
CHAPTER I. INTRODUCTION

The appropriate federal role in developing and managing the nation's water resources has been a contentious issue facing the Congress since the federal government first assumed responsibility for navigation projects in 1826. Over the years, federal policies for selecting and sharing the costs of water projects have responded to the needs of an expanding industrial and agricultural economy. Federal water development objectives have included regional economic development, national defense, and creation or preservation of noneconomic benefits that the private market would not otherwise supply. To achieve these national objectives, the federal government has assumed most of the responsibility for financing and paying for water projects. Because many of the early water projects served interstate needs, decisionmaking has become centralized at the national level.

The Congress has always recognized that water projects are investments and that the expenditure of public resources should return the greatest possible net benefits to the nation. But this principle--often referred to as economic efficiency--has never been fully integrated into federal water development programs. Only recently have attempts been made to formally incorporate the efficiency principle into water development guidelines. After 150 years of building federal water projects, new projects are diminishing in favor of more efficient operation, maintenance, and rehabilitation of existing water projects. Most of the large, federally important water projects were built over this period, and remaining construction needs are focused on smaller intrastate projects.

With this transition in water resource needs, it seems logical to expect the way the federal government deals with these needs to change also. Federal water policies put in place to stimulate development cannot be expected to address the emerging Congressional concern for economic efficiency. In this regard, the three most important policies for current Congressional consideration are water project cost sharing, financing, and decisionmaking. Taken together, high federal cost assumption and complicated administrative processes for evaluating and selecting projects are the source of most of the inefficiency in federal water resources development programs.

PLAN OF THE PAPER

Chapter II presents background information on federal water resources programs, roles of the federal agencies and the Congress, and current water project cost-sharing policies. Chapter III documents the underlying changes in water development priorities. In Chapter IV, the economic efficiency objective is defined as it applies to water resources investments and in terms of implications for changing water project cost-sharing conventions and decisionmaking processes. Chapter V evaluates three options that could lead to a more efficient investment program for water resources.

CHAPTER II. FEDERAL WATER RESOURCES DEVELOPMENT POLICIES

Although about 20 federal agencies are, to a degree, responsible for about 30 kinds of water resources development, four agencies account for most federal activity: the U.S. Army Corps of Engineers (Corps), the Bureau of Reclamation (Bureau) in the Department of the Interior, the Soil Conservation Service (SCS) in the Department of Agriculture, and the Tennessee Valley Authority (TVA). Together, these agencies and the Congress make most of the water project investment decisions with limited nonfederal input. This chapter presents background information about the water development authority of these four agencies, their water project cost-sharing policies, and the roles these agencies and the Congress play in the decisionmaking process.

HISTORY OF FEDERAL WATER PROGRAMS

All water resources investments originated as state or local responsibilities, but as the nation expanded and water problems entered into national consciousness, new federal programs were developed to deal with those problems. ^{1/} Federal intervention has been justified principally on grounds of promoting regional economic development.

Navigation

The Gallatin Report of 1808 proposed a nationwide, federally subsidized system of navigational canals and locks and dams, justified on grounds of economic development of the West and on national defense needs. The nation's rivers were considered the principal means of transportation linking westward expansion with the more developed eastern half of the country. Thus, federal authority for constructing the inland waterways and ports and harbors began with the first Omnibus Rivers and Harbors Act in 1826. This and successive Rivers and Harbors Acts have enabled the Corps of Engineers to develop a navigational improvement program for construction, operation,

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1. See Beatrice Hort Holmes, A History of Federal Water Resources Programs, 1800-1960, U.S. Department of Agriculture Miscellaneous Publication No. 1233 (June 1972).

and maintenance of the inland waterways system, including navigational locks and dams and maintenance dredging of the nation's ports and harbors. In fiscal year 1974, the federal share to complete all authorized water projects, termed "exposure," would have been about \$40.5 billion. ^{2/} Of that total, waterway projects accounted for 16 percent and commercial harbor projects for about 3 percent (see Table 1). In fiscal year 1982, the Corps spent about \$1.3 billion to construct and operate inland navigation and commercial harbor projects (35 percent of 1982 combined water resources appropriations of the four main federal water agencies).

