RIVER BASIN PLANNING CONCEPTS AND THEIR USE IN RESOURCE DEVELOPMENT

by

Raymond H. Wells
Head of River Basin Survey Staff, Soil Conservation Service

INTRODUCTION

Senate Document 97 dated May 1962 establishes executive policies, standards, and procedures for uniform application in the formulation, evaluation and review of comprehensive river basin plans and individual project plans for use in development of water and related land resources.

The Water Resources Planning Act dated July 1965 provides means whereby the Water Resources Council, composed of the Secretaries of the Interior, Agriculture, Army, Health, Education and Welfare, and Chairman of the Federal Power Commission, carries out the principles of Senate Document 97 in the preparation of comprehensive regional or river basin plans. The provisions in Senate Document 97 and the Water Resources Planning Act have contributed much toward unifying planning policies and procedures for the use and development of water and related land resources.

River basins are usually the most appropriate geographical units for planning the use and development of water and related land resources in a way that will realize fully the advantages of multiple use, reconcile competitive uses through choice of the best combination of uses, coordinate mutual responsibilities of different agencies in levels of government and other interests concerned with resource use.

PROBLEMS IN RIVER BASIN PLANNING

On November 12, 1968, the President of the United States submitted to the Congress a report prepared by the Water Resources Council on the nation's water resources. In the President's letter of transmittal he enumerated many of the problems that face this country today and stated that positive action is necessary to assure adequate water resources for the demands of America's future. Some of these problems were: the major drought in the Northeastern part of the country; pollution infesting and destroying our most productive and scenic waters; the nightmare of ravaging floods still hovering over too many American communities; the expanding economic activity that is consuming available water supplies in some regions; the growing need for swimming, boating and other recreational facilities close to urban centers; flooding in many watersheds and downstream areas; erosion from rural and developing urban areas washing away our lands and choking streams and lakes with sediment, organic and chemical wastes that threaten the purity of streams, lakes and estuaries; and the conflicts that are widening between the need to develop water resources and to preserve the scenic and natural quality of water related environment.

Positive action has already begun. Four river basin commissions have been established and 49 states are participating in comprehensive water resources planning.

CONCEPTS OF RIVER BASIN PLANNING

The concepts of river basin planning are constantly changing. No longer can we think in terms of solving problems and satisfying community needs within a single watershed, state or region. Planning for the wise use of our land and water resources begins with an assessment of these resources at the national level. The Council's planning standards state that planning should be directed to three major purposes: (1) economic development, (2) enhancement of the quality of the environment, and (3) well being of the people. The first purpose, economic development, is related to the region's share of national growth. As a guide to the first purpose, the Council has arranged with the Office of Business Economics (OBE) and the Economic Research Service (ERS) for projections of national growth of population and the economy to the target years 1980, 2000 and 2020. These economic projections present a consistent set of measures of the economy under assumed rates of growth. The OBE and ERS have then estimated regional shares in projected national growth. The regional shares are based on past performance of the regions plus any known developments that would change interregional relationships. Estimates are also made for sub-basins within each region. These projections are first approximations of how the national economic growth would be distributed, given the restraints on national economic efficiency that exist in the economy today. They do not take account of major policy or technological changes of the future. From these projections, estimates are made of water and related land requirements over the next 50 years. A computation is made of the proportion of these requirements that can be supplied from existing facilities and programs in order to arrive at net requirements that must be met by new or accelerated programs. USDA is keenly concerned with current and projected levels of food and fiber requirements.

WATER DEFICIENCIES AND SURPLUSES

Water deficiencies and water surpluses within regions must be known and estimates made of future requirements in order that a balance may be achieved between regions with water surpluses and regions where water deficiencies exist.

Requirements for water are derived from the demand of the economy for the products and services obtainable through use of water but are limited by the cost of alternative means for satisfying these demands.

Effective solution of urban water use and waste disposal problems require coordinated planning by the many governmental units involved in these areas. There is need for improved arrangements for the development, financing, and management of water supply and waste disposal systems, floodplains, and other water problems in metropolitan areas.

