PLAN OF STUDY SUBPROJECT REPORT

FOR

A CASE STUDY OF A FEDERAL EXPENDITURE ON A WATER AND RELATED LAND RESOURCE PROJECT

BOISE PROJECT, IDAHO AND OREGON

OWRR TITLE II CONTRACT C-4202-IDA

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for and in cooperation with the

Idaho Water Resource Board

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ABSTRACT

Modern technology, increased affluence and population growth have resulted in an expanding use of the nation's water and related land resources. The public is demanding better management and use of natural resources while at the same time the conflicting demands are creating more and more issues.

Federal expenditures make up a substantial portion of all government expenditures in water development. This Plan of Study Subproject report presents an analysis of the federal role in water development and planning criteria; and the report proposes an approach for completing the ex-post analysis of the Boise Project in southwest Idaho and eastern Oregon.

As a result of the work completed during the first year on the Plan of Study Subproject Study and the Hydrology and Economic History Support studies the following conclusions and recommendations are presented and discussed:

--Ex-post analysis of a selected water resource project can contribute to more responsive planning, decision making and a better allocation of resources.

--Ex-post analysis, structured so as to utilize the Principles and Standards,[1/] will provide maximum utility to the planner.

--Ex-post analysis should be structured following societal objectives rather than traditional water use functional objectives. The Principles and Standards, with modification, can accommodate this approach.

--The influence of exogenous forces on beneficial and adverse effects must be considered if a realistic appraisal is to be obtained through an ex-post analysis.

1/ Principles and Standards for Planning Water and Related Land Resources; U. S. Water Resources Council; Federal Register, September 10, 1973, Nov. 1974.

ACKNOWLEDGEMENTS

The thrust for this study of the Boise Project originated with water resource planners. Faced with a complexity of situations, ranging from preparing long-range conceptual plans to an immediate assessment of existing operational problems, planners expressed an interest in examining a fully developed federal project to gain insight on impacts of given decisions.

Also, numerous academicians concurred that much could be gained not only from an impact standpoint but also from developing methodology for use in future planning activities.

To the many who offered suggestions during the course of this study, we are thankful. Several individuals, including Warren D. Reynolds and Jim C. Wrigley of the Idaho Department of Water Resources, Dr. Roger Long and Dr. John Carlson of the Department of Agricultural Economics, University of Idaho, contributed more time and interest and deserve special acknowledgement. Policy guidance and direction were tendered by an Advisory Committee of Dr. William E. Folz - Chairman, University of Idaho; Dr. Ray Linsley, Stanford University, Dr. Emery Castle, Oregon State University and Dr. John Ehrenreich, University of Idaho. Their views and comments were invaluable.

We also wish to thank Mrs. Kitty Stewart who typed many drafts and transcribed many tapes during preparation of this report. Her editorial advice and typing skills greatly improved the style and appearance of this paper.

INTRODUCTION

A research study proposal was submitted to the Office of Water Research and Technology (OWRT)[1/] for a three-year ex-post analysis of the federal expenditures utilized in developing the land and water resources of the Boise Project in southwest Idaho and eastern Oregon. The study proposal was accepted by OWRT and grant funds awarded for the first year's effort. Grant funds necessary to complete the ex-post analysis were to be awarded on a year-to-year basis, subject to an annual study proposal and the availability of grant funds.

In accordance with the study proposal, a Plan of Study (POS) was to be completed during the first year for the purpose of guiding future study activities. Additional support studies were scheduled to be conducted concurrently so that key data and information known to be needed for analyses in succeeding years would be available. The two selected support studies initiated and completed during the first year were (1) the Hydrology Subproject Study and (2) the Economic History Subproject Study. Although the two support studies were conducted concurrently with the POS subproject, they asserted an influence on the structuring of the POS through the information and insight provided on the Boise Project.

The possibility that grant funds might not be awarded for the succeeding study years was recognized. Because of this, the POS and support studies were structured so that a usable product would be provided at the conclusion of the first year's effort.

The Plan of Study presented herein for the Boise Project provides the information needed to guide and structure efforts in succeeding years so that the ex-post analysis contemplated in the original research proposal can be completed in a timely manner.

1/ Agency designation was Office of Water Resources Research (OWRR) at the time the proposal was submitted.

A brief discussion of the format followed in presenting the POS is included to guide the reader. The report is organized in two major sections: section one presents a discussion of the need and purpose of ex-post analysis of federal expenditures, policies and criteria; and section two relates this material to the Boise Project. This approach was adopted after experiencing difficulties in previous drafts with seperation of material generally applicable to ex-post analysis studies and that specific to the Boise Project study.

EX-POST ANALYSIS

The Boise Project case study is an ex-post analysis of a federal expenditure on a water and related land resource project. In order to formulate a Plan of Study for this case study, it was necessary to review and analyze federal expenditures, policies and planning criteria. Following is a discussion of these topics as they relate to ex-post analyses and to the Boise Project study effort.

FEDERAL EXPENDITURES FOR WATER DEVELOPMENT

Of the $240 billion spent on waterways, irrigation and drainage projects, water supplies for cities and industries, and other water resource developments, approximately $72 billion has been spent under governmental auspices. The growth in federal expenditures for the period 1900 to 1969, for selected water resource categories, is shown in Table 1. Currently, federal expenditures are being budgeted at a rate of $3 to $4 billion annually.[2/]

2/ Evaluating Federal Water Projects; Science, Vol. 181, August 1973.

TABLE 1.--Estimated historic federal expenditures for water resources and related activities (millions 1972 dollars)

Year	Indexing Factor	Navigation	Flood Control	Irrigation	Power	Water Supply & Pollution Control	Watershed Protection	Fisheries & Wildlife	Multiple Purpose	Total
1900	18.7	$ 350	$ --	$ --	$ --	$ --	$--	$--	$ --	$ 350
1905	18.6	430	--	90	--	--	--	--	--	520
1910	17.5	550	--	140	--	--	--	--	--	690
1915	18.2	850	--	180	--	--	--	--	--	1030
1920	6.8	280	60	40	--	--	--	--	--	380
1925	8.1	530	120	70	--	--	--	--	--	720
1930	8.3	660	350	70	40	--	--	--	--	1120
1935	8.6	1480	380	180	110	--	--	--	--	2150
1940	7.0	1020	740	240	230	10	--	--	110	2350
1945	5.5	280	400	80	140	--	--	--	70	970
1950	3.3	440	900	480	530	30	10	--	840	3230
1955	2.55	290	380	190	440	20	20	10	660	2010
1960	2.03	590	690	170	460	150	30	20	1070	3180
1965	1.73	700	920	160	610	230	60	20	490	3190
1969	1.325	490	660	100	610	400	50	30	430	2770

Source: A Historical Study of Water Resources Policy of the Federal Government, 1900-1970; Legler, John B. et al., Washington University, St. Louis, Mo. (1971), pg. 397-398.

Management of the nation's water and related lands involves federal agencies, regional organizations, state agencies, county and municipal governments, special districts and innumerable private entities. These groups have constructed approximately 1,400 major reservoirs, numerous minor reservoirs, thousands of miles of conveyance and distribution systems, and millions of wells to control and supply water for various uses.3/

FEDERAL POLICIES AND PROCEDURES

Policies and procedures at the federal level have evolved over a period of years in conjunction with increased federal expenditures in water development. The 20th century brought forth the first of many significant pieces of legislation which expanded the federal role. The 1902 Reclamation Act thrust the federal government into water resource development in the western states. Planning criteria for water resources, comparable to present day criteria, was first expressed in the 1936 Flood Control Act. By that Act, criteria was first set forth which incorporated economic rationale as a basis for evaluating the merits of a water development project.

Following World War II, increasing emphasis was placed at the federal level on multiple purpose water development projects. Budget Circular A-47, formulated in 1952, outlined a more rigorous economic rationale to be used in evaluating multi-purpose water developments. Economic efficiency criteria were emphasized in the circular.

In 1963, evaluation criteria was redefined by Congressional action as expressed in Senate Document No. 97. The criteria of economic efficiency was again stressed along with national goals such as conservation and recreation.

Major congressional directives illustrate the rapidly changing role in federal policy in water resource planning and development. The following list contains federal acts passed since 1965; a summary statement is included.

3/ The Nation's Water Resources; U. S. Water Resources Council, 1968.

1. The Appalachian Regional Development Act of 1965 (Public Law 89-4) authorized the preparation of a comprehensive plan for development of water and related land resources of the region as a means of expanding economic opportunities. The plan for water and land resources is to be an integral and harmonious component of the regional economic development program authorized by the Act.

2. The Federal Water Project Recreation Act of 1965 (Public Law 89-72) provides for full consideration of opportunities for recreation and fish and wildlife enhancement in federal projects under specified cost allocation and cost-sharing provisions.

3. The Water Resources Planning Act of 1965 (Public Law 89-80) establishes a comprehensive planning approach to the conservation, development, and use of water and related land resources. The Act emphasizes joint federal-state cooperation in planning and consideration of the views of all public and private interests.