Flood Control

Flood control remained a local concern until the 1860s when the Corps of Engineers recommended extensive construction of flood control levees in the Mississippi Valley to protect new settlements. The rationale for federal intervention was the uncoordinated, ineffective local protection efforts and projected costs beyond the financial capability of the states and localities. The Corps' flood control activities expanded as the country grew and eventually incorporated the multiple-purpose reservoir concept (impounding stream flow for irrigation, navigation, recreation, hydroelectric power, and municipal water supply as well as for flood control).

At about the same time, in the late 1940s, the Soil Conservation Service was given the authority to construct smaller, upstream flood control structures in conjunction with its assistance program to local agricultural

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2. The remaining federal cost to complete an authorized project is defined as exposure. In 1975, the Water Resources Council compiled federal exposure by project purpose based on 4,796 projects that were authorized as of 1974 (see Options for Cost Sharing--Part 5A, Planning and Cost Sharing Policy Options for Water and Related Land Programs, November 1975). Some of these projects were active, but others had been authorized as early as 1884 and never acted upon. Though incomplete, this data base was a blend of then-contemporary needs and historical federal priorities. Today, the total federal water project exposure--about \$60 billion--is roughly equivalent to the 1974 level after accounting for inflation. The current allocation of total federal exposure among project purposes is also roughly equivalent to the 1974 allocation, because no new projects have been authorized since 1976.

TABLE 1. DISTRIBUTION OF FEDERAL WATER RESOURCES CAPITAL EXPOSURE AS OF FISCAL YEAR 1974, BY PROJECT PURPOSE

| Project Purpose | Capital Costs (In percent) |
|---------------------------------|-------------------------------|
| Waterways | 16 |
| Commercial Harbors | 3 |
| Urban Flood Damage Reduction | 21 |
| Rural Flood Damage Reduction | 19 |
| Irrigation | 7 |
| Hydroelectric Power | 6 |
| Municipal and Industrial Supply | 4 |
| Water Quality Control | 8 |
| Fish and Wildlife Preservation | 2 |
| General Recreation | 7 |
| Other | 7 |

SOURCE: U.S. Water Resources Council, Options for Cost Sharing--Part 5A, Planning and Cost Sharing Policy Options for Water and Related Land Programs (November 1975).

organizations. Today, all four federal water agencies build flood control works. Flood control projects accounted for about 40 percent of the total federal capital exposure for authorized water projects as of fiscal year 1974 (see Table 1). In fiscal year 1982, about \$1.3 billion in federal expenditures were made for this purpose (35 percent of 1982 combined water resources appropriations of the four federal water agencies).

Irrigation

With the passage of the Reclamation Act in 1902, the Bureau of Reclamation was given the responsibility for developing western water resources for irrigation and later for hydroelectric power. The purpose of the act was to promote economic development of the West and settlement of western public lands by offering inexpensive federally developed water and power to family farmers. Originally, western farmers were to repay the entire federal investment without interest (using a revolving fund) over ten years. But, costs escalated and many farmers could not meet their repayment obligations. As a result, several acts between 1902 and 1939 relaxed the original financial terms and established the present "ability to pay" criterion. By 1980, 161 irrigation and related projects had been constructed or authorized by the Bureau. Irrigation projects accounted for about 7 percent of the total federal capital exposure for authorized water projects as of fiscal year 1974 (see Table 1). Over the last ten years, annual Bureau spending for irrigation has accounted for about 6 percent of annual combined water resources appropriations of the four main water agencies.

Hydroelectric Power

Prior to 1906, hydroelectric power projects were undertaken by private parties, sometimes with federal permission (if on navigable waters) or under special federal leases for use of surplus water. But in that year, the Secretary of the Interior was authorized to develop hydroelectric power at reclamation projects. In 1912, the Corps was given discretionary authority to add water power provisions to navigation dams. Five years later, the Flood Control Act of 1917 required the Corps to include hydropower provisions as part of flood control dams when economical. In 1933, the TVA was empowered to exercise all federal water and power functions on the Tennessee River system, including the construction and authorization of hydroelectric power projects. Today all three agencies plan, construct, and operate hydroelectric power facilities. In fiscal year 1974, these projects accounted for about 6 percent of the total federal water project exposure (see Table 1).