Shortages of water of suitable quality may render an area unattractive for industrial development. Flood hazards may restrict development. Too much or too little water tends to interfere with development of a viable economy and result in under-utilization of resources. Water and related resource development offers one means of countering the trend to over-concentration in urban areas and to correct the deficiencies of undeveloped areas.

Comprehensive river basin planning considering the criterion of economic efficiency will give increased attention toward achieving community and regional development goals, including increased employment and income, and national goals for a balanced population and economic growth among regions.

To satisfy projected domestic and municipal water needs will require that major storage and conveyance works should be planned giving full consideration to cooperation by local, State and Federal authorities and to appropriate implementing arrangements.

Agricultural water use includes use for irrigation and livestock. In the drier part of the country, irrigation makes a difference between low-producing range and highly productive cropland. In the humid areas, irrigation can prevent crop failures in drought years and increase yields and improve product quality even in average years. Irrigation is by far the largest consumptive user of water. In many areas now being irrigated increased efficiency in water use may be the only economic means to provide adequate water for optimum plant growth. Comprehensive planning will relate irrigation and drainage potentials to projected national food and fiber requirements and regional social and economic goals.

RECREATION AND FISH AND WILDLIFE

About one-fourth of all outdoor recreation is dependent upon water. Nation-wide, there is a serious imbalance in both the location and types of recreation water and the concentration of population. This problem is accentuated by the scarcity of recreation waters in areas convenient to people residing in the nation's larger cities. Without appropriate action, this situation will become more acute in the future in both the quantity of recreation water and the quality of the recreation experience. Comprehensive planning will recognize that it is to the public interest that the quality of the environment be fully considered in planning water developments in order that the potential for natural as well as man-made water oriented recreation opportunities be realized.

Fish and wildlife resources add quality and vitality to our environment and their variety, abundance and vigor are positive indicators of the health of that environment. Water and related land developments properly planned and operated have provided and can continue to provide widespread and important fish and wildlife benefits. By careful planning possible harmful effects of these developments can be ameliorated and often the habitat can be enhanced. If fish and wildlife are to maintain

their important place in our life and economy, every opportunity must be taken to improve their habitat and minimize damage to their habitat in the development of water and related lands. Water resources planning should consider more fully the potentials for increasing public enjoyment of fishing, hunting and related recreation and give increased consideration to preservation and enhancement of estuaries, natural lakes, wetlands and free-flowing streams.

MANAGEMENT OF WATER AND LAND

Management of water and related land encompasses the management of water supply, distribution and use; water quality and health aspects; floods and floodplains; watersheds and water courses; and beaches and shores. These are closely interrelated; however, all must be considered in comprehensive water resource development and management programs.

The management of water quantity includes the storage, conveyance, distribution and use of water. In addition to structural developments, water quantity management includes such things as new technology for augmenting water supply, water allocation procedures, methods for improving water use and reuse, and a system operation for optimum benefit, control and use. Multiple-purpose water development structures should embrace as many uses as possible in each project. The number of potential reservoir sites in the nation is physically limited and these are being preempted in many cases by incompatible development. Comprehensive river basin planning should identify potential sites that will be needed in the future for Federal and non-Federal development; restriction of further incompatible development through purchase, acquisition of rights, easements, land use controls or combinations of these means.

Flood management considers such measures as flood control structures, including reservoirs, channels, levees, and land treatment; identification and management of lands and facilities in the floodplain; flood insurance; flood warning systems; and disaster operations. Comprehensive river basin planning will recognize the need for a unified program of floodplain management and the needed cooperation between the local, State and Federal governments to achieve a satisfactory solution to the flooding problem.

WATER QUALITY

Growing concern with the rapidly mounting pollution loads imposed on the nation's streams, lakes and coastal waters has stimulated a vast and vigorous national effort to control and abate water pollution, restore or enhance polluted waters, and preserve existing high water quality to meet the beneficial uses demanded of this national resource. Because water quality is basic to the success of all beneficial uses made of the water resource, sound water quality management is becoming increasingly important. Such management must employ the wide range of tools available; these include collection and treatment of municipal and industrial wastes to the degrees required, land treatment and other control measures for dispersed sources of natural pollution, in-stream aeration, temporary detention of effluence during critical low flow periods, and reservoir storage for flow regulation.

