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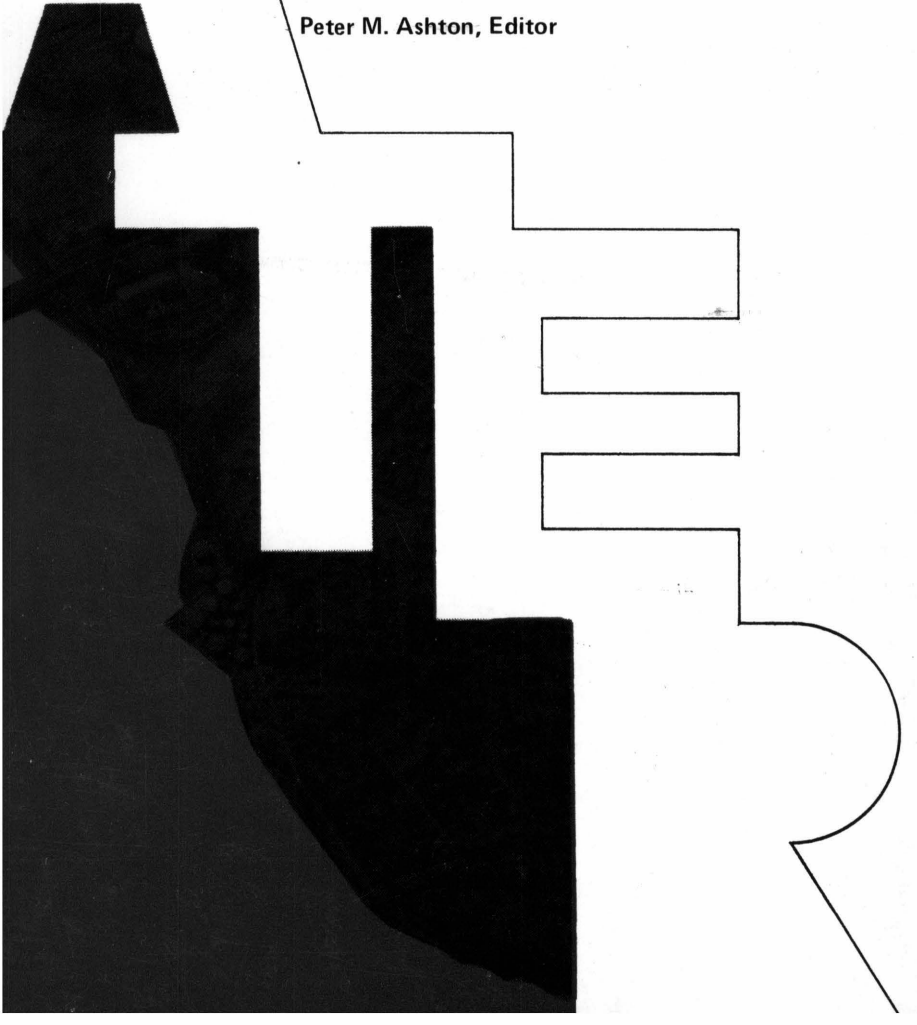
# National Water Commission: A Review of Some Issues

Proceedings of a Seminar Series

Peter M. Ashton, Editor



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# National Water Commission: A Review of Some Issues

## Proceedings of a Seminar Series

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by
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# PREFACE

In June 1973, the final report of the National Water Commission was transmitted to the President and to the Congress of the United States in accordance with the provisions of Public Law 90-515, approved September 26, 1968, which established the Commission.

The National Water Commission was established following a number of proposals involving major water resource development projects which generally pointed out that long range water problems were becoming increasingly critical nationwide. In recognition of this situation, the U.S. Bureau of the Budget (now the Office of Management and Budget) concluded that only a national commission could effectively assess the many common aspects of water problems, and only such a commission could outline the consistent courses of action to be followed in achieving the most efficient utilization of the Nation's scarce water resources. Thus, the mission of the National Water Commission became to determine what policies should be adopted so that the highest measure of utility would be returned to society from the Nation's water resources and to assess the extent to which policies of the past are suited to needs of the future.

The Final Report of the National Water Commission is primarily a summary document containing hundreds of policy recommendations compiled into some seventeen program areas. These recommendations emerged from an intensive program of background studies covering all the major fields of interest related to water policy. Water resource experts, universities, consulting organizations, foundations, and other institutions contracted with the National Water Commission to prepare these background studies and the resulting reports represent a major contribution to the multi-disciplinary body of knowledge on water resources.

During the 1973-1974 academic year, the Virginia Water Resources Research Center decided to offer a non-credit series of seminars, open to all members of the university community and other individuals with water resource interests, concentrating on some of the central issues raised and discussed by the National Water Commission. These seminars were held on a once monthly basis on the campus of Virginia Polytechnic Institute and State University. Seven seminars were held in all, each focusing on one of the National Water Commission topics, and each led by a water resources expert who, either as a consultant, background study author, or staff member, had a direct involvement in the work of the National Water Commission.

This publication contains the text of the formally delivered part of each seminar leader's presentation recorded onto tapes at the time of presentation and subsequently transcribed and edited. Unfortunately, it was impossible to record the questions and disucssions which followed each formal presentation. This compilation is made available as an abbreviated and simplified treatment of some of the more significant issues addressed by the National Water Commission. Readers interested in more detail are referred to the original publications.

The editor would like to express his gratitude to the Office of Water Resources Research, U.S. Department of the Interior, and to the Virginia Water Resources Research Center for their support on this project. Thanks are also due to Tom Johnson, Eileen Garner, and Jean Hagerbaumer for their assistance in producing this publication.

