TOPIC 4

ENVIRONMENTAL ASPECTS OF INTEGRATED RIVER BASIN DEVELOPMENT

Scope

River basins are developed in order to achieve certain objectives, among which are the control of floods; the generation of power; the supply of water for municipal, industrial, and agricultural use; opportunities for fishing; improved transportation; and recreation. To the extent that these objectives are achieved they will contribute to the economic development and to the quality of life of the population. To the extent that side effects such as the proliferation of disease, blooms of macro- or micro-flora, the displacement of people, and adverse effects on the dynamics of the river are created, economic development and the quality of life will suffer. Adequate and comprehensive planning is required to maximize the positive effects while minimizing those with adverse consequences.

Guidelines

Planning should consider the basin as an integrated unit. The complex of needs which are to be provided by the development of the basin should be defined. To provide for these needs a variety of devices can be provided by a large main river dam, tributary dams, dikes, levees, afforestation, zoning, insurance, redesign of the dwellings, or a warning system for the population. In general these could be divided into those which minimize the flood and those which minimize the effect.

The choice of alternatives should be guided by the assessment of adverse and beneficial environmental impacts which the projects might create. These impacts would include those affecting the fauna, flora, and land and water resources, as well as humans. To carry out such impact analyses, the establishment of an Environmental Impact Assessment (EIA) System is recommended; this would include guidelines for the governmental and administrative procedures for the assessment. A recent SCOPE Workshop (SCOPE-WISE, Victoria Harbour, Canada, January 28 — February 8, 1974) dealt specifically with the EIA principles and methodologies.

The EIA should identify impact-generating activities and impact receivers. The latter includes the natural environment as well as areas of human concern, i.e., health, socio-economic factors, and cultural aspects. Three other responsibilities of the EIA are: the prediction of impacts; the interpretation of assessments; and the production of reports in a form comprehensible to the decision makers and the public.

As a major step in the process of establishing an EIA system, it is necessary to undertake comprehensive surveys on the nature and character of land and water resources in conjunction with health and socio-economic studies. The feasibility of such studies will depend on the availability of manpower; considerations for strengthening local capabilities in this respect should receive priority attention.

At all stages there should be active participation of an interdisciplinary group in the decision-making process at the national level. When river basins are shared by two or more nations, this participation is particularly important at the regional level. It is strongly recommended that developing countries undertaking river basin development form national and regional bodies which are given the power to coordinate all activities dealing with the planning, implementation, and management of such projects.

With respect to all matters associated with integrated river basin development, international and regional agreements are recommended in order to ensure full regional cooperation and to avoid the transmission of any secondary adverse effects from one country to another. All efforts should be directed toward the implementation of decisions which ensure environmental safety and foster sound management.

Recommendations for research

Since the purpose of river basin development is to promote the quality of life, comprehensive and detailed socio-economic studies should be conducted to cope with problems which might arise from the development programs and to make full use of their benefits.

Basic surveys of water and land resources should be undertaken during the early planning stages. The functioning of the river basin should also be studied, not only from a hydrological point of view, but also as an integrated ecosystem in which the interaction of major variables could be identified. These goals could be fostered by making wide use of all modern methods of data-gathering, modeling, and simulation, as well as by setting common standards.

Agriculture, grazing, forestry, mining, and other practices invariably generate environmental effects. Extensive studies on these diverse land use practices are recommended, not only because of the impacts of the projects and their secondary effects, but also because of the reverse impact of these practices on the projects. Research programs should be multidisciplinary in nature.

Since flood hazards are of paramount importance to river basin development and because flood technology is in its infancy in most developing countries, systematic studies should be undertaken on flood warnings, causes, and methods of control.

Changes in the existing ecosystems induced by a development project should be studied through a program of problem-solving multidisciplinary research. The resulting experience would be vital for the sound management of the resources of the ecosystem. Any man-made change within the

watershed may affect the quality and/or quantity of water and in turn the chemical, physical, and biological characters which regulate the dynamics of the system.

After the completion of the project, continuous monitoring should be maintained to assess environmental impacts in order to anticipate undesirable secondary effects and to provide a feedback for feasibility studies on future projects.

Comprehensive studies should be undertaken on the organization of river basin development authorities—national and international—and on the various development methodologies. These studies should be made available to all nations, especially those initiating integrated river basin development projects.