Major sources of pollution are returned flows from municipal-industrial power and agricultural withdrawals and runoffs and sediment from lands used for urban, mining, agricultural, logging, and other purposes. Waste loads from municipal systems alone are expected to increase nearly four times over the next 50 years.

Cooperative Federal, State and local government planning efforts are being developed to intensify institutional and financial arrangements for immediate and long-range water quality management actions on basin and region-wide basis, as well as to find technical solutions to pollution problems. Comprehensive river basin planning has pinpointed the need for achieving immediate effective water quality management and has made projections on the future magnitude of pollution problems and general recommendations for their solution.

WATERSHED MANAGEMENT

The protection and management of the nation's watersheds to maintain and enhance the quantity and quality of water is an important and continuing task. Soil erosion with its resulting effects through sedimentation remains a challenging problem in agricultural and urban areas. In water-short areas water yield, both surface and subsurface, is a critical factor. In many regions the competition for land to serve a number of important functions will require sound planning and application of conservation measures and improved management systems designed to provide for multiple use of both private and public lands. Some of the more critical soil and water conservation problems exist in metropolitan areas and proper planning for resource management as a part of the comprehensive planning process is necessary. Watershed lands require carefully designed and widely applied management programs to meet the demands for high quality water, food and fiber, recreation, wildlife, a pleasant and attractive environment for rural and urban residents, and an opportunity for economic growth. In view of the importance of watershed lands to the water resource and the national economy, increased emphasis should be given to watershed protection and management projects.

Comprehensive river basin planning is putting increased emphasis on the need for adequate land treatment and management of agricultural and other water related lands to protect streams and water supplies from siltation and other adverse quality changes as well as increased attention to planning for land changing from agriculture and forest to urban development and to avoid erosion and sedimentation.

LAND DRAINAGE

Where there is need for more agricultural production, land which is otherwise suitable for crop production may be drained and brought into production. Land drainage also facilitates construction and maintenance of roads, urban areas, airports, parks, and recreation areas. Reclamation of wetlands may be the most economic source of new lands for such developments.

However, there is often the conflict between such development and preservation of wetlands in their natural state for fish, wildlife, timber and recreation. It has only recently been recognized that undisturbed marshes, swamps, and overflow lands have a significant relation to the environment. Some of these values can be measured in economic terms; others are intangible but of increasing importance to our modern society.

Although there is a large potential of lands that could be and may need to be drained for agricultural or urban uses, comprehensive river basin planning will recognize that these lands must be carefully appraised for their values as natural wetlands to determine in each case their highest use.

INSTITUTIONAL ARRANGEMENTS

Without question, it is recognized that water and related land resources constitute a complex system which responds to the actions of both man and nature. Management is a process of controlling this system and includes the planning, development and operation of water and related land resource projects and programs. Any significant water use or water or land management program affects one or more uses or water problems and in turn is affected by them. Upstream activity determines the limits within which downstream activity may be carried out. Actions taken in one river basin may affect the water situation in other basins, either directly by the physical transfer of water, or indirectly through the allocation of economic resources or the stimulation of political concern. The factor of human beings working through human institutions is a determinant in the water equation. Institutional considerations include such diverse matters as Federal, State and local law; the form and powers of water organizations; financial arrangements; public attitudes; political traditions; and the like.

At the local level of government, municipalities have played the dominant role in village and urban areas in providing water supply and in the removal and treatment of sewerage and storm runoff. In many cases they have constructed single-purpose or dual-purpose reservoirs often a considerable distance from their corporate boundaries to provide hydroelectric power generation and/or municipal water supply. In addition to these types of activities, there are more than 10,000 special districts established under State law and authorized to plan, build and operate local projects of one or more types. Their boundaries may be coterminous with a county, be smaller than a county, or include all or parts of several counties. In 1967 there were approximately 2200 drainage districts, 650 flood control districts, 896 irrigation districts, 1220 sewerage districts, and over 2100 water supply districts. In addition to these, there were about 3,000 soil and water conservation districts.