4. The Public Works and Economic Development Act of 1965 (Public Law 89-136) establishes national policy to use federal assistance in planning and constructing public works to create new employment opportunities in areas suffering substantial and persistent unemployment and underemployment. The Act provides for establishing federal-state regional commissions for regions that have lagged behind the nation in economic development.

5. The Water Quality Act of 1965 (Public Law 89-234) provides for establishing water quality standards for interstate waters. These standards provide goals that must be incorporated into planning procedures.

6. The Northeastern Water Supply Study of 1965 (Public Law 89-298), Congress recognized that assuring adequate supplies of water for the great metropolitan centers of the United States has become a problem of such magnitude that the welfare and prosperity of this country require the federal government to assist in solution of water supply problems.

7. The Clean Water Restoration Act of 1966 (Public Law 89-753) provides assistance for developing comprehensive water quality control and abatement plans for river basins.

8. The Department of Transportation Act of 1966 (Public Law 89-670) provides standards of evaluating navigation projects and provides for the Secretary of Transportation to be a member of the Water Resources Council.

9. The Wild and Scenic Rivers Act of 1968 (Public Law 90-542) provides that in planning for the use and development of water and related land resources consideration shall be given to potential wild, scenic, and recreational river areas in river basin and project plan reports, and comparisons are to be made with development alternatives which would be precluded by preserving wild areas.

10. The National Flood Insurance Act of 1968 (Title XIII, Public Law 90-448) provides that states, to remain eligible for flood insurance, must adopt acceptable arrangements for land use regulation in flood-prone areas. This provision, together with Executive Order 11296, August 10, 1966, places increased emphasis on land use regulations and administrative policies as means of reducing flood damages. Planning policies must include adequate provisions for these new enactments and directives in an integrated program of flood-plain management.

11. The Estuary Protection Act of 1968 (Public Law 90-454) outlines a policy of reasonable balance between the conservation of the natural resources and natural beauty of the nation's estuarine areas and the need to develop such areas to further the growth and development of the nation.

12. The National Environmental Policy Act of 1969 (Public Law 91-190) authorizes and directs federal agencies in the decision-making process to give appropriate consideration to environmental amenities and values along with economic and technical considerations. The results of this analysis are to be included in proposals for federal action.

13. The Environmental Quality Improvement Act of 1970 (Public Law 91-224) further emphasizes congressional interest in improving the environment and the major responsibility that state and local governments have for implementing this policy.

14. The Flood Control Act of 1970 (Public Law 91-611) requires in Section 122 promulgation of guidelines designed to assure that possible adverse economic, social and environmental effects relating to any proposed project have been fully considered in developing such project, and that the final decisions on the project are made in the best overall public interest, taking into consideration the need for flood control, navigation and associated purposes, and the cost of eliminating or minimizing such adverse effects.

15. The Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500) sets forth as an objective the restoration and maintenance of the chemical, physical and biological integrity of the nation's waters. The Act provides (1) that it is a national goal to eliminate by 1985 the discharge of pollutants into navigable waters; (2) that by July 1, 1983, an interim national goal be achieved such that where attainable, water quality is provided which would provide for the protection of fish, shellfish and wildlife and for recreation in and on the waters; (3) it is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited; (4) it is the national policy that federal assistance be provided to construct publicly owned waste treatment works; (5) it is the national policy that area-wide waste treatment management planning processes be developed and implemented; and (6) it is the national policy that a major research and demonstration effort be made to develop the technology necessary to eliminate the discharge of pollutants into the nation's waterways.

16. The Flood Disaster Protection Act of 1973 sets strict time periods by which state, county, and local entities must adopt acceptable arrangements to control land use in flood plains in order to be eligible for any federal funding in the area affected.

EX-POST ANALYSIS OF WATER PROJECTS

Considering the magnitude of federal expenditures and the number of major congressional acts directed at water resource planning and development, it is somewhat surprising that little has been done in the way of ex-post analyses of projects and programs. That this type of analysis is needed by planners is noted by Schultze:

> "Our prior knowledge of production functions is quite limited. Uncertainty of this type puts a great premium on careful post-program evaluation. Feedback of operating results to program planning is essential." 1/

A need for the same type of feedback information to be incorporated in the decision process is supported by Haveman:

> " . . . real improvements in public sector performance will not be achieved unless information on the input (cost) and output (benefit) results of ongoing and completed government undertakings is incorporated into the decision process. Indeed, because the behavior of decision makers in the public sector is influenced by a lack of incentives to achieve efficient programs, it is not unreasonable to presume that performance in this sector will not improve until the people themselves are informed of the results of the ex-post analysis." 2/

Ex-post analyses of projects and programs are needed to help guide and influence the planning process and the decision-making process.

In nearly all analyses of public projects completed to date, emphasis has been placed on the ex-ante evaluation of benefits and costs. Consequently, adequate criteria and study procedures have not been developed for ex-post analyses. Research efforts on case studies such as the Boise Project will help to overcome that deficiency.

In conducting an ex-post analysis, it is essential to distinguish between "with and without" project conditions, as opposed to a "before and after" situation. Conclusions as to anticipated versus actual

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1/ The Politics and Economics of Public Spending, Brookings Institution, 1968.

2/ The Economic Performance of Public Investment, Robert Haveman, 1972.

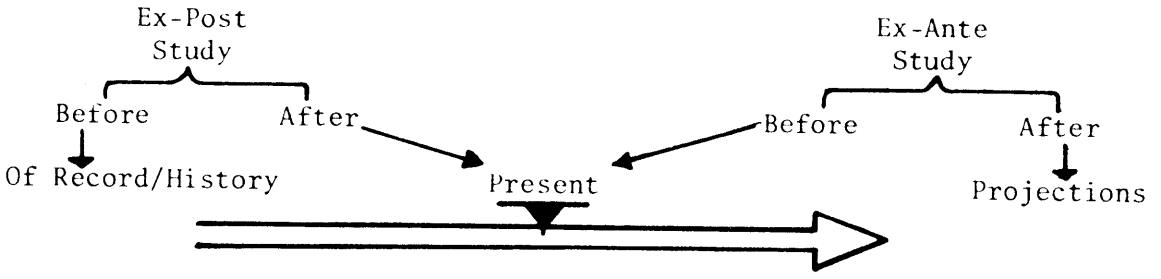
benefits and costs can easily be misrepresented or be completely erroneous if valid comparisons are not made. Basic efficiency criteria requires that the observed values of relevant outputs be compared with the value that would have existed if the project had not been constructed. As noted by Haveman:

> "An ex-post evaluation of this 'before-and-after' sort is of no use to the planner in his efforts to improve evaluation procedures. If, for example, the flood losses actually prevented by a project were estimated and used as a basis for judging the benefits produced by the project, the appraisal of the project's worth would be greatly overstated. Implicitly, the appraisal would indicate that the prevention of damage to property induced into the floodplain by the project constituted a benefit attributable to the project. Such a claim has no economic rationale, because the additional capital placed on the floodplain would have been located on comparable land, which probably would have been flood free, if the project had not been constructed. If ex-post evaluation is to contribute helpful feedback to the planning process, it must avoid the simpler, more manageable 'before-after' comparison and seek a measure of the difference between the value of flood losses that occurred with the project and flood losses that would have occurred if the project had not been completed." 1/

Further discussion of the points raised by Haveman and the complexities involved are illustrated in Figures 1 and 2. Figure 1 illustrates the difference in evaluating a before and after situation for an ex-post study as compared to an ex-ante study.

Figure 1

Comparison of Before and After Situations of Ex-Post and Ex-Ante Studies to a Time Frame

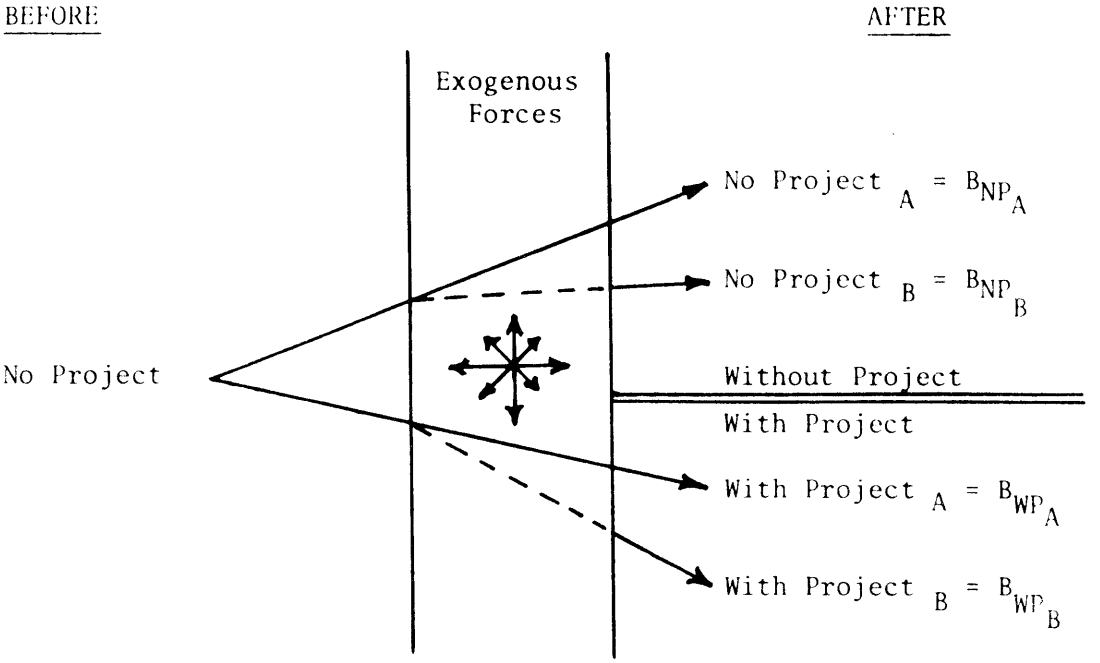


1/ The Economic Performance of Public Investment; Robert H. Haveman; 1972; P. 7.