Peter M. Ashton

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# THE NATIONAL WATER COMMISSION: AN OVERVIEW OF ITS STRUCTURE AND INVOLVEMENT

Ralph E. Fuhrman*

The National Water Commission was created by an Act of Congress approved by President Johnson on September 26, 1968.** The Commission's background is interesting because it stemmed from proposals for water developments in the Colorado River Basin which raised a number of fundamental questions concerning the future policies of water resource development in the United States. Congress was asked in certain proposals to authorize the Central Arizona Project in Arizona and New Mexico, and to establish a lower Colorado River Basin Development Fund. At about the same time, it was asked to authorize the Bridge Canyon and Marble Canyon dams affecting the Grand Canyon of the Colorado as well as the study of importation of water into the Colorado Basin from other regions of the country. These were varying, overlapping and conflicting proposals and there was a strong local desire for each. The U.S. Bureau of the Budget, the predecessor of the present Office of Management and Budget, informed the Senate Committee of Interior and Insular Affairs in May 1965 that, although it had no objection to authorization of the Central Arizona Project and the lower Colorado River Development Fund, many of the other proposals required further careful study. The Bureau pointed out that while the long range water problems of the lower Colorado River Basin were serious, such problems were by no means limited to that area. They were becoming increasingly critical for other parts of the country as well. Under these circumstances, concluded the Bureau, it would be appropriate to review the water resource development problems and opportunities for the Nation as a whole rather than only the Colorado Basin. As a result, the Bureau recommended the establishment of a National Water Commission. Only a National Commission, it said, could effectively assess the many common aspects of current water problems and only such a Commission could outline any consistent courses of action which must be followed if this Nation is to achieve the most efficient utilization of its limited water resources.

The duties of the Commission, as given in the Act, are outlined in one lengthy sentence which reads:

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**P.L. 90-515, September 26, 1968, 8Z Stat. 868.

*The Commission shall (1) review present and anticipated national water resource problems, making such projections of water requirements as may be necessary and identifying alternative ways of meeting these requirements giving consideration, among other things, to conservation and more efficient use of existing supplies, increased usability by reduction of pollution, innovations to encourage the highest economic use of water, interbasin transfers, and technological advances including, but not limited to, desalting, weather modification, and waste water purification and reuse; (2) consider economic and social consequences of water resource development including, for example, the impact of water resource development on regional economic growth, on institutional arrangements, and on esthetic values affecting the quality of life on the American people; and (3) advise on such specific water resource matters as may be referred to it by the President and the Water Resources Council.*

The Commission refused to consider any specific projects as its objective was not to weigh the merits of local projects. Rather its charge was to determine future policies that would help the United States generally in striving to meet its long range future water problems.

The Commission was composed of seven members appointed at the pleasure of the President, not requiring Senate confirmation. The Commissioners were otherwise employed, and were paid only a per diem fee and reimbursed for travel expenses. They were forbidden to hold any other position as officers or employees of the United States. The Commission was required by law to consult with the Water Resources Council, which is a Cabinet Council made up of the Secretary of the Interior and the Secretaries of other Federal departments having interests in the water world as continuing, ongoing operating agencies. The Commission was to terminate not later than September 26, 1973. Actually it terminated at the end of June 1973, practically three months in advance, and with about $50,000 of unspent appropriations.

Some Federal Commissions have been used to sweep issues under the rug, and in the water field, there have been 20 National Commission that have studied the water problem in this century. Many think the reports of these groups have been printed, put on the shelf, and forgotten. Let me assure you that it is not the case. A study of these reports shows that many of their characteristics and salient point have found their way into legislation. One of the most recent is the Senate Select Committee of 1960. Senator Kerr from Oklahoma chaired that group and Ted Schad, who was Secretary of the National Water Commission and Executive Officer of the staff, was the

director of the Select Committee. They did a monumental work with a somewhat narrower scope than this one. Mr. Schad himself, because of his experience in the water resources section of the Library of Congress, had a tremendous amount of experience in national water resource problems and he was the ideal man to head up this Commission activity.

While the study was considered national, the Commission chose to limit itself to the 48 coterminous states, because the water resource problems of Hawaii and Alaska are vastly different. In accordance with the law, the Commission did consult with the Water Resources Council. The Commission immediately laid out conferences or hearings in seven areas of the country inviting anyone who wanted to testify to do so. Twenty-two fields of interest were selected for background studies, consultants and staff were engaged. The staff grew to 44 by mid-June of 1971 and shrunk as sections of the work were completed. It has been gratifying to see the final report issued in recent months. The final report, as well as a summary report, are available from the Government Printing Office.*

The Commission met once a month, giving about 50 meetings in all, and considered all the various reports and recommendations made to it. Interim reports were issued annually and preliminary and final reports were issued in early 1973. After the preliminary report, comments from the entire country were invited and used in the preparation of the final report. The major working groups of the Commission were the Engineering and Environmental Sciences Section, the Social and Behavioral Sciences Section, a Legal Section, the Forecasting Section, and the Administrative Section. This report includes a great number of recommendations which deserve detailed study.

## Water Demand and Supply

We become accustomed to ample supplies of water from the faucets and we are usually satisfied as long as the water continues to run. Water as a primary requirement of life is extremely interesting and essential to every form of plant and animal life. There must be enough of it for irrigation of crops if irrigation is needed, but it is absolutely inescapable to have water in the right place at the right time and in sufficient quantities for all of our needs. Water is limited in amount to that provided by Nature from year to year. The annual quantity is about the same but with growing population and expanding industry, demands go up and up. The fresh water we have available is that which rainfall provides to our rivers and lakes, natural and artificial, and that

*National Water Commission, Water Policies for the Future, Final Report of the National Water Commission, Washington, D.C., June 1973.

which percolates into the ground as groundwater. The Commission's assignment was to determine policies that would make the water we have go the farthest and serve the growing population in the future. While the total fresh water available in the United States is great, there are areas of the country where water is very short. The Southwest from West Texas to California is virtually a desert area and the principal water available is that which comes in from rivers to the north or what may be mined from the ground. The latter supply is diminishing because the groundwater table is being lowered rapidly. In other words, water is being taken out of the ground much faster than rainwater is replacing it through percolation. Water is the one great natural resource that is naturally replenished but in limited quantities, as opposed to coal, oil or minerals, the stocks of which remain constant.

