

# Development and Environment

Environment and Social Sciences /  
Environnement et Sciences Sociales

1

Mouton • Paris • The Hague

mcmlxxii

# Development and Environment

*Report and Working Papers of a Panel  
of Experts Convened by the Secretary-  
General of the United Nations Conference  
on the Human Environment (Founex,  
Switzerland, June 4-12, 1971)*

Mouton • Paris • The Hague

mcmlxxii

*Published in collaboration with the*

École Pratique des Hautes Études (VI<sup>e</sup> Section)

© 1972 United Nations, Geneva, and École Pratique des Hautes Études  
(VI<sup>e</sup> Section), Paris.

Library of Congress Catalog Card Number: 72-75446

*Printed in France*

# Contents

Introduction, by Maurice F. Strong.	IX
I. The Report of the Panel	
1. <i>Overall Perspective</i>	5
2. <i>Environmental Issues in the Development Process</i>	II
3. <i>Some Considerations for Environmental Policy Formulation</i>	21
4. <i>Implications for International Economic Relations</i>	29
5. <i>Implications for Policy Action</i>	39
<i>List of Participants</i>	43
II. Selected Working Papers	
Enrique Iglesias <i>Development and the Human Environment</i>	47
K. William Kapp <i>The Implementation of Environmental Policies</i>	67
Jan Kulig <i>Environmental Policies for the Developing Countries and Their Development Strategy</i>	95
Miguel Ozorio de Almeida <i>Economic Development and the Preservation of Environment</i>	107
Ignacy Sachs <i>Environmental Quality Management and Development Planning: Some Suggestions for Action</i>	123

United Nations Conference on the Human Environment <i>Environmental Costs and Priorities: A Study at Different Locations and Stages of Development</i>	141
United Nations Conference on Trade and Development <i>The Implications of Environmental Measures for International Trade and Development</i>	185
General Agreement on Tariffs and Trade <i>Industrial Pollution Control and International Trade</i>	201

MAURICE F. STRONG\*

## Introduction

The story of man's relationship with the natural environment dates back to the dawn of man's emergence as the dominant species on our planet. It is indeed inseparable from the story of man's own development.

But it is only recently that "environment" has become a public issue on a global scale. It first arose in the highly industrialized societies in which concern centred on the adverse consequences of many of the varied practices and technologies which have produced the unprecedented affluence of those societies. In this context, it is not surprising that many people in the developing countries questioned the relevance of this new concern for environment to their own compellingly urgent development priorities.

They asked if it was really a disease of wealthy societies—why they should be concerned with it at all, especially at this preliminary stage of their own development. Indeed, some suggested that if more industry meant more pollution they would welcome more pollution. But at the same time they asked how the actions taken by the more industrialized countries would affect their own interests, what was likely to be the availability of the technical assistance, and what would happen to the markets they require for their own development. They asked what attention was to be given to the kind of environmental problems which directly affected them.

It was to attempt to determine the answers to these questions that a panel of twenty-seven senior experts in the fields of both development and environment met at my request at Founex, near Geneva, Switzerland, from June 4 to 12, 1971. Also participating were observers from

\* Secretary-General of the United Nations Conference on the Human Environment.

various United Nations agencies most directly concerned. The report of this meeting represents an outstanding contribution to a full understanding of these issues. This is an indispensable prerequisite to the kind of international co-operation which will be required if mankind is to deal effectively with the newly-perceived environmental challenge. The report delineates clearly and cogently many of the principal issues which will confront governments of more industrialized and developing countries when they assemble at Stockholm in June 1972 for the United Nations Conference on the Human Environment. I regard it as a major contribution to the preparations for the Conference, and a historic turning point in the "development-environment" dialogue.

The report makes clear that the environment issue is indeed of great importance to developing countries and points out why it must be considered as an integral aspect of their own development process. It brings out the important differences in perspective and priority between the environmental problems of the industrialized countries and those of the developing countries. It makes a compelling case for a common concern and common action in a number of important areas.

I want to record my deep gratitude to all of the participants in the Panel who gave so fully and generously of their time and talents to make this report possible. I would particularly like to thank Dr. Gamani Corea of Ceylon, who chaired the group so admirably, and to Dr. Mahbub ul Haq of Pakistan, who undertook the prime responsibility for preparing the report, as well as to those other participants who prepared the exceptionally high-quality papers which provided the basis for the work of the Panel.

Thanks to all of them, we have taken what I regard as a very significant step forward on the road to Stockholm.