Figure 2 illustrates the necessity of distinguishing between a with and without condition and a before and after sitution when evaluating the beneficial and adverse effects in an ex-post analysis of a project. This same warning also applies to ex-ante evaluations.

Figure 2

Beneficial and Adverse Effects on a Before/After - With/ Without Basis as Modified By Exogenous Forces



B_{NP_A} = Benefits under a no-project situation, assuming no influence by exogenous forces.

B_{NP_B} = Benefits under a no-project situation, as modified by exogenous forces.

B_{WP_A} = Benefit under a with-project situation, assuming no influence by exogenous forces.

B_{WP_B} = Benefits under a with-project situation, as modified by exogenous forces.

If exogenous forces are ignored, benefits attributable to a flood control project could be assumed to equal B_{WP_A}. Haveman notes that the actual benefits should be computed on a "with and without" basis, so that actual benefits would equal $B_{WP_A} - B_{NP_A}$.

A difficulty not covered in this example is the effect that exogenous forces will exert on benefit calculations, both on a "with and without" basis. While exogenous forces are difficult to forecast on an ex-ante basis, their existence can be readily identified on an ex-post basis. As noted in Figure 2, net benefits with a flood control project should actually be calculated as $B_{WP_B} - B_{NP_B}$ if the effects of external forces are included.

The exogenous forces are likely to modify benefits on a "with and without" project in different magnitudes. For example, consider a "with project" providing a surface water supply for irrigation, and a "without project" condition including most irrigation from groundwater brought about as a result of technological improvements in high lift pumps. The technological improvements in high lift pumps would be an external force which substantially altered the projected benefits under the "without" condition but had only minimal impact on the "with" condition involving a surface water system. Exogenous forces that must be fully considered in an ex-post analysis are discussed more fully below.

Exogenous Forces

The identification of exogenous forces relevant to an ex-post evaluation of a project or program is not particularly difficult. However, an evaluation of the impact that these forces exert on the benefits and costs can be exceedingly complex. Nevertheless, some accounting must be made in a realistic appraisal of benefits and costs through an ex-post analysis. This type of feedback information can in turn help guide the planner in an ex-ante study of a project or program.

Historic, political and economic events in the world and the United States (such as wars, economic development programs, foreign aid, social changes, increasing educational levels, improved diet levels, and technological changes) will influence the way in which a project or program is established and exists. Changes in demand, productivity, and marketing can alter significantly the original plans, both positively and adversely. Overlapping jurisdictional responsibilities and locations may affect land use pattern and productivity within a relatively short time of project completion. Special districts such as flood control, drainage, school, fire, highway, water and irrigation may impose constraints, direct and indirect, in limiting the productivity of a project. The influence of federal, state, or local regulatory ability must also be considered in the evaluation process. For example, the imposition of stringent water quality standards and crop improvement regulation early in the history of the Boise Project would have had a significant

effect on the crop productivity. Categories of exogenous forces and the sequence of Boise Project construction are shown in Figure 3.

It is impossible to predict exogenous forces such as wars and technological advances over a long time period; short range and long range predictions must be tempered with a realization of the degree of uncertainty attached.

In the Boise Project, technology revolutionized productivity and reshaped planned use of the land and water resources. Early in the project history, the horse was the primary source of power and hand labor common; now gas powered machines and self-propelled equipment are utilized. Land areas initially providing forage and grain to maintain the basic draft animals are now used to produce cash crops. Similar advances have occurred in technical knowledge of fertilization, weed control, and seed hybridization.

A final area of concern that must be considered in an ex-post study is the change in the knowledge and acceptability of management concepts concerning authorized project functions. For example, while the Boise Project was authorized to provide power, irrigation, flood control and recreation, public attitudes have changes over time to significantly alter the relative desirability of the output for these functions. The recreation program initially authorized was limited in scope and facilities. Substantial change began in the early 1960s through the external forces of low cost boating, water skiing, increasing demand for camping and day-use facilities.

External forces may disguise the true productivity and effects of any given expenditure for resource development. Methodology to identify external effects for each element or type of major event need to be developed for each particular project. Individual ex-post analyses should consider independent events with different importance based on the original objectives of the authorized legislation for any given project. All effects should be identified whether they can be quantified or not.

PUBLIC CONCERNS - WATER DEVELOPMENT PROJECTS AND PROGRAMS

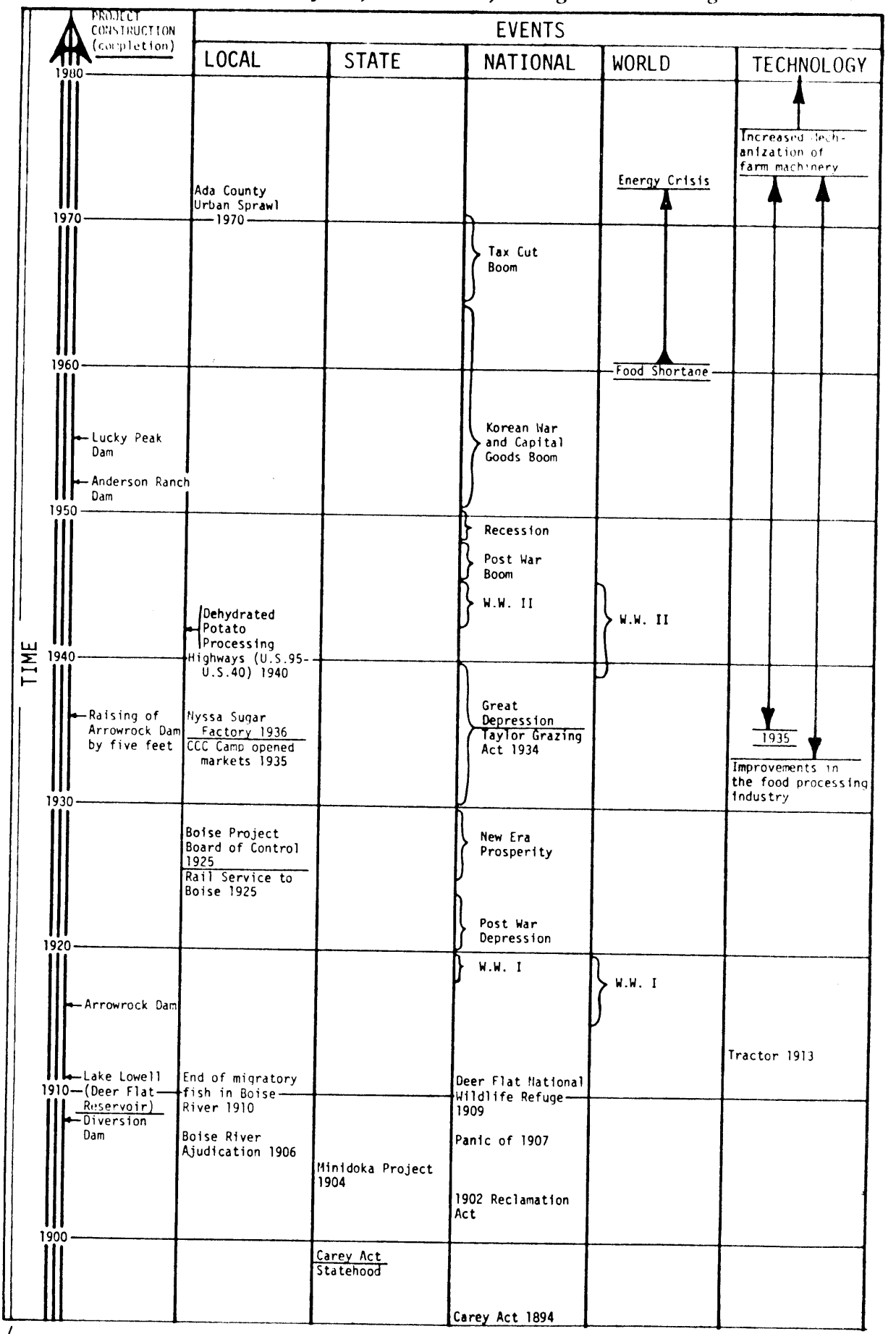
In seeking response from the public and decision makers in water projects and programs, planners must provide information covering all areas of interest. The economic, environmental and social impacts must be clearly identified and evaluated. A discussion of the impacts follows.