The demand for water is characterized by several unique features. For example, after considerable review, the Commission became convinced that there are very few truly essential water requirements such as small amounts for drinking, cleaning, fire fighting in municipalities, and other social and environmental purposes. In addition, the demand for water and water-related services is affected by many other factors and policy decisions, some in fields far removed from what is generally considered to be water policy. For example, the invention of the kitchen garbage grinder increased the load on municipal wastewater treatment plants, and the decision to support the price of cotton caused vast increases in irrigated acreage in the high plains of Texas. Consideration of such extremes indicates the breadth of the Commission's studies and recommendations.

Concerns about water may be centered about two basic attributes: quantity and quality. The quantity may vary from too much to too little, while the matter of quality will depend on physical, chemical, and biological characteristics. The proportion of runoff from precipitation in the 48 states varies from 68 per cent in the North Atlantic States to 25 per cent in the Lower Colorado River Valley. These percentages, together with unfavorable annual precipitations, cause great variations in water availability and point out forcibly that many questions in the water field cannot be answered at the national level, though national policies can be determined for guidance. In the 48 contiguous United States, many decisions must be made by state governments; the report makes this recommendation. A related conclusion of this section on water supply is that federal programs can assist in supporting national population distribution policy. But water programs alone are not adequate to control population policies and determine where people will live.

As to the quality of water, there is the matter of water pollution control which happens to be the area of my greater interest in the Commission's work. The principal sources of pollution are from the population of our cities and the wastes of our industries. In many cities there are, in addition to strictly domestic wastes, contaminated storm waters which are a major problem in the older cities of the country. There are also major sources of pollution from agricultural pursuits as well as mining pursuits, and general runoffs, erosions, siltation, and resulting sedimentation. This is only a recitation of these by topics and anyone is quite an item in itself. For instance, in the agricultural world there is leaching of chemicals from fertilizers so that the fertilization of the streams and the over-abundance of phosphates and nitrates in the streams give fertilizing support to the growth of organisms in the water and, hence, degradation from within. The great mining scourge is the acid mine water which drains to streams lowering the pH and killing all life so that neither fish, nor anything that fish live on, can exist in the streams. Not until these streams are neutralized, in some cases by alkaline wastes, are they fit for a biological habitat again. Only then may they proceed with the natural self-purification process. Siltation, about which there has been awareness longer than any of the other water quality issues, was responsible for the development of contour plowing many years ago.

Throughout the Report, there is one noteworthy tone which probably reflects the fact that the Commission was made up of hardheaded businessmen. It felt that Uncle Sam should not pay for water resource developments. Rather such developments should be paid for by those who benefit by them. Also, those that get a water supply should pay for that water supply, those who pollute the water should pay for the relief of that water pollution. People should stop thinking that only Uncle Sam has any money in his pocket to do these things — a principle that we must come to. The conclusions of the Report were made at about the same time that the 1972 Water Pollution Control Act Amendments were passed by the Congress; it is of interest to note that the 1972 Act is not in accord with the Commission's findings. Possibly Congress is trying to outdo the recommendations to the Commission Report here by prohibiting pollutional discharges into streams. This is exceedingly expensive, and there is no ring of reason, nor any sensible justification, to approach water pollution control in that way. The Commission Report says, clean up the streams but use the recuperative power of the streams.

Another important point in the Commission program is to continue the way we are going for a ten-year period with federal help to build pollution control

works and then cut off federal help. From that time on, cities and states will be on their own but must conform to federal standards. From experience, it is difficult to stop any federal program because of the pressures against it, but that was the recommendation of this Commission. An aggressive research and development program is the only way to attack many of the problems in the industrial waste field. In this connection, the federal government would finance industry-instigated research on systems and methods of industrial waste treatment when the results of the research are shared with the other industries countrywide in the form of a national benefit. Such a program would do very well to investigate methods of using beneficially the nutrients that are produced in treatment works.

As to non-point pollution sources, these include not only the agricultural fertilizers but also the general contamination of the soil by animal wastes. In a growing agricultural pursuit feedlots, where cattle are fed intensively before going to the packing house, produce serious water pollution problems. Animal wastes wash over the surface of the ground into watercourses and consume the oxygen resources of the stream. England has a very sensible approach to this in that, when a feedlot serves one hundred or more head of cattle, it is no longer considered an agricultural pursuit but an industry, thus having to conform to industrial standards of pollution control.

## Federal Involvement and Land and Water Planning

The "user pay" principle is consistent and persistent throughout the Commission Report in the hope that financing from Washington can be reduced. There would be federal support of regional water planning through the states as is done now, but the Commission emphasized that many of these activities must take place at the state level. The Report outlines certain things that the Federal government can do well — for example, evaluating the pollution status and progress nationwide, and encouraging regionalization and comprehensive metropolitan water drainage systems for economies of scale and increased efficiency. The Federal government, the Commission says, should reinforce and support the states' primary responsibility for discharge permits, information and enforcement, and if the state does not do these things, the Federal government should take over activities for pollution control. Furthermore, the Report recommends a strong education and manpower training program to provide the needed men and women to conduct these programs.

On the matter of the flood plain management, the Report gets closer to the land use matters as this is a strongly water-related aspect of land use. Again, on the "user pay" principle, the Commission said, the expense of any allowed

development in a flood plain must be offset by the gain in the use of that facility whatever it may be. In other words, losses must be expected there, but if losses exceed the expenses, that is poor business and should be prohibited. All costs are to be counted, in the general tone of the Report. The Commission recommends that the Water Resources Council, which is a permanent government organization, promulgate guidelines to encourage flood plain control and that the Federal government installations must comply.