## PART ONE

# The Report of the Panel



JUNE 12, 1971

## Letter of Transmittal

*Dear Mr. Secretary-General,*

- 1. We herewith present our Report on Development and Environment. The Report attempts to place the growing environmental concern in its proper developmental perspective in the context of the urgent and pressing needs of the developing countries.*
- 2. We hope that the Report will be of some help in the context of the Stockholm Conference on the Human Environment. We also hope that the Report will serve to enlarge the perception of the problems of the less affluent part of the world in the more affluent one and to focus attention on the opportunities for a beneficial and growing partnership between the developing and the developed countries.*
- 3. This Report deals with only a few selected themes of policy which are important to the developing countries. There is considerable work now going on in other forums, particularly in the Intergovernmental Working Groups, within national governments and in the United Nations Secretariat, which should help make the perception of these problems more specific and concrete before the Conference in Stockholm in 1972.*
- 4. We would like to emphasize that we have participated in the deliberations of the Panel in our individual capacities. The Report is an expression of the broad spectrum of our views. We felt that at this preliminary stage of the treatment of this subject, it would be appropriate to present our general approach to the broad range of problems and possible solutions rather than to seek a minimum "common denominator" that is endorsed in every detail by all participants.*
- 5. We wish to express our appreciation of the excellent background documents which were prepared for us by individual members of the*

*Panel, by international agencies and by the United Nations Secretariat, and from which we greatly benefited. We would suggest that a selection of these papers be distributed in a separate volume.*

*6. In submitting this Report, we wish to express our deep appreciation of the initiative you took in convening our Panel. We would also like to thank the members of your Secretariat for their tireless efforts in making the production of the Report possible.*

*7. We also wish to thank the representatives of the international agencies and other consultants for their very valuable contributions to our deliberations.*

*8. Mr. Gamani Corea served as Chairman of our Group, Mr. Belai Abbai as Vice-Chairman and Mr. Mahbub ul Haq as Chairman of the Drafting Committee.*

*Yours sincerely,*

M. Adamovic  
Martin Alexander  
Samir Amin  
S. Antoine  
W. Beckerman  
Belai Abbai  
Mrs. N. Castañeda  
Gamani Corea  
Mahbub ul Haq

F. Herrera  
U. Himmelstrand  
E. Iglesias  
Cheikh Hamidou Kane  
K. W. Kapp  
J. Kulig  
H. Landsberg  
J. Mayobre  
H. M. A. Onitiri

M. Ozorio de Almeida  
P. Pant  
I. Sachs  
M. Z. Shafei  
H. Singer  
J. Tinbergen  
S. Tsuru  
Puey Ungphakorn  
F. Van Dam

## CHAPTER ONE

# Overall Perspective

1.1. The current concern with the Human Environment has arisen at a time when the energies and efforts of the developing countries are being increasingly devoted to the goal of development. Indeed, the compelling urgency of the development objective has been widely recognized in the last two decades by the international community and has more recently been endorsed in the proposals set out by the United Nations for the Second Development Decade.

1.2. To a large extent, the current concern with environmental issues has emerged out of the problems experienced by the industrially advanced countries. These problems are themselves very largely the outcome of a high level of economic development. The creation of large productive capacities in industry and agriculture, the growth of complex systems of transportation and communication, the evolution of massive urban conglomerations, have all been accompanied in one way or another by damage and disruption to the human environment. Such disruptions have indeed attained such major proportions that in many communities they already constitute serious hazards to human health and well-being. In some ways, in fact, the dangers extend beyond national boundaries and threaten the world as a whole.

1.3. The developing countries are not, of course, unconcerned with these problems. They have an obvious and a vital stake in them to the extent of their impact on the global environment and on their economic relations with the developed countries. They have also an interest in them to the extent that they are problems that tend to accompany the process of development and are in fact already beginning to emerge, with increasing severity, in their own societies. The developing countries would clearly wish to avoid, as far as is

feasible, the mistakes and distortions that have characterized the patterns of development of the industrialized societies.

1.4. However, the major environmental problems of developing countries are essentially of a different kind. They are predominantly problems that reflect the poverty and very lack of development of their societies. They are problems, in other words, of both rural and urban poverty. In both the towns and in the countryside, not merely the "quality of life", but life itself is endangered by poor water, housing, sanitation and nutrition, by sickness and disease and by natural disasters. These are problems, no less than those of industrial pollution, that clamour for attention in the context of the concern with human environment. They are problems which affect the greater mass of mankind.

