents in nearby urban centers.

3.36 The magnitude of the mining project, the limited availability of data and the potential environmental/health impact, persuaded the Bank Group to engage an environmental pollution control expert. His report from the field, while recognizing the very significant economic/social benefits that Peru would realize from the proposed operations, weighed them against/the adverse environmental/health effects. Based on these findings, the Bank Group persuaded the borrower to accept in principle the incorporation of a number of environmental safeguards in project design.

3.37 In particular, it will take whatever steps are agreed to be necessary to alter its present tailings disposal practices, should this prove necessary,

and will monitor air pollution in and around the smelter site to preclude any threat to public health or to agricultural interests. Qualified consultants, acceptable to IFC, will conduct detailed studies on mine tailings disposal and air pollution.

3.38 / In another case, examination of the plans for the Erdemir Steel Expansion Project in Turkey revealed that little or no provision had been made to control the liquid and gaseous effluents which would be released into the environment in relatively large quantities. Of particular concern was the possible effect of air pollution on public health and on livestock and vegetation in and around the project site. Further, the liquid wastes, containing toxic ingredients, were to be released directly into the offshore waters of the Black Sea, which already shows signs of heavy pollution. It was decided that an industrial pollution study should be made, and a team of industrial pollution control experts was engaged by the Bank Group. The team recommended controls to achieve reasonable standards governing the release of effluents in keeping with conditions peculiar to the project site. The sum of $5 million, representing 1.7% of total cost, was included in the project cost estimate for this purpose.

3.39 Irrigation projects may not only result in soil salinity and water-logging, they may also produce infestation by undesirable aquatic plants and the creation of new or enlarged habitats for water-associated disease vectors, especially those snail species involved in transmission of Schistosomiasis. Irrigation canals, by increasing the opportunities for human contact with water, also increase the opportunities for transmission of water-borne disease.

3.40 The Upper Egypt Agricultural Drainage Project illustrates some of those problems. The construction of the High Dam at Aswan has allowed for perennial irrigation by stabilizing the flow of the Nile. Perennial irrigation has brought the groundwater table up to or just below the surface and, with it, salts which raise the salinity of the soil and of irrigation waters. As a consequence, land is going out of production and this situation will continue unless and until adequate drainage is provided, as is being done in this project.

3.41 The disease of Schistosomiasis (Bilharizia), long known to Egypt, affects millions of persons. WHO has described it as one of the major crippling diseases of developing countries. Perennial irrigation has improved the habitat for the snail vector of the parasitic disease, and increased both its distribution and the chance for human infection (resulting in greater clinical severity of the disease). How to control the snail over large areas and arrest the clinical severity of the disease poses a formidable problem for Egypt's agricultural and public health authorities.

3.42 The Bank Group-financed drainage project in Upper Egypt provided an opportunity to study and deal with the problem. An internationally recognized Bilharizia expert, after a field survey, made recommendations for chemical control of the snails and treatment of infected individuals; these recommendations were incorporated into the project. The control effort is designed to fit into a national plan for tackling the environmental and clinical aspects of this disease.

3.43 Ecological problems also have psychological, physiological and socio-cultural components. Recognition of these problems and the opportunity

for minimizing them can be seen in a number of Bank Group-financed projects. In the case of the Accra/Tema Water Supply Project in Ghana, the resettlement of eight villages within the impoundment area with a population of about 2,000 was preceded by a detailed socio-economic study, as part of the project feasibility studies. Detailed planning and supervision of the resettlement would be undertaken by the University of Kumasi. While not a hydro-power project, this project presented similar resettlement problems and opportunities, and would seem to have been handled in a model manner. In the case of the Quae Yai Hydro-electric Project in Thailand, 8,000 inhabitants will be resettled out of a reservoir area, and presenting classical psycho-socio-cultural problems. In the environmental studies conducted during the feasibility stage, careful consideration was given to resettlement sites, changes in occupation, life-styles, physical and social conditions, social services, etc., and these have formed the basis of a resettlement plan to be implemented by the borrower and government. Many other project examples exist, such as the Sao Simao, Itumbiara and Paulo Alfonso Hydro-electric Projects in Brazil, wherein resettlement problems were presented and required incorporation as integral aspects of the projects' formulation and implementation.

3.44 These illustrations from the Bank's experience in environmental work underscore the important point that remedial measures have to be spread over a number of sectors. As pointed out, often the secondary impact on environment can be much more serious than the primary. This means that in evaluating the environmental impact of the projects financed by it, the Bank Group should spread its net as wide as possible, calling in other international agencies in cases where the comparative advantage lies with them.

(v) Sector-specific problems

3.45 In looking at environmental problems, the Bank Group has followed what may be described as the project approach. As indicated in Section B, the Office of Environmental Affairs first identified those projects that, for reasons of chosen technology or siting, had potential environmental problems and then suggested changes that were deemed necessary in order to reduce their impact on the ecology. This project-by-project approach notwithstanding the Bank's experience shows that different countries and different sectors of the economy are each faced with their own specific set of problems. Some of the potential problems are described below.