The Commission said that the federal legislation for land use planning should include special provisions for the coordination of any plans by state and federal resource planning agencies. Now this proposed legislation is before the Congress. It appears that there will be some kind of a land use act by the Congress within the next session or two. This act will probably make federal funds available for aid to the states in land use planning. In other words, allotments will be made to states so that they will be induced to participate in the program. Today, I learned that your state, through its legislative committee, is considering this very thing now. Several states have already passed such legislation, and many others are considering it.

In the early years ahead, there will be much increased activity in land use planning. Land use and water use are such intimate partners that you cannot separate them. In recent years, the report of the Public Land Law Review Commission has made its recommendations so that in time the Congress will merge these matters and bring them into harmony. The integration of water and land use planning is long overdue. However, it has been properly observed that the 1972 Water Pollution Control Act Amendments were so broad that they also constitute a land use act. It must be realized that man is a land animal and that anything done to improve the air or water is a benefit to his existence. In making future engineering designs and River Basin development plans, future locations of industries, highways, and subdivisions are strongly influenced. In other words, water quality alone is not an end, only a means to an end. Water planners working apart from other functional planning agencies often work without any firsthand knowledge of the needs and intentions of those who are planning for proper land use, transportation, housing, and industrial development. Important decisions about land use may be constrained or blocked by independently conceived water resource development. Land use planning and water resources planning must be integrated.

Water resources planning is important but only one aspect of overall resources planning to satisfy human wants. An example of the relationship between water and land planning is found in their mutual involvement with flood damage reduction. Flood damages follow when lands which carry flood flows

are occupied by buildings and other types of improvements. Land use plans made without the involvement of water planning may permit the extension of residential and industrial buildings onto the flood plain and may permit natural floodwater storage areas, such as swamps, to be drained and filled. The use of the flood plains for channel-constricting uses such as filling for site improvement or for the disposal of solid waste materials are other examples. Water planners, on the other hand, sometimes proceed without the involvement of land planners. The construction of reservoirs in rural areas is a prime example. Such reservoirs frequently become recreation magnets for a considerable distance. Rural governments in the vicinity of the reservoirs usually are not equipped to manage the land development traffic, law enforcement and sanitation problems which develop from these. These uses of land and water in upstream areas may directly or indirectly affect downstream estuaries and coastal zones. Similarly, land uses in the coastal zones themselves may affect the uses of water there. Land use plans prepared and implemented by the states should, where appropriate, provide for developing and protecting the characteristics of estuaries to coordinate land use and water resource planning. If the President's bill — and that seems to be the favorite one in the Congress — or any similar bill, should eventually pass, we will have an essentially complete package of air, water and land acts which, once fully implemented, can insure that our life-giving environs will be saved for posterity.

# URBAN WATER RESOURCES PLANNING AND MANAGEMENT

Maynard M. Hufschmidt*

Thank you very much. I shall first talk about the planning aspects of urban water management, and then go on to discuss the question, "to what extent has the National Water Commission considered the problems and policy issues associated with urban water resource planning and management?" I shall start with a brief historical introduction, and then discuss the findings of several studies on urban water resource planning undertaken during the 1960's and, finally, examine the findings and recommendations in the Commission's report as these are related to the results of these studies.

According to the National Water Commission, 75 per cent of the population of the United States now lives in metropolitan areas which are defined as areas with at least one city of over 50,000 population. They comprise less than 2 per cent of the land area of the 50 States. Another 13 per cent of the population lives in smaller urban areas. By the year 2000, about 85 per cent of the people will be living in metropolitan areas, according to the projections of the Bureau of the Census. We are an urban nation and are becoming increasingly so. The significance of this urbanization trend for water resource planning and policy is clear. Regardless of historical circumstances and past problems and issues, national water policy for the next two decades should be urban oriented; and we shall look at the Commission's findings and recommendations from this point of view.

## A Short Historical Note

Historically, there have been two threads to U.S. water policies, plans, and programs. One is national, which developed around concerns first for interstate commerce including navigation, and later for major flood control projects and large scale irrigation developments in the West. From these nineteenth century beginnings, there evolved our comprehensive multiple-purpose river basin planning and development, beginning in the Conservation Era of the early 1900's and carrying on through the Tennessee Valley Authority and other major river basin developments from the early 1930's to the present. Most of the present pattern of national water resource legislation and institutions, including the Water Resources Council and the associated river basin commissions, is a reflection of this national thrust. Alongside this national emphasis, however, there has been consistent local concern for

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domestic water supply, sewage collection, treatment and disposal, and urban storm drainage. With few exceptions, these two activities, the national and the local, proceeded independently; there was little interaction between the federal water resource planning and local urban water supply and water quality management activities. This situation was reflected in several national water resource studies made since World War II; in these studies, urban-oriented water resource problems received very little treatment.

For example, in the report of the President's Water Resources Policy Commission in 1950 [1], very little attention was given to urban or metropolitan water resource problems or issues. The primary concern of the staff and the Commission members was for river-basin problems, plans, and policies. This is reflected in the make-up of the report. Of the 445 pages of the report, only 10 are concerned with urban water supply and 11 with water pollution control; also, in Chapter 3 of the report — the chapter concerned with planning — the river-basin was proposed as the basic planning unit for water resources. The state was considered to be the smallest unit of government capable of effective multiple-purpose planning; although local units of government were viewed as desirable participants in such planning, they were not considered to be major actors in the water resource planning scene.

This 1950 report (also known as the "Cooke" Commission report) did contain a specific recommendation having to do with the areawide water system management. It reads as follows: "The states and the federal government should encourage the formation of metropolitan water districts, to develop and transmit necessary water to meet in the most economical way the requirements of a group of communities, when those communities are dependent upon the same water supply, or when existing plans prove inadequate." This clear-cut statement of the 1950 report favoring metropolitan water management and water supply districts should be remembered when later we examine the National Water Commission's statement on the same subject. In general, however, the Cooke Commission report suggested that where water pollution control was a problem, it should be dealt with as an integral part of a river-basin plan and program.