1.5. It is evident that, in large measure, the kind of environmental problems that are of importance in developing countries are those that can be overcome by the process of development itself. In advanced countries, it is appropriate to view development as a cause of environmental problems. Badly planned and unregulated development can have a similar result in developing countries as well. But, for the greater part, developing countries must view the relationship between development and environment in a different perspective. In their context, development becomes essentially a cure for their major environmental problems. For these reasons, concern for environment must not and need not detract from the commitment of the world community—developing and more industrialized nations alike—to the overriding task of development of the developing regions of the world. Indeed it underscores the need not only for a maximum commitment to the goals and targets of the Second Development Decade, but also for their redefinition in order to attack that dire poverty which is the most important aspect of the problems which afflict the environment of the majority of mankind.

1.6. Whilst the concern with human environment in developing countries can only reinforce the commitment to development, it should serve, however, to provide new dimensions to the development concept itself. In the past, there has been a tendency to equate the development goal with the more narrowly conceived objective of economic growth as measured by the rise in gross national product. It is usually recognized today that high rates of economic growth, necessary and essential as they are, do not by themselves guarantee the easing of urgent social and human problems. Indeed in many

countries high growth rates have been accompanied by increasing unemployment, rising disparities in incomes both between groups and between regions, and the deterioration of social and cultural conditions. A new emphasis is thus being placed on the attainment of social and cultural goals as part of the development process. The recognition of environmental issues in developing countries is an aspect of this widening of the development concept. It is part of a more integrated or unified approach to the development objective.

1.7. The incorporation of environmental issues and goals in the sense discussed here in the concept of development, raises—as does the incorporation of other social goals—important issues for planning and policy making. To the extent that these objectives support or reinforce economic growth—and it can be shown that some of them do—their place in the pattern of priorities would be more readily established. But where conflicts are involved, particularly in the short or medium run, more difficult choices would have to be made regarding the “trade off” between these and the narrower growth objectives. These choices can only be made by the countries themselves in the light of their own situations and development strategies and cannot be determined by any rules established *a priori*. Subsequent sections of this report attempt to identify and elaborate upon the specific environmental problems faced by developing countries and the ways in which these could be categorized as aids to planning. But the importance of distinguishing between measures or programmes that are conducive to growth, or at any rate not in conflict with it, and those that may involve some sacrifice in growth objectives is clear enough. It is similarly important to distinguish between measures or programmes whose claims on financial resources are likely to be relatively modest from those which are likely to prove more costly. The employment creating potential of environmental programmes is yet another aspect that is of relevance to the planning process.

1.8. Whilst the environmental problems of developing countries are in large measure those that have arisen from the lack of development, it is also true that problems arising out of the process of development are also in evidence in these countries to an extent that depends on their relative levels of development. Indeed as the process of development gets under way the latter type of problem is likely to assume increasing importance. The processes of agricultural growth and transformation, for example, will involve the construction of reservoirs and irrigation systems, the clearing of forests, the use of fertilizers and pesticides and the establishment of new communities. These processes

will certainly have environmental implications. Similarly, industrialization will result in the release of pollutants and react on the environment in a number of ways. Again, the growth of the entire economic infrastructure of transport and communications will have consequences for the ecological system. Urbanization is already a pressing problem for many developing countries and some of their cities are experiencing problems common to those of the industrialized countries. In addition, with the urgent need for the rural areas to sustain a growing population, the problems of rural environment assume a new significance.

1.9. The problems are already severe enough in developing countries. But in the absence of resolute action, they will tend to attain formidable dimensions in the decades ahead. The very growth of population, when not accompanied by adequate economic development, brings out the prospect of rising unemployment, further impoverishing the countryside and swelling the drift to the towns and creating human problems of the deepest intensity. They can only aggravate the serious social and political tensions that even now prevail in these societies. There can indeed be little doubt about the urgent need for corrective action.

1.10. These issues are elaborated upon in succeeding chapters of this report. To the extent that some of the advanced environmental consequences of the process of development could be avoided by better planning and regulation, the developing countries have an opportunity to profit from the experience of the advanced countries. The importance of establishing adequate safeguards and standards in project planning and preparation is thus underlined. These standards must necessarily be those that are appropriate to the specific conditions of these countries and be capable of being observed within the resources available to them. All this reflects the vital importance of data and of research. It also raises the question of the instruments by which environmental policies could be implemented, particularly in situations where decisions are undertaken by private investors, whether domestic or foreign, in the context of market forces.

