

A STUDY OF
ECONOMIC AND FINANCIAL POLICIES
FOR STATE WATER PROJECTS

Formulated from the Work of
THE SUBCOMMITTEE ON ECONOMIC AND FINANCIAL POLICIES
FOR STATE WATER PROJECTS

of the
JOINT COMMITTEE ON WATER PROBLEMS

for transmission to the
ASSEMBLY WATER COMMITTEE
in compliance with ACR 149

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ASSEMBLY WATER COMMITTEE

STATE OF CALIFORNIA

August 5, 1959

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ASSEMBLY
CALIFORNIA LEGISLATURE

2114 State Capitol Building
Sacramento 14, California
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TO: MEMBERS OF ASSEMBLY WATER COMMITTEE

The attached material is a study in the form of a suggested integration and comprehensive analysis of the work done during the past two years by the Subcommittee on Economic and Financial Policies for State Water Projects of the former Joint Committee on Water Problems. As you know, this same joint committee work has been assigned by ACR 149 to the Assembly Water Committee for completion.

The release of the attached study at this time appears appropriate because it will bring the Assembly Water Committee members up to date on the past two years' work and will form a basis upon which to complete the assigned work. Further, it is hoped that water groups, state and local government agencies, and interested expert personnel will thereby also be able to study the progress to date. Any comments and criticism which will assist in the formulation of sound policies for the State's water program will be appreciated and should be furnished the Committee.

I should like to emphasize that this study is an effort to set forth the results of preceding years' work and is only a committee work document. It should not be looked upon as committing this Committee to any particular views.

Sincerely yours,

Carley v. Porter

CARLEY V. PORTER, Chairman
Assembly Water Committee

CVP:dw

INTRODUCTION

The State of California has a long history of water resources development. Initially this development was by private undertakings, but after 1872 irrigation and other public districts also began constructing projects, augmented in the mid-1930's by federal construction of projects. In the last two decades the State of California has been going through a metamorphosis beginning with the early planning of the Central Valley Project which the Federal Government eventually constructed, continuing in later years with the planning of the Feather River Project and finally achieving maturity with the organization of the Department of Water Resources in 1956. The organization of the department coincided with the first appropriations by the Legislature for the construction of a state water resources development project.

California's water resources development has not been without serious problems. The evolution and growth of both federal programs and local water resources projects have required these agencies to accumulate substantial bodies of policy covering most of the important decisions which must be made in planning, authorizing, constructing, operating and maintaining projects. Into this arena of existing local or federal policies and practices, the State of California has entered with the Feather River Project, the largest and most complex project yet proposed for construction in this country. As a result, the Department of Water Resources, the Legislature and the interested public have needed answers to many perplexing problems.

The problems confronting the State as it undertakes a water resources development program include many aspects of water rights law, engineering, economic and public policy. Certain problems relating to economic and financial

policies for state projects were assigned by the 1957 General Session of the Legislature to the Joint Committee on Water Problems by Assembly Concurrent Resolution No. 198. The resolution states that the committee is

"...to hold hearings and to study the problems involved in establishing policies to be used by the State of California in evaluating economic and financial feasibility of the Feather River Project and other units of the California Water Plan and to recommend appropriate policies to the Legislature for adoption. Among the specific problems to be resolved are the determination of the State's interest in constructing or assisting local projects, the determination of which project purposes of multiple-purpose projects should be reimbursable or nonreimbursable and the degree of such reimbursability, the method of cost allocation to be used, the basis of establishing rates for project services, methods of evaluating benefits and costs and the resolution of any conflicts between desirable state policies and established federal policies. In undertaking the above work the Joint Interim Committee on Water Problems is authorized in addition to its other powers to secure information from appropriate federal, state, and local agencies, to obtain the services of consultants, and to secure other information and investigate related problems as may be appropriate."

To undertake this work, the Joint Subcommittee on Economic and Financial Policies for State Water Projects was established.

In addition to the work directed by Assembly Concurrent Resolution No. 198, the Chairman of the Joint Committee on Water Problems assigned two other subjects to the subcommittee. The first of these was contained in Senate Concurrent Resolution No. 140 which called for the joint committee to

"...examine in all its various phases the complicated problem of establishing fair, equitable and desirable policies for the sale of water and power from state projects and determine a proper policy on cost allocations..."

The subcommittee was also instructed by the Chairman of the Joint Committee to study possible amendments to Chapter 2052, Statutes of 1957, with particular regard to defining the State's interest in local projects and the nature of possible financial assistance to local projects.

In undertaking its broad assignment, the subcommittee in the past has had available the services of the Executive Secretary to the Joint Committee on Water Problems and staff assistance from the Legislative Analyst's Office.

Assembly Concurrent Resolution No. 149, 1959 General Session, extended the work of the subcommittee until the 1960 Budget Session and assigned the work to the Assembly Water Committee from which a special subcommittee has been designated to complete the task.

As the State has progressed further during the past several years in its efforts to plan, finance and construct projects, the need for financial and economic policies has become urgent. The deficiencies in existing statutes have become more apparent, and the interested public has devoted more attention to these matters. It has been recognized that a project can be faulty on an economic or financial basis, with just as serious consequences to orderly progress and a successful state water development program as when legal and engineering deficiencies exist and that a project cannot be regarded as sound unless all these factors and their related problems are considered and resolved.

The subcommittee has been impressed not only with the interest and sincerity of the large number of witnesses appearing before it in the past two years, but also with the sense of responsibility which was reflected in their statements. Their many excellent statements will contribute greatly to the formulation of a sound body of policy for water resources development by the State of California. The subcommittee wishes to express its gratitude for this splendid cooperation and assistance.

II

THE SUBCOMMITTEE'S PROGRAM

It was apparent from the complexity and intense public interest in many of the problems assigned to the subcommittee that a minimum of two years' work, and perhaps even longer, would be required. Accordingly, a high priority was given by the subcommittee during its work in calendar year 1957 to the financial condition of the State and to the "pay-as-you-go" approach to water project financing. The subcommittee's work on these matters was published on March 24, 1958, as the twelfth partial report of the Joint Committee on Water Problems. That progress report covered the following hearings:

<u>Date</u>	<u>Location</u>	<u>Subject</u>
August 26, 1957	Sacramento	Presentation of a report, "Economics of a Water Resources Program", dated July 9, 1957. This report broadly covered many of the problems assigned to the subcommittee and provided background for future subcommittee work.
August 27, 1957	Sacramento	The Director of Water Resources reviewed the work of his department, showed how the department's work might relate to the subcommittee's activities and provided further valuable background for the subcommittee's use.
September 18, 1957	Sacramento	Chapter 2052, assistance to local projects was considered.
October 24, 1957	San Francisco	Statements were received from the principal fiscal officials of the State on the State's financial condition as it pertains to project financing. A panel of eminent California bankers and bond house representatives discussed the use of general obligation bonds for financing construction of water projects.
November 12, 1957	Los Angeles	Recommendations were presented by Southern California water interests on the financing problem.

<u>Date</u>	<u>Location</u>	<u>Subject</u>
November 13, 1957	Los Angeles	Continuation of November 12 hearings plus the discussion of general obligation bond financing for water projects by a Southern California panel of financiers.
December 19, 1957	Sacramento	Work session by the subcommittee.
December 20, 1957	Sacramento	Recommendations were received from central and northern California water interests on the financing problem.
January 29, 1958	Sacramento	Presentation of water project staging study by Department of Water Resources showing future dollar requirements by year for projects envisioned for state construction. Further presentation of recommendations on project financing.

Note: The transcript of the hearing held on December 17, 1957 at San Diego by the Joint Committee on Water Problems (the subcommittee's parent committee) contains considerable testimony on the financing problem. This transcript has been reviewed and certain testimony from that hearing is used by the subcommittee.

During calendar year 1958, the subcommittee devoted its attention to examining cost allocation methods, a study of federal water resources repayment policies and special state problems involved in repaying project costs. It also secured much information on establishing rates for project services. The subcommittee has followed the general approach, essentially dictated both by logic and the State's revenue problems, of first determining the State's capacity to finance a water resources development program, and within these limitations, studying the problems of cost allocation, repayment and pricing. It was felt that reversing this approach might lead to conclusions which could not be financed by the State or would place an unwarranted strain on the State's entire capital expenditure program. Therefore, the work for the 1958 calendar year was based upon, and continued, the study of financing problems conducted during 1957.

Hearings were held in calendar year 1958 as follows:

<u>Date</u>	<u>Location</u>	<u>Subject</u>
May 15, 1958	Sacramento	The Department of Water Resources and the Corps of Engineers presented their over-all views on cost allocation and reimbursement.
May 16, 1958	Sacramento	The Bureau of Reclamation reviewed its practices and policies on cost allocation, reimbursement and repayment. The Standord Research Institute presented its report recommending state policies on cost allocation, reimbursement and repayment.
June 8, 1958	Sacramento	State and federal agencies with interest and responsibilities in recreational water resources development discussed their programs and policies.
July 10, 1958	Eureka	Repayment problems of recreation.
August 27, 1958	Napa	Repayment problems of the North Bay Aqueduct.
August 28, 1958	Hayward	Repayment problems of the South Bay Aqueduct.
September 15, 1958	Sacramento	Testimony by state and federal agencies on problems of irrigation repayment.
September 16, 1958	Fresno	Repayment problems of irrigation.
September 17, 1958	Bakersfield	Repayment problems of irrigation.
September 18, 1958	Santa Barbara	Repayment problems of irrigation and recreation.
December 3, 1958	Los Angeles	Repayment problems of irrigation, recreation and municipal water supplies.
December 4, 1958	San Diego	Repayment problems of irrigation, recreation and municipal water supplies.

This study by the subcommittee represents the progress, to date, from exploring the many economic and financial facets of water resources development in a total of 21 days' hearings conducted throughout the State in the past two years. Diversity of opinion naturally exists throughout the State and it is obviously impossible to satisfy all shades of opinions and beliefs. Instead,

this study attempts to trace through the record of hearings a pattern of consistent, logical and sound state policy. The evaluation of policies has been, as far as possible, on the basis of both the experiences and expressions of attitudes representing a majority of the witnesses. The soundness of these policies has been judged in terms of:

1. The objective, professional advice available to the subcommittee in the report prepared by the Stanford Research Institute as a result of the generous financial support of the Haynes Foundation and the report entitled Economic Evaluation of Water by the University of California, as well as several other professional studies such as those prepared for the Hoover Commission Task Force on Water and Power, or published in professional journals and books;
2. A review of water resources development programs as executed by several federal agencies, and
3. A testing of possible state policies against the factual data available to the subcommittee from studies of the Department of Water Resources and many local water agencies.

The organization of this study is simple. Chapter III outlines financing approaches for all the projects found necessary in California and which are economically sound. Chapter IV lays out the concept of a sound project which can be financed under the method proposed in Chapter III. Methods for fairly and equitably dividing project construction costs among project purposes are discussed in Chapter V. Finally, the problems of repayment are evaluated in the remaining chapters.

III

PROJECT FINANCING

The subcommittee continued during the past year its work on the problem of raising capital to finance project construction. A number of alternatives suggested by the two panels of financiers appearing before the subcommittee the year before have been explored in some detail. Two suggestions showed merit. The first was the use of revenue bonds to finance the construction of the power features at Oroville.

The subcommittee made an effort to ascertain whether a generally accepted method of cost allocation would be adequate to support an issue of revenue bonds sufficient to finance the power features at Oroville. A rough estimate of approximately \$250 million was used for the allocation to power. In a letter dated October 29, 1958, Mr. John Inglis, Vice-President of Blyth and Company, Incorporated, stated⁽¹⁾:

"I can appreciate the necessity for allocating costs as far as some phases of the Feather River Project are concerned. However, I believe that a revenue bond issue could be marketed without this being in any way a drawback.

"Naturally, I am assuming either adequate legislation would be drafted authorizing the issuance of such revenue bonds by the State or State Agency. The legislation would also provide that all or certain power revenues would be the security for the revenue bonds and, naturally, it would be essential that the revenues be assured and adequate...

"In today's bond market, I would say that \$250,000,000 revenue bonds of approximately fifty years in maturity could be financed if a tight enough contract with a reliable purchaser or purchasers for the sale of such power were executed, and the amount of net power revenues available for debt service on the bond issue were in the neighborhood of \$13,000,000 or \$14,000,000."

Mr. Alan K. Browne, Vice-President, Bank of America, agreed, stating in a letter of October 23, 1958:

"I can see no objections to the issuance of revenue bonds on any particular phase of the development program wherein the pledge of revenues and other assurances to protect the bondholder would indicate feasibility. In other words, if there is sufficient revenue to satisfy the debt requirements, there should be no financing problem. In establishing a revenue bond, it would be appropriate to have it refundable by either state general obligation bonds and/or other revenue bonds. This would assure flexibility and the potentiality of the lowest interest costs desirable and possible."

It thus appears feasible for the State to issue revenue bonds to finance approximately half the construction costs of the Oroville features. Revenue bonds could also be used to finance the power features of other projects in the California Water Plan.

In some areas, such as Southern California, local water agencies can raise large sums of construction capital by issuing their own general obligation bonds. Frequently their bonds sell at a lower interest rate than state bonds. A lower interest rate, of course, would reduce the cost of project water to such agencies.⁽²⁾

Accordingly, the second financing alternative evaluated by the subcommittee was the capacity of local agencies or service areas of state projects to raise by their own general obligation bonds either a portion or all of the construction costs of various project features required to serve them.⁽³⁾ This money could be advanced to the State and placed in trust for construction purposes or could be used by the local agency to construct a portion of the project facilities serving them. In either case the local water users would have a substantially reduced repayment obligation to the State.⁽⁴⁾ If the local agency were able to construct, operate and maintain portions of a state project such as a branch aqueduct, it would have, in addition to retiring its own bonds, only its portion of the costs of the

storage features, delta pumping plants and main transmission aqueducts to repay the State, plus operation, maintenance and replacement costs for these facilities. This latter situation now exists in San Diego County where the Metropolitan Water District and San Diego County Water Authority are now constructing the southernmost leg of the Feather River Project aqueduct into San Diego with the anticipation that it will deliver Colorado River water on an interim basis. The San Diego County Water Authority stated to the subcommittee:

"This area is also able to contribute to the costs of works necessary for delivery of the water before the water would be available. Actually, the San Diego County Water Authority has already done so in its financing of the current construction of the Second San Diego Aqueduct along the route recommended by the Department of Water Resources as being the route through which state project water would be delivered into San Diego County." (5)

Regarding the possibility of advancing funds to aid the State in financing construction of state projects, the Southern California Water Coordinating Conference stated:

"Generally speaking, the urban areas in Southern California needing additional supplemental water have sufficient assessed valuation and economic capacity to pay their portion of costs of a state water development such as the Feather River Project, or alternately by constructing such portion on their own account, or advancing moneys in contract with the State. We believe this is sound policy to be applied throughout the State." (6)

The Metropolitan Water District stated:

"We have the financial capacity and could advance such money for the construction cost if such a proposal were approved by the District's voters, and assuming all other conditions as favorable for the completion of the contemplated development." (7)

The subcommittee received considerable testimony on the financing of both the North and South Bay Aqueducts. Some local sentiment was expressed for the organization of a metropolitan water district to finance and construct the North Bay Aqueduct. (8) Although this approach appears to be reasonable,

it had not been given full consideration by the project supporters. The bonding capacity of the areas served by the South Bay Aqueduct is much greater and could easily support local financing and construction.(9)

In other areas of the State which may be served by state projects, there appears to be no substantial capacity to assist the State in project financing. In fact, this reason plus the almost state-long scope of a major project, such as the Feather River Project, are two of the main reasons for undertaking a state construction program. Obviously, therefore, construction funds for project facilities required to serve undeveloped areas and to construct the main storage and distribution facilities must be provided by the State.

The State should utilize all available methods of raising local construction capital, not just because lower interest rates may thereby be possible, or because it is difficult for the State to raise the funds, but also because a sharing of the responsibility to raise capital will generally result in more local interest in the project and a sounder over-all project.

In view of these considerations, it appears that state revenue bonds can be used to raise the capital for construction of the power features at Oroville or at other projects where feasible. This practice, plus the advance of capital from local agencies when possible, or local construction of branch aqueducts when possible, plus the anticipated federal contribution for flood control features at Oroville Dam and the anticipated federal construction of the San Luis Project as an integrated feature of the Feather River Project, could greatly reduce the capital costs of the Feather River Project which the State must raise by general obligation bonds. By this financing approach, the State could pool the financial resources, construction capabilities and objectives of all agencies interested in the Feather River Project or any other major project. The State itself could fill in, with its general obligation bond issues, the financial voids that other agencies cannot handle as

well as building the main transmission facilities. Since these voids largely constitute areas of substantial state interest and touch upon the responsibility for coordination of development and comprehensive resource utilization, this role would not appear inappropriate for the State of California.

There would remain several less expensive project features which would have to be paid for by cash contributions from the State.⁽¹⁰⁾ Portions of the investment in recreation, fish and wildlife or certain nonfederal flood control benefits appear, as shown in subsequent chapters, to fall into this category. Because there would be no revenues to repay them, there would be no means of repaying general obligation bonds issued to finance them. Properly then, they should be financed from current revenues of the State.

The above approach to project financing has one distinct advantage. Since the capacity to finance a project would in part be related to the willingness of its beneficiaries to raise portions of the construction capital, the better the project plan, the easier it would be to finance. It would be easier to raise the construction capital for whatever number of projects are needed, for they would be largely self-financing. The State's available general obligation bond capacity would be strained much less and could be spread over more projects since it would have to furnish only a part instead of most of the construction capital required. The State's cash resources would have to furnish only the money for minor nonreimbursable features, and progress in project construction would have a minimum dependency on either a surplus in cash, new sources of General Fund revenues, or the status of the State's program of bond issues.

Water is far from a simple commodity,
Water's a sociological oddity,
Water's a pasture for science to forage in,
Water's a mark of our dubious origin,
Water's a link with a distant futurity,
Water's a symbol of ritual purity,
Water is politics, water's religion,
Water is just about anyone's pigeon,
Water is frightening, water's endearing,
Water's a lot more than mere engineering,
Water is tragical, water is comical,
Water is far from the Pure Economical,
So studies of water, though free from aridity,
Are apt to produce a good deal of turbidity.⁽¹⁾

IV

THE CONCEPT OF A SOUND PROJECT

It is easy to assume that a water project is a fixed object and that there is little variation possible in either planning or constructing it. Any project does indeed become fixed when constructed because most of its features⁽²⁾ cannot be changed after concrete and steel are in place. Thereafter, only large additional expenditures can change its size or service area, relocate the aqueducts or provide features not originally included. But there are equally important intangible aspects of project planning which also must be established. For example, a project is planned on assumptions regarding future sources and costs of energy, the economics of industrial and agricultural growth, and changing patterns of urban living and recreational interests.⁽³⁾ Some of these assumptions pertain to marginal project features which must, therefore, be most critically evaluated. In addition, many projects are so expensive that their repayment must be completed by future generations, which introduces the hazards of predicting future events at the limits of human comprehension.

Perhaps the most difficult intangible aspect of project planning is the nature of the market and the economic, political and social philosophy involved in assumptions made regarding the disposition of project services.

Since most large projects are constructed and operated by units of government, they are uniquely subject to a special category of marketing problems. Thus, public confusion frequently arises when governments market services which private enterprise would furnish at a profit if it could. Project policy frequently is lacking to indicate whether a governmental service is being provided at the expense of the general public, e.g., police protection, whether a vendible service⁽⁴⁾ is being sold on the basis of recovering costs, or whether a mixture of governmental services and vendible services is being provided through the use of subsidies.⁽⁵⁾ In California the degree of governmental services or vendible services which should be provided by state water projects has not been decided, although design and relocation work has started on the first projects authorized for state construction. The extent to which project services may be classified as vendible will be considered in subsequent chapters. First, it is necessary to establish the relation of vendible services to a project and its planning.