Some 10 years later, when the Senate Select Committee on National Water Resources was conducting its studies, the urban water pollution problems had become quite serious. But in its report, dated January 30, 1961 [2], the Committee took a supply and demand approach to water resources. Thus, the Committee looked at urban water supply needs in quantitative terms and found that, overall, demands for urban water supplies are not large in relation to available supplies. With that orientation, it is not surprising that the report

tended to de-emphasize urban water problems. But, there was a change of emphasis in the Senate Select Committee report. Rather than pressing solely for national leadership in river-basin planning, the Select Committee report called for building up the capabilities of the states to participate in comprehensive, multiple-purpose planning, still however on a river-basin basis.

In fact, it appears that there was even less of an urban focus in the Select Committee report of 1961 than there was in the Cooke Commission report of 1950. This is the more interesting because (unlike the Cooke Commission report of 1950 which was put on the shelf, with little or nothing done about its recommendations) the Select Committee report did have many of its recommendations implemented. Two major results were the Water Resources Research Act of 1964, through which water resources research centers were established in each of the 50 states, and the Water Resources Planning Act, which established the Water Resources Council to coordinate Federal-State activities in water resource planning and development, and authorized financial support for state water resource planning. It is all the more striking, therefore, that a report which was so very effective had so very little urban emphasis. So, during much of the 1960's, as urban water problems were growing, there was implementation of a set of policy recommendations that were rural-resource, rather than urban oriented.

Beginning in the mid-1960's, however, greatly increased attention was given by analysts to urban water resource problems. The ASCE Urban Water Resources Research Program Committee is probably the outstanding example of this trend. From 1967 on, this Committee, through a series of studies, documented the deficiencies in basic data, on urban hydrology, and on urban water resources research generally. A number of other analysts, including Kelnhofer at Georgia Tech and Schaefer at the University of Chicago, conducted studies on metropolitan water resource planning and management. These studies were greatly influenced by the work of Professor Gilbert White then of the University of Chicago who, as many of you know, has been one of the intellectual leaders in the water resource fields over the past 30 years. My own special interest in urban water resources started in 1966, when I began a study ultimately published in 1971 on "Water Resources Planning in the Urban-Metropolitan Context."[3] So it was not surprising that, when I was asked to be a consultant to the National Water Commission in 1968, I emphasized the importance of urban water problems as a subject of the Commission's agenda. So the Commission and its staff were made aware of these urban aspects from the beginning of their work.

## The Commission and the Urban Water Problem

How did the National Water Commission deal with urban issues in its activities? Two of its major consultants, Gilbert White and Abel Wolman, were recognized experts on water problems, White on flood-control particularly, and Wolman on water supply and water quality management. In addition, several key staff members, including Victor Koelzer and Alex Bigler, were knowledgeable on urban water problems. The Commission also contracted for several background reports in urban and metropolitan water management. And in the fall of 1971, with the cooperation of the ASCE, the Commission sponsored a conference at Airlie House on urban and metropolitan water problems and policies, which brought together many of the foremost urban water experts and urban planners with particular interests in urban water resources. At this meeting, there was full and free discussion of the major problems and issues. Although the proceedings of this meeting were not published, it could be said that by early 1972 the Commission staff was well briefed on almost all of the disparate thinking that was around on urban water policy.

## The Commission Report

Only one chapter of the Report, Chapter 12, "Metropolitan Water Management" is solely concerned with urban water problems, but it would be misleading to look to this chapter alone for the urban focus of the Report. In fact, urban water problems and issues are addressed in a number of the other chapters, especially in Chapter 10 on planning and decision making, Chapter 4 on water quality, Chapter 5 in sections on flood-plain management and sedimentation, and Chapter 11 on organization and administration. My discussion will cover all relevant chapters of the Main Report and the Summary Report which summarizes in terms of seven themes.

Three of the seven themes have special relationship to urban water policy. Theme Number 3 emphasizes that water-resource planning must be tied more closely to land-use planning, and that structural solutions must be de-emphasized in favor of management and planning solutions. The concern is with urban land-use planning and with the use of urban flood-plain management as an alternative to building dams and levees. Theme Number 7, consistent with the new federalism approach, holds that water resource planning and management can best be done at the local level, and that the federal role, which is now large, should be substantially reduced. Realistically, the term local is defined as the problem-shed — in some cases the river-basin or in other cases, the metropolitan area. This de-emphasis of the national government approach to water resource planning has obvious implications for

urban areas because the policy is to place more responsibility on local units of government, including bearing more of the burden of cost. Just as the Cooke Commission emphasized national planning in 1950, and the Kerr Committee emphasized state planning in 1961, the National Water Commission has stressed local planning and management of water resources. And, Theme Number 2 has to do with the shift of national priorities from development to environmental improvement. This shift is exemplified by the establishment of EPA, the enactment of the National Environmental Policy Act, and the consistent trend of recent court decisions in supporting environmental quality goals.

Given these urban-related themes, let us look at the report's findings and recommendations in terms of basic data, research, planning, organization, and administration, as related to an urban focus. First, as for basic data. As reported above, the ASCE Committee and others who studied the urban water problem called attention to serious inadequacies in urban water data, including hydrologic and water management data. Yet, these inadequacies are barely recognized in the Commission's report, and there is no supporting recommendation in the report. The Commission merely reported as follows in Chapter 12: "Data on some aspects of urban hydrology are inadequate to meet the future needs of metropolitan area water management. Moreover, techniques for joint administration of some metropolitan water services on an areawide basis will create an even greater demand for data and for analysis of the data than are available to enable water managers to make timely operating decisions throughout the system." Furthermore, in Chapter 17 which deals with basic data, there is no recognition of inadequacy of urban water data in relationship to rural data. Actually, the data collection and analysis programs of the Geological Survey, the Weather Bureau, the Soil Conservation Service, and other water resource agencies still have a strong emphasis toward rural areas when viewed in terms of the relative needs of rural and urban areas. Yet this imbalance of programs is not recognized. The only exception is the discussion on data needs in the excellent section on flood-plain management in Chapter 5. In that section, deficiencies in flood-plain data are recognized and a recommendation is made for a federal program to reduce these data deficiencies. But in the key chapter on basic data and research (Chapter 17), there is no recognition of the special needs of urban water resources.

