

Financing Water Resources Development

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Introduction

In theory, cost sharing and financing are distinct: financing refers to the provision of funds enabling the implementation of a project, while cost sharing refers to the agreements made among involved parties to assume responsibility for the payment of incurred expenses. In practice, however, the distinction between cost sharing and financing tends to blur and becomes less distinct. For example, a local government may seek federal cost sharing as one of several alternative methods of financing a local project. The cost-sharing policies and programs of the federal government profoundly affect the financing arrangements of local and state governments and the private sector for water resources development and management. Consequently, in the discussion which follows, some effort is made to separate financing and cost sharing, but in general, the two concepts merge.

The role of financing and cost sharing in water resources development has received relatively little attention in the past. Compared to the attention given to benefit-cost analysis, the role of financing and cost sharing in water resources development has been ignored. This lack of attention probably results because cost sharing does not rest on an elegant theoretical basis and is politically sensitive. Furthermore, only minimal data on cost sharing and financing local, state, and federal government and private water projects and programs exist.

In the following sections, a brief survey is made of past and present financing practices for water resources development and

the roles of federal and nonfederal governments and private interests in financing. A more detailed look at the varied assortment of existing federal and nonfederal cost sharing provisions is then presented along with a sampling of some emerging issues. The focus here is on policy questions that are currently arising due to competing interests for water and water project funding. Next, several proposed strategies for dealing with these issues are discussed including the current administration's proposal resulting from the president's water policy review. Finally, some closing remarks are made concerning the substantial changes necessary to bring about consistent, equitable, and efficient cost sharing and financing arrangements in water development.

Federal Financing and Cost Sharing

Federal Interest and Involvement

Historically, the federal government has had a major interest and involvement in financing and managing water resources development. This federal interest and involvement stems from the close association between national goals and water resources and is fundamentally based on the constitutional provisions of the Preamble, the Commerce Clause, war and treaty powers, and interstate compacts. In practice, however, it is through taxing and spending that the federal government can allocate financing resources to specific water problems. The underlying motivation is often a national interest such as national defense, economic development, environmental quality, or general social well-being. According to North (1978), justification for federal involvement in water resources can be summarized in four functions:

1. Meeting national priorities, either constitutionally specified or jointly agreed upon by federal and nonfederal interests.
2. Providing and allocating public goods or services associated with water development.
3. Providing reservations for the future.
4. Providing a response to emergency and critical needs.

National priorities motivate the federal government's involvement in many areas, and water is no exception. These priorities change from time to time and emphasis has been placed on such aspects of development as navigation, irrigation, flood control, energy, and the environment. Attention is focused on these areas of water development as possible means to achieve more general national goals such as defense, economic development, full employment, wage and price stability, and income redistribution.

Over the years, important water-related congressional acts have provided explicit areas and means for federal involvement in water resources development and management. In general, the intent has been to assign the cost of providing benefits to the direct recipients. However, the Rivers and Harbors, Flood Control, Reclamation, and Water Resources Development acts and amendments have dealt with this principle inconsistently, due in part to the difficulty in identifying beneficiaries.

The Reclamation Act of 1902 required the beneficiaries of irrigation water to repay the capital costs of irrigation and to assume responsibility for operation and maintenance costs (P.L. 161, 1902). The Rivers and Harbors Appropriation Act of 1884 prohibited any cost burden to be placed on users of navigation channels (C. 224, S. 4, 23 Stat. 147). The Rivers and Harbors Act of 1902 recognized that local benefits derived from federal investment in rivers and harbors and provided for local cooperation in return (P.L. 154, 1902). This cooperation has typically been in the form of lands, easements, and rights-of-way. Another manifestation of federal financing and cost sharing came into being with the Flood Control Act of 1936 (P.L. 738, 1936). Under the act, extent of federal cost sharing varies, but in general it includes all implementation excluding lands, easements, and rights-of-way that must come from nonfederal project sponsors. On the average, the federal financing share for local flood control projects amounts to about 80 percent of the total first cost (National Water Commission, 1973). Although the original 1936 Flood Control Act included major flood control reservoirs in the cost-sharing provisions, later amendments in 1938, 1941, and 1944 excluded nonfederal

cost sharing of reservoirs. The rationale behind that decision included such factors as interstate problems, the national interest, and the inability to identify beneficiaries. Federal involvement in municipal and industrial water supply has been a more recent development. The Water Supply Act of 1958 (P.L. 85-500, Title III) provides for federal financing of water supply storage in federal reservoirs for municipal and industrial purposes but requires 100 percent reimbursement of capital and operating maintenance costs.

Quantitative estimates of federal financial involvement in water resources development and management as a result of these various federal acts are displayed in Tables 1 and 2. Table 1, from the Report of the National Water Commission (National Water Commission, 1973), presents estimated historic federal expenditures for water resources development for the period 1900-1970. Table 2 presents a summary of federal water-related obligations by purpose, by major agency, and by type of financing for 1974. With the exception of expenditures for water quality as detailed below, little change in relative funding levels has occurred since 1974.

With the passage of the Water Quality Act of 1965 (P.L. 89-234) and the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500), the federal government became heavily involved in the financing of water-quality projects. To achieve the goals of the 1972 act, \$18 billion was authorized for planning, design, and construction of wastewater treatment facilities. These funds are administered by the Environmental Protection Agency under a cost-sharing arrangement that provides for a federal share of 75 percent of construction costs, with the remaining 25 percent to come from state and/or local contributions. As a result of "midcourse corrections," the Federal Water Pollution Control Act Amendments of 1977 (P.L. 95-217) extended the deadlines set in 1972 and authorized an additional \$24.5 billion for the EPA Facilities Construction Grants Program, covering the period 1978-1982. While the full Fiscal Year 1978 authorization of \$4.5 billion was appropriated, the annual appropriations of \$4.2 billion (FY 1979) and \$3.4 billion (FY 1980) have fallen short of the \$5 billion annual authorizations. However, federal financing of water quality is

TABLE 1
 Estimated Historic Federal Expenditures for Water Resources and Related Activities
 (billions of 1972 dollars)

	<i>Indexing Factor^a</i>	<i>Navigation</i>	<i>Flood Control</i>	<i>Irrigation</i>	<i>Power</i>	<i>Water Supply & Pollution Control</i>	<i>Watershed Protection</i>	<i>Fisheries & Wildlife</i>	<i>Multiple Purpose</i>	<i>Total</i>
1900	18.7	.35	—	—	—	—	—	—	—	.35
1905	18.6	.43	—	.09	—	—	—	—	—	.52
1910	17.5	.55	—	.14	—	—	—	—	—	.69
1915	18.2	.85	—	.18	—	—	—	—	—	1.03
1920	6.8	.28	.06	.04	—	—	—	—	—	.38
1925	8.1	.53	.12	.07	—	—	—	—	—	.72
1930	8.3	.66	.35	.07	.04	—	—	—	—	1.12
1935	8.6	1.48	.38	.18	.11	—	—	—	—	2.15
1940	7.0	1.02	.74	.24	.23	.01	—	—	.11	2.35
1945	5.5	.28	.40	.08	.14	—	—	—	.07	.97
1950	3.3	.44	.90	.48	.53	.03	.01	—	.84	3.23
1955	2.55	.29	.38	.19	.44	.02	.02	.01	.66	2.01
1960	2.03	.59	.69	.17	.46	.15	.03	.02	1.07	3.18
1965	1.73	.70	.92	.16	.61	.23	.06	.02	.49	3.19
1970	1.22	.23	.36	.11	.55	.56	.08	.02	.40	2.31

^aThe indexing factor is the multiplier used to convert current dollars to 1972 constant dollars.