3.46 Industry: Few if any industrial projects are free of potentially troublesome environmental problems. Most common, as would be expected, are those associated with air and water pollution, solid wastes disposal, noise, in-plant industrial hygiene, plant siting, and subsequent related land use and settlement patterns. The capacity of the environment to withstand the injection of industrial wastes without serious undesirable consequences must be carefully considered. It is also important to identify specific pollutants, known to pose a demonstrable threat to human health or ecological systems (e.g., mercury, fluorine, arsenic, etc.) even in very low concentrations; their release must be prevented or carefully controlled and monitored. Fortunately, the pollution resulting from industrial processes is susceptible to control. The degree of control appropriate will depend upon the environmental setting and the quality of the ambience to be achieved. Conditions in many developing countries permit more liberal effluent and emission standards than can be tolerated in the more highly industrialized countries. But it is important not to foreclose potentially important future resource options; hence, the need for projecting the cumulative consequences of industrial pollution.

3.47 Power: Thermal power projects exhibit many of the problems characteristic of industrial schemes as they relate to air and water pollution. Of especial concern is the effect the heated cooling waters will have on the biota of the water body into which they are discharged.

The problems associated with transmission lines have to do with scenery and tourism. The problems can be minimized or avoided if the proposed route is considered in relation to these values. Use of herbicides along the right-of-way creates problems for the local flora and fauna.

3.48 Forestry: Forestry projects present problems associated with ensuring a sustained timber yield through regulation of annual allowable cuts, prescription of cutting cycles appropriate to the species harvested, reforestration of cut-over areas, prevention of erosion and fire, and maintenance of stream flows in the areas being harvested. Problems can also arise in connection with the scope and extent of enforcement of forestry laws and regulations, the competence of forest management institutions, and the award of lumbering concessions. The transport and industrial aspects of forestry projects may also require examination.

3.49 Fishing: In marine fishing projects problems concern the stocks to be exploited, and the manner in which they will be harvested to ensure a sustained yield. This leads to examination of the institutional capacity for overseeing and regulating the harvesting of this resource, as well as for conducting the necessary studies, investigations, and research.

Pollution with respect to its impact on the fisheries, especially estuarine and coastal stocks, is a matter of continuing concern.

Fresh water fishery development schemes can be threatened by fertilizer and pesticide runoff, weed and algae infestation, and water-borne diseases.

3.50 Livestock: Livestock projects require considerations of range conditions and carrying capacity, and the prevention of over-grazing. Livestock/wildlife competition, encroachment on game preserves, barriers to wildlife migration routes and the adequacy of water supplies are associated issues. In semi-arid areas, the potential for contributing to desertization, a phenomenon affecting large areas of the Sahel zone in Africa, must be taken into account.

3.51 Rural Development: Rural Development projects may require consideration of health-care delivery and environmental sanitation. New water supplies need to be protected against surface and sub-surface contamination. The problems presented by small sub-projects--impoundments, irrigated areas, fish ponds, etc.--are local in character and can readily be handled, often on a self-help basis.

3.52 Transport: Highway projects may at times change surface water drainage patterns and lead to erosion. If not properly planned they may open new pathways for transmission of human and animal disease; lead to unregulated settlement along the route, and create aesthetic problems in areas with high tourism potential; adversely affect wildlife habitats; and pose safety problems for people and animals. Highway design engineers and contractors are, however, becoming increasingly aware of the problems posed for the physical environment, while development planners are becoming aware of the secondary impact of new roads. The problems presented by railways are similar to those posed by highways. The principal problem associated with airports is noise, which affects decisions concerning runway orientation,

flight paths and aircraft schedules. Siting and land use zoning assume importance, as means of minimizing the undesirable consequences of congestion from development associated with or triggered by the airport. Port development and inland waterway projects may pose problems of dredging and the disposition of spoil material, the possible disruption of fish habitats, the potential for accidental oil spills, pollution of water, changes in sediment transport which may alter beaches and other land forms, undesirable urban development, marine accidents and solid wastes management. Pipelines which are not properly sited can become a barrier to wildlife movement, create an aesthetic blight, constitute a hazard if ruptured by an earthquake and may encourage improper use of herbicides along the right-of-way.

3.53 Tourism: Tourism projects often constitute an aesthetic threat to the local scenery. Architectural design and proper utilization of the land/water areas being developed are critical as is the continued prevention of pollution in water bodies associated with the project. The impact of such projects on nearby urban areas and on people and cultures should be taken into consideration.

3.54 The foregoing discussion suggests that it is possible to move away a little from the project-by-project approach that the Bank Group has followed to-date. It is possible, for instance, to develop environmental guidelines that would be sector-specific. While this would not do away with the need for detailed project analysis; it would help the development agencies to focus attention on potential environmental

Awareness of problems associated with certain sectors can help to improve project design with regard to its environmental impact.