Economic Impacts

Methodology and criteria for identifying and evaluating the direct economic impact of a project or program are well established. The traditional benefit-cost analysis formula compared direct benefits and costs and was applied at different levels of planning and administration as part of the project justification process. The project was considered, economically, a good investment if direct benefits exceeded direct costs.

Figure 3

Events Chart - Boise Project, 1900-1974, Categories of Exogenous Forces[1/]



[1/] Only a generalized listing is provided for illustrative purposes. Details are discussed in the support study, Economic and Ecological History.

Certain indirect and external benefits and costs were not accounted for in traditional benefit-cost analysis. An identification and evaluation of these must also be made if the public and decision makers are to be fully apprised of the total economic impacts. Ex-post analysis of projects such as the Boise Project can help provide the insight needed to assess indirect and external benefits.

Environmental Impacts

Methodology and criteria are now being developed for identifying and evaluating environmental impacts of a project or program. Impetus for the development was brought about by passage of the National Environmental Policy Act of 1969 (PL 91-190); Environmental Quality Improvement Act of 1970 (PL 91-224); and approval by the President of the Principles and Standards for Planning Water and Related Land Resources in 1973. The methodology and criteria developed to date are often found difficult and costly to apply to specific projects or programs; more experimentation and creative use of methods are necessary.

Evaluation of the environmental impacts of a project (such as the Boise Project in an ex-post study) will prove particularly challenging in that concern in this area is not directly identifiable in evaluation criteria prevalent during project-planning, authorization and construction. An implied concern by planner and decision maker may have existed. However, there is no criteria by which to identify and evaluate the extent. The overriding project rationale at that time dwelled on economic and development considerations. Although the multiple-benefit emphasis did include some consideration for hydro-electric power generation, the main thrust of the Boise Project was to enlarge the existing irrigated acreage by transforming a large tract of semi-arid grass and sagebrush grazing lands to a green fertile irrigated area. While there was an awareness of a number of food processing activities that would follow and the need to improve transportation to move goods to the market, there was little if any concern for the associated environmental impacts. Ex-post analysis of projects such as the Boise Project can help provide the insight needed to better assess environmental impacts.

Social Impacts

Methodology and criteria for identifying and evaluating social impacts are well developed for many social programs but have not been extensively applied in the evaluation of water projects and programs. Approval by the President of the Principles and Standards has initiated activity in this area since a listing of social impacts is now required as part of the planning process.

All aspects of a project or program must be interpreted within a cultural setting. Impacts associated with irrigation, flood control, hydro-electric power, recreation, etc., must be interpreted within the

subcultural milieu of the residents of the area. Thus, while economic indicators provide an indication of the growth of society, a different set of indicators is needed to measure the social well-being of people.

Greater concern has been expressed recently in developing social indicators for use in measuring the general well-being of people. In a U. S. document entitled, *Toward a Social Report*, an attempt was made to provide some social indicators. Six aspects of social well-being were discussed: health and illness; social inability; learning; science and art; and participation and alienation. It is argued that by measuring these (and perhaps others) characteristics over time an indication of the social well-being of society, can be determined.1/

In the past, most decisions relating to public investment were based on economic benefit-cost information with minimal concern for the more intangible social values. If analyzed, social impacts were usually defined as the number of jobs that the construction and operation of the project provided for local residents. The assumption was that additional jobs for local people was beneficial and thus automatically raised social well-being. Recent studies have raised some question concerning the adequacy of this limited assessment of social impacts.2/ A Michigan State study concluded that:

> "helping geographic areas of low income should not be confused with helping poor people. Projects in poor areas may not help the poor people in that area."3/

Projects which help low income areas but bypass the poor people in the area may in fact create a disadvantageous situation for many by raising the costs of services and increasing taxes.4/ In other instances, the poor may receive the least advantage. A study of the Stonewall Jackson Reservoir in West Virginia found that while all

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1/ Toward a Social Report; U. S. Department of Health, Education, and Welfare; U. S. Government Printing Office; 1969.

2/ Toward a Social Report; U. S. Department of Health, Education, and Welfare; U. S. Government Printing Office; 1969.

3/ A test of Federal Water Project Evaluation Procedures with Emphasis on Regional Income and Environmental Quality; Detroit River, Trenton Navigation Channel, Schmid, A. Allen and William Ward; Agricultural Economics Report, 158; Michigan State University, East Lansing, Michigan; April, 1970, p. 72.

4/ Social Objectives of Water Resource Planning and Management; Mann, Dean E.; Paper delivered at Spring Water Resources Seminar, National Capital Section, American Society of Civil Engineers, April, 1971, p. 4.

income levels benefited to some degree from the project (primarily because the people in the area were required to pay only a fraction of the total cost) the lowest income levels received the least benefit while the upper income group received the largest benefit per household.1/

Ex-post analysis of projects such as the Boise Project can help provide the insight needed to better assess social impacts.

1/ Resource Investment, Impact Distribution and Evaluation Concepts, Kalter, R. J. and Stevens, T. H.; Amer. Journal of Ag. Econ.; May 1971.

NEW PLANNING CRITERIA - PRINCIPLES AND STANDARDS

New criteria to be used for planning of federal and federally assisted water and land resource programs and projects was published by the U. S. Water Resources Council in the Federal Register on September 10, 1973. The new criteria, known as the Principles, Standards, and Procedures for Water and Related Land Resources Planning (P&S) were approved by the President in October 1973.1/

The P&S are designed to provide a more complete identification of the economic, environmental, and social impacts, to the decision maker. Beneficial and adverse impacts are identified. The formulation and adoption of the P&S was an outgrowth of general dissatisfaction by the public with the criteria that was in use.

The water resource planner faces the task of utilizing the P&S to formulate plans for new programs and projects. Little experience is available to help guide the planner in this task. This type of experience and information can be obtained by ex-post analyses of existing projects.

An ex-post analysis of a project, such as the Boise Project, will involve both a macro- and micro-view of the economic, environmental and social impacts. The economic and environmental impacts are directly addressed in that the P&S provides for objectives by which to formulate plans. These are two: (1) National Economic Development Objective, and (2) Environmental Quality Objective.

The P&S aptly provides for two of the three areas of study (economic and environmental); and can be readily modified to provide for identification and analysis of social impacts; and must be used by planners in formulating and evaluating projects and programs which involve federal expenditures. Therefore, it is recommended that the P&S be used as a basic framework on which to conduct ex-post analyses. Modification of the P&S to permit the identification and evaluation of social impacts to proceed with equal importance with economic and environmental concerns will be necessary. This will require separation of the social aspects now disguised in the P&S accounting process.

The National Economic Development Objective and Environmental Quality Objective as defined by the P&S are as follows:

1/ Principles and Standards for Planning Water and Related Land Resources; U. S. Water Resources Council; Federal Register, Sept. 10, 1973, Nov. 1974.

National Economic Development Objective

The National Economic Development Objective is enhanced by increasing the value of the nation's output of goods and services and improving national economic efficiency. National economic development reflects increases in the nation's productive output, an output which is partly reflected in a national product and income accounting framework designed to measure the continuing flows of goods and services into direct consumption or investment.

In addition, national economic development is affected by beneficial and adverse externalities stemming from normal economic production and consumption, imperfect market conditions, and changes in productivity of resource inputs due to investment. National economic development is also affected by the availability of public goods which are not accounted for in the national product and income accounting framework. Thus, the concept of national economic development is broader than that of national income and is used to measure the impact of governmental investment on the total national output. The gross national product and national income accounts do not give a complete accounting of the value of the output of final goods and services resulting from governmental investments because only government expenditures are included. This is especially true in those situations where governmental investment is required to overcome imperfections in the private market. Therefore, national economic development as defined in these standards is only partially reflected in the gross national product and national income accounting framework.

A similar situation prevails where a private investment results in the production of final public goods or externalities that are not exchanged in the market. Components of national economic development are:

(a) The value of increased outputs of goods and services resulting from a plan. Developments of water and land resources result in increased production of goods and services which can be measured in terms of their value to the user. Increases in crop yields, expanding recreational use, and peaking capacity for power systems are examples of direct increases in the nation's output which results from water and related land resources developments. Moreover, such developments often result in a change in the productivity of natural resources and the productivity of labor and capital used with these resources. Increased earnings from changes in land use, reduced disruption of economic activity due to droughts, floods and fluctuating water supplies, and removal of constraints on production through increased water supplies are examples of direct increases in productivity from water and land development that contribute to national output. Development of water and land resources may result in increased production from the employment of otherwise unemployed or underemployed resources, as well as contributions to

increased output due to cost savings resulting in the release of resources for employment elsewhere.

(b) The value of output resulting from external economies. In addition to the value of goods and services derived by users of outputs of a plan, there may be external gains to other individuals or groups.