Source: Adapted from John B. Legler et al. (1971). A Historical Study of Water Resources Policy of the Federal Government, 1900–1970, prepared for the National Water Commission. Mimeo, Washington University, St. Louis, Mo., pp. 397–398.

TABLE 2
Summary of Federal Water Related Obligations by Purpose,
by Major Agency and by Type of Financing, 1974

14

<i>Purpose</i>	<i>Total</i>		<i>By Major Agency</i>					<i>By Type Financing</i>		
	<i>(mil \$)</i>	<i>(%)</i>	<i>(mil \$)</i>					<i>(mil \$)</i>		
			<i>SCS</i>	<i>Corps</i>	<i>BuRec</i>	<i>EPA</i>	<i>Other</i>	<i>Direct</i>	<i>Grant</i>	<i>Loan</i>
Urban flood damage reduction	796	11	<1	364	-0-	-0-	432	404	107	285
Rural flood damage reduction	564	8	64	355	17	-0-	128	434	-0-	130
Drainage	27	<1	5	1	-0-	-0-	21	27	-0-	-0-
Agricultural water supply	172	2	28	19	126	-0-	-0-	160	-0-	12
Erosion and runoff control	120	2	-0-	26	-0-	-0-	94	120	-0-	-0-
M&I water supply	397	6	3	43	40	-0-	311	85	20	293
Water quality management (P.S.)	3008	42	-0-	1	<1	2662	345	22	2805	181
Recreation—general	325	5	9	149	10	-0-	157	198	127	<1
Fishing and hunting	114	2	1	16	19	-0-	78	72	41	1
Boating—berthed and launched	10	<1	-0-	7	-0-	-0-	10	10	-0-	-0-
Natural areas	28	<1	-0-	<1	<1	-0-	28	25	3	-0-
Historic and cultural sites	<1	<1	-0-	-0-	-0-	-0-	-0-	<1	-0-	-0-
Ecological systems	2	<1	-0-	<1	-0-	-0-	2	2	-0-	-0-
Navigation	660	9	-0-	660	<1	-0-	-0-	660	-0-	-0-
Hydroelectric power'	419	6	-0-	206	130	-0-	83	419	-0-	-0-
All other	483	7	34	32	78	57	282	313	143	26
Total	7125	100	144	1879	420	2719	1963	2951	3246	928

Source: Taken from "Financing Water Resources Planning, Implementation, Management: The Unsolved Problems," 1978, by Ronald M. North; the information comes from U.S. Water Resources Council, *Planning and Cost Sharing Policy Options for Water and Related Land Programs*, "Current Situation," Part II, Washington, D.C., November 1975.

by far still the largest single component of total federal expenditures for water resources development and management.

Since the 1972 amendments, \$28.2 billion has been appropriated for EPA grants (through FY-1979). About \$21.2 billion of this total has been obligated in contracts and approximately \$11 billion has actually been outlaid (U.S. Environmental Protection Agency, 1979a). In comparison, under the 1956 Water Pollution Control Act Amendments, which first authorized federal financial assistance in the construction of municipal treatment plants, a total of \$5.2 billion was granted for projects between 1956 and 1972.

Cost Sharing

Federal interest and involvement in financing of water resource development is closely related to, and in some cases identical to, the federal interest and involvement in cost sharing. The National Water Commission articulated a clear statement of goals for federal cost sharing (National Water Commission, 1973):

- To provide adequate supplies of water and water-related services for the nation developed at least cost over time.
- To promote the efficient use of water and water-related services by users.
- To encourage improved management of land and other related resources in conjunction with water.
- To promote harmony of water developments with other national policies and programs.

A central element in any notion of cost sharing is that of an equitable distribution of costs. This goal is deceptively easy to state, but a widespread agreement on what is equitable is difficult if not impossible to obtain. While requiring the beneficiaries to bear the cost of providing received benefits is conceptually sound, it is in the identification of the beneficiaries that the problem lies. First, the benefits from a water project may be so widespread that beneficiaries can be identified in only general terms. Flood control projects illustrate this problem in that the resulting flood protection can be enjoyed by residents of states

and towns as well as by industries over a considerable area. Another difficulty lies in the traditional approach of allowing the federal government to underwrite public benefits but assessing to private beneficiaries the portion of costs allocated to the provision of private benefits. The problem here is to define clearly what is meant by the terms public and private. For example, the costs of irrigation projects have customarily been transferred to the recipients of the water, indicating a private benefit. However, in many cases the water is not priced at market value; hence the agricultural water supply has, in effect, been subsidized, indicating some sort of public benefit.

Current Practices and Policies

The current cost-sharing situation for water resources development reflects the lack of consistent or uniform policies. Cost sharing in practice involves a wide variety of participants, methods, and timing schedules. The Section 80(c) Study, the most detailed analysis of federal cost sharing to date, summarized the current situation for 1974 and a brief discussion of that summary lends useful insight into the complexity of the issue (U.S. Water Resources Council, 1975). At the federal level, cost-sharing participants in water resources include seven cabinet departments encompassing eighteen agencies and seven independent agencies, commissions, and authorities. Methods of cost sharing at the federal level include grants, loans, and direct investment in programs and projects. At the nonfederal level, shares can be borne through contributions in cash or in kind, responsibility for operations and maintenance, user charges, reimbursement contracts from user fees, or assessments. Regarding timing of the cost-sharing arrangement, a distinction must be made between implementation costs and operating, maintenance, and replacement costs. The federal share for implementation can occur either during construction or as a reimbursement, while the nonfederal share can appear in either of these forms or through contracted periodic payments or market-based direct payments (made when, as, and if used). For operation, maintenance, and replacement costs, the federal share can be appropriated as required or contributed through a reimbursement arrangement. The nonfederal share can appear currently as required or as repayments derived from user charges.

To further complicate the cost-sharing picture, there exists a wide variety of water resource development purpose categories. Twelve major purposes were defined in the Section 80 Study and included such areas as urban flood damage reduction, agricultural production, water quality management, navigation, etc. (see Tables 3 and 4). Furthermore, it is possible to separate cost-sharing arrangements according to the measures employed (such as construction of levees, dams and channels; flood warning systems; and sewage treatment plants). Finally, cost-sharing arrangements apparently vary among the twenty-one water resources regions of the nation (see Table 3). For example, in the case of recreation, the nonfederal percentage varies from 8 percent in the Arkansas and Upper Colorado regions to 70 percent in the Tennessee region. For irrigation, the nonfederal share varies from 10 percent in the Missouri region to 66 percent in the Alaska region.