In view of the testimony received by the subcommittee at its hearings that the people of the State desire project vendible services be marketed under a policy of substantially full repayment,⁽⁶⁾ it is the purpose of this chapter to explore some of the more important aspects of formulating a sound project based upon a full repayment approach.

The Frame of Reference for Evaluating a Project

In planning a water project, a frame of reference is needed to evaluate the proposed project and the market for project vendible services, as well as to judge whether the State's capital and material resources are being utilized to achieve a net gain for the State. The Subcommittee on Benefits and Costs of the Federal Inter-Agency River Basin Committee in May 1950 published the

"Green Book"⁽⁷⁾ which derives a "project benefit" frame of reference from an adaptation of traditional economic theory. Traditional economic theory is based upon the businessman, his production of goods and services and sale of them in a competitive market to gain a profit. While this frame of reference does not specifically encompass the role of government, our government operates in this economic medium. The Subcommittee on Benefits and Costs has, therefore, simulated the medium in an adaptation it proposed in the Green Book which has become the standard for project evaluation by federal agencies.

The adaptation of the Subcommittee on Benefits and Costs deletes the customary profit motive on the basis it does not apply to most government activities. A concept of "benefits"⁽⁸⁾ is substituted for revenues to be realized from the marketing of project services. With these two changes, the framework then states that the "benefits" from government water resources development must exceed the costs required to secure these benefits. This benefit-cost ratio is substituted for the premise that the businessman at least covers costs with revenues in the long run. In applying benefit-cost analysis, the Green Book prescribes an elaborate system based on relatively arbitrary assumptions for estimating "net benefits" in terms of dollars to express the values derived from the project⁽⁹⁾. These elaborate computations of benefits are considered necessary because some project purposes cannot produce revenues, others are not required to produce revenues or do not repay their entire costs.

The benefit-cost evaluation methodology developed by the Green Book is oriented primarily to the concept of nonrevenue-producing government services and tends to treat all project services more as fire or police protection rather than as a business or utility-type operation. An evaluation of the subcommittee's transcript of hearings shows that there is no meaningful way to reconcile the Green Book approach of a benefit-cost analysis with the views expressed before the subcommittee that the people of California expect its water projects to be operated on a business-type basis in which project

beneficiaries should pay their costs. In California, therefore, revenues instead of benefits must become the basic criterion in project planning and formulation. Such a criterion is elemental if capital repayment is to be achieved. It therefore became logically necessary to reconsider the original premise of the Green Book when it established the benefit-cost analysis as the basic guide in project formulation. This reconsideration disclosed that the benefit evaluation approach (the benefit-cost analysis or ratio) is both theoretically and practically deficient for California.

Obviously, if project vendible services are marketed at rates which recover their construction costs, then project revenues need not be replaced by benefits in the framework of economic evaluation because revenues will more directly and easily serve the same purpose, i.e., revenues will accurately reflect those benefits which should be considered in project planning. In fact, if all project purposes furnished vendible services, there would be no need to compute any project benefits to evaluate the project. If project beneficiaries or recipients of project vendible services cannot repay the costs of producing such services (the question of subsidy or having costs administratively declared nonreimbursable is not being considered here) then the scope and service area of the project need to be reexamined and revised to bring costs in line with repayment, i.e., the project has not been planned to permit full repayment. Thus, revenues from project vendible services should be used instead of benefits for project planning and evaluation purposes, that is, a revenue-cost analysis should be used instead of a benefit-cost analysis where vendible services are involved. The revenue-cost analysis restores the traditional and accepted economic theory to project planning. Merely because governments do not operate to secure a profit does not mean that it is necessary to bypass conventional economic analysis and to ignore revenues in project formulation.

Rather, the evaluation of projects by the use of "benefits" should logically be limited to those project purposes which do not produce revenues.

The effect of the use of the benefit-cost analysis is to eliminate the use of the conventional market devices to evaluate project services and this is where its major deficiency for California occurs. The computed project benefits have no demonstrable dollar or market value but instead are expressed in fictional dollars. Project benefits are isolated into a medium of their own where they can be manipulated by computation and assumption to achieve whatever results are desired. In this isolated medium they are not subject to the impartial, objective test of the market. This concept of a special medium for evaluation of water project benefits is not consistent with our basic economic system. Edward F. Renshaw states this point clearly:

"In a free society with both consumer and producer sovereignty, the only real test of a benefit is the willingness of people individually and collectively to pay for value received."(10)

The following comments by Professor Pegrum underscore this point:

"The market economy or genuine imitation of it is a sine qua non for economic calculation and efficiency in economic policy. This basic fact cannot be gainsaid. Under an institutional system where individual freedom is one of the primary objectives and cornerstones, departure from the operation of the pricing system and the market economy is fraught with peril, even though at times it may be unavoidable. What should be avoided, however, is the temptation to ignore the rationing function of the pricing system under some such euphamistic term as the "benefit" theory. A free economy demands the use of the competitive pricing system under all possible circumstances and a full recognition of the consequences when there are departures from it, together with a full evaluation of the alternatives involved and a disclosure of the costs of the alternatives. In this way an intelligent and economical decision can be made..."

One of the most deeply imbedded principles of economics is that the various forms of the price mechanism which operate in the market place are the most efficient and socially desirable means of establishing the value of economic goods and services. The evaluation of project benefits outside of any market, as practiced in benefit-cost analysis, when a market actually exists or can be brought into being, is a deviation from traditional economic theory.

Revenue-cost analysis returns to the traditional economic concept that an economic good is worth what consumers are willing to pay for it and this will is best expressed when the market determines the price. If there is no government profit motive, the price expressed in terms of revenue, need only cover costs. Hence, the simple formula that revenues from vendible services of a state-owned, utility-type project at least equal investment, operation, maintenance and replacement costs, including interest.

It may be observed that the operation of the market pricing concept does not function exactly the same for water projects as it does, for example, in the purchase of a basket of fruit by a housewife. This is because government water projects do not directly face competition from other suppliers of water. However, the prospective purchaser of project vendible services has alternatives to the use of project services which can, in an economic sense, serve as substitutes for the project vendible services and, thus, an element of competition or purchaser alternative is introduced. When a project is to supply supplemental water, the prospective purchaser can reduce his purchases by more scientific irrigation techniques, by changing crops or by other adjustments. In other instances, he may be able to make some additional water available by adding capacity to existing facilities or by developing alternative supplies. Thus, the market concept can operate to the extent that the purchaser or beneficiary of project services participates in determining both the economic value of the service for planning purposes and the price he will pay. In the benefit-cost analysis, the construction agency determines by its own judgment and calculations what the economic value or benefits from the project may be. This is not the operation of the market system because the prospective purchaser or beneficiary has no voice in establishing the value of the vendible services, nor has his willingness to pay been tested. After the project is constructed pursuant to a benefit evaluation, the prices for project vendible services may have to be reduced below their economic value to prices which do not cover costs

in order to dispose of project services. Furthermore, ignoring the market pricing of project vendible services may lead to an anticipation by prospective purchasers that they will not be required to repay costs. Such a condition imperils the structure of capital repayment for any project.

Perhaps the above paragraphs make clear the real challenge in the use of revenue-cost analysis. Repayment becomes an inherent consideration in planning and design and actually raises the economic problems which must be resolved. Economic and financial feasibility analyses do not do this as may be shown by the equations below which set forth the ~~premise~~ of the Green Book:

Benefits must equal or exceed annual equivalent costs (economic feasibility).

Revenues must equal or exceed allocated reimbursable costs (financial feasibility).

At first glance, since benefits must equal or exceed costs in the first equation and revenues must equal or exceed costs in the second, it might be inferred that actual project revenues must equal or exceed costs. But the two costs are not the same; one is total economic costs and the other is allocated reimbursable costs. Each cost is computed differently and is intended to measure different cost values. Thus, the comparison of total project revenues to total costs required to produce those revenues, is never made. As a result, actual project investment, operation, maintenance and replacement costs have little relation to revenues (and virtually none where subsidy is involved). A simple comparison of these costs with revenues is never made; there is only an appearance of such a comparison.

No revenues or method of collecting them were discovered by the subcommittee for flood control and downstream fish, wildlife and recreational features, so a concept of benefits appears to be applicable. It is logical to use benefits for project evaluation when revenues cannot be collected. Inconsistency with accepted economic theory arises when benefits are substituted

for revenues even though revenues exist, as occurs in the benefit-cost analysis with the result that a revenue-producing project purpose is treated the same as a nonrevenue-producing purpose. This may be satisfactory for a federal project where capital repayment by each purpose is not a primary consideration because of subsidies but it does not fit the pattern of reimbursement and capital repayment recommended at subcommittee hearings.

The use of a revenue-cost ratio does not cause nonvendible project services to lose all value or to disappear. They still exist and can be considered in project formulation but nonmarket or benefit evaluations must be limited to nonvendible project services so that such benefit evaluation cannot distort the revenue-producing and capital repaying aspects of the project.

There is also some misunderstanding of nonmonetary project benefits, frequently known as "secondary" or "indirect benefits". Almost any state capital expenditure, such as water projects, highways, schools or institutions, brings secondary or "ripple effect" benefits in varying degrees from both the capital expenditure and the continuing supply of project services. Since all state capital expenditures have such benefits, water resources development projects do not occupy a unique position with regard to such benefits. Benefit-cost analysis tends to assume that only water projects have such benefits and, therefore, introduces a bias in favor of water resources development and against other programs by evaluating secondary or indirect benefits which are ignored in other government functions. In fact, the State Departments of Education, Public Works, Mental Hygiene, etc., if given time to develop methodology could also be expected to produce many favorable benefit-cost ratios, some of which might be much higher than those developed for water projects. Indeed, the benefits of providing facilities to educate one child for a productive life could be assigned an astronomical value compared to some water project benefits.

The problem faced by the State is much broader than that encompassed in the present use of benefit-cost evaluations to evaluate individual projects. It is how to allocate available funds among all government functions, as well as among individual water projects, so as to achieve the highest social, political and economic returns possible from all state expenditures. It is impossible to determine the proper share of the total funds available to the State which should be allocated to water resources development by any analysis unless the same analysis is applied to all state functions seeking funds. For practical reasons, this appears to be impossible because of the widely varied functions of government even if the theory of benefit evaluation were sound. Therefore, a benefit-cost analysis is meaningless as a guide to expenditure of state funds when applied only to water resource development.

Benefit-cost analysis is not concerned with the source or scarcity of the funds to be invested. In a business enterprise, capital can be raised by paying the current interest rate and this is a cost voluntarily entered into by the business. In government, the use of the public's credit and the sovereign power of taxation to raise capital for investment introduces another situation--forced contribution with or without returns. Benefit-cost analyses do not protect the taxpayer because they eliminate meaningful relationships between project planning and expenditure of public funds for construction on the one hand, and revenue or capital repayment on the other.

Since benefit-cost evaluation for revenue-producing project purposes contains both theoretical and technical deficiencies, it is not surprising that it tends to break down in practice. Net benefits over costs often are attributed to project purposes even when there is no possibility of marketing the project services to recover their investment costs because no one is expected to, nor can pay that much for the services. In some extreme cases the total investment benefiting each acre or other unit could not even be realized by sale of the

property being benefited.⁽¹²⁾ Frequently, project benefits are inflated.⁽¹³⁾ Projects with any moderate degree of soundness are rarely rejected for lack of a favorable benefit-cost ratio. The benefit-cost ratio does not effectively eliminate economically unsound projects and it is not used to rank projects on the basis of relative economic merit.⁽¹⁴⁾ The decisions in project selection, therefore, are usually made on some other basis, frequently purely political.

In summary, it thus appears that on the basis of both experience to date and theoretical soundness, the benefit-cost analysis is deficient for the needs of California. The only objective substantiation of a benefit-cost analysis for project vendible services is in the market place and this results in converting a benefit-cost analysis into what is actually a revenue-cost analysis.

Market Evaluation of a Project

Since the emphasis in appearances before the subcommittee was on substantial repayment of project costs, accurate evaluation of the revenue-producing capacity of the project market becomes of utmost importance in the planning process. If the planning process does not maintain some identifiable relationship between costs and revenues, there can be none in project repayment. To overlook this relationship is tantamount to planning a project without regard to its repayment. The Irrigation Districts Association stated the problem precisely:

"...there appears to be a tendency to approach our first state projects in reverse of the traditional method for the construction of financially feasible projects. Instead of starting with the determination that there is an existing demand for the water and power and incidental benefits which would create a group of financial underwriters for the project, there seems to be an attitude that the Feather River Project is necessary and beneficial and must be built--so now we have to find out who will pay for it."⁽¹⁵⁾

The market for each project purpose should establish whether that purpose is included within the project and should limit its size and scope to quantities which can be marketed at a price to cover the costs of production.

This was stated by the Subcommittee on Benefits and Costs in terms of net benefits rather than revenues, when it discussed the scope of project development.

"The scope or scale of development of a project should be established at the point where the net benefits from use of resources for project purposes are at a maximum. Net benefits are at the maximum when the scale of development is established at the point where the benefits added by the last increment of extension of scope are equal to the cost necessary to add that increment of scope to the project.....At the point of maximized net benefits, the total project benefits will necessarily exceed the total project costs by the maximum."

The Stanford Research Institute arrived at the same conclusion when it stated:

"In the discussion just concluded, it was suggested that the optimum point of development for a given project or project component is achieved when net benefits are maximized."⁽¹⁶⁾

If revenues are substituted for benefits, it follows that engineering factors such as the design of the dam, the operation of the reservoir, the size and location of project aqueducts and other service facilities have some identifiable relationship to the revenues derived from project vendible services. The planning of a project becomes then a balancing of engineering with market factors or revenue projections in which engineering is a means to an end, but does not of itself establish the end. Project planning is not a matter of warping economic and financial factors in order to force some relationship between the engineering design and the market for project services. The balancing of engineering and market factors is no easy task, particularly when market factors can be subtle and can even be played down by beneficiaries during the project planning period.

An example of the difficulties which can occur in project planning was revealed to the subcommittee during its hearing on repayment problems of the North Bay Aqueduct.⁽¹⁷⁾ Of the four counties proposed to be served by the project only the Petaluma Valley in Sonoma County and the southern portion

of Napa County had sufficiently urgent need for water to prompt them to give unqualified support to the North Bay Aqueduct. Both Sonoma County and Solano County have heavy bonded indebtedness just undertaken in behalf of new federal projects at Coyote and Monticello. The three principal cities of Napa County have their own water supplies to meet present needs. Marin County can construct alternative local developments or purchase Russian River water at costs which they claim will be equal to, or lower than North Bay Aqueduct water delivered to them.⁽¹⁸⁾ While some day in the future the North Bay Aqueduct may be needed, the market evaluation for the project had substantial deficiencies and did not justify the project as originally planned, even though the engineering for the project may have been sound.⁽¹⁹⁾

The use in California of the expression "water requirements" may be the source of some difficulties in properly evaluating the market for project vendible services. Professor Karl Brandt has observed that the word "requirements" originated in World War II as a method of identifying the military needs of the Nation which were to be given a high priority without regard to cost.⁽²⁰⁾ A more accurate economic expression than "requirements" is the word "demand" which comprehends price as well as quantity. The Stanford Research Institute has stated:

"Economic demand is an expression of the various quantities of a product that can be sold at various prices and under given market conditions. It is not a 'requirement' or 'need' computed without regard to either price or market conditions. As the price of a product increases, moreover, the quantity that can be sold generally decreases, and vice versa. Indeed, the quantity of project water that can be sold at one price may be far different from the quantity that can be sold at an appreciably different price."⁽²¹⁾

The effect of price on the quantities of water used and therefore the size of project facilities was shown the subcommittee by Mr. Howard W. Crooke, the Secretary-Manager of the Orange County Water District, when he discussed the effect of the \$3.90 per acre-foot tax, known as a replenishment assessment, which his district has levied on all ground water extractions.

"Consideration was given to the effects of the additional costs which would be added to water for irrigation and industrial purposes (by the \$3.90 tax). It was the general opinion that agriculturalists and industrialists would of necessity have to give special consideration to better planning in the utilization of water.

"Experience from the time of the levy of the first replenishment assessment to date indicates that many farmers are producing better crops with smaller, well-planned applications of water. Many farmers indicate that with the replenishment assessments on the production of ground water and with water meters on their wells they are for the first time in their farming operations giving careful consideration to their water usage. Industrial plants, where in former years water was used once and then dumped in the sewer, have re-engineered their operations and are successfully reusing their water many times before dumping it in the sewer. Other industrial plants have indicated their willingness to place in operation spreading ponds to return effluent water to the ground water supplies whenever analysis indicates the water is of such quality that it should be conserved. These water conservation practices no doubt are the result of higher costs of water... I believe from this trend in our area we can conclude that if water to agriculture or industry is subsidized to provide a low cost to the user, larger aqueducts will have to be built to carry excess water to provide for maximum rather than optimum use."(22)

Greater freedom is afforded to project planners by tax subsidies or payment by one group of project beneficiaries for benefits received by others. Under such practices it is not necessary to limit project costs by too stringent a consideration for revenues or benefits and projects can be planned for which there is little hope of an adequate market for repayment. There then is a basis for the seemingly logical conclusion that the project must be subsidized whereas the difficulty probably lies in the project planning and faulty evaluation of the market in relationship to actual needs. The fact that water is an essential commodity for human existence, that there is an unquestioned need for conserving our water supplies and that multiple purpose development of project sites should be encouraged, while true, nevertheless frequently obscure the economic principle that projects must in some form return the costs of furnishing their vendible services or they are a net loss to the state's economy. Otherwise the labor, materials and money put into the project might have been more

advantageously used for some other project.⁽²³⁾ To make this statement does not deny the need for sound, comprehensive water resources development. Rather, it means that projects should be planned to fit their market capacities.

There are limitations on the size of a project intended to provide a future water supply. The capital for construction whether borrowed or raised by taxes or user charges must come from the resources of the present generation but it will, in most cases, be paid back by future generations. No one knows the availability of capital to future generations but if the progress of mankind continues as in past decades, the raising of capital and the physical effort required to construct a major project in California will be easier by the year 2,000 or thereabouts than it is now. As a result, the sacrifices of the current generation to build a large project to supply water to meet requirements of 40 or 50 years in the future may be somewhat ill advised, for the future generation may be able to construct its own project to meet its needs with considerably less strain on its resources.⁽²⁴⁾

The North Bay Aqueduct, for example, is sized so large that its capacity will not be fully utilized until all project construction costs are fully repaid.⁽²⁵⁾ The resulting burden of amortization and interest is too great for most prospective water using agencies and particularly irrigation water users to repay from their very limited initial use of the aqueduct waters. The Department of Water Resources in Bulletin 60 proposes that the resultant initial revenue deficiency of \$17,000,000 during the first 30 years of operation of the North Bay Aqueduct should be made up by the State. As a consequence of oversizing, the State would initially have to raise an excessive amount of construction capital and then make up the revenue deficiencies which may partly result from the greater interest payments required. This doubles the penalty for oversizing the project.

Two justifications are given for sizing a project so large. One is that the project revenues will be adequate to repay these deficiencies in the

last 20 years of the repayment period. This future revenue does not, however, provide the funds to pay the heavy project annual costs during the period of revenue deficiency. The second justification is that it is cheaper to build a large project initially. If all costs, including revenue deficiencies based on full repayment, show that the large project is cheaper, then it should be built, but all costs must be considered.