Chapter IV

IMPLICATIONS FOR BANK GROUP OPERATIONS

4.1 The Bank Group has acquired considerable operational experience in its environmental work. In the experience gained thus far, the following have been identified as policy issues of some importance. First, the question of environmental standards. Should the Bank Group advocate the determination and enforcement of universal standards or should it continue to follow the project-by-project approach and recommend measures that are specific to the environment in which the project is to be located. Second, to what extent should satisfactory environmental performance be a condition for bank loans. Third, who should meet additional costs that would result from this environment constraint. Each of these issues is discussed below.

Environmental Standards

4.2 Development assistance agencies recognize that developing countries want to give priority to programs and projects which will promote economic growth, and will assign less importance to environmental concerns. They also recognize that the choice of development goals, priorities and alternatives is the sovereign responsibility of each developing nation.

4.3 At the same time, there is growing concern over the continuing deterioration of the environment on a global scale, the transnational environmental effects of development programs, especially at the regional level, and pressure, both within and outside governments, for steps to curb the growth of pollution and to minimize or eliminate the damaging side effects of development. Consequently, donors are tending to take a careful look at costs and benefits in environmental terms and at alternative ways of selecting and implementing the development projects they agree to support.

When, as will happen, a developing country opts for sacrificing the environmental protection aspects of development activities in favor of greater, or less costly, immediate economic growth, development assistance agencies must decide whether to provide assistance to a project of this character.

4.4 It has been suggested in some quarters that the potential for conflict could be reduced if all development assistance agencies were to adopt common environmental standards or criteria which development projects must satisfy to qualify for assistance. Developing countries, however, see such an approach as an infringement of their right to set their own priorities and standards, a form of "environmental imperialism." And in development assistance agencies there is some opposition to the "standards" approach, on the ground that it may lead to insistence on impracticable and excessively costly solutions, and fail to take due account of the wide variety of circumstances and situations and the multiplicity of variables in project design and implementation.

4.5 Since each country decides for itself how to allocate limited resources to environmental protection as against education, housing, etc., and since levels of income, costs, local environmental absorptive capacities, tastes and cultural values differ from country to country, decisions concerning the allocation of resources will also differ. Uniform international standards, therefore, are in general inappropriate (except perhaps to the extent that they can be demonstrated to be physiological minimum standards, i.e., international health standards). While rejecting the automaticity and rigidity of uniform standards, the developing countries appear to regard "guidelines" of the Bank Group type, as acceptable. However, the developing countries wish to participate in the formulation and application of any such guidelines,

and they emphasize the need for consultation between donors and recipients on these matters.

4.6 At the same time, in addition to the objections noted above, developing countries have expressed concern that the application of guide-lines may lead to "bottlenecks" in the implementation of development projects. There is also some concern that environmental standards are being proposed by developed countries to maintain comparative technological advantage over the developing nations. Nevertheless, it seems probable that agreements setting international standards on hazardous and toxic material, and environmental agreements related to the oceans, will be worked out. Extensive research is uder way to evaluate the extent of man's global impact on the earth's air mantle; these efforts may also lead to agreements on international standards.

4.7 Reccomended approach for the Bank Group: Developing countries fear that uniform environmental standards or criteria applied to both developed and developing countries alike, if used in support of development assistance projects or activities will discriminate against them. Uniform standards may also be difficult to develop and may prove very costly for the developing countries. It is therefore appropriate for the Bank Group to follow a project by project approach and incorporate only those environmental measures that are considered essential. But should international agreement be reached in certain environmental areas, the Bank Group should assure that its project financing is consistent with their terms.

4.8 The Bank Group should also help to bring to the attention of its member governments information, guidelines, instructional materials, technical data, etc., on environmental affairs. In doing so, however, the Bank Group should make plain that it is not imposing on its members its own views about environmental protection.

Enforcing Environmental Performance

4.9 Given the concern that development projects be "environmentally sound", the question arises whether country performance in establishing and following a sound environmental policy should be a condition of lending.

4.10 The question of "conditions" or "strings" attached by donors has long been a contentious issue. The growing concern with environmental implications has added a new facet to the problem. Developing countries are worried that development assistance agencies, reflecting the donors' viewpoint, will translate this concern into additional criteria of eligibility for support. This is closely linked to developing country fears that developed countries may agree on environmental standards for particular types of projects, insisting that these standards be met as a precondition to the provision of assistance.

4.11 Since the issue of "conditions" is not new, its resolution in respect of environmental issues should be arrived at by applying the policy which has been followed with respect to "conditions" relating to economic or technical feasibility, engineering adequacy, financial soundness, etc. Without mutual agreement and cooperation among the parties, a project or program is unlikely to be successful, or at least will not be so for very long. Unilateral attempts by one party to impose or force compliance with requirements, restrictions or conditions will not work and are likely to impair the relationship. This is not to say that conditions should never be imposed; it is as unrealistic to expect assistance agencies, bilateral or multilateral, to extend aid unconditionally as it is to expect a recipient to accept the directives of an external authority concerning matters it considers to be within its own prerogative. The solution is not to eschew

"conditions", but rather to seek agreement on conditions which are sensible and satisfactory.