Environmental Quality Objective

The Environmental Quality Objective is enhanced by the management, conservation, preservation, creation, restoration, or improvement of the quality of certain natural and cultural resources and ecological systems in the area under study and elsewhere in the nation. This objective reflects society's concern and emphasis for the natural environment and its maintenance and enhancement as a source of present enjoyment and a heritage for future generations.

Explicit recognition should be given to the desirability of diverting a portion of the nation's resources from production of more conventional market-oriented goods and services in order to accomplish environmental objectives. As incomes and living levels increase, society appears less willing to accept environmental deterioration in exchange for additional goods and services in the market place. Responsive to the varied spiritual, psychological, recreational, and material needs, the environmental objective reflects man's abiding concern with the quality of the natural physical-biological system in which all life is sustained. Components of environmental quality objective include:

(a) Management, protection, enhancement, or creation of areas of natural beauty and human enjoyment such as open and green space, wild and scenic rivers, lakes, beaches, shores, mountain and wilderness areas, and estuaries.

(b) Management, preservation, or enhancement of especially valuable or outstanding archaeological, historical, biological (including fish and wildlife habitat), and geological resources and ecological systems.

(c) Enhancement of quality aspects of water, land, and air by control of pollution or prevention of erosion and restoration of eroded areas embracing the need to harmonize land use objectives in terms of productivity for economic use and development with conservation of the resource.

(d) Avoiding irreversible commitments of resources to future uses. While all forms of development and use affect and sometimes change the tenuous balance of fragile aquatic and terrestrial ecosystems, the implication of all possible effects and changes on such systems is imperfectly understood at the present

time. In the absence of absolute measures or standards for reliability predicting ecological change, these planning standards emphasize the need for a cautionary approach in meeting development and use objectives in order to minimize or preclude the possibility of undesirable and possible irreversible changes in the natural environment.

(e) Others. Given its broad and pervasive nature, it is not practical to specifically identify in these standards all possible components of the environmental quality objective. If other components are recognized, they should be explicitly identified and accommodated in the planning process.

ORGANIZING AN EX-POST ANALYSIS

Ex-post analyses of projects or programs should be organized to respond to contemporary concerns regarding economic, environmental, and social impacts, rather than in the traditional manner which utilized water use functions as a focal point. The public, planner and decision makers need better information about the total impacts that result from an action such as a water project or program. This array of information, when provided by functional categories, is often limited and/or difficult to discern. By structuring the study efforts to be responsive to societal concerns rather than agency concerns, better and more complete information can be available to the public and decision makers at the local, state, and federal levels. It is recommended, therefore, that ex-post analyses of projects and programs, such as the Boise Project, be structured to provide for economic, environmental, and social subproject studies.

The P&S provide a basic framework that can be readily applied, with minor modification, to provide for economic, environmental, and social subproject studies. The modification required involves providing for a Social Objective instead of addressing these issues in the accounting process under the National Economic Efficiency Objective and the Environmental Quality Objective.

A general concern in any comprehensive study effort is the need to avoid duplication of data collection and study activities. The "system of accounts" in the P&S should minimize this problem by providing a common data base for use in the three subproject studies.

An outline for each of the three recommended subproject studies for the Boise Project is presented in the next section under *Boise Project - A Case Study*.

BOISE PROJECT - A CASE STUDY

The material presented in the previous sections of this report addresses the role of the government in water development, planning criteria, and the need and requirements for ex-post analyses of projects and programs. Following is a review and discussion relating specifically to the Boise Project. A description of the study area, project facilities, and outline for each proposed subproject study is presented. A review of the study outline for the support studies conducted in conjunction with the P&S during the first year effort is also included.

STUDY AREA

The Boise Project was selected for study purposes because of its "stage" development by the Bureau of Reclamation, Corps of Engineers, and other federal and state agencies. Availability of data and information makes this project uniquely suitable for an ex-post analysis research study.

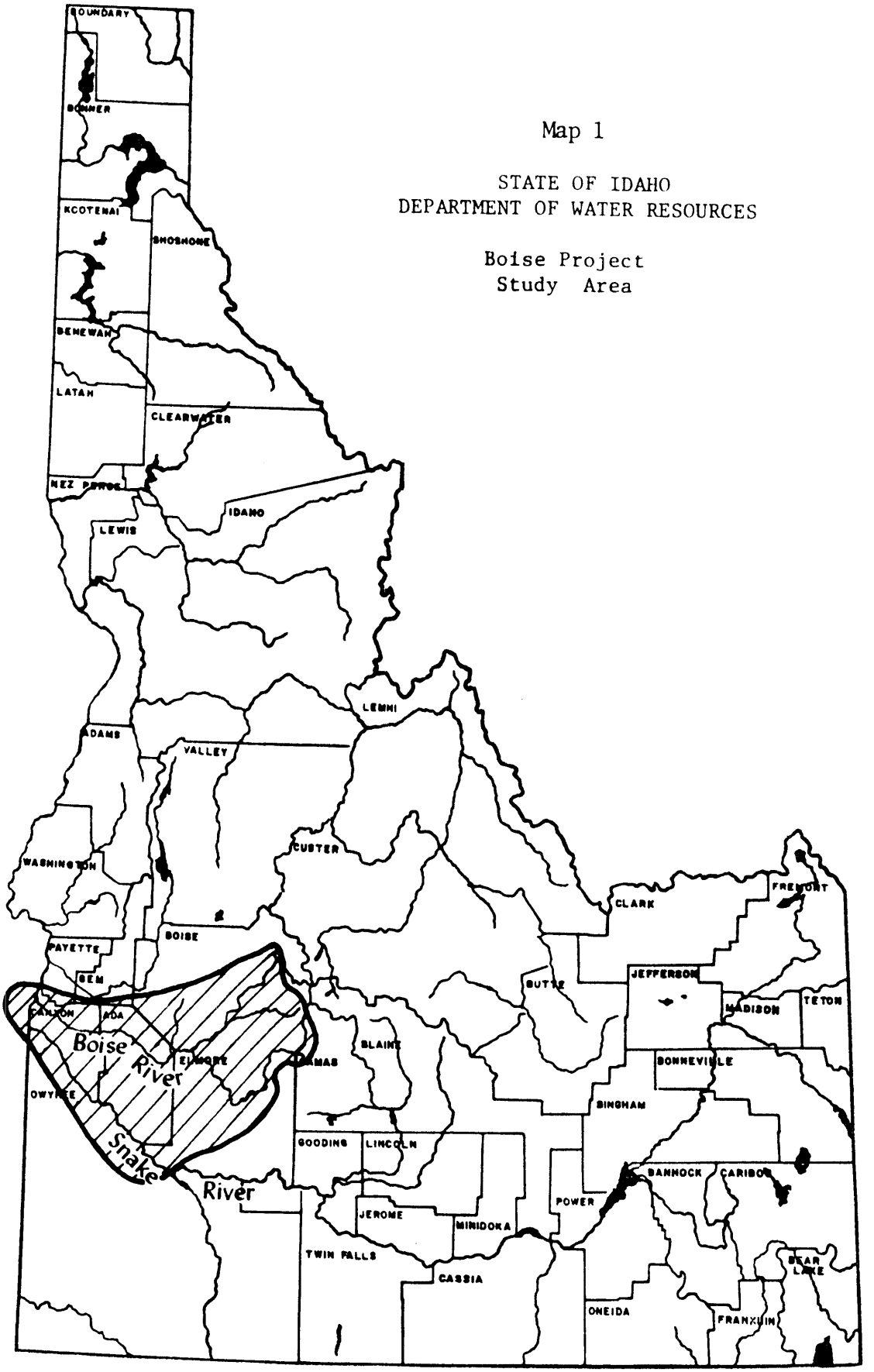
The project lands are situated in southwestern Idaho and southeastern Oregon and are shown on Map 1. The study area encompasses all of Canyon County and major portions of Ada, Elmore, and Boise counties. The project provides irrigation water to approximately 167,000 acres.

Three of Idaho's nine largest cities are located in the area, with Boise the state capitol being the major trading center. The total area population in 1973 was approximately 220,000, however, the communities within the study area service a marketing area of over 350,000 people.

Map 1

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

Boise Project
Study Area



Inputs to other sectors of the economy, both within and outside the study area, are substantial. Several large corporations are located in the study area. These include Albertson's, Inc., a national grocery retail chain; Boise Cascade Corporation, a diversified conglomerate; Idaho Power Company, the most extensive private utility in the state; Morrison-Knudsen Company, a leading heavy construction company; J. R. Simplot Company, a national leader in food processing and fertilizer production; and Trus-Joist Corporation, a producer of specialized building materials.

The climate is mild with frost-free periods often exceeding 150 days. The average annual precipitation is about 12 inches. The Snake River crosses the area from the southeast. The Boise River, a major tributary to the Snake River, flows through the center of the area and enters the Snake at the Oregon-Idaho border.