1.11. Environmental issues may come to exercise a growing influence on international economic relations. They are not only a formidable competitor for developed countries' resources (which in some instances might have been channelled towards development assistance), but they are also a factor which, to an ever increasing degree, could influence the pattern of world trade, the international distribution of industry,



the competitive position of different groups of countries, their comparative costs of production, etc. Environmental actions by developed countries may have a profound and manifold impact on the growth and external economic relations of developing countries.

1.12. Some environmental actions by developed countries (restrictions on the importation and use of certain commodities, imposition of environmental regulations, standards and other non-tariff barriers on imports as well as increased production costs reflected in higher export prices) are likely to have a negative effect on developing countries' export possibilities and their terms of trade. Recycling of raw materials may also tend to diminish the volume of primary commodities consumed and imported into developed countries.

1.13. In some fields, environmental issues open up new possibilities for developing countries. The structural changes in production and trade, as well as the geographical relocation of productive enterprises which might be necessitated by environmental considerations, should provide new opportunities for meeting some of the developmental needs of the developing nations. This relates first of all to the relationship between natural and synthetic products and the reopening of certain markets to exports of natural products. In some cases, developing countries might have a possibility of increasing the inflow of foreign capital and of creating new industries. If such opportunities are to be fully realized, they will require new and concerted measures on the part of developed and developing countries in the fields of international trade and investment, as well as in the control of private foreign enterprises.

1.14. The desire to retrieve some of the past damage to the environment and to minimize the environmental cost of future development will, in most cases, represent a new claim on productive resources and an additional element in the cost of production. Some of this burden may be reduced in the future as science and technology itself responds to the needs of environmental management. Still, one of the major questions which would arise from the increased concern with the preservation of the environment is how the higher cost of future development would be shared as between developed and developing nations. There are misgivings in the developing countries that, given their peripheral role in the international economy, arising not only from their present low economic capacity and bargaining power but also from a declining relative share in world trade and the increasing gap in per caput income, they might not be able to take full advantage

of the fresh opportunities that may arise from environmental control, while at the same time they might have to bear part of the extra burden which such control would entail. The increased cost burden arising from greater attention to environmental problems should be accompanied by a greater willingness to provide additional assistance and induce a greater effort to reduce the inefficient allocation of productive resources arising from indiscriminate protection of agriculture and industry in both developed and developing countries. It certainly should not provide fresh argument for even greater protection.

1.15. The focusing of attention on environmental issues has therefore implications that go beyond national policies in developing countries. The international aspects of the present environmental concern are discussed in a subsequent chapter. But we would like to stress here that the extent to which developing countries pursue a style of development that is more responsive to social and environmental goals must be determined by the resources available to them. Clearly there is scope for a better allocation of the presently available resources, but the results that could be obtained within their present resource constraints must necessarily be limited. If the concern for human environment reinforces the commitment to development, it must also reinforce the commitment to international aid. It should provide a stimulus for augmenting the flow of resources from the advanced to the developing countries. Unless appropriate economic action is taken, there are a number of ways in which the developing countries could suffer rather than profit from the new emphasis on environment. The latter could have implications for aid, trade and the transfer of technology. The developing countries are vitally concerned that these implications should be positive and beneficial rather than negative and harmful.

## CHAPTER TWO

# Environmental Issues in the Development Process

2.1. The preceding chapter has indicated that the environmental problems of developing countries fall broadly into two categories—the problems arising out of poverty or the inadequacy of development itself, and the problems that arise out of the very process of development. The problems in the first category are reflected in the poor social and economic conditions that prevail in both the rural and urban areas. For most developing countries these are, by far, the problems of greatest importance. But as the process of development gets under way the problems in the second category also begin to emerge and to gain in significance.

2.2. The environmental policies of developing countries must naturally be concerned with both categories of problems. But, as the preceding chapter has indicated, the remedial approaches to the first set of problems are closely interwoven with policies for overall development. These policies should, of course, embrace wider dimensions than the growth of gross national product alone, and must include some of the major environmental problems that arise in the context of urban and rural poverty. As already mentioned, problems of poor water supplies, inadequate sewerage, sickness, nutritional deficiency, and bad housing need to be dealt with in the process of planning and policy making. Goals and objectives in these fields should be incorporated into development plans as much as targets for the growth of output.