Multiple Purpose River Basin Development Under the TVA

During the 1930s depression, the federal government created the Tennessee Valley Authority to promote economic development of an entire river basin--the Tennessee River system--by constructing facilities for flood control, navigation, and hydroelectric power generation. By 1953, the TVA had built 20 multiple-purpose dams on the Tennessee River mainstem and major tributaries. In 1981, the TVA operated 25 multiple-purpose dams, and nine single-purpose hydroelectric power generation facilities with total water resources appropriations of about \$67 million. The TVA spent about \$25 million in fiscal year 1982 for constructing new water resources projects (multipurpose dams, flood control facilities, navigational facilities, and recreational facilities).

Environmental Enhancement

Toward the late 1950s, the federal government again expanded its role in water resources development by embracing environmental enhancement objectives--water quality control, recreation, fish and wildlife development, ecological protection, and municipal water supply. The four federal water agencies together have obligated a relatively small percentage of their annual construction and operation budgets for these five purposes. For example, as of fiscal year 1974, the federal exposure for these agencies on the five environmental purposes combined accounted for only 14 percent of the total federal exposure (see Table 1).

CURRENT COST-SHARING POLICY

No unified national policy exists for sharing water project costs among the federal government, state and local governments, and direct users. Cost-sharing conventions have been shaped incrementally for each federal water agency through a series of federal statutes and administrative rules dating back to the turn of the century. Consequently, federal shares for the same type of water project differ among the federal water agencies. Within a given agency, cost-sharing rates can also vary for different technical solutions to the same water resources problem. There are two ways of viewing current cost-sharing rates: in terms of nominal cost-sharing rates, that is, those named in authorizing or policy legislation; and in terms of effective, composite cost-sharing rates that represent actual cash or contributions-in-kind paid by each participant over the project life. Effective nonfederal rates are generally lower than nominal rates.

Nominal Cost-Sharing Rates

Nominal cost-sharing rates vary widely from program to program and from agency to agency primarily because of 80 years of incremental water policymaking (see Table 2). For example, cost-sharing rates and terms for rural flood damage reduction were established for the Corps in 1928 and 1936, for the Bureau in 1940 and 1956, and for the SCS in 1954 (see Table 3). In addition, the Congress has often added new cost-sharing provisions, or made special exceptions, each time new projects were authorized. New provisions rarely replaced older ones; usually, they were added on, creating inconsistent, often confusing sets of rules and regulations.

Corps of Engineers. Under current policy, nonfederal cash contributions are not required for commercial navigation projects (ports, harbors, and waterways); structural flood control projects (reservoirs, levees, flood walls, and the like); hydroelectric power projects; water supply components of multipurpose reservoirs; or joint costs of fish and wildlife enhancement, recreation, or water quality features of multipurpose projects. Up-front cash contributions are required from nonfederal sponsors to cover 25 percent of separable fish and wildlife costs (for example, fish hatcheries) and 50 percent of separable recreation costs (such as boating or swimming facilities). For Corps projects, nonfederal sponsors are required to provide necessary land easements and rights-of-way. On average, they have accounted for 14 percent of urban flood control capital costs, 5 percent of rural flood control capital costs, 14 percent of port development costs, and 5 percent of inland waterway project capital costs. Nonfederal participants must repay within 50 years the capital costs of providing water supply storage and hydroelectric power.

The Corps pays all operation and maintenance (O&M) costs for navigation projects, major flood control reservoirs, and joint costs of multipurpose reservoirs. Nonfederal sponsors pay O&M for all other types of projects--local flood control, drainage, hydropower, water supply, irrigation, and separable cost of multipurpose reservoirs.

Bureau of Reclamation. Up-front cash payments are not specifically required from nonfederal sponsors of Bureau projects.^{3/} Minimum non-

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3. An exception to this rule occurred in the Colorado River Basin Project Act Amendments of 1982 (P.L. 97-373), which required that nonfederal interests make up-front contributions of 20 percent of selected features of the Central Arizona Project. Local farmers supported this requirement and sought private financing in the bond market.

