

# Role of the Corps of Engineers in Water Resource Planning

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During colonial days and up to about 1900, our forefathers were concerned primarily with exploration and exploitation of water and other natural resources. This promoted rapid expansion and accumulation of wealth and involved little thought of planning other than for immediate operations generally local in scope.

The Corps of Engineers was virtually the only federal agency engaged in water resource development during that period. With Theodore Roosevelt stressing conservation, some early attempts were made to inventory needs and to formulate programs for water resources. The concept of developing entire river basins under unified plans and for a multiplicity of purposes emerged. Various agencies were established to achieve this planning objective. However, little was done until about 1928 when the Corps of Engineers was authorized to study the possibilities of developing river basins for navigation, irrigation, flood control, and power generation. The resulting "308" reports stimulated interest in planning for water resources. In 1933, TVA was authorized. During 1936, the first of several Flood Control Acts was passed, giving responsibilities for planning to various Federal agencies and authorizing many individual flood control projects.

In evaluating planning for water resources today, we must keep in mind that such efforts actually started about 25 years ago. Many agencies have become involved during this period and many changes in policies have been issued as this planning has progressed. This period has also been eventful in many other respects, including two major wars, unparalleled expansion of industry, scientific achievements, political changes, and population increases. The pattern for water resources has changed since 1900 from exploitation to planning, conservation, and development.

The Corps of Engineers plans primarily for navigation, flood control, and power. Inevitably such planning involves coordination with

all agencies, federal, state and local, engaged in development of water resources. The Corps recognizes the need for three types of plans:

Type I—Framework plans, covering major river basins, to insure that consideration is given to long-range needs and developments.

Type II—Comprehensive sub-basin plans covering basins of ordinary size, and designed, in general, to be authorized by stages.

Type III—Project plans for authorization of individual projects by the Congress.

Twenty-five years ago, our surveys were primarily Type III to determine feasibility of flood control or navigation projects for authorization. They examined engineering and economic aspects of problems, based on existing conditions. If no publicly acceptable project could be justified for construction by federal funds, nothing was recommended and the problems remained. These projects tended to be single-purpose, involving minimum of coordination with other agencies. Maps, economic, and engineering data were limited, and criteria for field investigations were yet to be developed. Now we do much more thorough investigations of foundations for structures, hydrology studies, and geological surveys of reservoir areas. More highly skilled specialists work as teams in project planning.

In 1950, Congress authorized the first framework (Type I) studies in two areas—the Arkansas, White, and Red Rivers; and the New England-New York region. These studies were made by interagency committees under the chairmanship of the Corps of Engineers. At the present time the Corps is working on framework plans (Type I) for the entire Ohio River basin and is starting a similar plan for the Upper Mississippi River basin. During fiscal year 1964 Type I plans will be started for the basins of the Columbia and Missouri Rivers.

In 1956 the Corps of Engineers started Type II, comprehensive planning, for the Delaware basin with full participation of other federal agencies and the five states involved. This plan has been completed and Congress approved certain parts of it in the Flood Control Act of 1962. A similar plan for the Potomac River Basin is nearing completion. During Fiscal Year 1963 the Corps is continuing work on Type II plans for the Susquehanna, Meramec, and Colorado (of Texas) basins. Type II plans are starting this fiscal year in 18 river basins—Willamette, Red (of the Southwest), White, Sabine, Neches, Brazos, Big Muddy, Grand (of Michigan), St. Joseph, Fox, Genesee, Wabash, Kanawha, Pascagoula, Big Black, Pearl, Connecticut, and St. John. During 1964, Type II planning will be

started in the St. Francis and Hudson River basins, the Puget Sound, and the Northern California region.

Comprehensive basin planning, as now conceived, may be defined as the determination of needs, investigation, and evaluation of capabilities, and formulation of long-range plans for development for all water and water-related land resources in the river basin. Such planning (Type II) provides a master plan, or blueprint for future development of natural resources. It involves an integrated forward look 50 or more years into the future, by the best talent available from all interested agencies. Solutions to problems may involve federal, state, or local agencies. Emphasis is placed on arriving at these solutions and fixing responsibility on appropriate agencies for financing and action. This master plan, when approved, provides an authoritative basis for continued planning and action by federal, state, and local agencies. Duplication of effort is avoided. The master plan provides strong justification for authorizing federal projects, and for establishing priorities and objectives. Needs can readily be related to completion dates for new projects. Gaps in planning can be identified and eliminated. Each agency and individual can examine the master plan for a closer look at the future and plan more confidently to execute his portion of the plan.