PROJECT FACILITIES

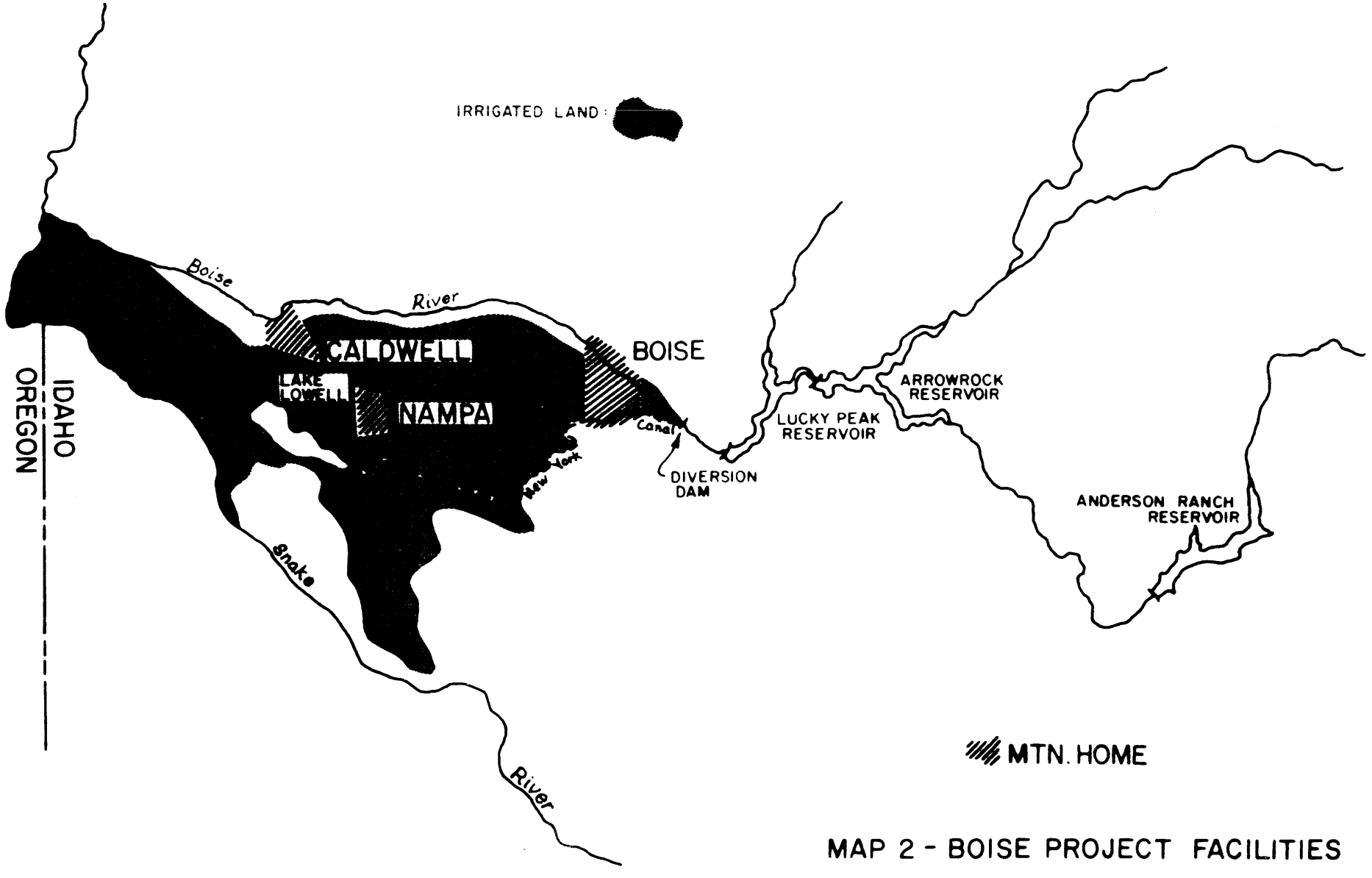
The Boise Project extends from the Boise River below the Diversion Dam in a southwesterly and westerly direction to the Snake River, and includes a small area in Oregon. Boundaries are shown in Map 2.

The project was built by the United States Reclamation Service and operated by the Service until April 1, 1926. Then the operation was turned over to a newly organized irrigation district under the Act of December 5, 1924, (known as the Fact Finders law). This Act provided for the repayment of the construction charges at 5 percent of the average annual crop returns over a period of 10 years. The Act was supplemented by amendatory contracts, which combined the balances of the construction charges and provided that repayments be computed on the basis of normal returns of the highest 10 years out of 13. These were accepted by the districts in 1951.

The Bureau of Reclamation has retained responsibility for the operation and maintenance of certain parts of the system known as the "Reserve Works." The Reserve Works include Arrowrock Dam, Anderson Ranch Dam, Diversion Dam, and the headworks of the New York Canal. The cost of the operation and maintenance of the reserved works is divided among the parties receiving water in proportion to their respective interests.

The Board of Control is the operation organization of the project and was created in 1926, by virtue of contracts between the five irrigation districts which encompass the project water users and the Bureau of Reclamation.

The operation of the three storage dams in the Boise River Basin is coordinated to provide for approximately 983,000 acre-feet of flood control space. The flood control operation plan is directed jointly by the U. S. Corps of Engineers, Bureau of Reclamation, Boise Project Board of Control, and the Boise River Water-Master.



MAP 2 - BOISE PROJECT FACILITIES

There are five major physical features of the project. These are:

1. Arrowrock Dam and Reservoir - A concrete arch dam located on the Boise River about 4 miles below the junction of the north and south forks, and about 22 miles upstream from Boise, Idaho. The 348.5 foot structure was completed in 1916 and at that time had the distinction of being the highest dam in the world. The reservoir originally had a storage capacity of 276,500 acre-feet, but this was increased to 286,000 acre-feet in 1937 by raising the height of the dam 5 feet.

2. Lake Lowell - Originally known as Deer Flat Reservoir, located approximately 7 miles south of Caldwell and Nampa, Idaho. Lake Lowell has a storage capacity of 177,153 acre-feet. The off-stream storage dam was completed in June 1911; the lower embankment was completed in January 1908; and the upper embankment was completed in July 1908.

3. Boise River Diversion Dam - An earthfill dam located about 8 miles northeast of Boise, Idaho. The diversion of water from the Boise River into the New York (Main) Canal serves distribution laterals and feeds Lake Lowell Reservoir. Construction of the dam was started in March 1906 and completed in October 1908. A small canal, known as the Penitentiary Canal, heads from the Diversion Dam and distributes water on the north side of the Boise River to a small area of land east of Boise. A small power plant of 1,500 kilowatts (kw) is located at the Diversion Dam.

4. Anderson Ranch Dam and Reservoir - An earthfill structure situated across the south fork of the Boise River, approximately 20 miles northeast of Mountain Home, Idaho. Four hundred and fifty-six feet in height, the dam was completed in 1951 and has a storage capacity of 493,161 acre-feet. A power plant with an installed capacity of 27,000 kw is part of the complex.