Before analyzing some specific examples that illustrate aspects of the current situation, it is necessary to develop a definition of cost sharing. To merely say that cost sharing is the agreement concerning cost allocation among federal and nonfederal interests is not adequate. For example, a 50 percent share contributed at the front end is not the same as a 50 percent share distributed over a specific repayment period, interest free, or a 50 percent share paid back over time with interest. For this purpose, the Section 80 Study used the concept of "effective composite" cost sharing. The term "effective" refers to the result of adjustments made for the impacts and implications of the major exceptions, provisions, and conditions which make the nonfederal actual cost share different from the stated cost share. Specifically, an effective cost share considers

- timing of the nonfederal contribution to the project, whether initially or by reimbursement,
- the interest rate on the reimbursable balance,
- the number of interest-free years,
- the length of the repayment period,
- the interest during construction,
- the magnitude and terms of transfer accounts, and
- the value of contributions in kind.

TABLE 3
Water Resources Council Options for Cost Sharing Cost Sharing Issues-
Dimensions, Current Situation and Options Summary of the Mean, Effective, Composite
Nonfederal Cost Sharing for All Programs and Projects by Purpose, by Region (in percent)^a

Purpose	NE 01	MA 02	SAG 03	GI 04	Ob 05	Tn 06	UM 07	LM 08	SRR 09	Mo 10	Ark 11	TG 12	RG 13	UCo 14	LCo 15	GB 16	CNP 17	CSP 18	Al 19	Ha 20	PR 21	22	USA 23	
URBAN FLOOD DAMAGE REDUCTION	16	29	30	26	8	56	24	5	5	11	11	40	15	*	28	8	3	34	6	2	-	13	20	
Rural Flood Damage Reduction	32	20	13	33	9	46	13	8	21	9	6	7	14	9	22	6	10	21	-	21	44	-	11	
Drainage	37	47	53	53	43	34	47	41	47	35	41	56	34	34	54	41	50	54	33	35	63	-	46	
Agricultural Water Supply (Irrigation)	34	42	27	39	35	34	34	52	37	10	18	37	19	10	32	59	11	34	66	47	50	-	19	
Erosion and/or Runoff Control	83	75	78	69	82	67	79	88	82	7	16	87	89	68	89	73	48	63	2	90	89	-	34	
RURAL FLOOD DAMAGE REDUCTION AND AGRICULTURAL PRODUCTION	37	32	23	43	13	48	18	10	34	9	11	11	24	13	31	33	12	30	4	27	53	-	16	
Commercial Fisheries Services	*	33	1	-	-	-	-	10	-	-	-	-	-	-	-	-	2	1	-	*	-	-	5	
AQUACULTURAL PRODUCTION	*	33	1	-	-	-	-	10	-	-	-	-	-	-	-	-	2	1	-	*	-	-	33	8
M&I Water	94	52	86	96	79	90	63	72	91	56	50	67	70	75	72	57	61	53	88	-	92	-	64	
Streamflow Regulation	*	13	*	-	4	4	31	-	-	*	-	-	-	-	-	-	*	-	-	-	-	-	2	
WATER QUANTITY MANAGEMENT	39	46	82	96	71	90	51	62	91	56	24	67	70	75	72	57	59	53	88	-	92	-	54	
Point Source	66	64	65	65	64	65	65	67	70	66	63	64	64	78	66	65	63	64	59	65	64	61	64	
Non-Point Source	-	1	*	-	3	-	2	33	-	4	-	5	-	-	-	-	-	5	-	-	-	30	3	
WATER QUALITY MANAGEMENT	65	62	64	65	39	65	59	65	68	49	62	63	64	77	63	64	57	64	59	65	64	60	60	
General	47	27	19	47	21	75	20	19	25	16	8	16	15	6	8	44	13	20	*	35	12	50	19	
Fish and Wildlife	38	27	11	33	12	27	16	39	27	11	7	9	6	10	19	30	8	19	23	58	25	-	14	
Boating (Berthed and Launched)	41	24	28	39	*	50	29	50	50	50	50	50	50	50	50	50	49	52	32	50	50	50	38	
RECREATION	44	27	19	42	20	70	20	25	26	15	8	16	11	8	13	41	11	22	19	42	14	50	19	
Natural Areas	7	1	2	6	55	23	2	54	2	1	4	4	13	22	55	62	2	15	11	87	*	*	*	
Historic & Cultural Sites	-	-	-	-	-	-	-	-	-	-	-	-	*	-	-	-	-	-	-	-	-	-	-	
Ecological Systems	51	41	38	35	55	88	2	59	62	35	68	48	82	88	82	79	30	43	38	83	*	-	26	
NATURAL AREAS & CULTURAL RESOURCES	13	2	5	11	55	39	2	57	4	3	5	9	18	39	73	74	4	24	18	85	*	*	6	
Commercial Harbors	5	19	2	41	-	-	19	13	-	-	-	12	1	-	-	-	2	23	1	7	-	-	16	
Waterways	-	9	10	13	1	94	2	6	-	3	6	6	-	-	-	-	7	20	-	-	-	-	6	
Services	-	-	*	-	-	-	30	-	9	30	12	-	-	-	-	-	25	-	*	-	-	-	10	
NAVIGATION	5	16	8	27	1	94	2	6	-	6	6	10	1	-	-	-	7	21	1	7	-	-	7	
HYDROPOWER GENERATION	101	61	55	*	41	123	56	23	*	57	27	*	*	70	72	*	63	73	85	*	*	*	64	
AREA REDEVELOPMENT BENEFITS	65	52	66	56	52	64	36	62	61	61	68	65	64	56	56	58	65	61	76	-	81	47	60	
GENERAL SUPPORT OR UNALLOCATED	2	12	1	2	12	9	4	16	21	18	52	4	17	18	15	17	3	100	-	50	*	2	23	
OTHER	100	23	46	50	-	-	-	13	-	9	18	2	6	4	19	-	1	28	-	*	-	-	25	
REGION MEAN ALL PURPOSES	55	42	29	47	18	70	17	10	23	21	16	33	24	37	38	39	40	42	40	32	51	23	30	

^aWeightings for the major purpose such as Water Quality Management may reflect programs that were unallocated to the subpurposes shown but included in the major purpose aggregate. (*) means there is a program or project activity for that purpose but no cost sharing was reported. (-) means there is no program or project activity reported for that purpose.