Since the subcommittee's transcripts show that users of project services who do not wish to repay their costs are in a minority in California, and that most water users are willing to pay their full costs if they can, it is a paradox that projects with insufficient revenues to repay costs can be planned. The reason, it may be repeated, seems to be the practice of using project benefits instead of revenues from vendible services to provide economic limitations on project designs. A total "net project benefit" figured in hundreds of millions of dollars means nothing to the individual project beneficiary as a figure and because it bears no relationship to what he will have to pay for project vendible services, gives him no effective and realistic tool with which to evaluate the project. He is interested in what he will have to pay for the project vendible services he receives and this has little relationship to the net benefits which control the project's size and service area. The project beneficiary, therefore, is faced with the repayment of project costs which have little relationship to his ability or willingness to pay. Such a beneficiary is understandably bewildered if he does not comprehend why his project costs are beyond his ability to pay.

On the premise that the best measure of the soundness of a project lies in the willingness of people to pay the costs, there is no better justification for project construction or more logical indication of the feasibility of a project than a commitment for the purchase of project vendible services. Such a commitment, made before construction is started, is most essential whenever a project facility serves only one customer. Otherwise, the State may be left

with a completed project facility and an inadequate repayment agreement because it has lost its bargaining position with the completion of construction and must salvage its investment by taking any repayment terms offered.

Logically, a 50-year repayment period is the maximum repayment period which can be justified for a project.⁽²⁶⁾ An interest rate of three percent, which is an approximate average for general obligation bonds will, when compounded over 50 years, result in total interest payments nearly equalling the capital involved.⁽²⁷⁾ It is almost impossible to justify the use of capital for purposes for which the returns are so low that interest costs will exceed the capital value of the investment. Since the State can most easily and justifiably raise project construction capital through the issuance of revenue and general obligation bonds, there is an approximate limit of 50 years on the project repayment period. The use of a 50-year repayment period would also be consistent with federal practice if there should be federal cooperation in a project.

The Objectives to be Realized by a Project

Another major area of decision for California lies in establishing the objectives to be achieved by a water resources development program. This is perhaps the most hazardous problem area to be resolved because it involves selecting objectives which will assure that projects, upon completion and during their useful lives, will best serve the needs of the State and its water users. This involves understanding the future economic development of the State and providing water supplies in a manner which will advance rather than retard that development.

The subcommittee has studied with interest a report by Messrs. McGauhey and Erlich of the University of California which explores the economic value attached to water utilization for different purposes in California and the selection of objectives which will assure maximum economic development in

California. Messrs. McGahey and Erlich conclude that federal reclamation policies will not provide the necessary guidance if maximum economic advantage is to be secured from the State's development of its water resources. (28)

"In underpricing water to carry out land use objectives, federal policy has been an inflexible substitute for supply and demand. As the agent for channeling the utilization of this resource to producers, public policy has encouraged uneconomical use in the sense that it has led to the apportionment of water in a manner unrelated to the relative yields that might result from its use as a factor of production. When industrial growth burst forth, water policies founded exclusively on a concept of maximum land reclamation were rendered ill-adapted to the changing pattern of western economic development. Industrialization stimulated a trend toward urbanization and a shift of population from farms to cities. Consequently, urban water demand persistently increased and it became possible to put important amounts of water to uses yielding a higher return and creating wider economic benefits than irrigation. Clinging to tradition, however, federal policy tended to stress the application of water to land and, in turn, to perpetuate an agrarian economy in the west. Thus, it became a faulty gauge of the economic value of water." (29)

It makes a difference to California's economy whether the State or Federal Government finances a project. If the Federal Government spends its money on either a marginal or a sound project in California, the State benefits from the influx of capital and the new economic activity resulting from the enjoyment of the project's services. This is a net gain to California's economy as an individual state even though California pays a portion of federal taxes. But when the State does the same thing on a relatively state-wide basis or for a local project, it takes money from one of its own pockets and puts it into another, for there is generally no net inflow of capital. (30)

The future economic development of the State and the associated need to provide job opportunities for the increasing population resulting both from in-migration and births is surely one of the major objectives of a water resources development program to be considered both now and in the future. Water resources development in California is needed to supply the market for water created by California's population, which is currently increasing at the rate of 500,000 persons annually. This is probably the most important economic factor in water resources development in California.

The following summary data covering a variety of indexes indicate the impact of population growth and the State's industrial expansion on California's water use and its potential influence on water resources development.⁽³¹⁾ Of every ten new persons in the State, six settle in the Los Angeles Metropolitan area, two in the San Francisco Bay area, one in the Central Valley and one in the remainder of the State. Total income from manufacturing increased 1.4 percent between 1950 and 1955 in the United States but increased 7.4 percent in California during the same period. In the period between 1933 and 1955, the increase in total personal income in California from manufacturing was three and one-half times that of farms. In 1955, 5.6 percent of California's total personal income came from farms compared to 67.7 percent from manufacturing.

The increase in farm employment in California from 1950 to 1956 was approximately six percent while the increase in manufacturing employment was approximately 58 percent. During the period from 1920 to 1950, California's farm population dropped from 15.2 percent to 6.3 percent as a percentage of the State's total population. Expenditures in California for hired farm labor in 1954 amounted to \$410,000,000 while wages for manufacturing workers amounted to \$3,144,000,000. The average factory worker earns annually more than twice the amount earned by the average farm worker.

The average net income per farm in California is currently more than three times the average of the United States. One reason for this is the presence of large highly organized and skilled farm operations. For example, in 1950 farms of 1,000 acres and over represented only 4.4 percent of total farms but comprised 70.7 percent of all land in farms. The amount of farm income received by these large farms in California is probably in the same proportion. However, about 50 percent of all farm operators in California, and these are the very small farmers, received outside income exceeding their farm income and this percentage is increasing rapidly.

These summary data show that industrial growth has been the basis for the major expansion of the State's economy in the past and will be the source of most of the future new jobs available to support the increasing population. It is also a major contributor to the growth of the State's tax base and general wealth. Therefore, the report of Messrs. McGauhey and Erlich questions whether water resources development should overlook those sections of the State's economy such as industry which can pay their own way and which contribute the most to the State's economic growth by giving inordinate attention to agriculture.

In 1950 the President's Water Resources Policy Commission noted this problem and gave the following advice:

"...even taking into account possible new developments, it is not considered likely that irrigation will provide support for more than 700,000 additional people in the Central Valley, including those indirectly dependent on farming activity... It is therefore evident that searching attention will have to be directed toward other means of supporting people, particularly manufacturing."(32)

As far back as 1945, Henry J. Kaiser stated:

"California's population constitutes so impressive a segment of the American market that virtually every great national merchandising organization has established facilities here. Expansion of manufacturing industries is essential in western economy. This is no reflection on the record of agriculture but it is rather an admission that California can no longer be operated on the products of the soil without ruinous taxation."(33)

Mr. Warren Thompson, Director Emeritus, Scripps Foundation of Research on population problems, in referring to the Central Valley Project, stated:

"In spite of the fact that the land in cultivation is likely to increase greatly, especially the land under irrigation, agricultural employment is more likely to decrease than increase. This means that no significant part of the future increase of population in the State will be absorbed in the expansion of agriculture."(34)

In view of the growing importance of industry, Messrs. McGauhey and Erlich conclude:

"The foregoing comparisons by no means suggest that if all of our water resources were put to urban and industrial uses instead of into irrigation, California's wealth would be

unbounded. They do, however, provide a basis for judging the economic wisdom of consigning limited water supplies to the irrigation of land without a thorough study of the quality of the land and without carefully considering the possibility that a greater economic good might come from assigning water to some competing beneficial use. This becomes especially critical in view of the irretrievability of water committed to irrigation--both because of the vested rights which go with the commitment and because irrigation water is consumed during use. The comparisons also suggest a revision of our past widespread tendency to consider the relative economic importance of industrial and irrigation water to be in the same ratio as the relative quantities used by each."⁽³⁵⁾

The logic of the thesis advanced by Messrs. McGauhey and Erlich is impressive. Their thesis, however, is not that farming has no place in California's future economic expansion, nor is it an argument against any appropriate assistance to agriculture. Rather, it is an effort to define the future role of agriculture in California and to establish, not its importance per se, but its importance in relationship to other future needs for California's water supplies. Urban and industrial water users have demonstrated their ability to supply their own needs in the past, and it has not been demonstrated that urban and industrial water users have suffered in the past in comparison with the more favorable treatment given agriculture. But as for the future, the same assurance cannot be given and herein lies the cause for concern.

Another problem of objectives in California's water resources development is the inclusion of recreation features at state constructed projects. It is clear from the subcommittee's record that the people of California desire to recognize recreation as a major purpose in project planning and construction. The growing need for recreation accompanying higher standards of living and increasing population and the importance of recreation as an economic base to many northern California areas was repeatedly confirmed.

However, the planning and construction of sound projects which include recreation features is not without its problems. Foremost of these problems is recognition of the nature of recreation development needed to satisfy varying

needs throughout the State. In many northern areas of the State the reduction in business caused by declines in lumbering, mining and other local forms of commerce is creating unemployment. Some of these areas are fortunate to be located where excellent natural recreation potential exists. In other places, recreation cannot become important without first developing or improving available water for boating, swimming, fishing, streamflow maintenance and scenic attractions. The development and improvement of such water resources potentials can, along with the development of other natural attractions, stabilize or enhance the economies of these areas. Therefore, these areas anticipate the creation of a recreation business of sufficient magnitude to constitute a source of gainful employment.

Other areas of the State also have need for recreational developments associated with water resources, but in these areas the relative effect on local employment and commerce will not be major and perhaps only slight. Therefore, the same recreational facilities that may foster an important form of commerce in one part of the State are considered to be fringe benefits in another part of the State. (36)

It should not be overlooked that the capacity to enjoy recreation of the type and magnitude considered here is a result of a high standard of living. The foundation of a recreational industry in northern California is then dependent on the economic vitality and continued high standard of living of all of California and the rest of the Nation. In the event of a serious economic recession, the expenditures made on recreation by the average person may be among the first to be reduced. (37)

There is, as a result, a close relationship between the need or market for recreational services of water projects and the general standard of living of the State and its adjacent areas. Recreation, as well as all other project services, has a market which should determine the nature and extent of recreational

features and developments which can justifiably be included in state water projects. The nature of this market is not known, and it will no doubt take some experimentation and study to establish an understanding of it.

One of the functions of the California Public Outdoor Recreation Plan Committee is to establish the needs for recreation in California and to outline a program which will indicate how these needs can best be met, whether through water projects or some other means. Mr. Dewitt Nelson, the Chairman of the California Public Outdoor Recreation Plan Committee, stated before the subcommittee:

"The plan and program of our study provides for an appraisal of the present and future need for outdoor recreation, a survey of the existing and potential supply, and an examination of the means for assuring an adequate future supply. From this study, preliminary recommendations will be prepared concerning the kinds of land and water areas which will be needed for outdoor recreation; where, in general, they should be located; the extent to which government should take action; and the jurisdiction of government which can reasonably be expected to finance the acquisition, development, and operation of the areas needed.

"A large share of the present recreation interests of the California population is in activities requiring water. Recent trends indicate that these interests will continue. We are, therefore, examining prospective water resource developments as one of the future sources of supply for types of recreation requiring water areas. Other sources include the natural streams and lakes, the ocean, and the bays and lagoons. The extent to which we will examine the potential of reservoirs will be related to their locations within the State. Reservoirs located close to heavy concentrations of population will be subject to the greatest demand on a year-round basis, since they will lie within weekend range of population centers. We will be especially interested in these nearby reservoirs. The more distant reservoirs will have their main potential during the vacation season when people have the necessary time to travel longer distances.

"Reservoirs vary widely in their recreation potential, both in quantity and quality, and we will be interested in classifying and evaluating them accordingly. For this purpose, we will have to rely upon limited experience since reservoir recreation is comparatively new."(38)

The subcommittee hopes that the work of the California Public Outdoor Recreation Plan Committee will furnish data which will assist in laying a sound economic and social basis for establishing the scope and size, as well

as justifying the recreational features of projects. Meanwhile, it appears that the addition of recreational features as economically justified is a worthwhile objective of water resources development in California.

One final problem of objectives involves the nature of the services to be offered by state constructed projects in those areas where other water agencies are already serving the best portions of a market. For example, the subcommittee found that the Solano Project of the Bureau of Reclamation will serve the best lands in Solano County with irrigation water. The remaining lands proposed to be served by the North Bay Aqueduct are of poorer quality with less capacity to return project construction costs.⁽³⁹⁾

In the area of the South Bay Aqueduct the City and County of San Francisco is already serving most of the higher revenue-producing markets for municipal and industrial water at rates beginning at \$65 per acre-foot. The State proposes to build the South Bay Aqueduct to serve agricultural, municipal and industrial water needs of the area. The State needs the sales of municipal and industrial water to repay those costs which should properly be charged to them in order that agriculture will only have to repay its proper costs. However, the City and County of San Francisco has indicated that it will resist any competition from a state project, particularly if the water is subsidized.⁽⁴⁰⁾

The question naturally arises whether the State will construct projects which have limited markets because some other agency is skimming off the cream of the market and leaving the unprofitable service to the State. If the State is to serve these unprofitable or limited markets, it probably will have to engage in a policy of generous subsidy. The only apparent alternative is to serve the market on the basis of integrating the state facilities with existing local facilities.

All of the foregoing discussion in this chapter has pertained only to the economics of sound water resources development. But California's future economic growth will require the development of many other resources in addition to water. As stated by one well-known authority, Professor Karl Brandt,

"The expected growth of the economy will depend largely on the availability of a sufficient flow of capital into investment in raw material producing, heavy and manufacturing industries, in power generation, transportation, housing, agriculture, and service facilities of all sorts. Such capital will be continually a scarce resource." (41)

The competition for California's public and private capital needed to develop these other essential resources will largely be controlled by the interplay of market conditions. Water development may not play its proper role if it is manipulated by noneconomic factors, for then water resources development may not satisfy all the State's economically justified needs. (42)

Professor Brandt also observed,

"In the development of water resources lies the great challenge to the ingenuity of this Nation. But there also lies in it the temptation to make exorbitant errors in timing and scope of investment which would lead inevitably to a detrimental impact on the development of the economy by laying idle for years capital, labor, and research resources--all of which are scarce amidst our relative wealth." (43)

In summary, it may be stated that there is no basis in available data or economic principles to predetermine for the indefinite future how the State should develop its water resources. Occasionally, individuals and groups may have their opinions but these frequently are colored by personal advantage or fear of loss. The safest course is to permit the play of economic factors and particularly supply and demand to exercise their natural influence in the market.

MULTIPLE-PURPOSE PROJECTS AND COST ALLOCATION

Assuming that the State raises sufficient capital to construct a multiple-purpose project, it is necessary both in the planning stage of the project and at the completion of construction, to make some equitable allocation of total construction costs among the purposes served by the project. This distribution of costs is not strictly a cost accounting function because it involves complex engineering and economic factors if an equitable allocation is to be made, and the problem of cost allocation is essentially one of striving for equity of treatment of each project purpose.

An understanding of several basic aspects of the planning and construction of multiple-purpose projects is essential to a comprehension of the cost allocation problem. The essence of multiple-purpose project development has been concisely stated by Brigadier General W. E. Potter, United States Corps of Engineers.

"There are a number of advantages inherent in multiple-purpose planning and development. One is economy, for it is usually cheaper to provide for several water uses in a single project than to build several single-use projects. Another is conservation of project sites. Favorable damsites are rare, and it is essential that the potentialities of each site be utilized as fully as is practicable. Multiple-purpose construction may permit development of water uses which could not be justified individually... And perhaps most important, multiple-purpose construction provides for future flexibility in the use of water."(1)

A water storage project requires certain basic structural features. Thus, a structure to impound water, reservoir space for the impounded water, and a spillway to bypass excess flows which cannot be used, are all essential, no matter what the intended use of the project. These are joint-use features which serve all purposes of the project irrespective of the number of project purposes. Naturally the size of these joint-use features will vary with the number of purposes served, the quantity of water devoted to each purpose, and

the physical characteristics of each project site, but these joint-use features vary only in size and not in number. This factor is fundamental to the economics of multiple-purpose projects. Thus, the use of one set of joint-use features for more than one purpose allows each purpose to be served at less cost per purpose than the use of separate structures for each purpose.

A power plant, diversion works or pumping facilities may be included in a multiple-purpose project, but these are single-purpose features which can clearly be related to the purpose being served. Normally, these single-purpose features will not serve any other purpose and can be identified so that their costs can be charged to the proper purpose.

Although no generalization can completely apply to each project, in general the addition of more purposes to a project is economically advantageous to each project purpose. Although the total project costs will be increased, that portion of the total costs which is properly chargeable to each purpose should be less than the costs of a single-purpose project providing equivalent services. As has been shown above, this results from dividing the costs of joint-use facilities among several project purposes. Thus, flood control, power, irrigation, etc., can be achieved at less cost than would be involved in building a series of separate single-purpose projects.

A multiple-purpose project should have sufficient reservoir space to permit the maximum economically justifiable retention of flood waters, as well as the maximum conservation of water during wet seasons for later release for power, irrigation and municipal water supplies, maintenance of navigation, fish life, recreation, salinity repulsion or similar purposes. The use of the reservoir space must be allocated to each purpose both as to annual time of use and quantity. The reservoir space must be available as planned, otherwise a portion of the project construction costs cannot properly be charged to the purpose. Thus, both proper planning and adequate operating limitations are essential to preserve the integrity of each project purpose if construction costs are to be allocated to it.

There is room for much honest disagreement in allocating project costs because some costs are relatively difficult to relate to the purposes served and joint costs cannot be directly related to the purpose served. It is also possible to manipulate the selection of cost allocation methods in order to arrive at predetermined ends. Because the allocation of costs is the basis for determining those project costs to be charged each project purpose, it indirectly establishes the rates required to repay project services. Therefore, it can also conceal subsidies to project beneficiaries who may be relieved of the requirement to repay their fair share of project costs. As a result, abuses can occur in the cost allocation of multiple-purpose projects which cannot occur in single-purpose projects.⁽²⁾

Many different methods have been tried by the Federal Government in past years for allocating project costs, but most have been faulty in some respects. In May 1950, the Subcommittee on Benefits and Costs, after extensive study recommended the separable costs-remaining benefits method for allocating construction costs to the various purposes of a project. This method is now widely accepted throughout the Federal Government and is standard in all project planning by the Corps of Engineers, the Bureau of Reclamation and the Soil Conservation Service.

Essentially, the separable costs-remaining benefits method of cost allocation for multiple-purpose projects is an attempt to develop an equitable method for charging the construction costs of joint-use features of a project to each of the purposes served by the project. It is based upon general agreement that each purpose of the project should share equitably in the savings resulting from multiple-purpose construction and that the cost of joint-use features should be distributed to each purpose of the project on the basis of benefits and without regard to the repayment of that purpose. Federal repayment policies are a separate matter and do not influence cost allocation.

The separable cost for a particular purpose is computed by omitting the purpose from the project design and then deducting this recomputed cost from the total cost of the multiple-purpose project. It is not the incremental cost of adding the purpose to the project, rather it is the estimated cost of the project without the particular purpose. The total separable costs computed for each project purpose, when deducted from the total project cost, gives the remaining joint costs.