Here are some principles or objectives we should keep in mind in modern comprehensive planning:

a. Needs must be determined, not only for current conditions but also for future conditions as far ahead as can be reasonably projected—perhaps 50 to 100 years.

b. All water resources and water-related land resources must be inventoried and evaluated.

c. Formulation of a plan of development must cover immediate and long-range needs.

d. Planning involves integrated, coordinated effort of all federal, state, and other agencies whose responsibilities, interests, authorities, and capabilities can best assure the quality of the end result.

e. The public must be kept sufficiently informed during the planning to assure that the plan of development will be publicly acceptable.

f. The plan of development must have flexibility. Provision must be made for maintenance of the planning on a current basis and for effective implementation.

g. "Executive focus" is vital to progress in comprehensive planning and in the development of water resources based on such planning.

h. All planning, Types I, II, and III, must be integrated to provide maximum net gain for minimum expenditure of the nation's resources.

i. This planning is not a job for the engineer alone. Many skills, particularly in economic projections, are required.

j. Such planning is expensive and time-consuming. Progress can be made only by continuous, co-operative effort to execute a well-conceived plan for survey.

From the preceding statements, one can appreciate the magnitude of the task of performing Type I and Type II planning to meet present-day demands. Let us now consider some of the measures being taken by the Corps to develop capabilities to perform this planning. These include:

1. *Broadening the planning concept of its field offices* through the issuance of policy papers and directives, group conferences of the Division Engineers with the Chief of Engineers, and group meetings of key planning personnel.

2. *Improving planning techniques* for arriving at the optimum combination of the numerous purposes, projects and scales of development that must be considered as alternatives in the formulation of comprehensive basin plans. In this connection the Corps has contracted with Harvard University to develop techniques for practical application of theoretical concepts of plan formulation. Contracts for studies of other aspects of planning and economic evaluation are being arranged with other universities.

3. *Improving cooperation and coordination with other agencies* through inviting them to participate in joint basin planning efforts, and by attempting to work out uniform policies. Of special importance, in connection with the latter, is an effort being made, in compliance with a request of the President, to develop a uniform cost-sharing policy for flood control. This effort is being sponsored by the council of four Secretaries to which the President has assigned responsibility for the over-all coordination of federal water programs. This council also has under way a project for the synchronization of river basin planning activities by all the federal agencies. Cooperation and coordination are also being improved by the putting into effect of the new Standards promulgated by the President.

4. *Recruiting and training planning personnel* by special programs of cooperation with the universities. During the summer of 1962 a pilot program was carried out by two division offices of the Corps in

collaboration with leading universities in an effort to interest superior graduates in a career with the Corps. Particular attention was given to obtaining economists. A program of training present personnel by making it possible for them to take graduate courses at selected universities has also been initiated. Seven key field planners participated in the first phase of the Harvard Water Program, and at the present time two employees of the Corps are taking advanced work at the School of Natural Resources of the University of Michigan. Use is also being made of Secretary of the Army Fellowships. (It was such a fellowship that enabled the late F. C. Murphy of the Corps to prepare an outstanding report on "Regulating Flood Plain Development" which was published by the University of Chicago.) In addition to the foregoing, field planning personnel are being furnished with copies of new books in the planning field; the use of "short courses" is being considered.

5. *Improving planning standards* by bringing the manuals issued to the field offices into line with the new Presidential standards, and also by incorporating in them improvements in methodology being developed by the various studies under way.

6. *Meeting needs for additional information* by continuing and accelerating the Corps' program of "Civil Works Investigations," and by contracting with selected universities to undertake research designed to solve pressing planning problems.

7. *Improving the Corps' planning organization* by adapting modern concepts of organization and administrative management to the unique needs of the Civil Works Program. The Chief of Engineers has under active consideration a number of organizational improvements intended to strengthen Corps' planning capability, and, in particular, to make employment with the Corps more attractive to the highest type of planning personnel, not only in the engineering field, but also in economics, political science, geography and other fields. He has also called upon the Division Engineers to give the matter careful consideration, and has scheduled a group discussion with them in December 1962. In reorganizing planning the Chief of Engineers will also take into account any findings and recommendations which may result from studies to improve manpower controls and utilization now under way by the Department of the Army, at the request of the President, and from management surveys made by the Engineer Comptroller.