TABLE 4
 Water Resources Council Options for Cost Sharing Cost Sharing Issues—Dimensions, Current Situation and Options
 Summary of the Mean, Effective, Composite Nonfederal Cost Sharing for All Programs and Projects by Purpose, by Agency (in percent)^a

Purpose	ASCS	FmHA	FS	SCS	COE	EDA	NOAA	EPA	CID	FIA	FDAA	BLM	USBR	BOR	FWLS	NPS	CG	I-PC	IVA	SBA	USA
URBAN FLOOD DAMAGE REDUCTION	-	-	-	*	17	-	-	-	-	13	*	-	*	-	-	-	-	-	94 ^b	47	20
Rural Flood Damage Reduction	-	80	-	27	7	-	-	-	-	-	-	-	10	-	-	-	-	-	60	-	11
Drainage	34	-	-	58	35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	46
Agricultural Water Supply (Irrigation)	34	-	-	54	19	-	-	-	-	-	-	-	18	-	-	-	-	-	-	-	19
Erosion and/or Runoff Control	34	-	*	89	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34
KURAL FLOOD DAMAGE REDUCTION AND AGRICULTURAL PRODUCTION	3	4	8	0	4	7	8	-	-	-	-	*	18	-	-	-	-	-	60	-	16
Commercial Fisheries	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
Services	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AQUACULTURAL PRODUCTION	-	-	-	-	5	-	33	-	-	-	-	-	-	-	-	-	-	-	-	-	8
M&I Water	-	91	*	100	54	-	-	-	-	-	-	-	71	-	-	-	-	-	-	-	64
Streamflow Regulation	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
WATER QUANTITY MANAGEMENT	-	91	*	100	40	-	-	-	-	-	-	-	71	-	-	-	-	-	-	-	5.1
Point Source	-	92	*	-	3	-	-	6	2	7	9	-	82	-	-	-	-	-	102	-	64
Non-Point Source	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
WATER QUALITY MANAGEMENT	-	92	*	-	3	-	-	62	79	-	-	-	99	-	-	-	-	-	102	-	60
General	-	-	6	3	1	7	-	-	50	-	-	-	18	*	-	*	-	-	94	-	19
Fish and Wildlife	-	-	-	57	11	-	-	-	-	-	-	-	13	-	25	-	-	-	-	-	14
Boating (Berthed and Launched)	-	-	-	-	38	-	-	-	-	-	-	-	-	-	-	48	-	-	-	-	38
RECREATION	-	-	-	62	17	-	-	-	50	-	-	*	18	-	25	*	48	-	94	-	19
Natural Areas	*	-	*	-	-	-	-	-	-	-	-	-	4	-	4	-	-	-	-	-	4
Historic & Cultural Sites	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*
Ecological Systems	-	-	-	-	-	-	-	-	-	-	-	-	-	-	51	-	-	-	-	-	26
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*
NATURAL AREAS & CULTURAL RESOURCES	*	-	*	-	*	-	-	-	-	-	-	-	4	-	9	-	-	-	-	-	6
Commercial Harbors	-	-	*	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16
Waterways	-	-	-	-	6	-	-	-	-	-	-	-	7	-	-	-	7	-	94 ^b	-	6
Services	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*
NAVIGATION	-	-	-	-	7	-	-	-	-	-	-	-	7	-	-	-	5	-	94 ^b	-	7
HYDRO POWER GENERATION	-	-	-	-	61	-	-	-	-	-	-	-	65	-	-	-	-	-	-	-	6.1
AREA REDEVELOPMENT BENEFIT	-	-	-	-	2	66	-	-	-	-	-	-	*	-	-	-	-	-	*	-	60
GENERAL SUPPORT OR UNALLOCATED	-	-	-	18	13	-	-	-	-	-	-	-	100	-	3	-	-	-	9	-	23
OTHER	-	-	-	-	30	-	-	-	-	-	-	-	17	-	-	*	-	-	-	-	25
AGENCY MEAN, ALL PURPOSES	34	89	*	49	20	66	33	62	73	13	-	*	37	*	20	*	8	*	76	47	3.0

^aWeighting for the major purpose such as Water Quality Management may reflect programs that were unallocated to the subpurpose shown but included in the major purpose aggregate. (*) means there is a program of project activity for that purpose but no cost sharing was reported. (-) means there is no program or project activity reported for that purpose
^bUpon review, TVA indicates that this rate is virtually zero. Consult TVA before use.

"Composite" refers to the combined total of implementation costs plus the capitalized present value of the estimated annual operation and maintenance costs. The concept of an effective composite cost share is a logical basis from which to compare cost-sharing provisions among purposes, agencies, measures, and regions. It is a true indication of the ultimate cost burdens borne by both federal and nonfederal interests.

A useful basis for assessing the current situation is to look at the variation of cost-sharing provisions among agencies for the same purpose. Tables 3 and 4 are included as summaries of the situation as determined by the Section 80 Study for Fiscal Year 1974. Since little revision of cost-sharing rules has taken place since then, these results should give a reasonably accurate picture of the situation in 1979. Table 4 lists each subpurpose and gives the nonfederal effective composite cost share as a percentage as it exists for each agency involved in that purpose. Where more than one provision exists within an agency for a single purpose, the figure given is the mean value of all such provisions. For example, in rural flood damage reduction, the nonfederal cost share in the three major federal construction agencies ranges from 7 percent for the Corps of Engineers to 10 percent for the Bureau of Reclamation to 27 percent for the Soil Conservation Service. In irrigation projects, the respective percentages are 19, 18, and 54. Other variations among agencies for the same purpose can be seen in Table 4.

The current situation in navigation has changed substantially since the Section 80 Study. Historically, the federal government has borne the full cost of construction, operation, and maintenance associated with navigation on inland waterways, with nonfederal contributions primarily in the form of land, easements, and rights-of-way. Using the mean effective composite cost-sharing concept, the nonfederal share in navigation was estimated to be 7 percent in 1974. The National Water Commission recommended full cost recovery of operation and maintenance costs on existing navigable waterways through a combination of fuel taxes and lockage charges. Under this recommendation, both passenger and commercial vessels would be subject to charges and for future projects all costs, including construction costs, would be borne by nonfederal interests

except in cases where national defense benefits are derived. In October 1978, Congress passed the Inland Waterways Revenue Act, which incorporated a "user-pay" principle (P.L. 95-502). While lockage charges were not included and passenger vessels were exempted, the act authorized a tax on fuel for commercial waterway transportation. A trust fund was established that will consist of fuel tax revenues and provide the funding source for appropriated construction and rehabilitation expenditures. While it remains to be seen what the ultimate cost recovery will be, the new act does provide some implementation of the fundamental user pay principle in cost sharing.

In summarizing the current situation, it is apparent that significant differences exist among water resource purposes, among agencies for similar purposes, among water resources regions for similar purposes, and among repayment arrangements. On a national average, including all purposes, agencies, and regions, the estimated effective composite nonfederal cost share is about 30 percent of the total cost of the federal and federally assisted water and related land programs (see Tables 3 and 4). Federal cost-sharing policy today is a complex web of approximately 185 separate rules that have been developed over the years by congressional acts and administrative decisions. Past studies of cost sharing, including the Cooke Commission (The President's Water Resources Policy Commission, 1950), the second Hoover Commission (Commission on Organization of the Executive Branch of the Government, 1955), President Eisenhower's Cabinet Advisory Committee (the Secretary of Agriculture, the Secretary of Defense, and the Secretary of the Interior [Chairman], 1955), the National Water Commission (National Water Commission, 1973), and President Carter's Water Policy Review (Carter, 1978) have all recommended reform in these areas. The current situation is evidence that these recommendations have generally gone unheeded.