The cost allocated to each purpose of the project is limited by a floor and a ceiling. The separable cost, itself, is the floor or minimum portion of the cost of the multiple-purpose project which may be assigned to the purpose. The ceiling or maximum cost which can be allocated to the purpose is the lesser of the benefits derived from the purpose or the alternative justifiable investment, that is, the alternative investment for a single purpose project which will obtain the same benefits. The remaining joint costs are added to the separable costs by apportionment among the project purposes on the basis of project benefits. Thus, a portion of project costs are allocated on the basis of benefits. No joint costs are added to a purpose which would cause the total of separable and joint costs to exceed the ceiling for the purpose.⁽³⁾

A second method of allocating project costs is known as the alternative justifiable expenditure method. It differs from the separable costs-remaining benefits method only in that actual or specific costs of single-purpose features of a project are used instead of the separable costs. This results in a larger figure to be distributed as joint costs. Since it is considered desirable to keep joint costs at a minimum because they are the source of difficulty in cost allocation, this method is not the first choice. However, the two methods are fundamentally similar and the alternative justifiable expenditure method is considered acceptable whenever separable costs cannot be computed.

A third method, the use of facilities, can be used in those cases where only two or three purposes are served by a project. A simple distribution of costs based on the proportion of use of the facilities for each purpose is adequate under such circumstances.

These three methods of cost allocation are currently in use by federal agencies. Of the three, the separable costs-remaining benefits method is preferable, but it is a complex method which is best suited to large-scale projects with a number of purposes.

Several other technical limitations make the method difficult to use occasionally and, in addition, it involves expensive calculations for small projects. It is, therefore, advisable to provide for some flexibility in the choice of allocation methods. This flexibility has been requested by the Department of Water Resources.

In selecting a cost allocation method, the subcommittee has considered not only federal practice but the fact that the report of the Stanford Research Institute and the statements of the Department of Water Resources explicitly support the separable costs-remaining benefits method. No recommendations against the method were presented to the subcommittee.

The Stanford Research Institute did point out one weakness:

"The principal weakness of the SC-RB method lies in the measurement of its determinants... the varying nature of the different project purposes renders benefit measurement on a comparable basis difficult. To the extent that these bases cannot be clearly defined or are not realistic, calculations of benefits can be used to manipulate the allocation method. In spite of the difficulties in measuring benefits, there does not appear to be a more suitable determinant for allocating costs. The closer that measurement of anticipated benefits can come to predicting the true value of a project's commodities and services, the more sound will be the cost allocation method."⁽⁴⁾

In recognition of the difficulties of computing project benefits as discussed in the preceding chapter of this report, and in view of the conclusion that revenues should be used in place of benefits in project planning and

justification, it is logical and consistent to use revenues in place of benefits in the allocation of costs by the above three methods whenever vendible project services are involved. This change will simplify the cost allocation computations and should not materially change the results.

VI

IRRIGATION REPAYMENT

The most difficult problems of project repayment pertain to irrigated agriculture. Agriculture probably has the lowest repayment capacity of any major project purpose, yet it is one of the most expensive purposes in terms of capital investment and uses the most water consumptively.⁽¹⁾ Any state irrigation repayment policy must contemplate the well-established policies of the Bureau of Reclamation as well as an array of economic and political farm problems ranging from surplus crops, price supports and soil banks to the international complications of dumping surplus crops on foreign markets. The subcommittee was not authorized to consider all these ramifications of irrigated agriculture; indeed, it could not since most of them are national rather than state problems. Still, all these problems will affect California's irrigated agriculture when it repays the costs of a state project.

Agricultural Surpluses

Agriculture is an important part of the state's economy and is the State's largest class of water user. Farm income contributes about six percent of the State's gross income, and farms support about six percent of the State's population.⁽²⁾ The long-range desire of this sector of the State's economy to expand is normal and probably justified by the forecasts of increasing population. Nevertheless, the farmers of California and the Nation face an intermediate-range problem of general overproduction in the next decade or two which is working hardships on both farmers and taxpayers. Although the people of the State and the Nation are fortunate to have a supply of food and fiber which exceeds their needs, the very abundance of this supply creates problems which are well known.⁽³⁾ The magnitude of this oversupply means that the Nation's farm policies face some readjustment. The State of California cannot correct the Nation's overproduction of farm commodities but it need not aggravate it or expose itself to jeopardy from shifts in federal farm policies.

The intermediate range expansion of agriculture on a large scale in California has apparently been assumed to be entirely in the best interests of the State, whereas it is only partially beneficial or needed.⁽⁴⁾ The subcommittee's record shows that such expansion will be mostly beneficial to lands receiving the water and to urban areas immediately adjacent. But this benefit is also dependent upon the extent the market of the State's farmers is subsidized by federal price support programs or controlled by state marketing orders. The taxpayers of California contribute about 10 percent of the billions of dollars in federal expenditures to help alleviate agricultural overproduction. California's contribution to federal expenditures for farm surpluses is greater by several times than the annual capital requirements for a state water resources development program.⁽⁵⁾ Thus, if California subsidizes irrigation water from its own projects, the taxpayers of California would help pay to provide water for agriculture; would help pay for the federal government to take general overproduction off the market; and would help pay storage charges on surplus commodities, all for food and fiber, substantial amounts of which are not needed at this time or in the immediate future.

Although there have been sizeable federal expenditures in California for both the soil bank and surplus crops in the last few years, the crops grown on irrigated lands in California are not generally under federal price support.⁽⁶⁾ California-grown citrus, nuts, grapes, row crops, fruits, tomatoes, et cetera, are marketed without federal price supports although some of the commodities in this category are under state marketing orders. Production of these commodities and a great variety of other products grown in California is already increasing without state projects and can be expected to increase even though the State supplies no irrigation water. This is because existing irrigation districts are expanding their areas of service, new irrigation districts are being formed, and new federal supplies of irrigation water are being developed.

The subcommittee has no specific evidence on how much the State's presently nonsurplus agricultural production can expand without overproduction but general indications are that any justifiable expansion is limited. A report prepared for the Hoover Commission Task Force on Water Resources and Power estimates the increase in agricultural production needed by the Nation as a whole:

"Comparison of projections of agricultural production for 1975 with consumption estimates for 1975 make two points evident: First, a normal acceptance and application of technology to present agricultural land resources can produce enough of the crops like wheat, corn, potatoes and cotton which are in oversupply now. Second, not even the most complete acceptance and application of technology to present agricultural land resources can produce enough fruits, vegetables and livestock products, particularly beef, to meet our requirements in 1975... It is apparent that the Nation will need to develop some new lands in order to produce enough fruits, vegetables, and livestock for the consumption requirements in 1975. The type of land reclamation to be undertaken, the type of land to be reclaimed, and the location of the lands in relation to other resources and the pattern of economic development, should be considered in relation to the specific agricultural commodities which will be needed." (7)

Speaking more specifically about California's agriculture, the California Department of Agriculture has advised:

"Specialists indicate that our good agricultural land is disappearing at the rate of 100,000 acres each year into urban and industrial developments and for use by federal and other public agencies. Our population increase in time will also be a potent factor to efface some of the surpluses in our specialty crop production. Such factors as these complicate one's thinking in terms of potential production within the next two decades. ***

"We are not aware of any crops grown in California on irrigated land now normally in short supply either locally or nationally. In fact, many of our fruit, nut and vegetable crops are ordinarily in good supply by comparison with market requirements. Peaches are being produced in overabundance. Potatoes, lettuce and melons, too, are being produced in overabundance. Also, such crops as cotton and rice are in ample supply. California cotton is in a relatively favorable position, however, because our cotton is of a staple which normally brings market price premiums. Furthermore, in California cotton is produced more generally with machine methods than in the older cotton-producing areas of the United States.

"We are not aware of any agricultural crop grown in California on irrigated land for which increased acreage should be developed in the immediate future, with the possible exception of alfalfa. This is because of its soil-improvement characteristics and its importance as a feed for livestock and poultry.***"

"With improved technology, yields per acre have increased beyond previous expectations. Such progress is still taking place. The additional irrigated agricultural acreage needed for California in the immediate future is more particularly to offset that which is being diverted to non-farm uses. Otherwise, the need is for only gradual expansion. In terms of water use, however, many underground sources of water have been drawn down to uneconomic levels, and need to be augmented by surface water sources.

"The need for expansion in irrigated agriculture for the period 1970 to 1980 will depend in a large measure upon population trends in California, specifically, and in the Nation generally. By 1975, population in California may reach approximately 25,000,000 persons, or something approaching an increase of about seventy-five percent (75%) over recent numbers. Nationally, the increase is likely to be approximately thirty percent (30%), which is less dramatic, but nevertheless very substantial. Furthermore, diets are likely to continue a recent and present trend toward more fruits, leafy vegetables, poultry and eggs, red meats and dairy products, with fewer potatoes and cereal grains, including rice. California will need a substantial increase in the use of land suitable for the production of fruits and leafy vegetables, and a more intensive use of land for feeds for animal products. Acreage increases for cotton, potatoes, and rice need not be substantial.

"Through the decade indicated (1970-1980), acreage increase in California need not parallel increases in population. An increasing percentage of our production will be marketed within the State, and a lesser percentage of our production will be marketed in out-of-state markets because our rising costs of transportation and marketing are making the movement of our products to midwestern and eastern markets increasingly difficult. Furthermore, advancement in technology very likely will continue, a development which will make it possible to produce more products from the acreages available than has been the case in the past; although irrigated land acreage of necessity will be increased gradually, this rate of increase may not prove so rapid in California as population increases would tend to indicate."⁽⁸⁾

The apparently limited justifiable expansion of California's agriculture must be considered along with the mounting evidence of dissatisfaction throughout the Nation with the present national farm policies, the high cost of support programs, and the dependency of many farmers on a politically precarious system of price supports. The State of California cannot predict the results of this dissatisfaction with national farm policies but it is prudent to assume that significant changes will occur in the farm policies of the Nation. Some agricultural economists argue as a possible solution to the Nation's farm problem

that from 50,000,000 to 60,000,000 acres should be removed from production to bring supply in line with demand.⁽⁹⁾ Arguments of this type should encourage a careful and selective approach to the State's agricultural expansion.

It can be assumed that future changes in the farm policies of the Nation will not have as much impact on California's agriculture as in some other parts of the Nation. Although most of California's irrigated farm production is not under federal price supports, the shifting patterns of crop production in other parts of the Nation, which might result from changes in price supports, could increase production in other states of those crops which California now produces almost exclusively. This is only a possibility--it may or may not occur. On the other hand, a reduction in price supports could also curtail some agricultural production in California or cause a decreased rate of expansion. The effect on the irrigation repayment of a state project from any of these changes could be serious.

Some new agricultural water supplies are needed for expansion of California agriculture to feed the increasing population. In addition, new water supplies for new agricultural lands are needed if only to continue replacing present farm lands being taken from production by subdivisions and to supplement diminishing ground water supplies. The problem may be stated simply, even though its solution is not simple. It is to pace the justifiable expansion of the State's agricultural water supply so as not to stimulate overproduction while, at the same time, not denying a supplemental water supply to existing agriculture now dependent on diminishing groundwater supplies.

As in the case of the marketing of any project vendible service, the safest and soundest approach to irrigation appears to be full repayment of costs. Only by this approach can the State be reasonably assured that the water it develops for irrigation uses will not aggravate the oversupply of farm produce or be put to production which might collapse if the Nation's farm policies are changed.

Bureau of Reclamation Irrigation Repayment Policies

Careful and conscientious consideration has been given to the irrigation repayment policies of the Bureau of Reclamation and to the appeals for the adoption of those policies in California. It bears repeating that federal programs and policies serve national purposes and objectives so that what is appropriate as a federal policy is not necessarily appropriate as a state policy. There are several over-all reasons why federal policies on irrigation repayment are not appropriate in all respects for California.

First, federal reclamation policy has evolved from a long series of policy changes with roots going back 50 years. Its original concept was merely the interest-free investment of money received from the disposition of public lands to build projects for the improvement of public lands. In time, federal tax revenues were appropriated and project construction shifted from benefiting public lands to benefiting private lands. The reclamation program was altered without a fully corresponding revision of objectives or repayment policies consonant with the changed character of the program.

Second, federal reclamation policies on irrigation repayment are not without powerful critics. It is doubtful that Congress, starting afresh, would reenact present reclamation policies.

Third, the State of California can raise large sums of capital to construct irrigation facilities most easily and properly by the use of bond financing. The use of bonds requires the State to find some method to pay the interest on these bonds if irrigation water users do not.

Fourth, the University of California has pointed out that the future economic growth of California will depend primarily on industrial expansion rather than agricultural growth. Thus, to the extent that reclamation repayment policies over-charge industrial water users and power users to assist irrigation water users, they reverse the repayment pattern which would, if desired, most directly stimulate the state's economic development. In Solano County and

even in Kern County, as well as other predominately agricultural areas of the State, there is a growing recognition that industry is needed in addition to agriculture for continued growth and prosperity. Although supporting the continued development of irrigated agriculture, these areas are also seeking industry and are planning to meet the problems of supplying the water needs of these industries.⁽¹⁰⁾

Fifth, the federal reclamation laws establish flexible but uniform policies for all the seventeen reclamation states irrespective of their wealth and economic development. California is more fortunate than some of her sister states in having a combination of better climate for irrigated agriculture, more plentiful water and better lands.⁽¹¹⁾ Many irrigators in California have, therefore, a greater capacity to repay irrigation costs than do irrigators in other states.

Sixth, the problems of limiting subsidy to irrigation water users are particularly difficult. Statutory and administrative efforts to limit subsidy by qualifying language do not seem to be effective. Only a modicum of pressure may be required to change a little subsidy into a major subsidy. No witnesses at the subcommittee's irrigation repayment hearings presented any acceptable basis by which subsidy could be limited nor has the subcommittee's study of federal policies shown any specific basis on which federal subsidies are actually limited.

One suggested guide for irrigation pricing to limit subsidies is the cost of water supplies in an area adjacent to a state project. The Merced Irrigation District furnishes water at approximately \$1.10 per acre-foot, Friant water users pay \$3.50 per acre-foot for Central Valley Project water, the San Luis Project proposes to charge \$7.50 per acre-foot, but the Semitropic area in Kern County probably can afford to pay \$13 to \$14 per acre-foot for Feather River Project water. Thus, any effort to price irrigation water from state projects on the basis of water prices at nearby projects is no help, for

the State is presented with a wide range of water prices. These prices generally do not reflect current conditions pertaining to state financing and construction but, rather, reflect conditions peculiar to a limited service area or construction costs of many years ago.

Likewise, the concept of ability to pay as measured by "repayment capacity" does not limit subsidy. The Bureau of Reclamation proposes that San Luis water users should pay \$17.50 per acre or \$7.50 per acre-foot for project water with the remaining repayment to be made from municipal and industrial water revenues and power revenues. The Bureau computes the repayment capacity of San Luis lands to be \$37 per acre. Deducting the cost of water from the computed ability to pay gives \$20 per acre, which is called the incentive to use project water. The Department of Water Resources has reported on a proposed development by the Palo Verde Irrigation District in which the water users are anxious to secure water even though no subsidy from municipal and industrial water users or power users is available, and the incentive to use water is only \$5 per acre.⁽¹²⁾ It is obvious that the State cannot objectively determine the minimum incentive required to assure a market for project water whether it is \$5 at Palo Verde, \$20 at San Luis, or some other amount, because this is the function of the market mechanism and only the desire for project water, as determined in the minds of each water user, can establish the incentive. Repayment capacity is actually, therefore, a ceiling on water pricing and not a floor which can limit subsidy. This is why the Department of Water Resources substituted "residual income" for "ability to pay" in its report of December 5, 1958 on estimated imports of water from the Feather River Project.⁽¹³⁾ The term residual income does not imply a basis for water pricing and leaves open the question of incentive.

Seventh, negotiating a repayment contract for project water is more difficult when a flexible portion of irrigation costs are to be repaid by others. No federal policy is known which establishes any consistent basis for a minimum

or fixed irrigation repayment controlled by known variables nor is there any known basis upon which such a minimum can be objectively determined.⁽¹⁴⁾ Thus, the State would be in an adverse position in attempting to negotiate a repayment contract for subsidized irrigation water which would encourage "one-sided" results because there is no logical, predetermined point beyond which the State cannot go in resisting pressures for downward pricing of irrigation water.⁽¹⁵⁾

Factors Affecting Repayment Capacity of Irrigation

The subcommittee does not feel that a policy of full repayment for irrigation is oppressive and unfair.⁽¹⁶⁾ Indeed, farmers of the State are not unmindful of the competitive or perhaps unfair advantage which subsidized water can give to some areas of the State. Mr. Elmer Wood, president of the Irrigation Districts Association, expressed his personal opinion with particular reference to a state subsidy for irrigation in Southern California.

"...I don't see that subsidies are fair in transporting water... I think you might as well transport my peaches to Los Angeles if I am going to help transport some water down there in a competitive area... If it costs more for water somewhere on a competitive basis, I feel those people should pay more for water. We have this difference... If you have climate or an arid climate with no rain and you take water to it, (it is) going to out-produce... the rainfall area. There is no question about it. We have a disadvantage in climate. So these things are eveners. It costs more to get water in an arid country. They have better climate to produce certain crops, such as avocados and lemons. Maybe they are frost-free and they are close to a market. If the market is there and you can grow it in your back yard and somebody helps to produce it there in your back yard (by supplying cheap) water, I don't think that is fair to the people that are living where the water is." (Transcript of September 16, page 43)

Careful scrutiny of the repayment capacity of agriculture indicates that several factors have an important bearing. An understanding of these factors and their judicious incorporation in project plans, as discussed in Chapter IV, can largely eliminate or substantially mitigate the repayment difficulties of irrigation. The most important of these factors are:

1. The range in quality of lands to be irrigated by a project has a direct bearing on the ability of irrigation to repay its costs. The Department

of Water Resources report on the Proposed Semi-Tropic Water Storage District, Kern County, dated June 1958, indicates a net repayment capacity (residual income) after deducting the cost of a distribution system, which ranges from \$9.75 to \$15.75 per acre-foot for irrigation water depending upon land quality with an average of about \$14.75 per acre-foot for the entire district. This is based on a land classification survey showing about 12,000 acres of excellent lands, 166,000 acres with limited crop adaptability and productivity because of soluble salts and exchangeable sodium, and 45,000 acres with shallow soil depths in addition to being affected by salts. The report estimates payment capacity for water at the farm head gate would range from \$15.00 per acre-foot for the poorer lands to \$21 per acre-foot for the better lands.

The department's report on the Proposed Ducor Irrigation District, Tulare County, especially illustrates the variation in land quality. The department found 1,700 acres of excellent quality lands, 700 acres of limited crop adaptability, 6,500 acres of shallow depths, and 2,100 acres of shallow soil and adverse topography. Likewise, the department's report on the Proposed Pixley Irrigation District showed about 23,000 acres of excellent quality, 27,000 acres of limited crop adaptability and productivity, and 20,000 acres with shallow soil depths affected by saline and alkaline conditions.

Under any circumstances in which the State would charge a flat rate for project water the price of water will tend to be limited by the poorest quality lands and, therefore, the lowest repayment capacity of the irrigation district.⁽¹⁷⁾ Where this happens, the repayment capacity of the average quality lands is not controlling and better quality lands are not repaying according to their real capacity. In an extreme application of this approach, if land quality is ignored and water is priced by ability to pay, it is theoretically possible to put water on rocks at no cost to the farmer.⁽¹⁸⁾

2. The size of the project facilities and any excess capacity to serve future water markets directly increases construction costs and reduces the capacity of project beneficiaries to repay full costs. The Solano project of the Bureau of Reclamation and other projects such as Cachuma in Santa Barbara County achieve full utilization of the developed water supply within 35 years. On the other hand, the State's North and South Bay Aqueducts would achieve capacity operation at the end of 50 years. The State's projects will not return full revenues or operate at full capacity until the 50-year project repayment period is actually completed. Therefore, repayment of the project must occur with only partial use of the project's capacity and irrigation water users find it difficult to repay costs.