2.3. The present Report does not attempt to elaborate upon the environmental issues of the kind referred to above, nor upon the manner in which they should be dealt with in the planning process. They are so much a part of social and economic conditions in developing countries that their treatment is but one aspect of the whole approach

to social and economic development. Each country needs to identify the complementarities and conflicts that characterize the relationship between social and economic goals in the circumstances specific to itself, and to determine its own priorities concerning the allocation of resources. The present Report seeks to do no more than draw pointed attention to the compelling urgency of the environmental problems that arise out of poverty, to the need for a new awareness of the importance of remedial measures, and above all, to the need for reinforcing the commitment, both nationally and internationally, to the development objective itself. It is to be hoped that the emphasis that is now being given to a more unified approach to development will result in a better recognition and treatment of the environmental problems that arise out of mass poverty.

2.4. The rest of the present chapter and, to a large extent, the succeeding chapter as well is mainly devoted to the second category of environmental problems that was mentioned earlier—problems that arise out of the process of development itself. These problems though possibly of lesser importance in the early stages of development, are clearly likely to gain in significance as the process of development gathers momentum. As mentioned before, the transformation of agriculture, the development of industry, the creation of networks of transportation and communication, and the growth of towns, are all integral parts of the development process. They must, therefore, form part of the major goals of development policy and planning. But it needs to be recognized that the process of development and change in each of these sectors can be accompanied by adverse side effects which could in many cases be avoided, or at least mitigated, by sound planning and policy. The experience of the developed countries has shown that these side effects could, if ignored, attain formidable dimensions and cause damage and disruption on a wide scale. The developing countries have an opportunity to avoid some of the mistakes or distortions that have characterized the development process in the past. By paying attention to these dangers they can, perhaps, attain a more satisfactory pattern of development than that achieved by the advanced countries.

2.5. The present chapter attempts, in a broad way, to identify some of the negative side effects that can arise out of the process of development in several sectors of the economy. The succeeding chapter discusses the ways in which these problems might be dealt with through better policies and planning methods. The main issue is how the benefits of development in each sector could be obtained with minimum

adverse side effects. In presenting a selected catalogue of environmental consequences which can be, and have been, experienced in various sectors of the economy, our intention is not to describe a long list of adverse repercussions so as to imply inaction, since every action may effect environment in some manner: our intention is merely to bring together some of the available knowledge on this subject so that the developing countries can draw their own conclusions in the context of their development policies. We would also like to point out that the existing knowledge on this subject is fairly thin and sketchy and a lot more research work is needed to identify the nature and dimensions of environmental problems in various sectors of the economy.

2.6. The discussion that follows attempts to identify and describe some of the environmental side effects that have been known to accompany, in varying degrees, the process of development in agriculture, industry, transport and human settlement. These side effects take several forms and may be grouped into a number of categories. These are:

1. *Resource deterioration*: the deterioration, for example, of mineral, soil or forest resources;
2. *Biological pollution*: the pollution represented by agents of human disease, and by animal and plant pests;
3. *Chemical pollution*: arising out of air pollutants, industrial effluents, pesticides, metals, and detergent components and similar agents;
4. *Physical disruption*: as reflected, for example, by thermal pollution, silting and noise; and
5. *Social disruption*: of which congestion and loss of a sense of community are examples.

These side effects manifest themselves in varying degrees depending on the sectors concerned, the particular geographical regions involved, and the stages of development attained by different countries. The first two categories are commonly experienced by most developing countries as are also silting and perhaps social disruption, whilst urban air pollution is becoming a problem of increasing importance in the larger cities of certain developing countries.

2.7. Although these side effects are likely to manifest themselves in the process of development, they need to be assessed within a framework which helps to establish their relative importance. A basic consideration would be the way in which a development activity relates to the carrying capacity of a country's natural, and even social,

system. Such issues as the speed at which environmental degeneration is taking place, the degree of its severity, the area that it covers, whether the environmental impact is reversible or irreversible, and at what cost and over what period of time are all of relevance in this connexion. The scale and pattern of a country's production and consumption structure are also of relevance in assessing the impact of environmental side effects. The use and disposal of materials and their environmental implications are, for example, influenced by the level of technology since this is relevant to the nature of inputs and outputs in the production process. Similarly, consumption patterns are of importance. In societies where the levels of non-discretionary expenditure—i.e. expenditures on basic necessities—are high, the process of consumption exerts adverse environmental effects of a lower order of magnitude. On the other hand, higher levels of discretionary consumption, particularly of more sophisticated manufacturing goods, generally produce a greater environmental impact. The social structure of a society, and its pattern of income and wealth distribution, are thus factors which are also of relevance.