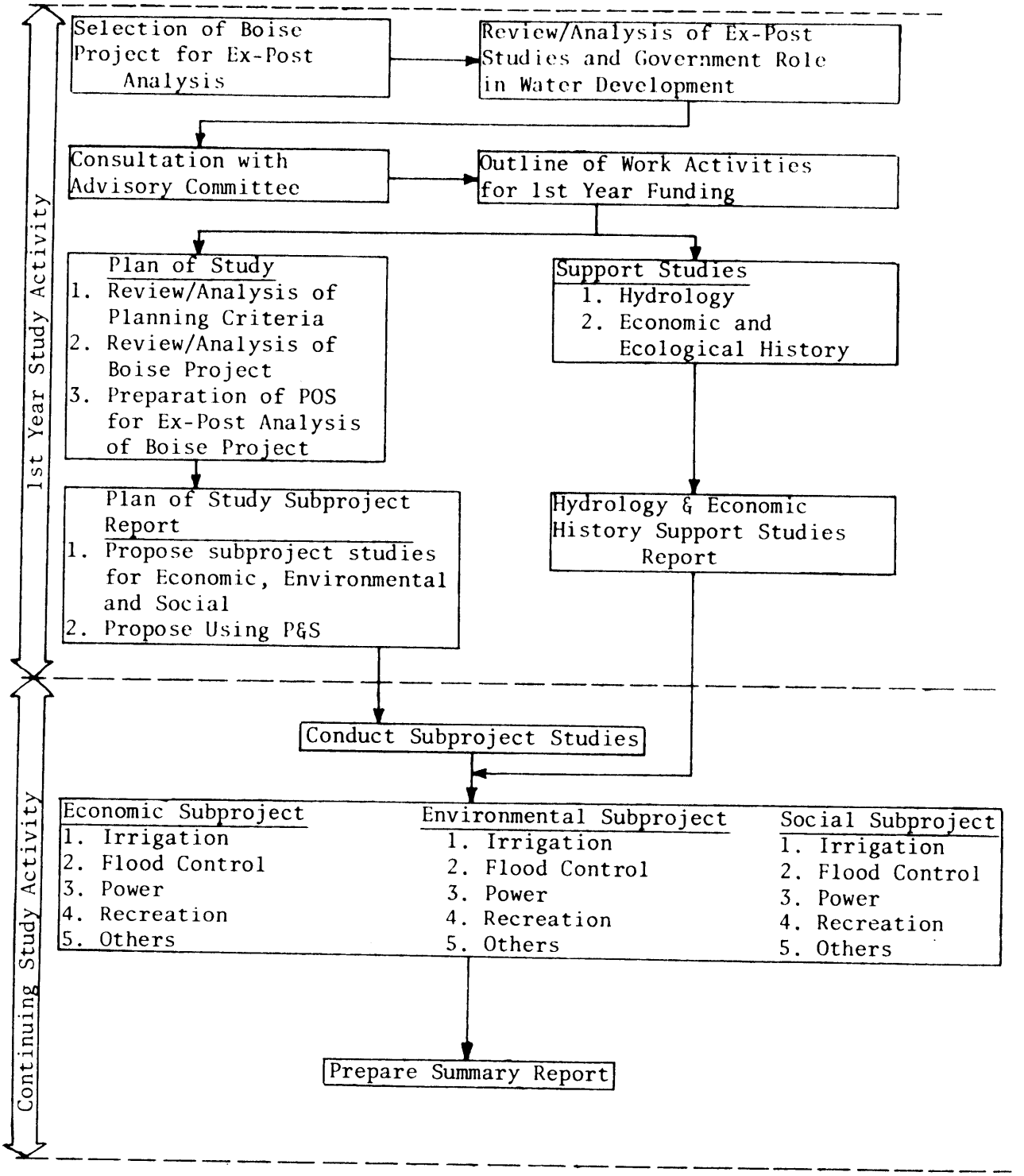
5. Lucky Peak Dam and Reservoir - Located on the Boise River approximately 10 miles above Boise, Idaho, this dam was constructed by the Corps of Engineers primarily to provide flood control along the main stem of the Boise River. Three hundred and forty feet high, this dam was completed in 1955, and has a gross storage capacity of 306,000 acre-feet of which 280,000 acre-feet are usable for flood control and other purposes including irrigation, recreation, and future power production.

SUBPROJECT STUDIES

The designated subproject studies--Economic, Environmental, and Social--are the focal point of the ex-post analysis of the Boise Project.

The three subprojects should analyze the singular effects caused by public investment relative to the four authorized project functions. In addition to the four authorized project functions, other implied but not directly authorized project functions must also be evaluated. For example, water quality, fish and wildlife, sedimentation, erosion, and others have been an implied objective of the original investment. A generalized flow chart illustrating the structuring of the ex-post analysis of the Boise Project is shown in Figure 4. Proposed outlines for each of the subproject studies are as follows:

Figure 4
GENERALIZER FLOW CHART FOR EX-POST ANALYSIS OF THE BOISE PROJECT



Outline for Economic Subproject: (Impacts to be determined for each authorized function.)

A. Changes in output.
   1. Value of increased outputs of goods and services from a project.
      a. Community and residential water supply;
      b. Electric power;
      c. Recreation enhancement;
      d. Agricultural water supply;
      e. Industrial and Commercial.
   2. Value of output resulting from external economies caused by a project.

B. Measurement of the value to users of increased output.
   1. Water supply.
      a. Agricultural;
      b. Industrial;
      c. Municipal.
   2. Flood control land stabilization, drainage and others.
      a. Changes in productivity;
      b. Changes in land use.
   3. Power.
      a. Change in dependable capacity;
      b. Change in average annual energy.
   4. Recreation.
      a. Change in general recreation days;
      b. Change in specialized recreation days.
   5. Resources required or displayed to produce final or intermediate goods and services.
   6. Decreased in output resulting from external diseconomies.

Outline for Environmental Subproject: (Impacts to be determined for each authorized function.)

A. Change in open and green space.
   1. Total acreage;
   2. Pattern and distribution;
   3. Change in accessibility, public amenities, etc.

B. Change in lakes.
   1. Total surface acreage;
   2. Shoreline mileage;
   3. Depths and water quality;
   4. Improvements in accessibility.

C. Change in marshland acreage.
   1. Biological significance as a breeding, rearing, and feeding ground.

D. Change in historical or archaeological resources.
   1. Size of area;
   2. Educational values.

E. Change in biological resources.
   1. Changes in habitat area;
      a. Total land and water surface acreage;
      b. Population estimates;
         (1) Age and size classes;
         (2) Sex ratios;
         (3) Distribution or density;
      c. Changes in accessibility, sanitation, habitat stabilization.

F. Changes in ecological systems.
   1. Maintenance of the natural environment in equilibrium;
   2. Protection of aesthetic aspects of environment;
   3. Contributions to scientific understanding of natural ecosystems.

G. Changes in water quality.
   1. Irrigation runoff;
   2. Municipal pollution;
   3. Industrial pollution.

H. Changes in land quality.
   1. Reduction in erosion;
   2. Reduction in turbidity and sediment pollution;
   3. Changes in river bank sloughing.

I. Presentation of irreversible commitments of resources to future use (opportunity cost of development alternative with higher environmental cost).

Outline for Environmental Subproject: (Cont.)

J. Changes in river channels.
   1. Hydrologic parameters;
   2. Vegetation;
   3. Capacity.

K. Changes in air quality.
   1. Smog;
   2. Blowing dust;
   3. Micro-temperature changes.

Outline for Social Subproject: (Impacts to be determined for each authorized function.)

A. Changes in real incomes.
   1. Distribution;
   2. Changes in the number of families living on poverty level incomes;
   3. Changes in the definition of poverty level incomes.

B. Effects on security of life, health and safety.
   1. Changes in the risk of flood;
   2. Changes in the occurrence of drought;
   3. Changes in insects and other health hazards;
   4. Changes in concentrations or exposures to water pollution;
   5. Changes in year-round consumer choice of foods or diet;
   6. Hospital diets.

C. Changes in educational, cultural, and recreational opportunities.
   1. Improved opportunities for community services such as utilities, transportation, schools;
   2. Increased cultural and recreational opportunities (i.e., increase in the number of facilities, leisure time, etc.).

D. Effects on emergency preparedness.
   1. Provision of flexible reserves of water supply;
   2. Provision of critical power supplies;
   3. Provision of reserve food production potential;
   4. Provision of population and industrial dispersal.

E. Changes in migrant labor force and the development of plural society questions.

SUPPORT STUDIES

Support studies on Hydrology and Economic and Ecological History were initiated in conjunction with the Plan of Study subproject as part of the first year activity for an ex-post analysis of the Boise Project. By early initiation of support studies, much of the data and information needed for the proposed subproject studies (economic, environmental, and social) can be provided on a timely basis. Feedback from the support studies was also of considerable value in the Plan of Study subproject.

In structuring the support studies for the ex-post analysis of the Boise Project, separate economic and ecological history studies were outlined. As the work effort on the support studies progressed, it was determined that a combined effort would better identify the relationship of these factors and the two efforts were combined to form the Economic History support study.

The type of information to be gathered by these studies is outlined as follows:

Economic and Ecological History Study[1/]

A. Define the ecological and geographic history of the area. Parameters to be included are climate, moisture, temperature, timber, wildlife, minerals, soils and vegetation. In addition the study should define the pre-project (pre-1902) perception of the area which can in turn be compared to the contemporary viewpoint.

B. Determine the National Goals, Policies, and Social Issues prevalent at the time of project authorization.

    1. Summarize the Federal Settlement Legislation. The settlement legislation and its various impacts and changes overtime should be evaluated. Items to be investigated include the Reclamation Act, Mineral Act, Federal Power Act, Carey Act, Homestead Act, Desert Land Act and the federal agriculture price support programs. Also a short general history of early day Bureau of Reclamation Service activities should be included.

1/ Economic History and Ecological History of the Boise Project for a Case Study of a Federal Expenditure on a Water and Related Land Resource Project, Boise Project, Idaho and Oregon; University of Idaho and Idaho Historical Society; June, 1974.

2. Determine the economic growth and stability objectives inherent to federal projects. This topic should be researched at the local, state, regional and national levels. Federal land and water projects started in other states at or about the same period of time should be identified as to their application to national objectives. The study should investigate whether the Boise Project was designed to be a model for further western water development.

3. Describe the geographic, social, and political compatibility of Idaho with the new federal land and water programs. The establishment of the local and state political power base in the Boise area should be evaluated in order to better define any social issues influenced by settlement. A discussion of the reasons for constructing the project in Idaho rather than elsewhere would be particularly meaningful. The study should help to provide the information needed to determine the economic efficiencies of development found in Idaho. Also the physical pay off factors should be noted in addition to specific location factors.

4. Determine the local, state and national moods toward ecological mitigation and compensation. The study should summarize the mitigation of environmental changes caused by public and private investments.