3. Assumptions regarding the type of crop grown and the managerial efficiency of a project water user influence irrigation repayment capacity. There is substantial variation in the profitableness of operations carried on under identical circumstances by different individuals. If water rates are based on repayment capacity and all irrigation water users are to be charged a flat rate for project water, the less efficient farmer is supported in a marginal operation by low-cost water and tends to establish the price of project water.

4. Assumptions regarding the size of the farm unit can affect the repayment capacity. In the Department of Water Resources report on the Palo Verde Irrigation District, dated July 17, 1958, the department found the residual income ranges from about \$45 per acre for a farm unit of 40 acres to approximately \$67 per acre for an 80-acre farm unit. Under certain circumstances, probably dependent upon cropping patterns, there is substantial variation in repayment capacity with the advantage in favor of larger acreages.

5. The use of project water on small acreages increases the cost of distribution facilities to the farm headgate. If the increased cost for distribution systems to serve small parcels of land is not absorbed by the irrigation water users, it must be passed on to the general taxpayers or paid through the diversion of other project revenues. (19)

6. Cheap water will result in high-priced lands under well-established economic principals. Bureau of Reclamation computations of the repayment capacity of lands incorporates the capital costs of lands and equipment. Because the productive capacity of land is relatively fixed, cheap water will be capitalized in higher prices for lands. High cost lands will thereby increase the land amortization payments, as well as interest payments which the farmer must make. Conversely, if the lands are priced lower, the irrigation water user can afford to pay more for irrigation water, other factors being equal because his land, interest and tax costs are less. Thus, higher prices for project water will not only return more of the project's construction costs but, by reducing land values, will compensate the farmer by reducing the investment he must make in land. This equalizing factor tends to minimize the effect of high water prices on the average farmer and helps to explain the fact that farmers serving the same produce market can pay widely different prices for water as noted earlier in discussing competitive pricing of water.(20)

The exact relationship and impact of the above six factors on each project is not easily determined and substantial detailed analysis would be required in each instance to establish such impact or relationship. However, the effect is there and if the State is to secure full repayment of project costs by project beneficiaries, each of the above factors will have to be given full consideration on every project. There is no simple, easy way to full repayment. Success lies in continued, painstaking review of project planning, design, and administration of water marketing to the end that a return of the project's costs is secured.

Secondary Benefits and Conservancy Districts

It generally happens that the indirect, ripple or secondary effects of applying water to farm lands is reflected in a substantial increase in commerce and trade throughout the irrigated areas and even in the adjacent nonirrigated areas.(21) This complex of agriculture and associated service, transportation and

industrial activities is a part of the broad field for which the term "agribusiness" has been coined.⁽²²⁾ The agribusiness complex immediately surrounding and adjacent to irrigated lands has traditionally prospered with the introduction of new water supplies in much the same manner that benefits accrue to adjacent areas from any major investment.

The local agribusiness complex is the most easily and clearly definable group of agricultural secondary project beneficiaries. In many appearances before the subcommittee local agribusinessmen recognized this secondary benefit and expressed willingness to assume some reasonable portion of the repayment burden for irrigation. Assistance from secondary beneficiaries to help repay irrigation allocated costs, usually by a uniform assessment on real property, has been used by the Bureau of Reclamation with considerable success. The practice is fairly widespread and is one aspect of the use of the "conservancy district".⁽²³⁾ Most conspicuously, the Board of Supervisors of Kern County endorsed this practice for Kern County by resolution presented to the subcommittee:

"That the indirect beneficiaries of irrigation projects shall share with the direct beneficiaries of such projects in the repayment of the costs thereof in such proportion as shall be determined by the Legislature of the State of California."⁽²⁴⁾

The subcommittee explored in detail the use of the conservancy district in Solano County, Santa Barbara County and Ventura County for the repayment of Bureau of Reclamation projects in those areas.⁽²⁵⁾ Each county firmly supported the technique and the subcommittee found that its application had been entirely satisfactory.

In the Southern California area, the subcommittee found the major water agencies already operating under relatively flat rates for water, irrespective of use, with the deficiency being made up by property assessments. While this is not precisely the concept of the conservancy district, which these agencies also support, it is roughly similar in effect and can be considered the equivalent of a conservancy district.

In general, the use of the conservancy district concept is harmonious with the attitude frequently expressed before the subcommittee that assistance or subsidy to agriculture should be at the local level rather than on a state-wide basis. The use of the conservancy district is the most acceptable basis discovered which justified subsidy for irrigation within the immediately foreseeable economic future of the State.

Subsidy for Lands, Easements and Rights-of-Way

A proposal frequently voiced throughout the State is to subsidize all project purposes by declaring the costs of lands, easements and rights of way, along with any necessary relocation of utilities, to be nonreimbursable. This proposal is based upon a misinterpretation of present state and federal policy whereby the State pays the costs of rights of way and relocation of utilities for federal flood control levee and channel works in behalf of the local beneficiaries.⁽²⁶⁾ This policy was established by Congress to assure that local agencies (by federal definition, this also includes the State) would assume some financial responsibility for levee and channel projects. It does not apply to federal flood control dams and reservoirs and has no application to any purposes of multiple-purpose projects.

The proposed application of this approach in California reverses existing federal policy while using the federal policy as justification for its adoption. The proposal would primarily benefit irrigation water users if applied in California. In so doing it would not discriminate between project purposes which need assistance and would therefore subsidize municipal and industrial water supplies, as well as power users. These two classes of project beneficiaries have traditionally needed no subsidy. Thus, in order to be of some assistance to irrigation water users, this proposal would subsidize all project beneficiaries. Because of both misinterpretation of its origin in federal policy and indiscriminate subsidy, there appeared no justification for accepting this proposal.

Foregoing Interest on Irrigation Repayment

Another federal policy advocated before the subcommittee is the foregoing of interest on investment costs allocated to irrigation. In federal policy the payment of interest on irrigation construction costs is not required; the interest cost is paid by the general taxpayer. On a state project the effect of foregoing interest would also eventually be felt by some group, probably the taxpayers, whose tax payments would leave them with a diminished amount of money to spend for their own purposes. Foregoing interest is acceptable when it is the method used to finance capital outlay costs associated with free governmental services, but it leads to troubles when applied to vendible services. Project repayment can be extended almost indefinitely when interest is not required and uneconomic or excessively sized project facilities are thereby concealed. These problems may have been in the minds of some water agencies when they appeared before the subcommittee, for they overwhelmingly favored the payment of interest. For example, the Irrigation Districts Association stated:

"Interest on money advanced by the State is considered by us to be one of the project costs which would be included as chargeable to irrigation water." (27)

Irrigation Development Period

One condition which requires special consideration for irrigation is the frequent need for a project development period during which repayment of capital is not required. A project development period should be as short as possible and the payment of operation, maintenance and replacement costs, including interest, should be required during the development period. With a financing program using bonds to raise construction costs, the accumulating costs of interest discourages any unnecessary extension of the development period. A project development period can be incorporated in the bond financing program by including within the covenant a moratorium on principal payments for a limited number of years. (28)

The subcommittee has noted that all the identifiable agencies now anticipating receiving irrigation water from the Feather River Project in both Kern County and in Southern California have indicated their willingness to repay full costs, if necessary, to get water supplies. The available data from the Department of Water Resources shows that these agencies probably can afford to pay full costs. On the other hand, the strongest protests against full irrigation repayment have come from areas not now projected to be served with water from any state project.

In summary, the net effect of a full repayment policy for irrigation may be a smaller acreage served with project water. However, each acre watered will grow more crops and produce more revenues for both the farmer and the project. The costs to the State will be minimal and no additional tax burden will be placed on the rest of the State. A full repayment policy will minimize the unneeded production of commodities already in surplus. Subsidized competition between different parts of the State resulting from the introduction of cheap water will not be encouraged and thereby unnecessarily upset established agriculture. All of these results appear to be in the best interests of both agriculture and the State as a whole.

VII

RECREATION REPAYMENT

Recreation repayment ranks next to irrigation as the most complex and difficult aspect of project repayment in California. This occurs even though some aspects of the problem are relatively simple. For example, the amount of construction costs allocated to recreation will generally be smaller than the allocation to irrigation, power or municipal and industrial water supplies. In addition, very little water will be used consumptively by recreation features, (1) nor will it usually require diversion and transportation. (2) The difficult aspects of recreation repayment arise from the need for California to pioneer new recreation policies not based upon the experience of federal, state and local agencies. Furthermore, there is a bewildering complex of existing state programs related to recreation, none of which by themselves are capable of supporting a recreation program at state water projects.

It has already been shown in Chapter IV that recreation should be included as a purpose in state projects. In Chapter IV, the problem of market analysis of recreation needs was discussed in relation to a sound project, and the contribution which the forthcoming report of the California Public Outdoor Recreation Plan Committee would make to knowledge regarding the market for recreation in California, was noted. It is the purpose of this chapter to evaluate the repayment potential of recreation and to explore several difficult related problems.

Nature of Recreation Investment

California is pioneering in the repayment problems of recreation because of a fundamental difference between recreation features at previously constructed projects and future recreation developments proposed by the State. Federal, state and local agencies, after constructing water resources projects for flood

control, power, irrigation or urban water supplies, have usually opened the projects to sightseeing, picnicking and other limited recreation uses. At more attractive reservoir sites, increasing attendance and public demands have prompted construction of camping, boating, fishing and other facilities which required modest investments usually made at the expense of the constructing agency of government. Frequently fees are charged, especially at local projects, which repay varying amounts of investment and operating costs.

This type of recreation development needs no reservation of water for recreation purposes. Recreation is not charged any part of the construction costs of the dam and reservoir, nor is the project design intended to enhance or create recreation values. Recreation facilities are merely added to the project as ancillary features. Costs of federal projects allocated to recreation include only specific costs such as picnic tables, boat launching ramps, access roads, etc. (3) With few exceptions, when recreation facilities are added to federal projects, they are nonreimbursable; that is, their costs are generally added on to the repayment obligation of other project beneficiaries. (4) No project construction costs (separable or joint costs) are normally allocated to recreation. This type of recreation project involves no significant investment and raises no difficult repayment problems.

As long as recreation is a nonreimbursable secondary purpose in project construction, it naturally is subject to the rights and privileges of the project purposes which produce revenues and pay the costs. As a result, reservoirs are drawn down for irrigation or power during the summer when the recreation potential is greatest. (5) In wintertime and during flood seasons, the reservoirs are full but wintertime weather conditions are not favorable for recreation purposes. As the population of the State has grown, the demand for recreation facilities has also grown and, in some cases, only reservoirs can create new bodies of water or stream flows at the desired locations. In addition, many

northern areas of California anticipate that recreation will stabilize and enhance their local economies. All of these factors converge to create a new role for recreation in water resources development, a role that elevates recreation to a major project purpose.

As recreation becomes a major project purpose, its role in project design and project repayment also changes. Water will have to be stored in the reservoir especially to maintain a year-round, relatively stable, lake elevation. This will require securing a water right to retain the water. Both separable and joint costs properly will have to be allocated to recreation. (6) Finally, if project construction costs are incurred specifically to create recreation values, recreation has a repayment problem similar to other project purposes. With these factors in mind, the subcommittee has examined recreation in the same manner as other project purposes, to determine whether it is a project vendible service subject to equal treatment with other project purposes.

Recreation Revenues and Benefits

Evaluation of recreation benefits has consistently caused difficulties for project planners and economists as a nonreimbursable minor project purpose, but it can be even more troublesome if recreation becomes a major purpose. Because of recreation's relatively personal and intangible values, the evaluation of its market and revenue producing capacity are among the most difficult and hazardous problems of project evaluation.

Benefit evaluation by the Federal Government, pursuant to the Green Book, has involved measuring project recreation benefits for each purpose in dollars. (7) Recreation construction costs involved have generally been small and, as a matter of convenience, federal agencies have at times in the past simply assumed that benefits equalled costs and no detailed evaluation has been undertaken. Most methodology for benefit analysis however has involved efforts to place a dollar value on intangibles such as the psychological satisfaction secured by visiting

the project (8) or by claiming as a project benefit a portion of the recreationists' expenditures made in visiting the project and enjoying its facilities. (9)

The value which has been placed on these intangibles is like all benefit analyses relatively arbitrary and subject to manipulation. Enjoyment by itself has no generally accepted dollar or market value. Furthermore, any effort to claim a portion of the expenditures associated with visiting the project or enjoying its facilities encounters the almost impossible task of identifying the portions of the expenditures which should be attributed to other related, nonproject activities of the recreationist.

As has been pointed out in Chapter IV, attributing a dollar value to recreation benefits does not create the funds with which to pay the separable and joint costs incurred in constructing the recreation features of the project. Such imputing of a dollar value to nonmonetary benefits from recreation is properly directed to the recreation beneficiary because it recognizes that he is one of the recipients of the project's recreation benefits, and that his use of the project determines the project's recreation value. However, in order to forge the missing link between the recreation beneficiary and the repayment of project costs, the State needs to secure revenues from the beneficiary in actual dollars instead of computing "benefit dollars".

Repayment Capacity of Recreation

The subcommittee made a special effort to evaluate the repayment capacity of recreation. Throughout the State it found the attitude widely accepted that recreation ought to pay its operation and maintenance costs. There was also some feeling that recreation should, in addition, repay the capital costs of recreation facilities if it could, but most frequently the attitude was expressed that recreation capital costs should be nonreimbursable in order to conform with federal policy or that recreation could not repay its costs. In most cases, witnesses had not actually evaluated the repayment capacity of recreation and occasionally a limited repayment capacity was simply assumed.

The subcommittee found several instances in the State where recreational developments are now repaying some of the investment costs of recreation facilities. At Lake Piru in Ventura County, Lake Cachuma in Santa Barbara County and Lake Henshaw in San Diego County, recreation is now paying all costs of operation and maintenance plus an appreciable portion of the capital invested in the recreational facilities. (10) The above three examples are only indicative. There is no conclusive data on the potential of recreation to repay project construction costs allocated to recreation when it becomes a major project purpose because no such project has yet been built. (11)

Even though there is no data available on the repayment capacity of recreation, there is evidence that a substantial repayment capacity does exist and that recreation can repay its costs:

First, the anticipated repayment period for state projects is fifty years. This means that the annual capital repayment is small. Furthermore, large allocations to recreation and large repayment burdens at any one project are not anticipated.

Second, the market for project recreational facilities is expected to continue growing. Recreation will also support an increasing segment of the State's economy. (12)

Third, recreation is already a major item in the budgets of most California families. The amounts of money spent annually on vacations, weekend trips, motor boats, skiing equipment, swimming pools, etc., is large and is increasing. Recreationists have demonstrated that they will spend substantial sums for expensive recreation and hobbies. (13)

Fourth, to the limited extent that recreation interests appeared before the subcommittee, they expressed a willingness to pay certain project costs. (14)

Fifth, California projects having recreation as a major purpose are likely to be located in the more remote mountainous areas. Most visitors at these projects will be vacationing or spending an extended weekend. They will visit the

Project with full knowledge of the expenditures involved and they will be prepared to spend the money. Remote recreation projects will have fewer visitors than projects close to metropolitan areas but each visitor will spend more money. Those projects close to metropolitan areas will have to rely upon large numbers of day use visitors, each paying a small fee and staying only a short time for a picnic, swim or boat ride.

Sixth, California is considered to have some excellent sites for the construction of recreation projects.

Seventh, the heavy attendance at existing major reservoirs such as Millerton and Folsom where facilities for recreation were virtually nonexistent, indicates that all other things being equal visitors would be willing to pay a fee for the use of additional facilities at properly equipped recreation projects. (15)

Eighth, the nature of the recreation potential at some projects will support private cabins, motels, commercial establishments and other private concessions. (16) A lease fee or assessment on such private properties and any businesses located at the project site or in adjacent areas which benefit from the construction of the project would assist in repaying project costs. This repayment assistance would be similar in some respects to use of the conservancy district for irrigation repayment because it secures repayment from those secondary beneficiaries who prosper from the project or whose properties it increases in value.

It has been set forth in preceding chapters, that the simplest and soundest measure of a project's value lies in the willingness of project beneficiaries to pay for the benefits they receive. If the project is a good one, with fine recreation features and attractions, the concessionaires and businesses adjacent to the project will prosper and can help support the project. A good project will also be attractive to the recreationist who will be more inclined

to pay a reasonable fee to enjoy its facilities. On the other hand, if the project has poor recreation characteristics, is poorly located or planned, no justifiable expenditure of state funds, whether or not repaid, can enhance its recreation values or cause the recreationist to receive enjoyment from a visit to the site.

The above factors indicate that the type of future recreation development contemplated in California, as distinguished from the very limited concept of recreation in the past, will support a very substantial repayment capacity if soundly planned and managed. There is also a greater likelihood of public support for the concept of recreation as a major project purpose if its costs are repaid.

The available information warrants a strong presumption, even though there is insufficient factual data to permit drawing a positive conclusion, that justified recreation project facilities can repay their allocated costs. An experimental period of several years may provide answers to the problem. Such a trial period would permit the State to construct recreation projects and to test whether full repayment of costs allocated to recreation is an achievable goal.

The subcommittee received testimony on the role of recreation as a form of commerce or business. Because recreation, besides being valuable to the recreationist, is also the basis of a growing portion of the State's economy, any statewide subsidy to the recreationist cannot be readily differentiated from a subsidy to the recreation business which is a part of our free enterprise system. Some justification has been presented for subsidizing the recreationist but none for subsidizing the recreation business. In addition, the subcommittee's record does not show any justification for offering a subsidy to the recreation business if a subsidy is not available to irrigation or other project beneficiaries.

Existing Assistance to Recreation

There are a number of programs already established which can assist in the development of recreation at state projects. Some of the most important of these are:

1. The Wildlife Conservation Board of the Department of Fish and Game has a program for the construction of access roads and boat launching ramps to be used by fishermen which is financed from pari mutuel racing funds. (17) The board finances and owns the facilities it constructs but operation and maintenance is by local agencies. No repayment of capital costs is required. The program can readily provide recreation facilities at state-constructed projects as well as local projects. Since it is impossible for the Wildlife Conservation Board to confine the use of its facilities to fishing, the board's program actually provides access and boat launching facilities for public use as well as fishermen.
2. The Division of Small Craft Harbors is lending funds to local agencies for the construction of boat harbors and launching facilities. (18) The construction loan must be repaid with interest. Although the program is just getting started in the State's coastal areas, it could include boat harbors at reservoirs created by state projects.
3. The Division of Beaches and Parks is currently constructing and operating recreation and park facilities at Folsom and Millerton Lakes as part of the State Park System. (19) The division charges only a nominal fee for the use of these facilities. The revenues received cover only a small part of the division's operation.

and maintenance costs at the project.

4. The Department of Fish and Game assumes the responsibility to stock reservoir waters and downstream reaches of benefited streams with fish and to provide adequate fishing at a state recreation project. (20)
5. In addition to these state programs, the United States Forest Service assumes the responsibility, to the extent of its available funds, for providing access roads and picnic areas or other needed public facilities at projects located in national forest lands. These facilities involve no investment by the State or user interests but are classed as a part of the development of national forests. (21)

Thus, there are a minimum of five existing state and federal programs, already financed, which cover most of the expenditures required in the development of recreation facilities at state projects. These programs had their origin in circumstances other than state construction of water resources projects. Nevertheless, they can be utilized in state project construction although, when so utilized, they may exhibit conflicting or divergent policies. The subcommittee has not attempted to reconcile the different policies of these programs pertaining to reimbursement, charging of interest, user fees, etc. Instead, it only recognizes them as authorized programs which should be allowed to contribute to water resources development.