TABLE 2. CURRENT NOMINAL NONFEDERAL CAPITAL COST-SHARING RATES, BY PROJECT PURPOSE (In percents) a/

| Project Purpose | Corps of Engineers | Bureau of Reclamation | Soil Conservation Service | Weighted Average 20 Federal Agencies |
|--|--------------------|-----------------------|---------------------------|--------------------------------------|
| Urban Flood Damage Reduction <u>b/</u> | 0-20 | -- | -- | 17 |
| Rural Flood Damage Reduction <u>b/</u> | 0-20 | 0-20 | 0-20 | 12 |
| Drainage | 50 | -- | 50 | 41 |
| Irrigation | 50 | 0-20 <u>c/</u> | 50 | 64 |
| Municipal and Industrial Supply | 100 <u>d/</u> | 100 <u>d/</u> | 50 | 81 |
| Water Quality Control | 0 | 25 | <u>e/</u> | 24 |
| Fish and Wildlife Preservation | 0-25 <u>f/</u> | 25 | 50 | 20 |
| General Recreation | 0-50 <u>g/</u> | 50 | 50 | 22 |
| Commercial Harbors <u>b/</u> | 0 | -- | -- | 10 |
| Inland Navigation <u>b/</u> | 0 | -- | -- | 5 |
| Hydroelectric Power | 100 <u>d/</u> | 100 <u>d/</u> | -- | 74 |

SOURCE: U.S. Water Resources Council, Options for Cost Sharing--Part 5A (November 1975).

- a. Tennessee Valley Authority (TVA) data excluded. There are no nominal cost-sharing requirements for TVA projects comparable to those for the other agencies. TVA repayment terms are based on selling electric power rather than on the traditional procedure of allocating costs by project purpose. See explanation in text.
- b. Nonfederal participants must contribute necessary land, easements, and rights-of-way, which in dollar terms could total as much as 20 percent of total project capital costs.
- c. Variable according to "ability to pay," but generally less than 20 percent.
- d. Repayment only, financing not required.
- e. Not established.
- f. Nonfederal share of direct separable costs is 25 percent.
- g. Nonfederal share of direct separable costs is 50 percent.

TABLE 3. MAJOR FEDERAL LEGISLATION AUTHORIZING COST SHARING, BY PROJECT PURPOSE

| Project Purpose | Affected Agency | Authorizing Legislation |
|---------------------------------------|-----------------|---|
| Urban Flood Damage Reduction | Corps | Flood Control Act of 1936 (P.L. 74-738) |
| | | Flood Control Act of 1938 (P.L. 75-761) |
| Rural Flood Damage Reduction | SCS | Watershed Protection Act (P.L. 83-566) |
| | Corps | Flood Control Act of 1936 Flood Control Act of 1938 Flood Control Act of 1928 (P.L. 70-391) |
| | Bureau | Small Projects Act (P.L. 84-984) Reclamation Projects Act of 1939 (P.L. 76-260) |
| | TVA | TVA Act (P.L. 73-017) |
| Drainage | SCS | Soil Conservation Act (P.L. 40-460) Watershed Protection Act |
| | Corps | Flood Control Act of 1944 (P.L. 78-534) |
| Irrigation | SCS | Soil Conservation Act Watershed Protection Act |
| | Corps | Flood Control Act of 1944 Reclamation Act of 1902 (P.L. 57-161) |
| | Bureau | Small Projects Act Reclamation Projects Act |
| Municipal and Industrial Water Supply | SCS | Watershed Protection Act |

(Continued)