4.12 Recommended approach for the Bank Group: One of the most useful roles which the Bank Group could play in the environmental field would be to establish a dialogue on the subject with member countries. The most effective vehicle to this end would be project appraisal, where the Bank Group's own work could provide the example of a proper balancing of all relevant factors.[1/] Bank Group financing of industrial projects in countries whose national environmental policy permits other enterprises in the vicinity to operate without emission controls justifies examination of the need for policy changes.

In many countries there are no laws, rules or regulations governing environmental matters; the Bank Group may, in these countries, encourage and advise on promulgation and implementation of appropriate legislation. Where environmental conditions have deteriorate significantly and are causing severe problems through their negative feedback upon man, they were seldom caused by any single enterprise or project. Air, land and water as recipient media must cope with cumulative impacts over time, and the Bank Group having information on national development plans, may be able to identify areas in which problems are likely to arise in the absence of precautionary measures and prudent planning. If the Bank & the borrower cannot agree on terms and conditions relating to environmental factors, the Bank will have to decide whether to provide the assistance proposed without environmental safeguards which it considers essential.

4.13 Also, the Bank Group should continue its current policy of reviewing every investment project from the standpoint of the potential

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1/ For a discussion of this see the Appendix on "Cost-Benefit Evaluation Problems and National Environmental Policies."

effects on the environment and agreeing with the borrower on remedial measures that may be considered necessary. It should encourage its member governments, both donors and recipients, to consider whether proposed projects have a potential for adverse environmental consequences, to arrange for further analysis and appropriate action where the nature and severity of those consequences warrant it, and to assure that project planning and execution takes due account of the results of that analysis. In this connection, the guidelines which the Bank Group has developed should be made available to governments, international organizations and individuals concerned with economic development.

Financing Environmental Protection

4.14 The question of "who pays" for environmental protection measures in the developing countries has already arisen in international discussions and promises to lend a controversial dimension to the environmental/development debate. In preparation for the U.N. environmental conference, the developing countries sought to establish the concept of "additionality", which means that/a net additional amount of assistance from the developed countries, in addition to the 0.7 percent of GNP target established for the Second Development Decade, should be made available to cover the added costs of environmentally sound development projects. The Development Assistance Committee of OECD expressed its reservations concerning this concept, considering it unrealistic and misleading to accept the notion of an increase in the gross total of resources available for development assistance to cover environmental costs. OECD has, however, accepted the principle that the added costs of development projects necessitated by environmental protection measures are a legitimate part of the project cost and should be taken into account by the donor countries. In this latter, albeit much weaker, sense the notion of "additionality" is acceptable to OECD countries; in the former

sense, it is not. The donor countries have also suggested that, should developing countries have "environmental projects" among their priority investments, they would,be willing to finance them(e.g., urban water and sewage, erosion control, forest management, etc.).

4.15 The question of additionality was raised again at the time of the setting up of the United Nations Environmental Fund (UNEF), as part of the United Nations Environmental Program(UNEF) which administers the Fund under the guidance of its 58 member Governing Council. UNEF was established in 1972 to provide "additional financing for environmental programmes".[1/] In order to enable UNEF to fulfill its policy-guidance role for the direction and co-ordination of environmental activities, the Environmental Fund will finance wholly or partly the costs of the new environmental initiatives undertaken within the United Nations system, including those envisaged in the Action Plan adopted by the United Nations Conference on the Human Environment. As originally conceived, the program sought to make additional resourdes available for global and transnational environmental projects. It was envisaged as a $100 million, 5 year program.

4.16 With the establishment of a separate UN Fund, some suggestion by the developing countries to use it as a source for augmenting other development assistance flows can be anticipated. In its present conception, however, the donors to the Fund have made it clear that it should not be considered as another source of assistance for development projects in developing countries, but rather, as a source of funding for activities which address global problems of environmental protection of concern to both the developed and developing countries. Examples of such activities are global environmental monitoring systems, research projects aimed at environment, international conventions and agreements on protection of the oceans and the atmosphere.

1/ United Nations, Report of the United Nations Conference on the Human Environment, document no. A/CONF. 48/141. Rev.1,p.30.

4.17 The concept of additionality, therefore, has acquired a number of different meanings. For the developing countries it means resources in addition to those promised for meeting the UN Second Development Decade Target. For the developed countries it means meeting additional project costs to be incurred for environmental reasons, without increasing the total flow of resources to the developing countries. The United Nations sought to take a position somewhere in between, where some additional resources will be made available for global and transnational environmental activities.