The Role of Local Agencies

The subcommittee found almost unanimous agreement that a local agency should operate and maintain the recreation features of a state project. The Department of Water Resources now has the authority to plan project recreation features as well as to acquire necessary lands. Since it is also responsible

for the payout of the project, the department can protect the State's investment in the project by preparing a master plan for the recreation development and assuming general supervisory responsibility over the local operating agency only to the extent to assure the repayment of project costs allocated to recreation. The local agency can install the recreation features or secure whatever assistance it chooses from the five programs enumerated above. To raise the necessary funds to meet its costs, the local agency can collect user fees and levy assessments on all benefiting property.

It may be emphasized that recreation as a major project purpose requires a concentrated program to fully utilize its potential. The project's potential will have to be diligently exploited both to secure the maximum public acceptance and revenues and to enhance local economy. The more the recreational features are used, the greater will be their repayment capacity and the greater will be their contribution to the local economy.

Downstream Fisheries

The Department of Fish and Game believes that it is the responsibility of the constructing agency, whether public or private, to provide downstream water releases which will prevent reduction in fisheries values from the construction of any project. This policy also appears equitable for application at state projects. In other words, the costs of preserving existing fisheries or wildlife resources should be a cost of the state project and should be included in the costs allocated to each major project purpose. This is logical for there would be no alteration of the natural streamflows and no fisheries detrements attributable to the project if the project were not being built to serve these major purposes. (22)

A different situation occurs, however, when enhancement of downstream fisheries and wildlife is included in the project plan. This enhancement creates values supplemental to preservation of natural fishery or wildlife

resources. Paying for these values is not properly a responsibility of the power and water users of the project. The Department of Fish and Game recommends that the responsibility for such enhancement be borne by the State. This may be necessary since there would apparently be no feasible method of collecting any repayment from those who enjoyed the benefits of the water as it runs downstream because of the physical nature of the situation. However, where any downstream benefits from enhancement are realized within the project recreation site, their repayment should be treated like any other aspect of at-site recreation.

In summary, the repayment capacity of recreation as a major project purpose appears to be substantial. As in the case of irrigation, recreation is generally a vendible project service. There is a market for recreation at water resources projects and the proper balancing of costs and location with the market for recreational services will probably assure repayment. Therefore, the State should experiment by constructing several water resources projects having recreation as a major purpose and should attempt to secure full repayment of the State's at-site project construction costs allocated to recreation including interest.

CHAPTER VIII

FLOOD CONTROL AND OTHER PROJECT PURPOSES

Preceding chapters have covered the major repayment problems confronting the State in water resources development. Three other project purposes, flood control, power, and municipal and industrial water, deserve attention, although they do not constitute particularly serious problems in achieving project repayment.

Flood Control

The more populated and highly developed an area becomes, the greater is the potential for property damage and loss of life from floods and, therefore, the greater is the flood control investment which can be justified to protect the area. It may be less expensive to provide this protection by constructing levees or channel rectification works instead of a dam and reservoir. Thus, economic factors constitute a limitation on the investment which can be justified for flood control storage at a dam and reservoir and help to establish the amount of reservoir space reserved for flood control purposes. (1)

In general, flood control storage can be more economically provided at multiple-purpose reservoirs rather than at single-purpose reservoirs because the same joint-use reservoir space reserved for flood control can be used after the flood season to store water for later release to generate power or to serve irrigation or municipal and industrial markets. (2) Although there may be some conflict between these different purposes, the Corps of Engineers includes these other purposes in its flood control projects because of their mutually beneficial relationships.

The subcommittee has found no equitable and workable basis for local repayment of costs allocated to flood control. The Federal Government has

experimented with local participation in federal dams and reservoirs for flood control purposes, but without success. In Section 3 of the Flood Control Act of 1936, Congress required local interests to pay for the costs of lands, easements and rights of way for federal flood control dams and reservoirs. This was repealed in Section 2 of the Flood Control Act of 1938. (3) Flood control dams and reservoirs are frequently remote from the built-up coastal or valley areas and upstream from population centers which benefit most from the protection. Presumably, it was found inequitable to expect the local interests at the project site to pay for project costs which primarily or partly benefited others.

In addition to the geographic separation of the project from its benefited areas, flood control is not a vendible service which can return a revenue to the State to assist in project repayment. It is more on the order of fire or police protection which is needed when flood stages occur on a river. If flood protection is supplied to one person, it is supplied to all inhabitants of a flood plain without regard to benefit or location. On occasion, it does enhance land values and when this occurs, the Federal Government may require a local contribution to compensate for these enhanced values. (4)

The real question is whether all taxpayers of the State should pay for the flood protection afforded a limited number of citizens in the project flood plain. Conceivably, the State might solve this repayment problem more equitably by forming a district constituting the protected area which could repay flood protection costs by assessments as is done by zones in local districts. However, the uncertain boundaries of benefited areas, the overlap of districts when several projects contribute differing amounts of flood control benefits to an area such as the floor of the Central Valley, and other reasons, appear to make the district concept unworkable for large projects. Since the Federal Government is moving towards the policy of paying the construction costs of nonfederal projects allocated to flood control, the repayment problem is largely a moot point anyway. (5)

The Federal Government evaluates flood control features at state projects on the basis of the benefit approach in order to determine the size of any federal contribution if there should be one. This eliminates the need for the State to consider the difficult economic and procedural problems of estimating benefits from flood control features. Therefore, the subcommittee has not considered this problem, beyond the general comments in Chapter IV, because it is at present basically a federal problem. (6)

Power

The generation and sale of electric power at most water resources projects produces ample revenues to repay costs allocated to power. Hydro-electric power finds a ready market in California and elsewhere in the nation if it is priced competitively with other sources of energy. The evaluation of the market for power is much easier than for other project vendible services. The wholesale rate for power can be relatively easily computed for different amounts and classes of power based on the costs of alternative means of generation such as fuel-fired plants. As a result, the problems of planning and designing a project which will produce power at a marketable price is not difficult and it is not customarily a problem to find customers or revenues.

An important factor in minimizing the repayment problems of power is the fact that project power features are planned and designed for current, not future, market conditions. That is, the power plant generally produces full revenues almost immediately after completion of construction. Generating capacity is not installed to meet an estimated demand 20 or 50 years in the future. If planning of irrigation, municipal and industrial or recreation features of projects could be placed on as precise and economically sound basis as power features, there would be many fewer problems in water resources development.

Some testimony before the subcommittee recommended the use of power revenues to subsidize irrigation while other testimony recommended the use of

power revenues to reduce repayment requirements on a flat across-the-board basis for all project beneficiaries. Virtually all witnesses proposed selling the power at the prevailing market price. As discussed in preceding chapters, no compelling justification has been found for subsidies to any purposes in state projects. It may be observed that this approach varies considerably from federal policy in power marketing. Power from federal projects is generally sold to preference customers (7) at rates less than the prevailing market rate. Federal policy also allows surplus power revenues to be used to subsidize irrigation. It, therefore, attempts to benefit both power and water users because public funds and governmental agencies create the benefits. In California, it has generally been proposed that project power be marketed at the highest rates it will bring. This provides no project attributable benefits to power users since they would otherwise be provided power service at equivalent prices.

Hydroelectric power involves high investment costs. In view of the shortage of capital available to the State, and the state's limited capability for issuing general obligation bonds, Chapter III discussed a plan whereby the construction capital for state project costs allocated to power could be secured from the sale of revenue bonds. If this is done, operation, maintenance and replacement costs would first have to be recovered from power revenues while the remainder of the power revenues would be required to pay interest and principal on the revenue bonds. Thus, the power revenues realized during the first decades of project operation would be needed to repay the revenue bonds and would not be available for other purposes.

It is not presently known how deeply the State may become involved in the generation of power at California Water Plan projects or what the power marketing problems of future projects may be. It, therefore, appears reasonable at this time for the State (1) to use revenue bonds to raise capital for power features, (2) to use no power revenues to subsidize other project purposes,

(3) to use all power revenues to expeditiously repay the investment costs of power and, finally, (4) to defer consideration of the uses of surplus power revenues for possible subsidies, power rate reductions or construction of other projects until such time as all power costs have been paid and truly surplus revenues actually exist.

Municipal and Industrial Water Supplies

Municipal and industrial water users have traditionally been able to repay their full project costs. Like power, their repayment problems are minimal. This is particularly true when the Southern California area, which is the major market for such water, proposes to repay its allocated costs in full with interest.

Municipal and industrial water users have occasionally assisted in the repayment of irrigation costs and this practice presents both problems and opportunities. (8) In Southern California, where many urban and agricultural areas are served with water by the same district, the subcommittee found a strong sentiment against direct state subsidy to irrigation. These areas favor continuing their existing practice of local assistance to irrigation in which the municipal and industrial water users tend to overpay their costs and the irrigation water users tend to underpay their costs.

Southern California water agencies frequently pay only operation and maintenance costs from water sales revenues using a relatively flat rate for all water service, irrespective of use. The important aid to irrigation water users results from the use of a district assessment on all property to repay construction costs. The assessment distributes the costs of construction over all property owners without primary regard to quantities of water used or the purposes served and thereby provides substantial assistance to agricultural water users because industrial and municipal lands are included in the assessment base. This is done because the water supplies were initially developed to serve the

urban areas. The interim use by agriculture of water supplied by surplus project capacity is advantageous to the urban areas because it helps carry the overhead or fixed project costs. Taken as a whole, the system of assessments and water tolls in Southern California, as pointed out in Chapter IV, is somewhat the same in general effect as the use of the conservancy district by the Bureau of Reclamation.

Southern California is an example of an area in the State where there is a peculiar identity of interest between agricultural areas and urban areas. With the expansion of urban development into agricultural areas, the distinction between urban and agricultural uses of water, as long as the water is used in the same geographical area, tends to be insignificant over the long run. These unifying bonds between urban and agricultural areas closely interrelate portions of the agricultural and urban economies of the areas so that primary and secondary beneficiaries tend more nearly to coalesce.

The problem of local water pricing and use of assessments is technically not a state problem. Whether it is accomplished by water tolls and assessments as in Southern California or whether a conservancy district is used, the State's major concern is that the contracting water agency have adequate repayment capacity to meet its commitments. It is the responsibility of each contracting agency to secure the funds for repayment by the means best suited to its local conditions.

CHAPTER IX

S U M M A R Y

The subcommittee conducted extensive hearings throughout the State on the problems of raising project construction capital, the evaluation of project feasibility, the allocation of costs and repayment problems. The resulting voluminous transcript indicates a general feeling that project beneficiaries should substantially repay allocated project construction costs and that subsidy, if used, should be at the local level rather than at the state-wide level. In view of this attitude, an adequate test of feasibility for state projects is the logical formula that project revenues should equal project costs for vendible project services. This was also found to be the best guide in pricing and marketing project vendible services. Only downstream fishing and recreation benefits and flood control were found to be nonvendible project services which, for different reasons, appeared to offer no feasible opportunity for repayment.

NOTES ON CHAPTER III

PROJECT FINANCING

- (1) For full text of this and related correspondence, see Transcript of December 3, 1958, page 117.
- (2) The Department of Finance has furnished the subcommittee with the following data on general obligation bond issues made by the State and major local water agencies during the past year. It can be seen that the State is paying interest rates as high or higher than the Bond Buyers' Index while major local water agencies are paying less.

<u>Date of sale</u>	<u>Par Value (000)</u>		<u>Average Life - Years</u>	<u>Net Interest Cost</u>	<u>Bond Buyer Index</u>
1/22/58	\$100,000	State of California - Veterans	15.5	3.07%	2.87%
2/11/58	18,000	Metro. Water Dist. of So. Calif.	6.5	2.38	2.97
4/15/58	5,000	San Francisco - Hetch Hetchy	11.17	2.60	2.99
4/23/58	50,000	State of Calif. - Veterans	15.25	2.96	2.96
4/23/58	50,000	State of Calif. - School	15.5	2.96	2.96
6/13/58	5,650	Sacramento Municipal Utility Dist.	11.5	2.61	2.92
7/23/58	100,000	State of Calif. - Veterans	15.5	3.23	3.10
10/15/58	18,000	Metro. Water Dist. of So. Calif.	6.5	3.03	3.50
10/27/58	2,000	San Francisco - Hetch Hetchy	11.0	3.15	3.38
12/3/58	50,000	State of Calif. - Construction	14.0	3.58	3.30
12/3/58	50,000	State of Calif. - School	15.3	3.61	3.30

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- (3) This was explored by including a question on this point in the questionnaire distributed to principal witnesses before the subcommittee.
- (4) The conditions relating to the advance of funds or construction of facilities would have to be established in a contract. Similarly, the details of repayment, operation and maintenance charges would have to be worked out.
- (5) Transcript of December 4, 1958, page 17.
- (6) Transcript of December 3, 1958, page 80.
- (7) Letter of December 19, 1958, per 10, 1958.
- (8) Statement by William R. Seeger, Marin Municipal Water District, Transcript of August 27, 1958, page 94.
- (9) Mr. Albert Henley, speaking for the Santa Clara-Alameda-San Benito Water Authority, stated "There is ample assessed valuation in Santa Clara County to undertake a project of that magnitude." (Transcript of August 28, 1958, page 165.) Santa Clara County alone has an assessed value of \$961,000,000 in 1950 and this assessed value is increasing at a rate in excess of \$100,000,000 per year. The estimated cost of the South Bay Aqueduct is approximately \$37,000,000.

Chapter III - Cont'd.

(10) Either General Fund or Investment Fund.

NOTES ON CHAPTER IV

THE CONCEPT OF A PROJECT

- (1) Kenneth E. Boulding. Professor of Economics, University of Michigan, Extracted from "The Feather River Anthology".
- (2) A project feature is any clearly definable portion of a project such as head-gates, turbines, switchyard, aqueducts, pumping plants, tunnels, fish ladders, boat launching ramps, access roads and sanitary facilities. Project features may serve one or more project purposes, but normally are easily related to one purpose. A project purpose is a category of service provided by the project. Customarily these purposes are flood control, irrigation, hydro-electric power, municipal and industrial water supplies, navigation, recreation, fish and wildlife, and occasionally salinity repulsion and pollution control.
- (3) "Our analysis of water resources development needs should encompass all potential water needs. It should be guided, of course, by the several problems now existing in each river basin. It should recognize, however, that these problems probably did not exist or were not apparent 20 years ago--a normal duration for the period of study, project formulation, and project construction--and that additional problems, not of major significance now may be of major significance 20 years from now. To this extent, I feel that our analysis of development needs, on which program formulation must rest to a large extent, must contain strong elements of imagination and foresight." Brigadier General W. E. Potter, U. S. Corps of Engineers, National Water and Power Policy, Chamber of Commerce of the United States, January 24-25, 1956.
- (4) Throughout this study the term "vendible services" will be used to describe those services of a project which can be sold to return some project revenues. These are normally power, municipal and industrial water, irrigation water and perhaps recreation and salinity repulsion. The use of the term "vendible services" is intended to differentiate the sale of project services for revenues from the term "reimbursement" which constitutes income that may come from any source, including taxes and overcharging for certain project services.
- (5) Mr. Howard A. Miller asks the question, how far have we gone in accepting a new social philosophy for this America of ours when we fail

"...to distinguish between services or facilities that are available to all comers and those that are restricted to specific individuals or groups? You and I may travel all public roads but if you live in Berkeley you do not take a bath in Los Angeles except as a personal or paying guest.

"Others, both in and outside of the Legislature, have advocated similar ideas which would overextend the State's responsibility and relieve special beneficiaries of their rightful obligations. It would seem that, in the minds of many, the mere fact that the State now enters into construction and operation of water projects automatically introduces a new set of economic principles." Economics of California Water Development, University of California, P. 21.

- (6) The expression "substantially full repayment" is used in this study even though some agencies flatly supported full repayment without equivocation. However, most agencies would permit some lessening of this rigorous repayment requirement if it were absolutely necessary in order to permit a needed project to be constructed or, as most frequently happened, they supported full repayment to the State with any use of taxes or subsidies for repayment purposes to be at the local level and under full control of the project beneficiary. Recreation, as discussed later, and flood control were two exceptions. The expression "substantially full repayment" is used to include within its connotation these qualifications.
- (7) See pages 6 and 7, "Proposed Practices for Economic Analysis of River Basin Projects", prepared by the Subcommittee on Benefits and Costs.

The subcommittee is also indebted to the report of the Stanford Research Institute entitled "Economic Considerations in the Formulation and Repayment of California Water Plan Projects", pages 21 to 24.

'It is presumed, for the purposes of this study, that the fundamental objective of the State's action in the field of water resource development is to achieve the most economic allocation of water, in other words, to maximize the net benefits to society of the development of the State's water resources. But this is a complicated subject which requires further elaboration.

"Like food and housing, or like petroleum and timber, water is generally scarce relative to the demand for it. It is an 'economic' as distinguished from a 'free' good, and consequently must be allocated among users in some manner.

"The problem of water allocation is complicated by the fact that water is useful in many ways for human consumption, for domestic purposes other than human consumption, for industrial purposes, for the removal of domestic and industrial wastes, as a home for fish and other aquatic life, for recreation and transportation, as a source of power, and for the irrigation of plants. Thus, water must be allocated among alternative uses as well as users.

"The problem is further complicated in that water is not always available in sufficient quantities at locations where people want to use it, and the facilities for storing and transporting water require resources which in their turn might be put to beneficial use in an alternative manner. In other words, the cost of making water available where it would not otherwise be must be taken into account along with alternative uses and users, if it is to be allocated in the most beneficial way.

"From the standpoint of economics, water is not fundamentally different from any other resource which is both useful and scarce; the same economic principles which apply to the allocation of, say, petroleum and timber apply, or ought to apply, to the allocation of water. This is not to ignore the realities of, for example, principles of engineering design, intricacies of water law, and political considerations. It is to suggest, however, that the problem of water allocation

is primarily an economic one and should, insofar as possible, be solved in conformity with economic logic. Ideally, water should be allocated so that the resulting increase in benefits (real income) exceeds the resulting increase in cost by the greatest possible amount.

"In the private enterprise sector of the American economy, resources are allocated by the impersonal forces of the market. The premise in private enterprise is that the net benefits of society tend to be maximized by the market. The allocation of resources tends thereby to be guided by the wishes of individuals (consumers) who, presumably, know better than anyone else how to maximize their own benefits.

"In the government enterprise sector of the American economy, resources cannot always be allocated by the market. Indeed, it is a function of government to provide those goods and services which, although they are of direct or indirect benefit to virtually every member of society, either cannot be sold to beneficiaries as vendible commodities (e.g., national defense) or would be of considerably less overall benefit to society if they were sold as vendible commodities (e.g., public education).

"Occasionally, of course, government enterprise may undertake to provide a product which is of benefit to users in so direct and identifiable a manner that it can be marketed as a vendible commodity even though it probably could not be marketed profitably by private enterprise--either at all or at a price sufficiently low to be 'in the public interest.' Thus, most state governments attempt to pay for their highway programs, at least in part, by a charge against highway users; many local governments sell water and power; and the Federal Government charges for the services of the post office. When government does go into 'business' in this sense, moreover, it generally expects to recover a portion if not all of its costs through the sale of the product or service. In other words, it is presumed that the costs of production should be borne at least to some degree by the direct beneficiaries of the product or service.

"On the other hand, most of the products and services made available by government (police and fire protection, national defense, public education, the administration of justice, etc.) are paid for by the people collectively through taxes. Moreover, while it is presumed that the benefits received by taxpayers collectively have a value at least as great as the value of the taxes paid, taxes are not, and cannot easily be, collected on the basis of individual benefit received. They are, for example, collected on the basis of property owned or goods purchased or ability to pay.