## Research

With respect to research, studies by the ASCE and others have pinpointed the inadequacy of research on urban water problems, including the social science and planning aspects as well as the physical aspects. The Office of Water Resources Research has known of this deficiency for a number of years and

has consistently given high priority to urban research in its water resource research program. Yet Chapter 17 contains no special recommendation that urban water resource research be emphasized. The set of research priorities listed on page 536 of the Commission's report could be interpreted to include urban-oriented types of research, but there is no explicit emphasis there. Thus, just as for basic data, the report is deficient in emphasis on urban-oriented research, except for flood-plain management, where in Chapter 5 research on flood management problems in emphasized. In my view, the Commission missed an excellent opportunity to support a redirection of research activity toward the kinds of problems that we will be facing over the next 20 or 30 years in the water resource field.

## Planning

As a basis for analyzing the Commission's findings and recommendations on planning, I shall first summarize some recommendations made by me in 1970 and made available to the Commission staff: [3]

1. The federal government should redirect its water-resource planning emphasis to give greater weight to urban and metropolitan problems.

2. As one means to this end, the Water Resources Council should undertake one or more pilot studies on metropolitan water resource planning, in which the resources of federal, state, and local agencies are combined with the goal of improving the state of the art of water resource planning at the metropolitan scale.

3. Federal water resource development agencies, including the Corps of Engineers, Bureau of Reclamation, Soil Conservation Service, and TVA should reorient their planning activities to provide greater help in solving urban and metropolitan water problems. Even within their existing limits of authority, there is considerable flexibility, and these agencies should use it and should seek out imaginative ways of helping states and localities to this end.

4. States should give more emphasis to urban and metropolitan water problems, but should play a supporting rather than a leading role in urban water resource planning.

5. Major leadership in urban water planning should be at the metropolitan or multi-county levels, in which water and related

land resource planning is carried on in conjunction with overall planning activities for the region involved.

The aim of these recommendations is to reorient water resource planning activities at the federal and state levels to support effective planning at the urban-metropolitan scale.

How does the Commission's report deal with recommendations of this kind? The answer is rather complex and, in the interest of time, only a summary will be given. Turning again to Chapter 5 on flood-management, we find that the planning implications in that chapter are very good with the exception of urban storm drainage (which will be discussed later). An example of the planning spirit of these recommendations is Number 5-10 under Section E, Programs for Reducing Flood Losses. "In formulating plans for flood loss reduction, full and equitable consideration should be given to all practicable alternative measures for achieving that goal, with a view of finding the best combination of such measures, using the evaluation principles recommended in Chapter 10 of this report." (Chapter 10 is concerned with planning and evaluation principles that are the basis for application of benefit-cost analysis to water resource development). And so in Section E of Chapter 5, we have a set of recommendations relating to local flood problems which propose actions by the federal, state, and local governments, ranging from basic data and research through planning and project formulation, all the way to implementation. The objective is to formulate and implement the "best possible" land use plan for the flood plain.

This concern for relating water and land use planning is well summarized in the last of the 13 specific recommendations having to do with flood loss reduction (No. 5-21). It reads as follows: "Any federal legislation to authorize a program of land-use planning should include special provisions for the coordination of any plans made under that program with flood-plain management plans made by the States and the Federal water resources planning agencies." This recommendation was written in the context of the National Land Use Planning Bill (the "Jackson Bill") which has already been introduced in 1972 and which is still being considered by Congress. The Jackson Bill is an attempt to provide federal stimulus to state land-use planning. The assumption underlying the bill is that many of our environmental problems are associated with the rather complete delegation by the states of land use planning and zoning authority to local governments, and the consequent need for states to do a more effective job of land-use planning. This has to do with coastal zone areas, with areas of critical environmental concern, and with areas affected by interstate highway interchanges, and the like. It is significant that only in this section of the

Commission's report is there an explicit statement that relates the concerns expressed in the National Land Use Planning Bill with those of water resource planning.

With respect to planning for water supply, we have in Section F of Chapter 5, a recommendation as follows: "The agencies responsible for preparation of comprehensive river-basin or other regional water plans, and the agencies responsbile for urban planning, should jointly develop more effective means of cooperation and coordination, as recommended hereafter in Chapters 10 and 11."

Unlike the situation of the basic data chapter, there is some coordination of the recommendations in Chapter 5 on flood-control and water supply and those in the chapters concerned with planning and management.

Turning now to Chapter 10 entitled Better Decision Making in Water Management, we find excellent presentation with respect to urban water planning. This chapter lists a number of deficiencies in planning which are not limited to urban areas but have particular relevance to them. Included, for example, are the statements that water resource planning is inadequately integrated with land-use planning, and that too little effort has been made to relate large-scale river-basin planning to the needs of metropolitan areas. Also there is a good statement on the integration of land and water planning in the first recommendation in Chapter 10. "If Congress enacts legislation to establish a program of Federal grants to States for improving State land use planning, it should make adequate provision in that legislation for the coordination of water and land use planning at the State, Federal, and local levels, and should encourage the use of coordinating institutions such as the Title II river basin commissions where they exist."

Another recommendation (No. 10-2) is that the Water Resources Planning Act of 1965 should be amended to open the present program of water resource planning grants not only to the states, but to local, intrastate planning entities as well. This recommendation addresses one of the suggestions in my report that I mentioned above. There follows a recommendation (No. 10-3) that the Water Resources Planning Act should be amended to provide for the establishment of federal-state-local planning organizations for areas where there is a distinct federal interest and where such organizations may be needed to provide more intensive and continuing attention to the water management needs of the smaller basins or metropolitan planning areas. This recommendation would give authority for the pilot program that I spoke of earlier. There is the question, of course, of what constitutes a distinct federal interest? Obviously, interstate urban areas

have a distinct federal interest. But do metropolitan areas such as Raleigh, Durham, or Richmond, have a distinct federal interest? Probably not any more than any other metropolitan areas, so the significance of this recommendation is not clear.