4.18 Recommended approach for the Bank Group: The Bank Group should maintain the position which it has taken to date in international discussions of the "aditionality" issue. According to this added costs in specific projects or activities for environmental protection reasons should be taken into account and, where necessary, assistance to such projects increased to cover all or appropriate portions of such costs. Whether or not such additions would increase the total flow of Bank Group assistance to the country would depend on a number of other considerations.

4.19 In an increasing number of cases, the borrower finances environmental studies in much of the same manner as it finances studies of other aspects of the project, a logical extension of the view that environmental, health and socio-cultural implications are as much a true dimension of a project as, e.g., the marketing aspects. Experience has shown, for example as noted earlier, that engineered changes in process design often produce results both superior to those obtained from end-of-the-line treatment, and less costly process changes (often based on recycling) and new processes are

constantly being developed to save resources and reduce treatment expenditures and disposal problems. An environmental study may also suggest selection of a different site, to avoid potential health hazards, reduce likelihood of adverse impact from effluents, avoid a conflict in resource use, etc. Under certain circumstances, the Bank Group itself will carry out and analyze the results of such studies. Where the Bank Group will not be carrying out the study, borrowers often ask for its help and advice, for example in drawing up terms of reference, or in making arrangements to have the studies carried out at the borrower's expense. The Bank should normally encourage borrowers to finance and carry out environmental project preparation studies themselves. However, in view of the importance of assuring that such studies are undertaken, the Bank Group should also be prepared, in appropriate cases, to include the cost of such studies in the expenditures to be retroactively financed out of a subsequent project loan.

4.20 An important issue is whether the Bank should finance "environmental" projects (a terms which can be applied to a great variety of projects, including air and water pollution control, control of erosion, solid wastes disposal, reforestation and pest and disease vector control) or should merely concern itself with the environmental/health dimensions of traditional projects. The economic and social returns of "environmental/health" projects can be quite substantial relative to other projects in a particular country. Such projects should be considered for Bank lending provided they meet the Bank Group's normal project criteria. Such a policy will not represent a significant change of position since there is already a long history of involvement in sectors with direct environmental/health consequences, such as water supply and sewerage, afforestation, etc.

4.21 In summary, this paper proposes the continuation of the Nank's present approach toward environmental problems. Some advances have been suggested in project design, implementation and finance. If these are adopted, the Bank Group can expect to play an increasingly fruitful role in improving and/or helping to retard the deterioration of man's physical environment.

Appendix

ECONOMIC EVALUATION OF NATIONAL ENVIRONMENTAL POLICIES AND PROJECTS

Project Considerations

1. As pointed out in the text of the paper, efforts are increasingly being made to include environmental considerations as integral parts of development strategy and action. This raises difficult problems of evaluating the various costs and benefits of alternative ways of dealing with environmental considerations. This appendix considers, first, the general criteria to be employed in cost-benefit analysis of projects involving significant environmental considerations; and, second, approaches to the formulation of national environmental policies. It attempts to identify the relevant principles involved, recognizing that both within the Bank Group and elsewhere, experience to date has shown quantification of both costs and benefits to be particularly difficult.

2. In principle, the methodologies and criteria applicable to projects with environmental aspects are similar to those applicable to other kinds of projects; the benefits (broadly considered) which could be expected to be realized from incremental environmental expenditures should be determined to be greater than those which flow from the best alternative use of the resources involved. There are, however, uniquely troublesome aspects of measurement and quantification associated with environmental matters which make application of such a concept at present more of an art than a science. It is difficult to predict the extent and type of environmental change that will result from a particular activity. It is even more difficult to value a predicted change in cost-benefit terms.

The Concept of "Willingness to Pay"

3. When the extent and character of environmental change can be predicted, existing markets will often provide a measure of the monetary value of

some of the effects. For example, the value of fish protein gained or lost through a change in water quality, and the repair and maintenance costs for physical structures subject to air or water pollution, can usually be adequately measured in this way. But it is not possible to directly establish a market value for the health effects of a change in amounts of air-borne particulates or a change in drinking water quality. In such cases indirect methods must suffice; an attempt must be made to infer from the prices of things which do have a market value, the value placed upon things for which no market has been established. For example, a Bank Group appraisal mission on a sewerage project in Brazil estimated some of the aesthetic and health benefits associated with a clean-up of the river on the basis of a predicted increase in nearby land values.

4. This approach to cost-benefit evaluation is based on the "willingness to pay." In principle, this is the concept that the Bank Group currently attempts to employ in projects with direct health and environmental consequences. While the concept presents measurement difficulties, it is in principle applicable to any project with environmental implications. Where markets fail or do not exist, an inference is drawn concerning the amount that individuals would be willing to pay were there a market. The measurement of willingness to pay should of course include the value of benefits which actuallly accrue to the individual, whether or not he is in fact charged with the cost of providing them.

5. Several factors with a special bearing on discussions of environmental matters, and which influence willingness to pay in particular instances, should be noted. Willingness to pay for alternative items is a function of resource endowments, e.g., national wealth, and also of individual preferences and tastes. Consequently, different countries will make different choices as between environmental goods and other goods.