Water management activities in the private sector exhibit considerable diversity in scope and purpose. Any activity in the private sector which alters or affects the surface of the land will also affect in some degree the land-water relationship. All construction activities, for

example, influence seepage and runoff patterns to some extent. All agricultural operations from the simple steps of clearing, cultivating, fertilizing and harvesting to the installation of elaborate irrigation and drainage systems affect the quantity and quality of water withdrawn, consumed and discharged.

COMPREHENSIVE, COORDINATED JOINT PLANNING

In view of the complex interrelationships among technical, economic and institutional factors involved in successful water management, the fulfillment of this policy requires, on a continuing basis, comprehensive, coordinated and cooperative or joint planning; comprehensive because all relevant factors must be studied, all reasonable alternatives evaluated, and present needs related to future demands; coordinated because the operational program of each management organization must be meshed with the programs of all others affected; and joint because that planning is most effective which is participated in by those agencies responsible for or affected by its implementation.

In the Water Resources Planning Act of 1965 Congress declared its policy "to encourage the conservation, development and utilization of water and related land resources of the United States on a comprehensive and coordinated basis by the Federal government, States, localities and private enterprise with the cooperation of all affected Federal agencies, States, local governments, individuals, corporations, business enterprises, and others concerned."

Title II of the Water Resources Planning Act provides for establishment of river basin commissions for river basins, groups of related river basins, or other areas as one means of achieving such coordination in this planning process.

A part of the Water Resources Council planning program includes framework studies (Type I) which are conducted by river basin commissions or other Federal interagency-State organization of a region, provide long-run economic projections of economic development; translations of such projections into demands for water and related land resource uses; hydrologic projections of water availability, both as to quantity and quality; projections of related land resource availability so as to outline the characteristics of projected water and related land resource problems; and the general approaches that appear appropriate for their solution. While potential sites may be identified, project formulation studies are not included in framework plans. These framework plans will provide general guides to future water resource development. The plans will indicate which regions or sub-basins within them have water problems calling for prompt detailed planning efforts as well as those where no such problems are current or looming. Normally, framework plans are the first phase of the comprehensive plan to be prepared by river basin commissions established under the Water Resources Planning Act.

Comprehensive river basin studies (Type II) extend the scope beyond those mentioned above (Type I) and are made to define and evaluate projects in sufficient detail, including project formulation, to comprise a basis for authorization of those Federal and federally-assisted projects to be initiated in the next 10 to 15 years.

Cooperative studies (Type IV) are those studies that are sponsored by states and include all or part of the state in which one or more Federal agencies participate.

RIVER BASIN PLANNING AND RESOURCE DEVELOPMENT IN MISSISSIPPI

The ultimate goal in river basin planning is the implementation of land and water resource development projects to satisfy local, State and regional needs as identified with the plan.

Methods and solutions to implementation often lie wholly within the legal and financial capability of the people living within the project areas. Local sponsoring organizations must assume the initiative with added technical and financial assistance coming from the Federal government.

Mississippi is fortunate in having adequate legal and financial resources in meeting these requirements through special district legislation.

The Pat Harrison Waterway District works with local sponsoring organizations, other state agencies, and the Federal government in the planning and implementation of projects in the Pascagoula River Basin. The Pearl River Basin Development District does the same in the Pearl and parts of the Big Black Basins as does the Tombigbee Water Management District in the Tombigbee Basin. Each of these Districts finances a watershed planning party to accelerate implementation of land and water resource development projects in their respective areas.

If the Congress authorizes the implementation of those projects as now identified in the Pascagoula, Pearl and Big Black Basin plans, 15 large multiple-purpose reservoirs will be constructed by the Corps of Engineers and the Pat Harrison Waterway District. Local sponsors and the USDA Program will complete 590 floodwater retarding structures and 74 multiple-purpose reservoirs. Over 2.6 million acres of land will be treated for watershed protection of which 340,000 acres are critical.

These measures, when completed, will supply 80,000 acres of surface water for recreation, protect 566,000 acres of land from flooding, reduce damages from flooding by $5,000,000, improve the water supply and water quality in deficient areas, enhance the environment, and generally improve the economic conditions of the people living in these basins.