Nonfederal Financing of Water Development

State and Local Governments

. In general, the largest portion of water resources financing and management lies in the domain of state and local govern-

ments, including special districts (North, 1978). However, there is a lack of data concerning nonfederal financing of water projects and programs for urban flood control and drainage; water supply, treatment and distribution; sewage treatment; and recreation. Existing data are generally only available for limited and scattered geographical areas and various purposes which are not consistently defined. Table 5 presents some aggregated estimates prepared by the National Water Commission. This lack of data on nonfederal financing of water projects and programs creates problems in determining appropriate federal and state water development and management policies. In response to this problem, the Water Resources Council recently sent legislation to Congress requesting authority to survey and compile historical expenditures by federal, state, and local governments and the private sector for purposes of water resources development and management (H.R. 4608, May 1979).

Excluding federal aid in the form of grants and revenue sharing (and state aid in the case of local projects), the two basic means of state and local financing are current revenues and proceeds derived from assuming a debt obligation. Current revenues at the state level consist primarily of tax revenues (e.g., sales, licenses, individual, and corporate income and property). In 1976, the total general revenues from state sources for all states was about \$107 billion (U.S. Statistical Abstract, 1978). In comparison, local governments received about \$109 million in general revenues for the same year.

Debt financing at both the state and local level continues to increase rapidly. Table 6 shows the increase in gross outstanding debt for states and localities from 1950 to 1976 (U.S. Statistical Abstract, 1978). In recent years, there has been a marked trend toward increasing the portion of revenue bonds issued relative to the total bond issuance. In 1970, new issues totaled \$18.2 billion of which \$11.9 billion was in general obligations and \$6.1 billion was in revenue bonds. By 1977, total issue had increased to \$46.8 billion of which only \$18.0 billion was in general obligations, while \$28.7 billion was in revenue. The explanation for this trend lies in the constitutional and statutory limitations on the debt incurred by state and local governments.

Such limitations are applicable in most states only to general

TABLE 5
Total Historical Expenditures for Water Resources Development

	<i>Period of Estimate</i>	<i>Cumulative Expenditures (billions of 1972 dollars)</i>			<i>Total</i>
		<i>Federal Ownership or Financed</i>	<i>State & Local Ownership and Financed</i>	<i>Private Ownership and Financed</i>	
<i>Instream Uses</i>					
Hydro Power	Total to 1968	9.3	3.2	6.2	18.7
Flood Control	Total to 1969	25.3	2.0	1.3	28.6
Navigation	Total to 1969	16.8	1.6	—	18.4
Recreation	Total 1956–65	1.1	1.9	3.3	6.3
Fish & Wildlife				—	
Waste Treatment	Total to 1971	11.3 ^a	62.8	no est.	78.7
Sanitary Sewers	Total to 1971			4.6 ^b	
Storm & Combined Sewers	Total to 1971			—	
<i>Out-of-Stream Uses</i>					
Municipal Water	Total to 1971	6.6	78.5	9.3 ^b	94.4
Industrial (except cooling water)	Total to 1965	6.6	4.6	13.3	24.5
Cooling Water	Total to 1969	.1	.1	1.4	1.6
Irrigation	Total to 1968	10.6	3.4	13.9	27.9
Total		87.7	194.4	56.5	338.6

^a Includes \$6.6 billion at Federal facilities.

^b To 1966 only.

Source: NWC staff estimates.

TABLE 6
Debt Outstanding: 1950 to 1976
(in billions of dollars)

<i>Year</i>	<i>Total</i>	<i>State</i>	<i>Local</i>
1950	24	5	19
1955	44	11	33
1960	70	19	51
1965	100	27	72
1970	144	42	102
1975	221	72	149
1976	240	84	156

Source. U.S. Statistical Abstract, 1978, p. 287.

obligation bonds. Hence, by turning to revenue bonds, the limitations can be avoided. Other means of circumventing such limitations are available. One method is to shift increased responsibility for debt financing from more restricted to less restricted governments. This can be either from state to local or from local to state. Another method is to lease the required facilities initially with the ultimate intention of purchasing them. The creation of special districts with individual debt and taxing limitations has enabled project financing to avoid local debt and property tax restrictions. As a way of reducing local borrowing costs, state financing authorities have been created which provide for state purchase of bonds issued by local governments. To provide the required funds, the state then issues its own bonds.

The Private Sector

In general, private investment in water projects represents merely another form of capital investment, financed in the usual ways by selling stock, issuing bonds, drawing from retained earnings, and incurring long-term debt. However, data are not generally available concerning total investment by the private sector in water projects.

Following the passage of water pollution control legislation, even industries not involved in water resources development

have been forced to consider water-related capital expenditures in the area of wastewater treatment. Industrial approaches to this problem vary considerably among industries as well as among companies within an industry. The two basic options are to use a municipal treatment plant or to build an individual plant that will treat only the company's wastewater. In the case of sharing the use of a municipal plant, a company's role in financing is well defined. In order to receive a federal grant authorized by P.L. 92-500, a municipality must comply with the requirements concerning industrial cost recovery and user charges. Industrial cost recovery provisions require industrial users to repay over a thirty-year period that portion of the federal share of capital costs that is allocated to the treatment of their wastewater. This repayment is interest-free and as such amounts to a federal subsidy on capital. According to a staff report to the National Commission on Water Quality, this subsidy amounts to about 44 percent of the capital costs (National Commission on Water Quality Staff, 1976). This feature, in addition to the favorable economies of scale that an industrial user can enjoy (up to 80 percent reduction of treatment costs for small users), makes the use of publicly owned treatment works very attractive to industry. The 1977 Amendments (P.L. 95-217) placed a moratorium on the industrial cost recovery provision to allow for review of the program. The review found the program to be ineffective and recommended an extension of the moratorium, which is now being considered by Congress. For industries building their own systems, incentives exist through accelerated depreciation and the use of tax-exempt municipal bonds. The latter arrangement allows a state or local government to issue tax-exempt bonds that finance a pollution control facility for a local industry. The bonds are backed by the credit of the industrial corporation, not by the issuing government (National Commission on Water Quality Staff, 1976).

Cost Sharing and Financing Issues

Many controversies and issues surround present financing and cost-sharing arrangements for water projects and programs.

Some of these have been discussed for years, such as the inconsistency in federal cost sharing among federal agencies, programs, and purposes. Some are relatively recent; for example, proposed federal cost sharing for rehabilitation of urban water supply systems.

Within the constraints of this paper, it is impossible to make a complete review of the many issues involving cost sharing and financing of water projects at the federal, state, and local levels. A few selected issues, however, are presented and discussed: (1) proposed federal cost sharing for rehabilitation of urban water supply systems, (2) the role of present federal cost-sharing policies in the energy/agriculture competition for western water, (3) proposed federal cost sharing for assisting local governments in complying with the Safe Drinking Water Act of 1974, (4) the problem of inconsistency in federal cost-sharing policies, (5) who will ultimately pay for poor groundwater management practices, and (6) extension of federal cost sharing to "multiple-purpose" water quality projects.