"In principle, there can hardly be a clear distinction between those products of government which should be paid for entirely by the direct beneficiaries and those which should be paid for by taxpayers generally. Presumably, however, it is possible to distinguish between

products in terms of the extent to which their costs can be assigned to a particular group of beneficiaries. Such a distinction would depend on such factors as the number of people who benefit directly, the number of people who benefit indirectly, the extent to which the direct and indirect benefits can be measured, and the relative values assigned respectively to direct and indirect benefits.

"There may be some government products whose indirect benefits are so widespread and so great that it is economically sound for all of the members of society to join in paying for them. On the other hand, there may be a product which is of substantial and reasonably measurable direct benefit to a clearly identifiable group of people and of relatively small indirect benefit to a relatively small number of people. A product of this sort should probably be paid for by the direct beneficiaries.

"It is one of the purposes of this report to investigate the question of who should be obligated to pay for the water development programs sponsored by the government of the State of California, and the issue need not be prejudged here. Certainly, it may be presumed that the government of the State would not be undertaking a water development program if the identical cost-price principles which guide the allocation of resources by private enterprise were to be followed. At the same time, as will be explained in more detail in Section IV, the anticipated benefits of water resource development should be taken into account and compared with anticipated costs, for anticipated benefits may serve in lieu of the anticipated revenues which are compared with anticipated costs in the formulation of a private enterprise project. To this extent, the market mechanism can tend to guide the allocation of resources in the case of government as in the case of private enterprise. Indeed, at least conceptually, the benefits of any government project or program should equal or exceed the costs, for if the costs exceed the benefits, the welfare of society is diminished."

- (8) The term "benefits" as used in benefit-cost analysis, means all identifiable gains, assets, or values, whether in goods, services, or intangibles, which result from the construction, operation or maintenance of a project. The "Green Book" divides these benefits into primary benefits measured in dollars which are directly attributable to the project, or secondary benefits which are gains, assets or values other than primary benefits. Project benefits are the sum of the individual benefits to be derived from each of the individual purposes to be included in the project.

Economic costs include all identifiable expenses, losses, and liabilities, whether in goods, services, or intangibles, which are incurred as a result of constructing, operating or maintaining the project. In general, it is federal practice to require that primary benefits equal or exceed primary economic costs before the project will be authorized for federal construction. This relationship of benefits to costs is known as the benefit-cost ratio and is the measure of economic feasibility.

Normally, the benefit-cost ratio includes only direct costs and benefits, i.e., those measurable in monetary terms. However, indirect costs and benefits can be of great significance and warrant consideration during planning and legislative authorization of a project. This does not mean that indirect benefits warrant the construction of an otherwise uneconomic project, but such benefits can be an important noneconomic justification.

- (9) Budget Bureau Circular A-47 further elaborates upon this system and makes it mandatory for project evaluations prepared by the Corps of Engineers, the Bureau of Reclamation and the Soil Conservation Service.
- (10) Edward F. Renshaw, "Towards Responsible Government", P. 66.
- (11) Dudley F. Pegrum, "Economics of California's Water Development, P. 66.

- (12) "In a recent Bureau of Reclamation report 12 units of a project had a benefit-cost ratio varying from 1.0 to 3.9. The construction cost per acre of land to be irrigated by the 12 units varies from \$140 to \$1,475. The percent of construction cost indicated by the report to be paid by water users varies from zero to 100. It is probable that none of the land in these 12 units, if provided with a full water supply, would have a market value of more than \$150 per acre. The weighted average estimated cost on a full water supply basis of the 12 projects is \$509 per acre. The weighted percentage of the cost to be repaid by the water users is 11.

"The 1953 report on irrigation development farm, Republican River Basin, Middle Loup division (sic) of the extension service of the University of Nebraska, for example, indicates that irrigated land is worth from \$150 to \$200 per acre, that is, returns will pay about 5 percent on this investment. About 160 acres of this land will yield the operator the equivalent of a salary of about \$3,600 per year in addition to the return on capital, and can pay up to \$4 to \$5 per acre-foot for water. If operation and maintenance costs are \$3 to \$4 per acre for farm delivery of 1.5 acre-feet per acre, a rough economic analysis can be made of a project with a construction cost of \$500 per acre if the initial value of the land is from \$30 to \$50 per acre.

	Cost		
	Farmer	Federal	Total
Original land value at \$40 an acre	\$6,400		
Capital investment for irriga- tion farming* at \$80 an acre	\$12,800		
Construction Cost	-----	\$80,000	
Total capital investment	-----	-----	\$99,200

	Returns	
	Farmer	Federal
Interest on \$200 an acre at 5 percent for 160 acres	\$1,600	
Repayment, 1.5 acre-feet at \$4.50 for 160 acres	-----	\$ 720
Total return	-----	-----
		\$ 2,320

*Includes farmer's cost of leveling, ditching, equipment, etc.

"Thus, considering that the amount provided for repayment of cost would continue indefinitely (if not for repayment, then for any other purpose), the return on the total investment would be a little less than 2.5 percent. The investment required to provide the income for one family, almost \$100,000, is considerably higher than that required in many basic industries. This analysis allows no depreciation of the farm since it is presumed that fertility, under proper management, can be maintained indefinitely.

"Thus, one may question whether the Federal Government, if it is interested in resource development, should undertake such a project of this type. Are there other basic developments that could provide a family living at less cost? Nevertheless, the project described is a reasonably good project. In 50 years it could repay \$225 per acre, almost one-half the cost. It would pay, over all, more than 2 percent annually on the total investment. As this is approximately the rate of increase in the national wealth, it does not seem unwarranted to assume that this project would contribute adequately to the general welfare.

"But when the Bureau of Reclamation, by a benefit-cost analysis, justifies projects costing from \$1,000 per acre to \$2,000 per acre or more in areas where crop yields will not exceed \$50 to \$100 per acre, it is the conclusion of the task group that such procedure is open to serious challenge and is something to which Congress should give prompt consideration. If a given irrigated farm is found to be worth \$250 per acre in the farm sale market, this is the measure of direct benefit. To this should be added indirect benefits, that is, the contribution the farm makes to the community and general economy. Even if we consider the indirect benefits as equaling the direct, we have a total of \$500 per acre in benefits.

"When we expend \$1,000 per acre in construction costs (and these costs must be paid in cash) to establish a contribution to the general economy of \$500, then it can be said, in all logic, that the net result is a loss of \$500 per acre to the national economy. Applied to a 160-acre farm, the loss is \$80,000.

"Use of the benefit-cost ratio by Federal bureaus since 1936 shows that it is easily corrupted and gives results which cannot be interpreted in values which are readily understood by the general public. It has attempted to serve as a means by which projects, which involve in their selection a high degree of humanitarian considerations, both social and political, can be assessed on an economic or monetary level, and this objective has not been realized.

"The task group concludes that the only effective measure of the economic worth of a project is the degree to which beneficiaries are willing to pay costs. It recommends, therefore, that all water resource development, not only the irrigation phase, meet the test of financial feasibility and that all beneficiaries, if they are so to be considered, share in the project cost." Task Force Report on Water Resources and Power, Volume Two, pages 628-630, Commission on Organization of the Executive Branch of the Government, June 1955.

- (13) There have been many critics of inflated project net benefits. See for example:
- a. Roland N. McKean, "Efficiency in Government Through Systems Analysis", John Wiley and Sons, Inc., New York, pp. 151 and 152.
 - b. "Reliability of Estimates of Agricultural Damages from Floods", p. 1275, Commission on Organization of the Executive Branch of the Government, Task Force Report on Water Resources and Power, Volume Three, U. S. Printing Office, June 1955.
 - c. Edward F. Renshaw, "Toward Responsible Government", Idyia Press, 1957.
 - d. Stanford Research Institute, "Economic Considerations in the Formulation and Repayment of California Water Plan Projects, Section V."
 - e. Statement by P. H. McGauhey and Harry Erlich, Transcript of September 15, 1958, pages 82 to 85.
 - f. U. S. Congress, Committee on Public Works, "Economic Evaluation of Federal Water Resources Development Projects." 82nd Congress, 2nd Session, House Committee Print No. 24, December 5, 1952.
- (14) The net benefits computed by the Department of Water Resources for the recreation features of Indian Creek Project in the upper Feather River area are on the order of 4 to 1 with one possible development of recreation at Grizzly Valley having a benefit-cost ratio of 13 to 1. These very high benefit-cost ratios would seem to indicate that the use of water for recreation purposes, although a valid and important use, has a higher economic value than the use of water for almost any other purpose, since these other purposes cannot develop such high benefit-cost ratios. This, of course, would not be a realistic conclusion.
- (15) Transcript of September 16, 1958, page 15.

The State of California made a somewhat similar criticism of federal project planning work in June 1950 when it commented in the document "Views of the State of California on Elements of a National Water Resources Policy Submitted to the President's Water Resources Policy Commission, page 62.

"Concerning technique, the principal federal water resources agencies, in their enthusiasm for projects, have frequently indulged in excessive planning prior to adequate investigation. Project plans have been fully developed before need for projects has been established. In some instances, construction itself has been initiated before it has been determined that required water supplies are available or that supplies, when developed, can be marketed and utilized. Again, numerous examples of this nature may be cited from California's experience in Federal water resources projects."

- (16) Page 53 of the Stanford Research Institute Report.
- (17) Transcript of August 27, 1958.
- (18) See statement of Mr. Lowell Eddington, Page ____.
- (19) This does not mean that the State could not determine to build the project and make up the deficiencies in revenue from general tax money or by overcharging some other project beneficiaries. The decision rests on whether the State is providing a free service or is marketing a vendible service. Subsidizing the project will not create a true market for its services nor will it make the project sound.
- (20) "Economics of California's Water Development," published by University of California, Committee on Research in Water Resources, page 10.
- (21) "Economic Considerations in the Formulation and Repayment of California Water Plan Projects", Stanford Research Institute, pp. 32 and 33.
- (22) The quotation is from a written statement based on oral testimony furnished the subcommittee.
- (23) See report of Subcommittee on Benefits and Costs, p. 9.
- (24) The Los Angeles panel of financiers justified the use of bonds for project financing on this same basis, when it stated:

"There is also the further question of the desirability of placing the burden of paying for a development which will have benefits largely in the future upon present taxpayers. A bond issue seems the only feasible solution." (Transcript of November 13, 1957, p. 212).
- (25) In both the South and North Bay Aqueducts the Department of Water Resources sized the facilities to meet the anticipated market growth for the next 50 years.

- (26) This discussion of time is in relationship to project revenues or repayment rather than benefits. Once again, the use of benefits instead of revenues opens the door to substantial controversy and manipulation. Thus, repayment is limited to 50 years by the Bureau of the Budget but, in some cases, benefits are computed on the basis of 100 years. It is generally recognized that benefits 100 years in the future have little present value and that, for all practical purposes, 50 years is the limit beyond which no substantial benefits should be added even if computed. See Stanford Research Institute's Report, pp. 42-49.
- (27) Article XVI, Section 1, of the State Constitution also limits state bond issues to 50-year terms.
- (28) The report, "Economic Evaluation of Water, Part I", on pages 5 to 19, contains a brief discussion of the changing objectives and patterns of federal reclamation policy. In summary, it states on pp. 211 and 212:

"At a time when most Americans were self-sufficient farmers and agriculture was the mainstay of the nation's economy, a policy underwriting widespread disposal of public lands for development into small farms was a logical goal. Policy makers broadly evaluated water in terms of its contribution toward making the landless self-supporting and toward settling and unifying a vast land area... Irrigation of private lands was originally an incidental objective but eventually, when public lands had largely passed into private ownership, the distribution of publicly developed water supplies to established enterprises became predominant. In rationalizing this change in concept, irrigation development was likened to roads and other public works in which a public purpose is involved. That the value resulting from the expenditure of public funds becomes the property of private individuals, however, has not seemed to weigh heavily in making federal appropriations."

- (29) "Economic Evaluation of Water", pp. 212 and 213.
The impact of changing water economics in the western reclamation states is already stimulating efforts in Congress to revise the reclamation laws. One of the most important of these is S. 13 introduced by Senator Engle in the 86th Congress. This bill would place a greater emphasis in reclamation law on serving urban and industrial water needs.
- (30) See Table 21, page 163 of "Economic Evaluation of Water". In 1929 California's per capita income as a percent of the national average was 142 percent but in 1955 it had declined to 123 percent. The report quotes Warren Thompson, an authority on population problems, that the relative decline in the State's per capita income "...may also make it more difficult for California to maintain some of its services to its citizens at a level superior to that in many other states."
- (31) The data are summarized from Chapter IV of the report "Economic Evaluation of Water".

- (32) The President's Water Resources Policy Commission, "Ten Rivers in America's Future", Washington, D. C., 1950.
- (33) Henry J. Kaiser, "Industry and the West", Proceedings of the California Water Conference, Sacramento, December 1945. Quoted on page 191, "Economic Evaluation of Water".
- (34) Warren S. Thompson, "Growth and Changes in California's Population", The Haynes Foundation, Los Angeles 1955. Quoted on page 192, "Economic Evaluation of Water".
- (35) Page 196, "Economic Evaluation of Water".
- (36) See statement of Harvey O. Banks, Transcript of September 18, 1958, p. 80.
- (37) Mr. R. L. Denbo of the Eureka Chamber of Commerce covered this point with considerable eloquence:

"We should remember that recreation comes as a by-product of commerce and industry. The same as one does not go out in the morning and say 'Today I will be happy', one does not say 'I am born for recreation.' First there must come a job.

"Recreation is becoming more and more a major factor in the economy, the living and the daily life of all America. Each year the standard of living becomes higher. With this higher standard of living comes more leisure time for individuals to devote to some type of avocation. However, we believe that the people of America and the State of California should be, and are willing to pay for their own recreation. Recreation, we must remember, is big business but it comes as a by-product of stable employment and higher standards of living. These are the blessings of America and the blessings which we must keep." Transcript of July 10, 1958, p. 86.

- (38) Transcript of July 8, 1958, p. 13.
- (39) Mr. Frederick Bold, representing Solano County stated:

"The class and grades of lands within the North Bay Aqueduct service area are somewhat lower than they are in the service area of the Solano Project." Transcript of August 27, 1958, p. 59.

- (40) Mr. J. H. Turner, representing the City and County of San Francisco, made this point clear:

"We fully support, policy-wise, the construction of a South Bay Aqueduct. We have been accused of qualifying that, so I will explain the qualification. We, of course, cannot support highly subsidized water being brought to each and every one of San Francisco's consumers in competition with San Francisco. It is per-

fectly possible that the State may conceivably build pipelines and distributing reservoirs and other facilities to the ultimate consumer on a state subsidized basis and run direct competition to San Francisco, thus depreciating substantially our current investment in the water supply." Transcript of August 28, 1958, p. 170.

- (41) "Problems in Planning for Future Demand of Water", by Professor Karl Brandt, Stanford University, published in "Economics of California's Water Development", University of California, February 1958, p. 8.
- (42) Good quality water in California is cheap in comparison to many other commodities but, in spite of its cheapness, the fact that it can be made available where needed only by building large expensive transportation works, means that it can never be as cheap as might be desired. If it ever does become in short supply at some future time, the market pricing system is still the most effective and equitable method our economic order has developed for rationing any commodity.
- (43) "Problems in Planning for Future Demand of Water", p. 18.

NOTES ON CHAPTER V

MULTIPLE-PURPOSE PROJECTS AND COST ALLOCATION

- (1) National Water and Power Policy, Chamber of Commerce of the United States, Water Policy Conference, January 24-25, 1956, page 16. The General also defined multiple-purpose planning.

"Let us start with a definition of multiple-purpose planning in connection with water resources development. Multiple-purpose planning means simply the planning of a single project or program to serve a number of needed water uses rather than relying upon several individual projects or programs each to serve a single use. In the case of reservoirs, for example, storage allocations adequate for each of several water uses often can be provided above a single dam. The multiple-purpose project is analogous in some respects to the department store in which we may purchase in one place a number of products we would otherwise have to visit several stores to obtain."

- (2) For a review of some problems in federal allocation of project costs see:
 - a. Statement of Department of Water Resources, transcript of May 15, 1958, page 12.
 - b. The Allocation of Costs of Federal Water Resources Development Projects. Report from the Subcommittee to Study Civil Works. 82nd Congress, 2d Session, House Committee Print No. 23. Washington, December 5, 1952.
 - c. Conservation and Development of Water Resources, Senate Committees on Interior and Insular Affairs and Public Works in connection with S. 281, 84th Congress, Government Printing Office, January 24, 1957.
- (3) For other discussions of the separable costs-remaining benefits methods of cost allocation, see the report of the Subcommittee on Benefits and Costs or the Bureau of Reclamation Manual, Part 118.
- (4) Economic Considerations in the Formulation and Repayment of California Water Plan Projects, page 84.

NOTES ON CHAPTER VI

IRRIGATION REPAYMENT

- (1) Economic Evaluation of Water, page 150. Approximately 60 percent of the water delivered to a farm headgate is consumed in contrast to a consumptive use of about two percent by industry.
- (2) Economic Evaluation of Water, pages 175 and 180.
- (3) The Federal Government "...already has \$2.3 billion worth of corn in the price support system, not counting this year's crop, the greatest in history. Without production controls next year, and with average weather, the crop can be expected to increase. Under the new plan for cotton, plantings will also head sharply up, adding to the cotton surplus. There is a similar outlook for wheat, no matter what Congress does about that crop."

In Fiscal Year 1953 "...agricultural outlays were \$3 billion. Last year they totaled \$4.5 billion. The estimate for this year is \$6.4 billion. Officials in the Agriculture Department privately estimate that costs may jump to \$7.5 billion or \$8 billion next year as the increasing flood of cotton, wheat and corn goes into Commodity Credit Corporation loans."

Secretary Benson "...argues that lower price supports and lower prices in the market will increase consumption. But agricultural economists almost unanimously oppose any idea that consumption would rise enough to end surpluses. The demand for food, they never cease to point out, is inelastic--it does not respond readily to changes of prices." Business Week, December 6, 1958, page 26.

The Committee for Economic Development has stated its view of the farm surplus problem in its report "Toward a Realistic Farm Program", December 1957, pages 5 to 6:

"In the last quarter century we have spent well over \$22 billion on programs to help the American farmer. About half was spent to stabilize farm prices and income. We have spent another \$22 billion on other programs, such as purchases of farm products for foreign assistance, not specifically designed for agricultural aid, but of direct or indirect benefit to the farmer. In mid-1957 the government was holding \$7-1/3 billion of surplus farm products.

"Yet, despite these vast outlays of public funds, farm income is declining. It has declined about 30 percent from 1951 through 1956. This decline has occurred in the face of a general, high level of prosperity and growth of population that have increased total domestic consumption of U.S. agricultural products by 11 percent over the past decade.

"There is only one reasonable conclusion from this: our farm programs have not accomplished their announced purpose of 'stabilizing, supporting and protecting farm income and prices.' In fact, our farm programs have worked in the long run--as we show here--to make the farmer's position increasingly insecure.

"The farm problem is complex in the extreme. But the basic difficulty with present public agricultural policy is simple: in trying to underwrite farm prices and income it perpetuates an unreal price structure that encourages overproduction of farm products and keeps too many people in farming, resulting in ever-growing surpluses of foods and fibers in government storehouses, surpluses that weigh down the very price structure public policy tries to underpin.

"Thus, under present conditions, public policy can only react to the growing insecurity of the farmer by increased outlays for price and income support, encouraging the farmer to imprison himself ever more hopelessly in his own basket of plenty, the while drawing an ever larger tax tribute from the public for the purpose of keeping the public's food and fiber bills artificially high.