C. Discuss the private development and settlement prior to 1910.

1. Describe the pre-settlement land and water use patterns. Pre-project land use maps should be prepared.

2. Determine pioneer land and water use. The study should detail the construction of water projects, delivery systems, water shortages, floods, flood plain development, expansion into new agriculture areas, cropping patterns, and ecological changes caused by private investment in the project area.

3. Describe the general economy of the project area prior to the public investment. The study should discuss the markets for agricultural, mining, and forestry products in both the Upper and Lower Boise Basin. Prices of the inputs and outputs of production should be included. Also, the rural and urban populations, transportation and utility networks and the development of financial institutions should be discussed.

D. Discuss the federal investment, development and settlement.

1. Summarize the original project proposals and discuss the geographical location of the various phases of the project and their subsequent feasibility studies.

2. Summarize the project authorization and funding. Identify all investments incurred by the project.

3. Determine the various phases of construction for the following construction projects:
   a. Boise Diversion, New York Canal, and Deer Flat Reservoir;
   b. Arrowrock, Anderson Ranch, and Lucky Peak;
   c. Trans-basin delivery system of Payette River water to Boise Valley;
   d. Canal systems, laterals and drains;
   e. External water transfer.

4. Determine the land ownership patterns.
   a. Describe the federal acquisition and conversion of land for project construction;
   b. Discuss private settlement and its legislative authorization;
   c. Discuss the amount and location of new lands brought into production and existing lands given supplementary water supplies;
   d. Determine any changes in land values, tax base, and ownership patterns and determine the extent that the reclamation of project lands created increased opportunity to individual ownership.

E. Describe the private investment and settlement after 1910.

1. Identify the general areas that continued to be developed under private auspices and include a discussion of water delivery and drainage systems, new land development and ecological impacts. Both the upper and lower Boise are to be considered. Various land use maps are to be constructed which detail flood plain development, changing land uses, and the inundated areas.

2. Determine the changes in water distribution facilities and include a discussion of on and off farm efficiency.

3. Describe the general economy of the project area during and immediately after project construction.

F. Relate, insofar as possible, the post investment impact of each phase of construction on the following items:
1. Flood plain development;
2. Agricultural marketing and prices (agriculture economy);
3. Commodity shortages and surpluses;
4. Cropping patterns;
5. Transportation and utility industry;
6. Population and Demographic variances (immigration and emigration characteristics);
7. Social stability;
8. Recreation on project lands and waters;
9. General political climate;

10. Ecological Effects:
    a. Fish and wildlife;
    b. Water quality.
11. Groundwater, seepage and drainage changes;
12. Energy requirements.

G. Determine the intervening land uses and historical change in land uses. General topics to be considered are:
    1. Organization;
    2. Industrialization;
    3. Highways.

H. Analyze the influence and economic significance of new industries and businesses organized in the project area and the changes which have occurred over time to employment per capita income, etc.

Hydrology Study

The study should collect the data relating to the pertinent hydrologic factors of river flows, reservoir levels, reservoir capacities, irrigation, and drainage flows in the Boise basin.1/

A primary effort would involve the development of a groundwater model for the Boise Project to be used in simulating the various effects of irrigation in the project area. Such information will be needed to conduct studies such as the water quality studies for the overall study. The following type of information should be collected in this study:

A. Physical basin descriptions;

B. Runoff characteristics;

C. Regulation System Description.
    1. Reservoir areas;
    2. Reservoir capacities;
    3. Operating ranges;
    4. Release patterns;
    5. Flood operating rules and criteria.

D. Irrigation System Description.
    1. Diversion facilities and capabilities;
    2. Canal capacities and characteristics;
    3. Acreages served;
    4. Storage space for different water right holdings;
    5. Rediversions of water;
    6. Input from Payette River System as needed.

1/ Hydrology Subproject for A Case Study of a Federal Expenditure on a Water and Related Land Resource Project, Boise Project, Idaho and Oregon; University of Idaho; June, 1974.

E. Determine irrigation diversions.
   1. History of diversion by system and area.

F. Determine irrigation return flows.
   1. Drains and their present pattern of flows;
   2. Drain flow relationships to groundwater.

G. Describe the Boise River water rights, and discuss the general character of the rights by time period and area.

H. Determine flood frequencies.
   1. National or unregulated flows;
   2. Historical conditions;
   3. Present development conditions.

I. Determine the amounts of Boise Valley groundwater.
   1. Evaluate the techniques of expressing effects of irrigation and river fluctuations on groundwater amounts.

J. Determine operation condition of the project system.
   1. Conduct a base study of reservoir fluctuations, diversions, return flows and groundwater variation under present development.

K. Describe the snow measurement and forecast system.

SUMMARY

A plan for structuring the study efforts necessary to complete the ex-post analysis of the Boise Project has been presented. Basically, the recommended approach calls for three subproject studies dealing with the economic, the environmental and the social impacts, to be completed. It was recommended that the Principles and Standards recently promulgated by the U. S. Water Resources Council be used as the basic framework on which to organize each subproject study and for structuring a common data base. The ex-post analysis, if organized in this manner, will provide the necessary data and information: to compare investment accomplishments over time for social, environmental and economic considerations; and to summarize the beneficial and adverse effects of the Boise Project development.

Figure 5 illustrates a method of summarizing the beneficial and adverse effects associated with a specific project facility, over a selected time period. A similar table should be prepared for each major structure and associated development of the Boise Project. The time periods selected for evaluation will depend on the time and monies available for the study and the availability of data, as well as key construction, operation and management data. It is possible to illustrate how operations may have changed as new facilities were added to the project. Other effects, such as hydrologic conditions prevailing in the appropriate year, can also be displayed. A major difficulty will be in judging whether effects are beneficial or adverse. The guidelines provided in the Principles and Standards should be used to permit consistency. Public attitude effects should probably be reported without designation in that they are continually changing.

An illustration of how the beneficial and adverse effects associated with the major structures comprising the Boise Project can be summarized is presented in Figure 6. It is proposed that the data be organized by authorized functions for each subproject study. This will provide an overall assessment of the effects associated with the federal expenditures

Figure 5 - COMPARATIVE ANALYSIS OF BENEFICIAL AND ADVERSE EFFECTS - DIVERSION DAM

BOISE PROJECT

Subproject:	Without Conditions (1900)	Proposed Project (1905)	Authorized Project (1906)	5 Yr. Cond. (1913)	10 Yr. Cond. (1918)	25 Yr. Cond. (1933)
ECONOMIC:						
Irrigation						
Beneficial Effects						
Adverse Effects						
Power						
Beneficial Effects						
Adverse Effects						
Recreation						
Beneficial Effects						
Adverse Effects						
Flood Control						
Beneficial Effects						
Adverse Effects						
ENVIRONMENTAL:						
Irrigation						
Beneficial Effects						
Adverse Effects						
Power						
Beneficial Effects						
Adverse Effects						
Recreation						
Beneficial Effects						
Adverse Effects						
Flood Control						
Beneficial Effects						
Adverse Effects						
SOCIAL:						
Irrigation						
Beneficial Effects						
Adverse Effects						
Power						
Beneficial Effects						
Adverse Effects						
Recreation						
Beneficial Effects						
Adverse Effects						
Flood Control						
Beneficial Effects						
Adverse Effects						

Figure 6 - SUMMARY OF BENEFICIAL AND ADVERSE EFFECTS
BOISE PROJECT

Subproject	Before (1900)	Diver. Dam & Canals (1908)	Lake Lowell (1911)	Arrowrock (1915)	Anderson Ranch (1950)	Lucky Peak (1955)	Present (1974)
ECONOMIC:							
Irrigation							
Beneficial Effects							
Adverse Effects							
Flood Control							
Beneficial Effects							
Adverse Effects							
Power							
Beneficial Effects							
Adverse Effects							
Recreation							
Beneficial Effects							
Adverse Effects							
ENVIRONMENTAL:							
Irrigation							
Beneficial Effects							
Adverse Effects							
Flood Control							
Beneficial Effects							
Adverse Effects							
Power							
Beneficial Effects							
Adverse Effects							
Recreation							
Beneficial Effects							
Adverse Effects							
SOCIAL:							
Irrigation							
Beneficial Effects							
Adverse Effects							
Flood Control							
Beneficial Effects							
Adverse Effects							
Power							
Beneficial Effects							
Adverse Effects							
Recreation							
Beneficial Effects							
Adverse Effects							

in the Boise Project. This will also provide for the data to be organized in a manner similar to the system of accounts contained in the Water Resources Council's Principles and Standards. The P&S note that:

> "The system of accounts calls attention to the important aspects of information which must be generated and displayed if the decision-making process is to be effective. The evaluation framework through the system of accounts provides for a systematic investigation of the full range and extent of effects of a plan and provides for a display of this information in a format which is clear and useful to all participants in the decision process."

As discussed previously, the P&S dominates water resource planning and development in the United States. The philosophy expressed responds to the public demand to know what is happening. As the resource picture continues to get smaller and more competitive, it is absolutely essential to review past developments. The concepts and direction expressed in this report will assist in that review.