TABLE 3. (Continued)

| Project Purpose | Affected Agency | Authorizing Legislation |
|---|-----------------|--|
| Municipal and Industrial Water Supply (Continued) | Corps | Water Supply Act of 1958 (P.L. 85-500) |
| | Bureau | Small Projects Act Reclamation Projects Act |
| Water Quality Control (Point Source) | Corps | Federal Water Pollution Control Act of 1972 (P.L. 92-500) |
| Fish and Wildlife Preservation | SCS | Watershed Protection Act |
| | Corps | Flood Control Act of 1944 Water Resources Protection Act of 1965 (P.L. 89-072) Water Resources Development Act of 1974 (P.L. 93-251) |
| | Bureau | Water Resources Development Act of 1974 |
| Ports and Harbors | Corps | Rivers and Harbors Act of 1920 (P.L. 66-263) |
| Inland Waterways | Corps | Rivers and Harbors Act of 1920 |
| | TVA | TVA Act |
| Hydroelectric Power | Corps | Flood Control Act of 1944 1937 Bonneville Power Act (P.L. 75-329) |
| | Bureau | Reclamation Projects Act |
| | TVA | TVA Act |

SOURCE: U.S. Water Resources Council, Options for Cost Sharing--Part 8D, Planning and Cost Sharing Policy Options for Water and Related Land Programs (November 1975).

federal shares are established by project type, but those shares may be paid with any combination of cash, contributions-in-kind (land, easements, rights-of-way), or repayments over time. For irrigation projects, capital costs are repaid (without interest) based on a calculation of farmers' ability to pay, which generally covers only about 10 percent of total project capital costs. Nonseparable capital costs allocated to fish and wildlife and recreation costs for facilities located on federal land are paid by the federal government. Operation and maintenance of all Bureau projects are the responsibility of nonfederal participants.

Soil Conservation Service. Prior to construction of any SCS project, a project agreement document must be signed by the responsible nonfederal entity endorsing that the following three conditions are satisfied:

- o All land affected by the project will be purchased by or is already owned by the responsible nonfederal entity.
- o The appropriate nonfederal share is secured in an escrow account and is available for payment of construction costs as performed and billed.
- o Operation and maintenance will be performed and paid for by the nonfederal entity.

The nonfederal capital share of most SCS projects is 50 percent, except for structural flood control (0 percent) and nonstructural flood control (20 percent). ^{4/}

Tennessee Valley Authority. There are no nominal cost-sharing requirements associated with TVA projects comparable to those of the other three federal water agencies. The TVA Act, as amended, established repayment terms for federal outlays based on selling electric power rather than on the traditional procedure of allocating project costs to purposes and recovering portions of those costs according to specific nonfederal cost-sharing rates.

The Amendments of 1959 required two types of payments to the U.S. Treasury from net power proceeds: a return on the federal appropriations

4. Structural flood control entails building structures to contain flood waters or otherwise prevent flood damages (dams, levees, dikes, flood walls). Nonstructural flood control reduces flood damages without building structures (zoning against floodplain development, early warning and evacuation systems, flood-proofing buildings).

for power facilities and repayment of the dollar amount of invested capital. The amount of return payable each year, beginning in 1961, is based on the appropriation investment at the beginning of that year and the average interest rate payable by the U.S. Treasury on its total marketable public obligations as of the same date. The capital repayment schedule was fixed at \$10 million per year between 1961 and 1965; \$15 million per year between 1966 and 1970; and \$20 million each year thereafter, until a total of \$1 billion had been repayed to the U.S. Treasury. As of the end of 1982, a total of \$370 million of the capital debt had been repayed. Return on appropriation investment totaled about \$1.2 billion as of 1982.

Effective, Composite Cost-Sharing Rates

Nominal cost-sharing rates reflect the intent of water resources legislation regarding who should be responsible for paying the costs of water projects. But nominal rates provide little information about who actually pays how much over the project life. Effective, composite cost-sharing rates do exactly that by accounting for capital repayment subsidies, such as repayment without interest (irrigation projects); interest-free start-up periods (water supply, hydropower, and irrigation); and low, fixed-interest rates over long periods of time (all projects). In a single project rate, effective, composite cost shares reflect the ultimate cost burden on all participants by combining capital contributions, the cash value of contributions-in-kind, and the discounted present value of annual operating costs.

For example, consider a Bureau project with a capital cost of \$14 million that is financed entirely by the federal government. The project would provide irrigation, municipal and industrial (M&I) water supply, and fish and wildlife benefits. The irrigation component costs \$8 million and is to be repaid by the local sponsor in full over 50 years without interest. The M&I component costs \$3 million and is to be repaid in full over 50 years at an interest rate of 6 percent. Fish and wildlife costs (\$3 million) are not repaid by the local sponsor. All operating costs, about \$100,000 per year, are paid locally. Thus, the local sponsor would pay \$11 million of the \$14 million project, for a nominal capital cost-sharing rate of 79 percent.