To summarize the Commission's stance on planning with respect to urban and metropolitan areas, one can say that, at least in the flood control section of Chapter 5 and in Chapter 10 (the general chapter on planning), there are recommendations that support what I consider to be the necessary reorientation of planning activity to take account of urban problems. There are, however, some specific inadequacies. These are in part associated with the basic stance of the Commission in attempting to discourage further federal initiative and intervention in the local water resource field.

Because the federal government is already heavily involved in urban flood-plain management, the Commission has positive recommendations for improvement of the Federal role. But this is not the case for urban storm drainage. When one looks at the urban water management program in the round, it is difficult to draw a distinct line between flood problems that arise from overflow of built-up areas (storm drainage), and those coming from overflows in recognized river channels and hence are in what we call flood plains. Nonetheless, in some cases damages from urban storm drainage are as great or even greater than damages that occur in recognized flood plains in urban areas. In this field of urban storm drainage, there is a great need for basic data, for research and also for better planning. Few if any cities have adequate urban storm drainage planning capability. In spite of this deficiency, the Commission's report recommends that the federal government take no initiative in this field. Urban storm drainage is held to be a local problem that local people should deal with. Part of the flood problem is recognized and supported in the report; the other part (which is very difficult to separate) is dismissed as being something of only local significance. Apparently, the Commission wanted to discourage Federal agencies, such as the Corps of Engineers from broadening their authority to yet another program which would bring with it federal subsidy.

## Metropolitan Water Management

Turning now to Chapter 12, which is on metropolitan water management, we find a focus which is on the classic urban water management problems of water supply, and water quality management, and to a lesser extent, urban storm drainage. The recommendations place emphasis on rationalizing these conventional water management functions to achieve economies of scale. The recommendation on consolidation of these "basic water services" is

somewhat ambiguous (in contrast to that in the Cooke Commission report in 1950). It reads as follows: "Municipalities, county governments, special districts, and other local government units should continue to explore the potential for consolidating separate tasks in providing water services to achieve economies of scale througout all or significant portions of their metropolitan areas." This weak recommendation on consolidation apparently reflects differences of opinion in the staff and on the Commission as to the worthwhileness of consolidation of these services in metropolitan areas. Although consolidation may achieve some economies of scale, local communities would need to give up some local autonomy and perhaps the economies of scale aren't worth this cost.

Chapter 12 also contains a constructive recommendation on coordination which holds that those who are planning for water services, should coordinate their activities with the planning for land use and occupancy. The view here is that water service planners should be dealing intimately with land use planners — a very sound and sensible recommendation. One of the issues that came out in the Airlie House Conference is that quite often in a large metropolitan area, land use planning undertaken by an areawide planning agency can be negated by decisions on water supply and sewer line extensions taken by an areawide water supply or sewage disposal agency, such as the Washington Suburban Sanitary Commission; these decisions on where the new water or sewer lines should go dictate where development will proceed. Fairfax County, Virginia presents an excellent case of the crucial relationships between the water supply and the sewage disposal and treatment systems and the timing and location of land development. Another useful recommendation in this chapter calls on water planners and managers to use the services or landscape architects, architects, recreation specialists, and urban planners in order to capture the opportunities for recreation and aesthetic benefits that would otherwise not be reaped in connection with the water services provided. Perhaps, a water supply reservoir can be used for recreation; or perhaps, some waste water treatment facilities can be related to some recreation area.

But all of the recommendations in Chapter 12 are based on the assumption that there is a water management sector involving the basic services of water supply, water quality management, and urban storm drainage in some cases. There does not seem to be any room in this concept for bringing in something like recreational use of water resources as an integral part of this agency nor, for that matter, for bringing in flood-plain management as a part of this agency. Only coordination with these activities is anticipated.

Finally, in Chapter 12, the issue of lack of metropolitan government is faced. In most metropolitan areas today we have Councils of Government, which are loose aggregations of elected representatives of counties or municipalities in a metropolitan area — with little if any delegated state authority. The Councils have been fostered by the federal government, via its granting power of public works. In fact, the Council of Governments is now in most cases the authoritative metropolitan agency that reviews federal grants to local agencies. In order for a local water supply agency or sewage disposal agency to obtain a treatment plant or a water facility grant from the federal government, a review must be made by an areawide planning agency which is usually the local Council of Governments. The Commission's stance in Chapter 12, which supports the integrity of the areawide water management agency, is in opposition to this approach. That is, the Commission considers it unwise that Councils of Governments should have the right to pass on water projects that have been developed in the metropolitan areas either by a metropolitan-wide water resource agency or by a water service agency of lesser geographic scope. Recommendation 12-6 holds that federal grant procedures should not be based on decisions made by local organizations that are not duly constituted under state law and are not politically accountable to their local electorate. Actually Councils of Governments are indirectly accountable to the electorate through their members who are the mayors, the county managers, and the heads of the county boards. But it is an indirect representation.

The basic premise of Chapter 12 is to maintain and enhance the integrity of the water management institution at the metropolitan scale; the premise is in opposition to other recommendations in the Commission's report that have to do with comprehensive water and related land use planning at the metropolitan scale. Apparently, the positions taken in Chapter 12 on metropolitan water organization were heavily influenced by those who were concerned with local water supply agencies, local sewage districts, and generally with local agencies that deal in the basic water services management.

A valid criticism of the approach of Chapter 12 is its failure to follow completely the logic of a single metropolitan water management agency which would contain broad water management functions, including flood-plain management, recreation aspects of water resources, and in fact, all of the major water resource purposes. But, in Chapter 12, the Commission opted for a limited water service agency patterned after organizations which now exist. Also, the Commission was unwilling to have the decisions of such an agency subjected to the discipline of an areawide multiple-purpose government entity which is short of metropolitan government, but which does represent the major political jurisdictions of the metropolitan area.