Before discussing briefly Type III planning, I will summarize the status of comprehensive planning for the Wabash basin. At Terre Haute, during March, 1962, General Cassidy suggested that com-

prehensive (Type II) planning is needed in the Wabash basin. He proposed that the Louisville District submit interim project reports (Type III) as needed for major reservoirs. These reports were to be expedited to completion this calendar year. Governors Welsh and Kerner acted quickly to establish Type II planning by the end of May, 1962. We developed an executive group consisting of the two governors, the District Engineer, and the representative of the Wabash Valley Interstate Commission. A coordinating committee, consisting of representatives of all federal and state agencies, is being established. We have submitted budget estimates for 1964 and have developed a plan of survey. Inventory of needs and of work already completed is in progress. My staff have met with all interested agencies and have developed a suitable basis for coordination of the first phases of this planning. We have planned to make use of capabilities of universities, colleges, and private engineering firms, wherever feasible, in completing this Type II planning. Some federal funds will probably be made available to state agencies through the various Federal agencies having functional responsibility. The Wabash Valley Interstate Commission will perform important functions in this planning effort, particularly in determining needs and evaluating proposed projects to be included in the plan of development. The Wabash Valley Association, civic organizations, and local communities can assist by orienting the public about this program and assuring public support of its objectives. We have made a good start but much remains to be done. Four to six years may be required to complete the Wabash Type II study, depending upon availability of funds.

Our studies of individual projects, Type III planning, have the basic purpose of developing recommendations to Congress of feasible projects for authorization. They must be sound engineering and economical projects, which are acceptable to the public. We consider carefully how each project fits into the development of water resources for the basin as a whole. The probable impact of the project upon the area is evaluated. We strive to recommend multi-purpose projects with maximum utilization of each reservoir site. We have authority now to amortize the proposed project over its anticipated life. This might be 100 years or more, whereas our old limit was 50 years. Water supply may be included for responsible local interests at no charge for the first ten years. We must be assured that these local interests will either make timely utilization of water or start paying interest at the end of the ten years. In "distressed areas" we may assess certain labor costs as benefits in computing the ratios of costs to

benefits. Greater latitude has also been given to us in including recreation benefits to justify projects for authorization.

By 1950, the Corps had completed about 50 reservoirs throughout the United States. By 1960, about 260 were completed. By 2000, we have had estimates that about 700 will be needed. Our criteria have been relaxed to make justification easier. Good reservoir sites are becoming harder to find and many have already been developed for other purposes. With each succeeding year, Type III planning requires increasingly more technical skills and efforts—more time and money—and more coordination.

What results have we achieved with our planning in Indiana to date? Two reservoirs have been completed and are in operation—Cagles Mill and Mansfield. Monroe, Salamonie, and Mississinewa reservoirs are under construction. Huntington reservoir will be started soon. Wildcat and Big Pine reservoirs have been recommended by us for authorization by Congress. Reports on several additional reservoirs will probably be submitted by the end of this calendar year. Many levees, floodwalls, and channel improvements have been authorized. Some have been completed. Others are inactive due to lack of required cooperation by local interests.

Another type of planning for water resources, performed by the Corps, is for operation of completed projects. Normally we try to find an interested local agency to operate the recreational facilities. In Indiana we are fortunate to have the State Department of Conservation as this sponsor for Cagles Mill and Mansfield reservoirs. We have a contractual agreement, which provides the basis for these operations. The state prepares an Annual Management Program to meet current planning requirements. Master plans may be revised by mutual agreement of the two parties to the license. Corps personnel operate the dam and outlet works for each reservoir in accordance with an approved plan of operations.

During the initial stages of construction of each reservoir, we encourage local interests to plan for the completed reservoir to achieve maximum benefits and least adverse effects. Such planning includes zoning, development of parks and access points, roads, and utilities. We negotiate relocation contracts with the owners—state, county, or local. Some prefer to settle for reimbursement. Others ask us to plan and to construct the required facilities and turn them over for use when completed.

In conclusion, I would like to point out that water resources planning on a large scale is relatively new. The Corps' capabilities have

expanded with the needs and we are learning from our experiences. We are conscious of the magnitude and complexities of the task nationwide, and of the need for coordinated, cooperative effort by all interested agencies. Our resources are organization, trained personnel, and money. We execute workloads prescribed by the Congress. State agencies give us much guidance and assistance in this important planning program. I am confident that great progress will be made in development of water resources in this area during our lifetimes. We of the Corps are pleased to participate and to have a major role in comprehensive planning for Indiana's river basins.