Rehabilitation of Urban Water Supply Systems

This problem is particularly acute in some eastern cities where water supply and distribution systems have been in place for up to 100 years. The antiquated distribution systems are known to lose significant amounts of water through leakage, possibly as much as 50 percent of the supply (GAO Draft Report, 1979). Also, many current supply systems are simply not adequate in size to provide for increased water usage. The costs of upgrading such systems are generally high. New York City, for example, has partially completed a water supply tunnel for which the total cost is estimated to be \$2.5 billion. That city also is spending \$20 million annually on replacement of distribution lines but would require twice that amount to keep from falling behind in its replacement schedule (GAO Draft Report, 1979). In Denver, the additional supply and treatment facilities required to meet projected needs will cost an estimated \$1.7 billion (GAO Draft Report, 1979). Boston can either rehabilitate its current system or divert a new supply from the Connecticut River at an estimated cost of \$100 million for either option (Wilson, 1978). Although water supply,

unlike other public services, is revenue producing, it is extremely capital intensive. Approximately \$10 in assets is required to generate \$1 in annual revenues (Environmental Protection Agency Study, 1977). The financing of rehabilitation programs has prompted several cities to call for federal assistance.

The basic federal policy question is whether a federal interest exists in assisting cities and towns in the solution of what previously has been primarily regarded as a strictly local problem—the provision, treatment, and distribution of a safe public water supply. Eastern cities point to the West and argue that the federal government has for years provided a source of supply of municipal and industrial water to western urban areas and that it is time that eastern cities and their system rehabilitation problems receive comparable federal assistance.

If the federal government should decide to cost share in this area, a secondary issue is whether a new program should be created or whether an existing program such as general revenue sharing or Community Development Block Grants (administered by the Department of Housing and Urban Development) could provide for rehabilitation needs. As noted earlier, cost estimates for rehabilitation are very large and existing programs would not be able to contribute significant amounts. While general revenue sharing allows any legal distribution of funds within a state, provided two-thirds of the funds go to local governments, a state may not be able or willing to channel most of this federal source into only one or two of its cities. Furthermore, the amount of revenue sharing available is limited, the allotment for Fiscal Year 1979 amounting to \$6.8 billion.

Western Energy-Agriculture Conflicts

In contrast to the primarily urban problem of rehabilitation of water distribution systems is the problem of western agriculture. Nowhere is water more scarce, yet more essential, to production. At present, there is increasing pressure on agriculture, which accounts for about 90 percent of consumptive use in the West, to yield to competing uses of available water. In particular, large-scale energy development in the form of shale oil development, coal gasification, and thermal electric generation will require large amounts of western water, which can only be pro-

vided at the expense of irrigated agriculture. The economic position of agriculture has worsened as agricultural price increases have not generally kept pace with rising costs. Much cropland has gone out of production as groundwater levels have dropped in some places as much as ten feet per year (U.S. Water Resources Council, 1978). Falling groundwater levels combined with rapidly increasing electric rates have increased the cost of irrigating with groundwater by several hundred percent since 1973 (Washington Post, June 18, 1979). Technological improvements have responded to the need for improved irrigation efficiency, but they tend to be highly capital intensive, further complicating the question of who will finance future agricultural production.

The cost-sharing issues underlying this competitive situation include:

- Are future federally developed irrigation projects in the national interest or will they produce benefits only to agricultural interests?
- Should the federal government continue to provide irrigation water at less than market value from existing and proposed projects in order to maintain western irrigated agriculture?

1974 Safe Drinking Water Act

Another financing and cost sharing issue results from the 1974 Federal Safe Drinking Water Act (P.L. 93-523), which established monitoring and regulation standards for community water supply systems. Amendments to the act in 1977 are expected to result in increased costs to certain communities for water supply. According to the American Water Works Association (AWWA), the total annual capital cost (amortized over fifteen years) directly associated with the implementation of the act is expected to be between \$150 and \$250 million (American Water Works Association, 1976). The AWWA estimates the annual operating and maintenance costs will be about \$263 million. Furthermore, it is estimated that the monitoring required to comply with the act will cost local governments an additional \$17 to \$35 million annually (American Water Works

Association, 1976). These increased costs will be felt by both publicly-owned and investor-owned systems and each must deal with the financing question.

The basic cost sharing and financing policy question is whether the federal government should cost share with local governments and private water companies in meeting certain requirements of the Safe Drinking Water Act.

Consistency of Federal Cost Sharing

Where should inconsistency in federal cost-sharing policies be eliminated, and where is there little cause for concern? This general question produces additional, more specific, questions. Should cost sharing for the same purpose be consistent among all agencies? Should cost sharing for a specific purpose be uniform among agencies even if the federal share may be in a variety of forms or if different measures are used? Should all regions be required to cost share at the same level even though different regions may have different needs? The consistency issue is particularly difficult since it is closely related to the equity problem in cost sharing. Despite this problem, however, it is probably desirable to seek consistency among agencies for similar purposes as a desirable feature. Also, there should be some consistency among purposes to avoid having projects planned and built on the basis of favorable cost sharing for a purpose rather than economic justification of the project. Finally, it is evident that inconsistencies among different measures to achieve the same purpose (e.g., structural vs. nonstructural flood control measures) must be overcome.

Who Pays for Inadequate Groundwater Management?

Depletion and mismanagement of groundwater resources is one of the most serious water resources problems facing the nation today (U.S. Water Resources Council, 1978). Someone will eventually pay for this—either the residents of the depleted groundwater basins through displacement of agriculture and industry, or the nation as a whole. In brief, should the federal government eventually pay to resolve this problem either by construction of major projects to import surface water or industrial development to replace the declining agricultural base

in the depleted ground water basins?

For example, consider the Ogallala aquifer under the high plains of the Midwest and Southwest, which is a major supply source for parts of Colorado, Kansas, New Mexico, Oklahoma, Texas, and Nebraska (Wilson, 1978). Since this region depends on irrigated agriculture for much of its economic activity, water is of primary concern. However, present pumping rates are exceeding recharge rates, and the groundwater reserves are diminishing (U.S. Water Resources Council, 1978). Unless other sources of water are explored and more efficient use of water is made, the ultimate result must be a decline in irrigated agriculture. A Resources for the Future study concludes that "The viability of hundreds of small towns and, indeed, the entire economic and social base of the area will be threatened by rapid decline in irrigated agriculture" (Frederick, 1976). The extent to which the federal government will become involved in the resolution of this situation is not yet determined. Even if it is decided that the high plains water problem is of national concern, it is not clear whether federal involvement will be in water development or in economic development through the stimulation of nonagricultural activities with less dependence on water. If water development is pursued, should federal cost sharing recognize ineffective management at the local level?