By contrast, the effective, composite cost-sharing rate would be much lower in this example. The federal government would pay an interest subsidy equal to \$5.5 million for the irrigation purpose--the discounted present value of a 50-year loan of \$8 million at a real interest rate of 6 percent. In addition, the federal government would pay the fish and wildlife cost of \$3 million for a total effective federal contribution of \$8.5 million. Nonfederal costs include the present value of irrigation payments without interest, M&I payments with interest, and all O&M payments. These total \$7.1 million.

Effective, composite cost-sharing rates were calculated using this methodology for almost 4,800 joint federal and state water projects based on a 6 percent discount rate and a project life of 50 years (see Table 4). ^{5/} For all types of water projects, the mean, nonfederal effective, composite cost share is 30 percent; or over the average life of a given water project, the federal government pays 70 percent of all costs and the nonfederal participants pay 30 percent. Nonfederal participants pay the least for navigation projects--7 percent of total project costs; and they pay the most for hydroelectric and municipal water supply projects--64 percent in each case.

Comparing Nominal and Effective Capital Cost Sharing

Effective nonfederal shares of capital costs are generally lower than nominal shares because of long repayment periods with fixed interest rates that tend to be low relative to the government cost of capital, provisions for interest-free "start up" periods, forgiveness of interest entirely during repayment, or the transference of cost from a reimbursable purpose to a nonreimbursable purpose (see Table 5). Low effective nonfederal cost-sharing rates imply a large federal financial responsibility and, potentially, federal subsidies. Large disparities between nominal and effective cost-sharing rates could indicate a cost-sharing outcome different from that originally intended by the Congress. For example, cost sharing for both inland navigation and irrigation projects involves substantial federal subsidies, but the nominal rate for navigation projects is close to the effective rate. The nominal nonfederal share of building a Corps' irrigation project is 50 percent while the effective share is only 15 percent. Most of this subsidy results from three practices: basing capital repayment terms on a calculation of ability to pay rather than the actual cost of service; allowing other beneficiaries (hydropower or municipal water users) to pay irrigation costs, thus creating a cross-subsidy; and forgiving entirely the interest on federal capital outlays. These practices were not the original intent of the 1902 Reclamation Act; rather, they have been added in subsequent legislation.

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5. Although cost-sharing rates were calculated on the basis of 1974 data, no new projects have been authorized since 1976 and no new cost-sharing arrangements have been established. Only the effect of using a different interest rate would change these calculations if made today. A higher interest rate would have the effect of decreasing the nonfederal share of most types of projects. See U.S. Water Resources Council, Options for Cost Sharing--Part 5A, Planning and Cost Sharing Policy Options for Water and Related Land Programs (November 1975).

TABLE 4. NONFEDERAL MEAN, EFFECTIVE, COMPOSITE COST SHARING FOR THE CORPS, BUREAU, AND SCS, BY PROJECT PURPOSE (In Percents)

| Project Purpose | Nonfederal Mean, Effective, Composite Share | | | |
|------------------------------------|--|--------|-----|----------------|
| | Corps | Bureau | SCS | 20 Agencies |
| Urban Flood Damage Reduction | 17 | a/ | a/ | 20 |
| Rural Flood Damage Reduction | 7 | 10 | 27 | 11 |
| Drainage | 35 | b/ | 58 | 46 |
| Irrigation | 19 | 18 | 54 | 19 |
| Erosion Control | 5 | b/ | 89 | 34 |
| Municipal and Industrial Supply | 54 | 71 | 100 | 64 |
| Water Quality Control | 3 | 82 | b/ | 60 |
| Fish and Wildlife Preservation | 11 | 13 | 57 | 14 |
| General Recreation | 17 | 18 | 63 | 19 |
| Commercial Harbors | 16 | b/ | b/ | 16 |
| Inland Navigation c/ | 6 | 7 | b/ | 6 |
| Hydroelectric Power | 61 | 65 | b/ | 64 |
| Agency Mean | 20 | 37 | 49 | 30 |

SOURCE: U.S. Water Resources Council, Options for Cost Sharing--Part 5A, Planning and Cost Sharing Policy Options for Water and Related Land Programs (November 1975).