6. Willingness to pay may also be a function of the options available within the area. For example, the value of cleaning a particular river or stream will depend upon the number of other clean bodies of water in close proximity and the extent to which they offer suitable alternative facilities. In an area with an abundance of clean water bodies, the marginal benefit of providing one more is likely to be substantially smaller than would be the case where there were very few water bodies or where most of them were fouled.

7. A third factor affecting willingness to pay falls under the heading of "non-user" benefits. Persons who are not and may never be users of a facility may nevertheless receive some benefit from the knowledge that the opportunity for use exists. In principle, that benefit should be measured by the sum of all such "non-user" beneficiaries' willingness to pay.

8. Finally, the use of willingness to pay as an indicator of a project's worth is limited to the extent that it is in part determined by the existing distribution of income. Thus it may be felt that the poor, who often suffer most from environmental pollution, should be protected by expenditures that exceed their capacity to pay.

Approaches to Project Analysis

9. Least Cost. A "least-cost" analysis evaluates alternative proposals for achieving a particular environmental target, with the solution that achieves both the environmental (and productive) targets at least cost being selected. It is important in any such analysis to assess the sensitivity of costs to variations in the environmental target level so that tradeoffs between levels of expenditure and the environmental quality obtained thereby can be evaluated. Although this approach provides only a partial analysis, if the proper sensitivity tests are made it can at least demonstrate, in physical and in cost

terms, what are the relevant tradeoffs. It is important to note that in this regard the project analyst should be concerned with achievement of the least social cost, defined to include costs incurred not only by the pollution control authority, but also by those who cause and by those who suffer from pollution. Achievement of the least social cost solution requires analysis of the financial and administrative approaches to pollution control as well as of the physical means of attaining environmental quality targets.

10. Where some but not all benefits are quantifiable, least cost analysis can usefull be supplemented by the "switching value" approach. This involves providing an answer to the question "How large would the value of residual environmental benefits (those benefits not quantified) have to be to justify the project?" In using this approach, it is assumed that the cost stream, the discount rate and perhaps certain other benefits are known. One can thus solve for the unknown value of residual environmental benefits which would equalize the stream of total benefits and total cost at the given discount rate. Since benefits occurring in multiple years are involved, future-year residual benefits must be expressed as a function of first-year benefits.

11. After obtaining a value showing what the first year benefit would have to be in order to justify the project, the decision whether to proceed will depend on a judgement about the reasonableness of the result. The computed value of first year benefits serves as a "switching value" for the decision. If a higher amount is ascribed to actual willingness to pay for these benefits, the project will be accepted; if willingness to pay is lower, it will be rejected. The greater the difference between the judgement concerning actual willingness to pay and the computed value of first-year benefits, the greater can be the confidence with which a project is accepted or rejected.

12. The foregoing kind of analysis is appropriate for dealing with "intangible" gains or losses, including aesthetic values or recreational activities. It also has special relevance to problems involving the permanent loss of a unique natural or cultural asset, for the fact of uniqueness will of itself make any kind of "market" pricing difficult, if not impossible.

Use of Qualitative/Descriptive Analyses

13. If the environmental impact is significant, and all attempts to quantify it in monetary terms fail, it should be possible to describe in qualitative or numerical terms the nature of the effects of alternative courses of action. A decision on project acceptability will typically be facilitated if, for example, in a project involving air pollution, a statement describing the benefits (or costs) of reducing (or increasing) the level of sulfur dioxide in a section of an industrial city accompanies the data on the costs and benefits quantified in monetary terms. The descriptive statement should attempt to characterize all aspects of the effects of the pollutants -- on sight, smell, taste, health, recreation, attitudes, animal and vegetative life, etc.

14. It is as important in a qualitative presentation as in a quantitative one to provide information in terms of incremental differences, i.e., to show the differences between the "with" and "without" cases, as well as the differences among project alternatives. Unfortunately, projects that produce only marginal changes may be harder to analyze than projects with a large non-marginal impact.

National Environmental Policies

15. In lending for a project with significant environmental implications, the Bank Group often has an opportunity to influence the larger institutional framework within which decisions will be made. This has been the case with projects now in the preparatory stages in Finland, Yugoslavia and Turkey. It is useful, therefore to consider the economic and social implications of alternative policy instruments available to governments. It should be kept in mind, however, that this is a new field in which views are still rapidly evolving and Bank Group staff experience is still fairly limited.

16. Of the many national or regional strategies that have been proposed, most can be classified as involving subsidies, regulations or charges.[1/] These different approaches create different incentives and have different effects on resource allocation and on the distribution of the gains and losses resulting from governmental intervention.[2/]

1/ The policy instruments discussed in this section are in general limited in their applicability to the pervasive problem of residuals generation (i.e., the generation of waste products from productive facilities) rather than the quite different problem of the loss of a unique natural or cultural resource. Moreover, they are not directed at the question of highly toxic substances, such as mercury or flourine, which can be dangerous even in minute quantities. Problems of unique resources and of toxic substances can more usefully be considered in the context of special studies.