Multipurpose Water Quality Projects

Water quality has been the focus of recent debate involving cost sharing. The question is whether the federal government should help pay the costs of controlling pollution in both wastewater and water supply. In wastewater treatment, the 75 percent federal share (85 percent for projects using "innovative alternative" technology) appears likely to remain as policy through 1983. There is a current move among planners of wastewater treatment systems to incorporate more than the single purpose of wastewater treatment into the design of a project. Additional purposes of primary interest include reclamation and reuse, energy generation, urban drainage, and recreation. The proponents of the additional purposes argue that the entire project should be grant eligible and not just the wastewater portion. Current EPA cost sharing policy does not cover the

wide range of multipurpose projects proposed, even though the innovative and alternative technology encouraged in the Clean Water Act is in many cases multipurpose in nature. In addition, current EPA policy is based on the assumption that achieving multiple purposes simultaneously should be less costly than achieving them separately, and all purposes should share in the cost savings. This can mean that funding for a multipurpose project is less than it would have been had the project been designed for the single purpose of pollution control. The net result is that fewer federal grant dollars are provided, thus discouraging a multipurpose approach.

Some data on the magnitude of potential cost sharing for multipurpose water quality projects exist. Urban drainage in combined sewer overflow is the most expensive purpose that can be combined with pollution control. The 1978 EPA Needs Survey estimates the cost of including this purpose to be about **\$103** billion, compared to a pollution control only cost in the same area of **\$25.7** billion (U.S. Environmental Protection Agency, 1979a). The same survey estimates the total cleanup costs (including, for example, secondary treatment, new collector and interceptor sewers, and combined sewer overflow), excluding urban drainage, to be **\$106** billion. The implication of these estimates on federal cost-sharing obligations if multipurposes are made eligible is clear—the inclusion of urban drainage in combined sewer overflow areas alone would increase the required grant dollars by **\$58** billion (75 percent of **\$77.3** billion).

Several observations are in order. EPA concludes that if the grants appropriation level remains roughly constant, then the pollution control needs alone will never be met because of inflation. Further, if any significant funds are reallocated to other purposes, then some pollution control needs must be sacrificed. Finally, by making multipurpose projects eligible, the needs levels among the states will change, resulting in a reallocation of funds among the states. For example, making urban drainage eligible implies a relative shift in funds to the Northwest and the Great Lakes states (U.S. Environmental Protection Agency, 1979b). On the other hand, making reclamation and reuse more eligible will result in more funds available to the West.

Strategies for Dealing with Emerging Issues

Issues have been discussed in the context of both financing and cost sharing. While attempting to approach the two areas separately, in theory, it is acknowledged that practically the separation is much less distinct. The pursuit of certain cost-sharing policies can profoundly affect the financing issues and the resulting financing methods employed. Consequently, alternative options in both financing and cost sharing will be discussed together.

Basic philosophical changes in cost-sharing policy have been proposed as means of improving the current situation. Shortly after the initiation of the president's water policy review in 1977, five cost-sharing options reflecting a broad range of philosophy were presented in an Issues and Option Paper published in the *Federal Register* (U.S. Water Resources Council, 1977):

1. *The current situation.* This option would continue the existing cost-sharing arrangements without change. It presumes that the inconsistencies in repayment terms and variations among agency programs and purposes that now exist are supported by valid reasons.
2. *Cost-sharing poor.* This option would modify existing cost-sharing arrangements to achieve greater consistency among agencies and measures providing similar benefits. It provides that cost sharing be expressed in terms of effective composite rates.
3. *Joint venture.* This option provides that 50 percent of the initial capital implementation or financing costs of projects would be provided by the federal government and the other 50 percent would be provided by state, interstate, or local governments, or by public nongovernmental entities.
4. *Block grant.* This option provides for grants to states as a replacement for the federal direct water resources development programs and projects. Initially, each state would receive grant funds equivalent each year to the annual federal water resources investment in that state

for the past several years. Eventually, grants would be distributed on a formula basis reflecting population, economic, and other factors related to state investments and expenditures in water resources.

5. **Full recovery.** This option calls for the federal government to plan, finance, implement, and operate projects and programs as it does today. However, in the case of projects authorized in the future, the cost-sharing terms for each project purpose or service provided by a project would require 100 percent repayment of all costs involved, including operation, maintenance, and replacement costs, interest during construction, and interest at the project evaluation rate for all repayment obligation schedules over a period of years.

Of the five options, several are under active consideration for implementation. Option 2 above emphasizes the elimination of inconsistencies among agencies and measures serving the same purpose. This incorporates the effective composite concept of cost sharing and results in moderate increases in the ultimate nonfederal share. In effect, it endorses the recommendation of the Section 80(c) Study, which set minimum levels for a variable nonfederal share depending on the purpose in question (U.S. Water Resources Council, 1975). Option 5 above has attracted little nonfederal support since it would require ultimate recovery of 100 percent of all associate project costs, including interest. The three remaining options from the 1977 Issue and Options Paper are presently receiving active consideration. Considerable support exists for maintaining the current situation based on the premise that the existing inconsistencies are justified by legitimate reasons.

Option 3, the joint venture approach, as detailed in the 1977 report of the president's water policy review, originally called for a uniform 50 percent federal, 50 percent nonfederal sharing of implementation costs for all projects (U.S. Water Resources Council, 1977). A modified version of this option was adopted as one of the president's water policy initiatives and was recently submitted by the administration to Congress (H.R. 4135). The proposal calls for an up-front state contribution of 10 per-

cent of the implementation costs associated with projects yielding vendible outputs (e.g., municipal and industrial water supply, irrigation, and power). For other projects, the outputs are considered nonvendible and a 5 percent contribution would be required. The administration proposal requires that the mandatory state 5 and 10 percent contribution be approved by the state legislature. Revenues received from vendible outputs would be shared with the states in proportion to the investments made. To prevent an undue burden on a state, an upper limit equal to one-quarter of 1 percent of the state's revenues would be placed on a state's contribution to any project. This 5 percent and 10 percent contribution would apply to projects of the Corps of Engineers, Bureau of Reclamation, and Tennessee Valley Authority that are not yet authorized, but would not apply to Soil Conservation Service projects. The SCS projects were excluded because of the large number of very small projects. For interstate projects, the states' cost and revenue shares would be based on the portion of benefits each state receives as a result of the project. If a state chose not to cooperate, the remaining states could provide that state's share and hence enable the project to proceed. The proposal would not apply to projects already authorized, but if a state volunteered to cost share on such projects, it would receive expedited consideration for implementation.

This proposal also addresses the consistency question in cost sharing with respect to flood control. A 20 percent nonfederal contribution (in addition to the 5 percent share) would be required for all flood control projects regardless of whether structural or nonstructural measures are used. This provision would apply to projects and programs of the Bureau of Reclamation, the Corps of Engineers, the Tennessee Valley Authority, and the Soil Conservation Service.

The administration has proposed this variation of the joint venture strategy as a means to: (1) involve the states more significantly in water project decisions by requiring state legislative involvement in deciding whether to build a water project; and (2) eliminate some of the conflicting inequitable rules governing cost sharing—especially with regard to structural and nonstructural flood damage reduction measures.