- a. Agency reported a cost category for this purpose but did not report cost sharing.
- b. No activity reported for this purpose.
- c. Receipts from the fuel tax implemented pursuant to the Inland Waterway Revenue Act of 1978 are not included; therefore estimates may be slightly low.

TABLE 5. A COMPARISON OF AVERAGE NOMINAL AND EFFECTIVE NONFEDERAL CAPITAL COST-SHARING RATES, BY PROJECT PURPOSE (In percents) a/

| Project Purpose | Corps | | Bureau | | SCS | |
|---------------------------------|---------|-----------|-----------|-----------|-----------|-----------|
| | Nominal | Effective | Nominal | Effective | Nominal | Effective |
| Urban Flood Damage Reduction | 0-20 | 14 | <u>b/</u> | <u>b/</u> | 19 | 15 |
| Rural Flood Damage Reduction | 0-20 | 5 | 0-20 | 0 | 0-20 | 19 |
| Drainage | 50 | 30 | <u>b/</u> | <u>b/</u> | 50 | 52 |
| Irrigation | 50 | 15 | 0-20 | 10 | 50 | 48 |
| Municipal and Industrial Supply | 100 | 54 | 100 | 68 | 50 | 100 |
| Water Quality Control | 0 | 0 | 25 | 99 | <u>b/</u> | <u>b/</u> |
| Fish and Wildlife Preservation | 0-25 | 7 | 25 | 4 | 50 | 51 |
| General Recreation | 0-50 | 14 | 50 | 11 | 50 | 58 |
| Commercial Harbors | 0 | 16 | <u>b/</u> | <u>b/</u> | <u>b/</u> | <u>b/</u> |
| Inland Navigation | 0 | 6 | <u>b/</u> | <u>b/</u> | <u>b/</u> | <u>b/</u> |
| Hydroelectric Power | 100 | 63 | 100 | 63 | <u>b/</u> | <u>b/</u> |
| Agency Average | 25 | 18 | 89 | 31 | 43 | 43 |

SOURCE: U.S. Water Resources Council, Options for Cost Sharing--Part 5A, Planning and Cost Sharing Policy Options for Water and Related Land Programs (November 1975).

- a. Average values are weighted within purposes by allocated cost.
- b. No activity for this purpose.

Both the hydroelectric power and municipal and industrial water supply purposes have large disparities between nominal and effective cost-sharing rates. Stated policy for federal water resources cost sharing for these two purposes calls for full recovery of all capital and operating costs through the sale of vendible products.^{6/} High nominal nonfederal cost-sharing rates attest to this. After compensating for interest rate and repayment period subsidies, however, the actual result is a rather large federal subsidy--38 percent in the case of municipal and industrial water supply and 36 percent for hydroelectric power development.

Effective nonfederal capital shares are sometimes greater than nominal shares (for example, Corps inland navigation projects or SCS recreation projects). This is because the cash value of land easements and rights-of-way allocated to these purposes can account for up to 20 percent of overall project capital costs. In general, total nominal and effective operation and maintenance cost-sharing rates are equivalent because the nonfederal participants either pay all operation expenses on a cash, pay-as-you-go basis (irrigation projects, for example) or they pay none of these costs (as in large flood control reservoirs or navigation projects).