2/ A comprehensive discussion of the principles involved is to be found in IBRD, "Finland's Water Pollution Control Program; the Role of Economic Analysis," Public Utilities Department, PUN 8 - February 20, 1974.

17. Subsidies. Subsidies are often used to encourage parties responsible for environmental pollution to install pollution control equipment, or to compensate them for having to meet environmental quality standards. However, by the distortion of relative prices, subsidies can be expected to result in inefficient investment decisions. One problem that arises is that unless all productive investment is to be subsidized, the regulatory agency must isolate the costs incurred by enterprises for purely environmental purposes from those costs that would be incurred in any case in the interests of increasing production or improving efficiency. This will frequently be too complex for a regulatory agency to handle since an enterprise's least-cost response to regulatory-requirements will often involve changes in internal processes which simultaneously result in usable or marketable outputs. This complexity is illustrated by information received during the preparation of a proposed project in Finland where it was estimated that it would cost as much as $100,000 simply to carry out a study of the net difference in cost to build a modern pulp and paper mill, with and without pollution control. As a result, in negotiating with authorities on the amount of the subsidy, the enterprises have all the advantages since only they have all the facts.

18. Due to the difficulty of separating out costs according to purpose, firms causing pollution have an incentive to claim subsidy for investments that strictly speaking are not for pollution control purposes at all. Furthermore, enterprises may be encouraged to invest in "end of pipe" treatment facilities rather than to carry out a less expensive internal process change, because the former can more easily be demonstrated to be an anti-pollution device and therefore qualify for subsidy.

19. Inherent in the provision of subsidies therefore is not only the danger that the least social cost means of achieving environmental quality targets will fail to be selected, but also the strong possibility that decisions to invest in productive equipment will be similarly distorted. As with any kind of subsidy, the optimal rate of consumption of products that have different environmental effects will not take place, because the total payment for the use of products (including an income or other tax necessary to pay the subsidy) is not related to the social cost of the particular products consumed. In particular, the supply of highly polluting products will tend to be greater than optimal.

20. While the distorting effects of subsidies are well known, subsidization of investment in pollution control equipment is commonplace. This may possibly be justified on the grounds that it is necessary to obtain the cooperation of industry in achieving environmental goals. Usually, however, the argument is couched in terms of equity; the establishment of environmental standards may require firms to make quite considerable changes in processes that have been carried on for many years.

21. The foregoing may be an argument in favor of gradualism in enforcing pollution control regulations. It shoud not however be used to justify the continued use of across-the-board subsidies, that do not distinguish between industries on the basis of social need. Furthermore, the fact that enforcement of pollution control standards may make the difference between a firm remaining in business or closing down is not in itself an argument for subsidizing pollution control. For example, assistance to a firm that is the major employer in a community in order to keep it in business may be carried out more efficiently by a system of lump sum payments than by direct subsidization of pollution control equipment. It would however be unreasonbale to expect a water pollution control authority to be able to exercise this kind of judgement.

22. Regulation/Standards/Licenses. The use of environmental resources for the disposal of water may also be controlled through regulation; for example, through issuance of permits (e.g., allowing a given volume of effluent discharge per time period); establishment of minimum standards of quality; or specification of equipment to be employed in treatment.

23. The easiest kind of regulation to draw up and enforce is one which is uniformly applied. A national or regional requirement that all effluent be of a specified quality is attractive from an administrative point of view. However, the inefficiencies associated with uniform regulations are substantial. Uniform effluent standards take no advantage of local absorptive or regenerative capacities, or therefore, of variations in the costs of pollution at different points, nor do they take into consideration the difference in marginal costs faced by different enterprises in adjusting the amount or quality of their effluents.

24. In addition, a aystem of uniform regulations and standards, by not allowing any flexibility in pollution control requirements, makes almost inevitable a complex and long-drawn-out system of appeals to avoid extreme inequities and inefficiencies (for example, where a particular enterprise's costs of control actually exceed the benefits to society of the effluent reduction). However, the process of appeals and litigation is usually self-defeating, since the industry always has the advantage in arguments about its costs and technology.

25. Individually Adjusted Standards. In view of the inefficiencies of uniform effluent standards, the adoption of effluent standards tailored to each enterprise is often proposed. In theory, a governmental body could appraise each enterprise and issue individualized regulations which would require the enterprise to reduce emissions to the point at which the marginal cost of an additional unit reduction among all enterprises is equalized and/or the desired level of total region-wide reduction is achieved. The administrative costs of obtaining the information required to institute such a system would, of course, be enormous. Furthermore, the potential for delays through appeals and litigation, which is a disadvantage of a uniform standards system, is even greater when individual standards are set for each enterprise.