It should be noted that the proposed legislation is technically both a financing reform and a cost-sharing reform. If a project under present policy calls for full federal front-end financing, but with full reimbursement by the nonfederal interest involved (appropriate interest included) then the ultimate cost shares would not be changed under the new policy. However, in many cases, repayment is interest-free and distributed over as many as 50 years, reducing the ultimate nonfederal share from a nominal level of 100 percent to an effective level of perhaps 20 to 30 percent. The new policy in these cases will result in a decreased effective federal share by eliminating some of the advantages enjoyed by nonfederal interests due to interest-free reimbursement.

The administration's proposal has been subjected to criticism. A commonly expressed concern is that, in spite of the stated goal, there is no increased state involvement in planning and managing of water resources development. However, while not necessarily opening up new areas for state involvement in water resources development, planning, and management, the proposal should provide incentive for states to take better advantage of existing opportunities. In addition, calling for formal cooperation among states in carrying out interstate projects is viewed by many as an unworkable provision of the proposal. Review of recent federal water project authorizations, however, indicates that relatively few are interstate projects. Interstate cooperation should be possible to meet the state cost-sharing requirements for the relatively few projects that have multistate benefits. Another objection raised by several states is that their ability to pay the front-end amounts is limited either by statute or state constitution. This problem already exists with some current cost-sharing requirements for federal projects. Under Section 221 of the Flood Control Act of 1970 (P.L. 91-611), a written agreement to repay construction costs is required prior to construction of Corps of Engineers projects. However, this has been interpreted so as not to commit states to bind future legislatures to assume the terms of previous agreements. It is also argued that the proposed cost sharing does little to eliminate the inconsistencies among purposes, programs, and agencies. In fact, the proposal does eliminate these inconsistencies for flood control, a category for which total federal investment is only

exceeded by water quality improvement. With the exception of flood control, the new proposal does not alter any of the existing cost-sharing provisions, although due to 5 or 10 percent front-end contributions, the reimbursement amounts would be correspondingly less. Finally, it has been suggested that an effect of the proposal will be to deter states from initiating projects less able to compete in the marketplace, but which may nonetheless provide substantial benefits such as environmental programs. In spite of the above objections, the administration proposal represents a much needed step in the direction of long overdue cost sharing reform.

The block grant approach, Option 4, has also been proposed as an alternative to the current situation. This option would provide block grants to states, allocated by a formula based on relevant factors such as population, economic variables, and land area. This concept forms the basis for a bill currently under Senate consideration (S. 1241) and represents a significant change in federal water resources development cost sharing. S. 1241 calls for assessment by the states of their individual water needs and the subsequent preparation of a priority list of projects. These projects would be subject to public hearings and agency review but would not require economic justification. The concept proposed by S. 1241 would consequently significantly decrease the existing emphasis on benefit-cost analysis for project justification.

To finance the cost of such projects, the bill calls for first-year funding of \$4 billion to be allocated to the states by a formula based strictly on population and land area. The states then would be free to spend their allotments as they felt appropriate, provided that they make a contribution of 25 percent of the construction costs of any project undertaken and 50 percent of the operating and maintenance costs. The 25 percent contribution could be made over the life of the project, subject to a "reasonable rate of interest." The effect of this strategy would be to give the states the primary role in water resources planning and development. Each state could then tailor the expenditure of its annual allotment to meet its individual needs.

An initial objection to this strategy is that the water needs of the states are not adequately reflected by population and

land area alone. The allocating formula as it stands would result in an inequitable distribution of the total amount spent nationally on water resources. States are also concerned that the nonfederal share of 25 percent is too high. It is difficult to predict the impact of this 25 percent obligation on a given state until its needs and its allocation are evaluated and compared. However, a general impact expected by the bill's sponsors is a reduction from current levels of the flow of funds to southern states and an increase in flow to northeastern and northcentral states.

Much of the preceding has dealt with proposed financing and cost-sharing arrangements for major water resources development involving federal and state governments. In addition to this area of concern is the financing and cost sharing for development of major municipal and industrial water supply systems by both public and private entities. One strategy calls for the establishment of a Federal Water Bank that would provide a vehicle for water companies and municipalities to issue long-term debt at reasonable interest rates (Joint American Water Works Association—National Association of Water Companies Committee on Financing Water Industry Projects, 1979).

The Water Bank would issue debt and use the revenue to purchase the securities of local water systems. Among the features of such a system would be:

- Private companies as well as municipalities would be eligible to use the Bank's services.
- All size of utilities would be eligible for loans.
- The Bank would eventually become privately owned.
- A provision could be made for giving loan preference to taxpaying investor-owned utilities to balance the grant/low-interest federal programs available to publicly-owned systems.

Another proposal for generating investment capital for private companies involves the establishment of a fund by local government through the sale of bonds (Symonds, 1978). Water companies then borrow from this fund for plant investment. The government then taxes the companies to recover interest

and principal. The tax represents an expense to the companies and thus can be recovered through increased water rates. The plant thus financed would qualify for a depreciation allowance enabling it to be replaced as required. A feature of this scheme is that each company would have its own financial program and would not have to compete with publicly-owned systems for scarce public dollars.

EPA is currently investigating alternatives to assist water utilities, especially small systems, in complying with the Safe Drinking Water Act (P.L. 93-523). EPA estimates the capital costs required to comply with the act would be about \$1.5-2.0 billion (EPA Staff estimate). Strategies under consideration involve possible expansion of existing programs. For example, something similar to Small Business Administration loans for private companies is being considered. For publicly-owned systems, programs like the loans and grants of the Farmers Home Administration could represent a viable form of federal assistance without creating a new multibillion dollar federal grant program.

Conclusion

An attempt has been made to survey and analyze a few of the key issues involving financing and cost sharing in water resources development. These issues are complex for many reasons—evolution of national goals, political sensitivities, vested interests, financing requirements of nonfederal interests, and cost-sharing inconsistencies, to list a few.

It is evident that financing and cost sharing are implicit issues in every water resources development question. The conceptual differences between the two issues must be acknowledged in order to design policies to achieve national goals and strategies to implement those policies.

The survey and analysis herein suggest that some present federal cost-sharing policies have resulted from conditions that are no longer applicable. The emerging issues discussed indicate trends in contemporary national priorities that must be recognized in water resources development and management. Primary areas of present concern include energy production, main-

tenance of existing water supply infrastructure, and water quality and related environmental problems. As priorities change, national cost-sharing policies must be either modified or reformulated to remain effective. Without such reform, financing obligations can become inequitably allocated.

Several strategies have been proposed as a basis for the acknowledged need for reform. To be successful, such strategies must not only be theoretically sound, they must be politically sound. Practical solutions must be sought through the existing political structure since any realistic solution generally requires the transfer of a subsidy from one interest to another. Until sufficient political support for transfer of this subsidy exists, the existing imperfections in cost-sharing policy for water resources development will remain.

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