FEDERAL WATER PROJECT DECISIONMAKING

Historical Development

Early in the history of federal water resources development, the need for an efficient decisionmaking process was less acute, since needs were large and the costs of the water projects were considered small relative to the development benefits they produced. But over time, as the major water projects were completed and the federal water agencies began to explore marginal development projects, it became apparent that some measure of preference was needed to select the best water projects. So the Congress, in the Flood Control Act of 1936, introduced a benefit/cost standard for evaluating water development proposals. The act stated: ". . . the benefits to whomsoever they may accrue (must be) in excess of the estimated costs." For almost 30 years, the federal water agencies individually developed methods to calculate costs and benefits of water projects; there was little

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6. For additional details, see U.S. Army Corps of Engineers, Digest of Water Resources Policies and Authorities (March 27, 1981); and U.S. Bureau of Reclamation, Reclamation Instructions, Part 116, Economic Investigations.

coordination and even less consensus over appropriate analyses or economic assumptions. In the late 1970s, this effort was finally coordinated by the U.S. Water Resources Council, which issued a set of standards for evaluating costs and benefits of a proposed water project.^{7/} These standards were never fully incorporated into federal water planning procedures, however. In 1983, the "Principles and Standards" were replaced by nonbinding "Principles and Guidelines" that emphasize project evaluation based on national economic benefits.

The result of such an evaluation is a benefit/cost ratio (B/C), used by the Congress to confirm the economic integrity of a proposed project. For reasons that are discussed in Chapter IV, however, a benefit/cost ratio is a relatively blunt instrument for separating more economic from less economic projects. As a result, federal funding often depends more upon the outcome of prolonged Congressional bargaining than on a project's economic merits.

A Multistep Decision Process

The process for evaluating and selecting water projects is lengthy and complex, involving approval of several offices in an executive agency, at least three trips to the Office of Management and Budget (OMB) and to Congressional committees for further approval, an act of Congress in most cases, and a Presidential signature.^{8/} The average time between project evaluation and the end of construction is 26 to 28 years. The three most important steps of this process are: preparation of the feasibility report, project authorization, and project appropriations.

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7. Between 1979 and 1981, the Water Resources Council published sections of "Principles, Standards, and Procedures for Planning Water and Related Land Resources," commonly called the P&S. Methods were developed to quantify national and regional economic development benefits of water projects. In addition, the P&S outlined procedures to evaluate environmental quality benefits and other social effects.
 8. For a detailed account of the process as it applies to the major federal agencies, see Gerald E. Galloway, Jr., Impediments in the Process for Development of Federal Water Resources Projects: Why All the Delay and What Can We Do About It? (prepared for the U.S. Water Resources Council, September 1981).

The Feasibility Report. At full cost to the federal government and at the request of a local sponsor (state or local government), field offices of the federal water agencies undertake a feasibility study to examine a potential water project from engineering, environmental, and benefit/cost perspectives. If the evaluation suggests a feasible engineering solution, without objectionable environmental problems, that will yield benefits in excess of costs, the project is presented to the Congress for construction authorization.^{9/} During this process, coordination with state and local officials is encouraged, but the federal agencies solicit relatively little direct input. A project's benefit/cost ratio is calculated at this stage.

Project Authorization. The Congress examines all this information, and if, in its judgment, the project has been evaluated fairly and appears to be in the national interest, it becomes one of a number of such projects contained in a water project authorization bill. Historically, there has been such a bill about every two years since the turn of the century, although the last authorization act was passed in 1976. A benefit/cost ratio of less than one will prevent a project from proceeding to the authorization step. But critics of this process insist that a B/C greater than one is not difficult to show because of the uncertainty inherent in procedures used to calculate project benefits.

Project Appropriation. It is relatively easy to authorize a water project because no funds are committed to its construction until the third major step--project appropriations. Each year, the federal water agencies submit their budgets for Congressional approval, including the agency's recommended spending on water projects. The pivotal decisions on federal spending are made at this stage. Based on OMB and agency recommendations, certain projects are selected for funding each year while others are not. Many more projects are authorized than the number chosen for yearly appropriations, creating a backlog of authorized but unfunded projects. In fiscal year 1982, for example, no request for appropriations was made for over 250 authorized, ongoing Corps projects. Another 362 authorized Corps projects had been deferred or were considered inactive. Once a potential project has progressed to the appropriations stage, economic selection criteria become much less important in guiding the choice of projects. Funding decisions generally follow highly charged Congressional debate.

9. The Office of Management and Budget is responsible for screening project feasibility reports prior to authorization. All Congressional action is at the committee level until an authorization or appropriations bill is presented to the entire Congress. Different committees handle the affairs of different federal water agencies.