"Basic to every other defect is the economic waste involved in public policy that keeps people, and material resources, at work producing surpluses of farm products while the nation is straining to fulfill simultaneously its desires for economic growth and national security.

"Such policy makes no sense, from the standpoint of the farmer, of the public at large (including the farmer), or of the national well-being."

The Hoover Commission Task Force on water Resources and Power commented:

"The task group has examined the question--why should more irrigated land be developed when we have crop surpluses? But in the examination it found that farm policy has a considerable influence on irrigation development, not through effect on federal irrigation development, but in the much larger field of private development.

"With the possible exception of cotton, there are no significant surpluses of agricultural commodities produced on irrigated land in the West. Price support for cotton has caused a material increase in irrigation on a basis that will not be permanent. The irrigation works for much of the recently developed cotton areas have been provided entirely by private initiative, but the whole program has been heavily subsidized because of the cotton support.

"In Central Arizona more than three million acre-feet of water are being mined from the ground water annually for raising of cotton. More than 1.5 million acre-feet are being mined annually in the western great plains of Texas. In an area west of the Pecos River, 300,000 or 400,000 acre-feet are mined annually for the same purpose. Much of this development will gradually disappear as pumping costs increase because of lowered ground water levels, or when the price of cotton is reduced, or both.

"The task group is perturbed but makes no comment on an agricultural program which will distort a wholly economic and desirable effort--crop production, efficiently and at low cost--to one of raising a crop for the purpose of selling it to the Federal Government." Volume Three, page 635. Commission on Organization of the Executive Branch of the Government.

- (4) A very pointed criticism of the expansion of agriculture in California is given by a prominent authority, Raymond A. Hill, who served as a member of a consulting board which reviewed the California Water Plan, Bulletin #3.

"The ratio of population to irrigated acres in California is already 1.5 to 1; it cannot eventually be less than two to one. I believe it to be true because of these high ratios that California is now and will become increasingly dependent on the agricultural products of other parts of the United States and even of other countries. We pay for these imports with our manufactured products. Can we afford, just to reduce the amount of these imports, to incur tremendous capital costs and continuing large operating costs to provide water for the irrigation of land now undeveloped? Certainly not, if the total costs to provide water for the agricultural products of these lands exceeds the price of equivalent agricultural products imported from other areas." Economics of California's Water Development, page 5.

- (5) Based on the data contained in note (3) above, the gross cost to the State's taxpayers was approximately \$300,000,000 in 1953 and \$640,000,000 in 1958. The net cost is less because some returns are realized by the Federal Government for these surplus commodities.
- (6) In 1957 soil bank payments in California were \$14,851,722 for 192,977 acres and in 1958, \$8,744,675 for 134,346 acres. California products placed under price supports in 1956 were \$20,141,431 and in 1957 were \$30,304,536. In addition, large amounts of products were placed in purchase agreements at no current cost to the Federal Government.

The costs of handling and storage for surplus commodities can be high. On December 16, 1958, page B3, the Riverside Daily Enterprise published a detailed story on the costs of milo maize being stored at Riverside.

"A mountain of surplus milo maize, government owned, is being piled in the Food Machinery Corporation's surplus building here.

"An area 700 feet long and 140 feet wide is deep with grain, 12 feet high at the outer walls. The last of 750 carloads is being blown onto the top and center, making the mound as high as 30 feet among the rafters.

"The grain is from last year's crop. It is being cleared out of warehouses in Kansas to make way for this year's grain. It amounts to about 1,340,000 bushels, but it's only a drop in the bucket compared to the 44,700,000 bushels of milo now stored on the West Coast by the Commodity Credit Corporation.

"This in turn isn't much compared to the 88,300,000 bushels of other grains stored on the West Coast, mostly wheat and barley. The shipments west were stepped up because storage space was exhausted in the Midwest.

"Sydney Harris, deputy director of the Portland commodity office, Department of Agriculture, has supplied a list of rates, plus grain sorghum price support regulations. The commodity office is in charge of West Coast storage. The median support price paid in Kansas counties

last year was \$1.84 per 100 pounds. The milo being stored here cost the government \$1,380,000.

"This grain amounts to 1,339,285 bushels. Handling charges are figured on the bushel basis. There was a truck receiving charge in Kansas of 5-3/4 cents per bushel, a rail loading charge in Kansas of 3/4 cent, a charge at another Midwest point for fumigation of the grain, a rail receiving charge of 1 1/2 cents in Riverside. There will be another rail loading charge here. These amount to 11 cents per bushel or \$147,321 handling charges to dockside at the eventual West Coast shipping port. This grain's destination is overseas in the Pacific area. Santa Fe charged 86 cents per 100 pounds for shipment of the grain from Kansas in carload lots, for a total of \$645,000, which carries through to dockside.

"In addition to in-and-out handling charges, California Milling Corporation here will collect .043 of one cent per bushel per day storage, which on this pile of grain figures out to \$575 per day. Assuming the grain will stay here a year, which reportedly is a reasonable expectation for the average milo stored on the West Coast, the Commodity Credit Corporation will have invested \$2,382,228 in this mountain of grain, apart from the overhead of the agency.

"The eventual sale price is problematical. It is based on current market price less a rebate in credit. The last sale had a rebate credit of \$6.60 per ton. On this grain with a year's storage, this would mean a loss of \$679,728."

- (7) Task Force Report on Water Resources and Power, Volume Three, pages 1171 and 1172.
- (8) Letter to the Chairman from State Department of Agriculture, dated January 30, 1959.
- (9) Business Week, December 6, 1958, page 26.
- (10) See Statement of Greater Bakersfield Chamber of Commerce, Transcript of September 17, 1958, page 68 and letter from Mr. David Balmer, County Administrator, Solano County, dated October 2, 1958.
- (11) "When viewed in its entirety there is probably no area in the United States more richly endowed than the Central Valley of California by climate, soil, mineral resources, and timber for the development of a thriving economy based on the production of food, fiber and other basic materials required by the nation. Nowhere else in the United States is there a larger body of first-class irrigable land suited to the production of a wider variety of crops. With an adequate water supply and the long, temperate, frost-free growing season, the fertile soils are capable of producing heavy yields of almost any crop one can mention." The Contribution of Irrigation and the Central Valley Project to the Economy of the Area and the Nation, Bureau of Reclamation, printed as Committee Print 11, House Committee on Interior and Insular Affairs, U. S. Printing Office, March 1956, page 6.
- (12) Letter dated July 17, 1958 from Director of Water Resources to Palo Verde Irrigation District.

- (13) Summary Statement by State Department of Water Resources, Economic Demand for Surplus Northern California Water in Southern California Area, Los Angeles, California, December 5, 1958, page 29.
- (14) See, for example, Table 2, page 11 of the publication "Our Water Resources, Project Note No. 33", published by the Tax Foundation, 1953. This table shows the repayment pattern for selected reclamation projects.
- (15) For further explanation of this problem see Letter of October 10, 1958 from the subcommittee chairman to the director of Water Resources.
- (16) Mr. Don M. Davis of Stone and Youngberg has observed:

"None of us knowingly wish to impose impossible financial burdens on any segment of our economy--but when the proponents and ultimate beneficiaries of a water project initiate the project and voluntarily agree to the terms of repayment--who is actually imposing the financial obligations?" Economics of California Water Development, page 125.

- (17) Assessments of lands within irrigation districts are by statute declared to be based upon quality and value. In practice, however, this is frequently not done. See Transcript of September 16, 1958, pages 31 and 32. Where a flat assessment is used and there is no variation in water rates according to quality of the irrigated lands, the poorest quality lands establish the repayment.
- (18) The Director, Department of Water Resources, stated:

"In the formulation of projects and in establishing the price for agricultural water to be supplied by State water projects, we must guard against unwarranted and uneconomic expansion of agriculture, particularly where such expansion would entail an undue economic burden on other segments of our economy. Full consideration must be given to land quality and capability to avoid uneconomic commitment of a large proportion of our available water resources to lands of marginal productivity. Land speculation must not be encouraged." Transcript of September 15, 1958, page 140.

Later, in the same statement, the Director added:

"If water were to be delivered under a pricing policy based solely on ability to pay, then extremely poor land would receive water free. Under present water laws, it is difficult to take the water away from such an area once the use has been established. Therefore, it is possible that under liberal application of such an ability-to-pay policy, nonproductive land could obtain a full and free water supply, while more productive land which might be developed at a latter time and which could pay its costs, would not have a full supply available. Furthermore, as heretofore stated, low quality lands tend to be used for crops having high water requirements. ...Within local districts, the land owners may decide to vary the price of water according to land quality or crops grown in order to make the most effective use of the land facilities. The local district could vary the charges by using a combination water toll and tax method of collection." Page 148.

- (19) Memorandum of the Chairman of the Subcommittee on Irrigation and Reclamation, April 25, 1958, U. S. Government Printing Office, page 43.
- (20) Letter from the Regional Director, Bureau of Reclamation, Sacramento, California to the subcommittee chairman, dated September 12, 1958, states:

"It is a generally accepted theory that the market value of land tends to reflect the capitalized net earning capacity of the land. Water costs, being one element of production costs, should influence earning capacity and, therefore, should reflect in the market value of land in inverse ratio." Transcript of September 15, 1958, page 67.

The Task Force Report on Water Resources and Power, Volume Three, page 643, comments on the problem:

"It has been found that the repayment ability of a beneficiary is closely associated with increase in his land values. Then it behooves the government to avoid the establishment of falsely founded prices for agricultural property. Reasonable land values, based on local conditions, will not overextend beyond his limits a settler adequately supplied with capital. The possibility of success of the irrigation venture is considerably improved thereby."

Mr. James Forbes, appearing in behalf of the Stanford Research Institute also commented on this problem:

"It should be recognized that such a policy (of subsidy to irrigation) is not likely to benefit farmers as farmers. The principal effect would be to increase land values. Thus, over a period of time, as farm land is bought and sold, the farmers who own or rent the soil will not be the people who derive the benefit from low cost water; they will have paid a price for their land or for their lease which includes the capitalized value of the water subsidy, and they will then be dependent on continuing water subsidy." Transcript of May 16, 1958, page 168.

- (21) This secondary benefit is well documented in "The Contribution of Irrigation and the Central Valley Project to the Economy of the Area and the Nation".

The Hoover Commission Task Force on Water Resources and Power made a very strong observation on this point:

"It has long been recognized that increase in property values of agricultural lands under irrigation development is at least matched and usually exceeded by the increase in value of nonagricultural suburban and urban areas. Indeed, it seems that from these latter areas actually comes much of the great pressure for expansion of irrigation. Entirely too frequently demand for an irrigation project stems from mainstreet rather than from the farming area itself." Volume Three, page 630.

- (22) Agribusiness - A New Way of Looking at Farm Problems, by John Davis and Ray Goldberg, Harvard Business Review, 1957.
- (23) See also the comments by Messrs. McGauhey and Erlich, Transcript of September 15, 1958, page 85.

Notes on Chapter VI (Cont'd.)

- (24) Transcript of September 17, 1958, page 76. Mr. Kenneth Kuney, representing the Tulare Chamber of Commerce, outlined a somewhat similar approach taken by the City of Tulare. See pages 133 to 136.
- (25) The details of the Solano, Santa Barbara, and Ventura Projects are in the Subcommittee's files.
- (26) Transcript of May 15, 1958, pages 91 and 92.
- (27) Transcript of September 16, 1958, page 18.
- (28) Both the San Francisco and Los Angeles panels of financiers agreed that bonds with limited development periods could be marketed. The Los Angeles panel specifically stated:

"The first maturity of the bonds could be deferred for five or ten years during the development of the project. Deferring maturities will result in a slightly higher interest rate, but a reasonable deferral to get the project constructed and in use is feasible." Transcript of November 13, 1957.

NOTES ON CHAPTER VII

RECREATION REPAYMENT

- (1) In this study the term recreation includes at site swimming, boating, fishing, scenic attractions, private cabins or rental rooms, restaurants, boat launching ramps, water supplies, sanitary facilities, parking areas, picnic tables, trailer and camping spaces, and access roads or trails. Downstream from the project, recreation includes the maintenance of streamflow for scenic, fisheries and wildlife purposes.
- (2) In certain circumstances, water transported for irrigation, or municipal or industrial purposes will be available in a reregulating reservoir for recreational use. This will be a secondary result of transporting the water. Normally, reregulating reservoirs will have little water in them during recreation seasons.
- (3) Hoover, Shasta, Folsom, Friant, Pine Flat, Isabella, Cachuma, Trinity and all other major federal dams in California and the west were designed and constructed without regard to recreation, in the sense that the design of the dam and reservoir with or without recreation features would not vary. However, several bills have recently been introduced in Congress to liberalize federal recreation policy.

The Sacramento Municipal Utility District has carried federal practice one step further by proposing the construction concurrently of recreational features with other project features in order to secure an integrated and less expensive project. The design of the District's dam and reservoir, however, is still for power purposes and does not incorporate any significant construction or investment for the purpose of providing recreational facilities.

- (4) The Central Valley Project is an unusual exception because \$2,804,000 is allocated to reimbursable fish and wildlife and \$11,628,000 is allocated to nonreimbursable fish and wildlife. The funds to repay the reimbursable fish and wildlife costs come from sales of water to the grasslands area and from power revenues. See Audit Report to the Congress of the United States, by the Controller General, for fiscal year ended June 30, 1956, pages 20 and 26.

In recreational navigation projects constructed by the Corps of Engineers, the costs of small navigation projects primarily for recreational use are divided between the Federal Government and the local interests concerned. In practice, application of this formula requires that local interests pay a large part, and in some cases the major part, of the first cost of such projects. In Corps of Engineers' projects of primarily local significance, the costs of fish and wildlife and recreation are borne by local interests. Reference material in subcommittee's files.

Frequently, Corps of Engineer recreational or fish and wildlife features are nonreimbursable to the beneficiaries, but are added onto the costs to be repaid by other project purposes. The Corps of Engineers stated:

Notes on Chapter VII (Cont'd.)

"Normally, there is no specific allocation to recreation use. We are not authorized under the law to allocate to recreation, except in very specific instances where the benefits can be clearly defined. Usually the recreation feature is allocated to other uses, and the other primary users carry such costs as are incorporated in the project plans for recreation." (Transcript of May 15, 1958, p. 65.)

The Corps also stated:

"In our estimates (of construction costs), we provide for minimum facilities to take care of the public, and I mean minimum, absolute minimum, drinking water, sanitary, parking, access roads, a nominal amount in connection with our maintenance and patrol roads. And these costs, as previously stated, are normally charged back to primary project functions. They are allocated and carried by the flood control, irrigation, power beneficiaries, or the costs are allocated to those uses. We have no authority to allocate them to recreation as such except in very specific cases where they are a part of a national forest or other specific situations like that." (Transcript of May 15, 1958, p. 80.)

- (5) An excellent example will be the operation of the San Luis Reservoir as proposed by the Bureau of Reclamation. During the late summer, the reservoir will be little more than a dry lake. This, of course, is necessary to fulfill its primary function of storing water during the winter for release during the summer.
- (6) The need to allocate separable and joint costs to recreation under such circumstances arises because of the purpose and inherent logic of the cost allocation process.
- (7) See Green Book, pp. 50 and 51.
- (8) For example, S. 1164, 85th Congress, 1st Session, introduced by Senator Kerr, established an arbitrary figure of \$1.00 per day per recreationist.
- (9) Following this method, the Department of Water Resources came up with a figure of \$2.00 per day per recreationist.
- (10) See Transcript of September 18, 1958, page 8, for data on the revenues received from Lake Cachuma, and page 38 for information on Lake Piru. Mr. Doe presented the following data on the operations of Lake Henshaw:

"A concessionaire has operated Lake Henshaw for the Vista Irrigation District as a hunting and fishing resort over a period of years, and the return has been rather impressive. The Vista Irrigation District receives a flat minimum rental regardless of conditions and then a share of the net profits. Now, that is after expenses have been deducted from the receipts. Those payments have fluctuated between \$25,000 and \$70,000 in all but one year when it was somewhat less. It went down to \$12,000 or \$14,000 by reason of the fact that there wasn't any water in the

Notes on Chapter VII (Cont'd.)

lake. The capital cost of the facilities that are devoted specifically to recreation to fishing, would be in my guess a sum of \$100,000 something like that...It would be possible for the project to assume some of the costs of construction."
(Transcript of December 4, 1958, p. 45.)

- (11) The prevalence of the practice of charging substantial fees for the use of project waters and recreational facilities is illustrated by the booklet prepared by the California Recreation Commission, entitled "Recreation Opportunities at Selected Water Reservoirs, 1957."
- (12) A recreation study in the Clear Lake-Wilson Valley area of the Cache Creek Basin, recently submitted to the Department of Water Resources, shows that persons seeking recreation in that area by the year 2010 will spend an estimated \$69,000,000 annually. The present amount annually spent in the basin was estimated to be \$15,050,000. (Sacramento Bee, January 1, 1959.)
- (13) See National Survey of Fishing and Hunting, U. S. Fish and Wildlife Service, Circular 44, Government Printing Office. This report shows the average expenditure by fishermen in the United States in 1955 was \$91.98, and for hunters \$79.49. It is obvious from the Survey that there is a very wide range in the expenditures of hunters and fishermen. This is to be expected since expenditures are related to income, and there is substantial variation in income.
- (14) See statements of California Wildlife Federation, Transcript of July 8, 1958, page 124, and Pacific Inter-Club Yacht Association, page 48.
- (15) See statement of California Public Outdoor Recreation Plan Committee, Transcript of July 8, 1958, page 14.
- (16) The type and variety of concessions as well as their prevalence is illustrated by the publication of the Recreation Commission, entitled "Recreation Opportunities at Selected Water Reservoirs". The proposed plan for recreational development by the Sacramento Municipal Utility District and Bulletin No. 59, Department of Water Resources' report on the Upper Feather River projects, illustrate the possibilities of attracting high value investments.
- (17) See statement of Wildlife Conservation Board, Transcript of July 8, 1958, page 61.
- (18) See statement of the Division of Small Craft Harbors, Transcript of July 8, 1958, page 85.
- (19) See statement of Division of Beaches and Parks, Transcript of July 8, 1958, page 96.
- (20) See statement of the Department of Fish and Game, Transcript of December 3, 1958, page 47.
- (21) See statement of U. S. Forest Service, Transcript of July 8, 1958, page 131.
- (22) This policy would be consistent with the effect of the federal policy detailed in note 4, above.

NOTES ON CHAPTER VIII

FLOOD CONTROL AND OTHER PROJECT PURPOSES

- (1) See the statement by the Corps of Engineers on the flood control allocation at Oroville, transcript of May 15, 1958, pages 86 to 88.
- (2) This is one reason why the Corps of Engineers does not secure water rights for its projects. See also transcript of May 15, 1958, pages 72 and 78.
- (3) Transcript of May 15, 1958, pages 60 to 62.
- (4) Transcript of May 15, 1958, pages 92 and 93.
- (5) The use of the same method of cost allocation by the State and the Federal Government, that is, the separable cost-remaining benefits method, greatly simplifies cost allocation problems when the Federal Government makes contributions to state projects. The use of revenues instead of benefits in the cost allocation formula should cause no serious problems in this regard.
- (6) The practices of the United States Corps of Engineers in evaluating flood control benefits have been repeatedly criticized by Congress and other federal and private agencies.
- (7) In federal law a preference customer is a public agency, cooperative or municipality which is given a preference in the availability of federal hydroelectric power.
- (8) Municipal and industrial water users of the Central Valley Project are repaying approximately \$26,000,000 of the costs allocated to irrigation.