26. Effluent Charges. Another technique is a system of effluent charges, under which a fee is levied on the use of publicly-owned environmental media for disposal of wastes. The amount of the fee is based on the total load of the harmful pollutant discharged. Where the data are less than complete and reliable, this approach may have certain advantages over those discussed above. For example, if a decision is taken to achieve a given level of reduction in effluent for some particular air-or-watershed, a unit effluent charge, at the proper level, will achieve the desired reduction at a lower total cost to the economy than a regulation calling for uniform reductions in levels of emissions or setting uniform quality standards. This is so because an effluent charge, unlike a uniform regulation, will induce the greatest reduction from those enterprises which can accomplish the reduction most efficiently. Self-interest in maximizing profits will lead each enterprise to invest in process changes or effluent treatment up to the point at which the cost of a unit reduction in effluent is equal to the amount of the charge. Producers with different cost characteristics will therefore respond differently. Uniform regulations, on the other hand, require a uniform response regardless of the cost to the individual enterprise.

27. International experience with effluent charge systems is limited. Several European countries, among them France, Holland, Czechoslovakia, Germany and the United Kingdom, which have employed license systems, have replaced or supplemented these systems with effluent charges or are considering doing so.

28. Because absorptive/regenerative capacities, and therefore the harm cause, will be different for different air shed or water basins, an effluent charge should be set on a regional basis. The level at which the charge is set is critical. In principle, the rate per unit of discharge should be equal to the estimated cost to society of an additional unit of pollutant discharged. While the informational difficulties involved in achieving this result are immense, it should be noted that such an estimate would also have to be made to rationalize a system of regulation. While determination of an ideal level of effluent charge may be beyond the current state of the art, several methods have been proposed for arriving at rough approximations of the proper charge.1/

1/ A practical method for arriving at a rough estimate of the proper charge might be as follows: First, an estimate is made of the total harm in a region being caused by a particular effluent, e.g., biochemical oxygen demand (BOD) or suspended solids in water, sulfates in air. Second, the total quantity in kilograms of the effluent currently being discharged by all sources into the air or watershed is determined. The damage estimate is then divided by the quantity to give an average cost that could be used as the effluent charge. Where more than one pollutant is involved a charge must, of course, be levied on each. In countries experimenting with such systems, formulas have been devised for computing the charges based upon a combination of different pollutants. There is an alternative, somewhat less desirable, approach, which does not require an estimate of social damages. If one of the goals of a national or regional program is a reduction by a certain percent of the amount of a harmful effluent, the amount of target reduction in kilograms could be estimated, and divded by the estimated total industry-wide cost of achieving the reduction. It may also be possible to obtain an independent estimate of the average per unit marginal cost of the target reduction across industries.

29. The question is whether an inexact level of effluent charge is more, or less, acceptable than an inexact effluent standard. With the "wrong" level of charges, the level of effluent production will be higher or lower than the target. The reduction that is achieved, however, is achieved by means of the "least cost" procedure. Furthermore, the level of charges may be raised or reduced over time to bring results in line with the target. If a uniform standard is adopted, whatever the standard, it can be shown to be inefficient with respect to particular enterprises with differing marginal costs. Individually adjusted standards avoid the latter difficulty but, as noted above, the informational requirements and the administrative machinery necessary to set the individual standards and to avoid claims of discrimination may be overwhelming.

30. The conventional wisdom is that with an effluent standard, the target for environmental quality is sure to be met, even though inefficiencies are involved, while with effluent charges the results are uncertain. Experience, however, has convinced many observers that almost exactly the opposite is true. Reductions in industrial waste loads where even modest sewer charges have been imposed by municipalities have often been rapid and spectacular; on the other hand, regulatory processes are frequently not only time-consuming, but also quite uncertain in result.

31. Where environmental pollution is excessive, and the first steps at improvement are being taken, the appropriate remedies for a particular industry may be obvious both to the regulatory agency and to the industry. In such cases, there may be no great difference in result between a system of individually specified standards and a system of effluent charges. As the desired level of environmental improvement rises, however, marginal costs typically increase in

a sharply non-linear fashion[1/] and the case for a rigorous system of charges becomes stronger.

32. Finally, an advantage of an effluent charges system is that it may be a source of funds for certain environmental improvement works that are most efficiently carried out by the public sector. In the water pollution field, for example, economies of scale may be reaped in collective treatment works, while artificial aeration, sludge removal and low flow augmentation would normally best be carried out by a public authority.

1/ See Annex 5 of IBRD, "Finland's Water Pollution Control Program; The Role of Economic Analysis," op.cit. One of the most detailed studies yet attempted for determining the cost of reducing pollution in a waterway was conducted almost a decade ago for the Delaware Estuary area of the United States. The study estimated costs of achieving a given level of reduction in water pollution through several different approaches, including uniform treatment standards and a unit effluent charge. It showed, among other things, that a program involving a uniform effluent standard resulted in costs from 70% to 100% higher than one involving a unit effluent charge, depending upon the specified quality level. (The difference in cost between the charge and the uniform standard was estimated at the time to be approximately $8 million annually for the higher quality level.)