2.8. Within a framework appropriate to its situation, a country may ascertain the nature of its environmental problems, and examine alternative forms of action in dealing with environmental policies. Environmental side effects which are encountered in the development of various sectors should receive selective treatment. They should first be evaluated in terms of the development priorities which guide the planning considerations of any country. Those side effects which directly frustrate the development objective should be given the most immediate attention for remedial action. Those of peripheral concern will inevitably receive less emphasis.

#### AGRICULTURE

2.9. The process of agricultural development often involves the transformation of low productivity systems of agriculture into systems where productivity is relatively high. In the course of this transformation, cultivation practices on existing lands are improved, the infrastructure of facilities and services for agricultural production is expanded, and new lands brought under cultivation through extensive systems of irrigation and river basin development. These changes are crucial to the development process itself. But they may also generate environmental side effects of varying degrees of importance. Some of the more common of these side effects are described here.

*Traditional Agriculture*

2.10. Environmental side effects may manifest themselves even within the framework of traditional systems of agriculture under the pressure of rapid population growth. These systems have often persisted for centuries, sometimes successfully cultivating the same lands without irreversible damage. But a new situation may be created by the rapid growth of population that is now taking place. This may impose pressures that were perhaps not experienced before and which could give rise to environmental problems.

2.11. Traditional agriculture in many tropical regions is characterized, particularly under stress of expansion, by a range of environmental hazards. These include leaching—notably the rapid leaching of nutrients and degradation of planted farmland following the removal of a forest; rapid soil depletion resulting from permanent cultivation which the relative infertility of the soil cannot support without the addition of nutrients; soil erosion through variable and heavy rainfalls and prolonged droughts or flash floods; and indiscriminate loss of forest resources through slash-and-burn techniques. Although much of this kind of environmental deterioration can be corrected if unlimited funds are available, some is so costly to correct as to be effectively irreversible. The fragility of tropical ecosystems may cause environmental deterioration to proceed rapidly and their recovery to be slow. In one instance, the establishment of an agricultural colony failed when deforestation resulted in the hardening of lateritic fields within five years; restoration on the other hand will take decades. In another case, previously ungrazed savanna was destroyed by over-grazing in two to three years, and will probably be lost to production for a very long period. There are opportunities for preventing some of these environmental hazards through proper planning and anticipatory action. For instance, under-employed labour that frequently abounds in rural areas may be mobilized in terracing mountain sides and in reforestation programmes. Many of Africa's current marginal lands, for example, have all the necessary elements for successful reclamation through new management techniques.

*Modern Agriculture*

2.12. The environmental hazards in the case of modern agriculture arise mainly from the chemical control of weeds and pests and from irrigation works. Fertilizers, on the other hand, would not appear at present to pose a threat even at prospective level of their use in the

developing countries. The side effects of insecticides and pesticides need to be watched fairly carefully. Their toxicity to fish and birds, as well as their persistence and mobility, make them a hazard beyond their target area. Irrigation projects, unless matched by drainage facilities, can result in salinization and water-logging. In one country modern canal irrigation serviced forty million acres in 1949, of which five million acres suffered from salinization and water-logging by 1959. However, much of this land has since been reclaimed through appropriate management. Even the welcome emergence of the high yielding varieties of wheat, rice, maize and other cereals can sometimes give rise to certain negative side effects, both because these varieties require larger quantities of chemicals such as pesticides and also since they replace hardy native species which, by natural selection, are often better suited to the adversities of local conditions and are valuable for interbreeding. Again, constant tillage which is facilitated by mechanisation can also damage the soil structure. Let us reiterate that modern agriculture would be impossible without the use of chemical fertilizers and pesticides, high yielding varieties of seeds and irrigation works, and a degree of mechanisation, but it is important that their side effects should also be taken into account in planning the use of these inputs to expand agricultural production.

#### RIVER BASIN DEVELOPMENT

2.13. River basin development projects are instruments of major importance for economic and social development, and are often an essential part of the development programmes. However, many of the environmental problems which are commonly discussed have arisen in connexion with the construction of these projects. This underlines the need for careful study and analysis in the design of large dams or dam sites, so that their negative side effects can be minimized through proper planning. Some of the environmental problems which are generally associated with river basin development projects include the spawning of waterborne diseases, the filling of reservoirs with sedimentation, the drying-up of down-stream fisheries, the spread of salinization and water-logging in associated irrigation projects, the inundation of valuable agricultural and forestry land, the displacement of population and the loss of mineral resources, wild life areas or valuable historical sites. The emergence of most of these adverse effects is generally gradual. Some of them can be readily corrected but others are practically irreversible because the capital investment is very large and fixed. Some of the consequences can be on a very large scale and