## Summary

To summarize, we find that with the exception of the issues of basic data and research, the commission has faced up well to the problems and issues of urban water management, and has made some very useful and constructive recommendations on the subject. One could wish that the Commission had given more emphasis to urban water issues. But when one tries to determine the overall consistency and rationale of the group of recommendations on urban water issues, one finds that the Commission had so many policy objectives in mind that its pricing policy and federalism recommendations got in the way of the consistency of recommendations for federal encouragement and support of urban water planning; and its notions of urban water management in the restricted sense got in the way of overall policy and program rationalization at the metropolitan scale. Given these qualifications, the Commission did a creditable job of reflecting urban water problems and issues in its report.

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# THE CHANGING ROLE OF FEDERAL WATER DEVELOPMENT AGENCIES UNDER MULTI-OBJECTIVE PLANNING AND EVALUATION PROCEDURES

Daniel W. Bromley*

In the following paper, I will discuss the evolution of a new federal role in water resource developments. To do this, I will weave together two threads — one representing a sequence of political events, the other pertaining to changes in the physical setting of, and demand for, water development projects. The efforts of the National Water Commission will be discussed within the context of the former sequence of events. Thus, my objective is to provide a framework for divining some parameters of the nation's water development program over the next decade — and to place the National Water Commission in proper context as an evolutionary force.

In the first section of the paper, I will discuss the political-economic history of water development programs at the federal level up through 1969. In the second section, I will concentrate on those changes in the demand for water resource projects that hold relevance for the future. In the third section, I will turn to several events in the period 1969-73 — including the activities of the National Water Commission — which comprise the major political forces for a changing federal role. Finally, I will discuss the implications of the evolutionary process discussed in the first three sections.

## Some Brief History: Pre-1969

The U.S. Army Corps of Engineers — with the passage of the Navigation Improvement Act — became involved in road and canal construction as early as 1824. At that time, investments were random in selection — arising out of an ill-defined process that included nothing resembling "evaluation" as we might today think of it. Following major floods in 1935-36, the Congress authorized numerous flood-control surveys. The Flood Control Act of 1936 contained the now-famous phrase that flood control works were justified as long as the ". . .benefits to whomsoever they may accrue are in excess of the estimated costs." Actual works of improvement were first authorized in 1938 directing the Secretary of Agriculture to develop run-off and water flow control measures in conjunction with the Army Corps of Engineers.

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The ambiguous language of the Act regarding benefits and costs left considerable room for confusion and by 1950 an Interagency Subcommittee on Benefits and Costs published Proposed Practices for Economic Analysis of River Basin Projects [19]. This document – known as the "Green Book" – called for the identification of all beneficial or adverse effects of water projects in both "tangible" and "intangible" terms.

The Subcommittee's recommendations were adopted by its parent committee – the Federal Interagency River Basin Committee. However, the Bureau of the Budget (now the Office of Management and Budget) alarmed by the all-inclusive nature of the categories for benefits, reacted with its own document – known as Budget Circular A-47 [7]. This took a more stringent line on benefits and argued that the proper criterion was a monetary benefit-cost ratio in excess of unity. This, then, became the basis for a disagreement between the mission-oriented water development agencies – and their supporters in the Congress – and the Chief Executive as represented by the Bureau of the Budget. While the "Green Book" called for the application of its general guidelines within the context of a given agency's program, Budget Circular A-47 insisted on uniformity across agencies. Since the Bureau of the Budget was in a position to enforce its view, the dissatisfaction within the Congress grew as favored "gifts" to constituents in the form of water projects failed to be included in the annual budget requests of the President.

It is said that 1956-57 marked the high point of Congressional discontent, but not until 1962 was the disagreement partially resolved. In May of that year, the Senate published Senate Document 97 which effectively replaced A-47 as the "official" evaluation guidelines [27]. This document was not the result of prolonged Congressional debate but was, instead, merely an interagency agreement approved by President Kennedy. It was never officially approved by the Congress – and its existence as a Senate Document is owed to the fact that Senator Clinton Anderson was Chairman of the Senate Committee on Interior and Insular Affairs.

As of that time, there were to be three objectives for evaluating water resource projects – national economic development, social well-being, and environmenatal preservation. In contrast to A-47, a monetary benefit-cost ratio greater than unity was no longer the sole criterion. In actual practice, it did become a necessary condition – projects with a ratio less than unity could not obtain authorization, but a ratio greater than unity was no guarantee of appropriations; projects with higher benefit-cost ratios were often passed over in favor of those with lower ratios (still greater than unity)

in certain locations [8, 17]. In 1964, Supplement #1 to Senate Document 97 was published and was concerned solely with the declaration of monetary values for outdoor recreation experiences [26]. This represents a classic example of shadow pricing by administrative fiat [5].

Things seemed to go rather smoothly until about 1967-68 when the Bureau of the Budget became insistent that the discount rate for projects – about 3 to 3 1/2 per cent – should be increased. Congress and the agencies were, naturally enough, opposed to such a change, but a compromise was struck wherein the entire evaluation process – but most notably the definition and admissability of "benefits" – was to be reassessed. This brings us to the creation of a special task force by the U.S. Water Resources Council to undertake the reassessment. We will return to this vein, but first it is necessary to trace the evolution of the nature of the demand for water resource projects. Following this discussion, we will return to the events of the period 1969-73.

## The Changing Nature of Water Resource Projects

When we speak of the federal water development agencies, there are three that are relevant: (1) the Army Corps of Engineers, (2) the Bureau of Reclamation, and (3) the Soil Conservation Service. Traditionally, the Corps has constructed dams and locks to provide for flood control, navigation, hydroelectric power, and recreation. Traditionally, the Bureau of Reclamation has constructed dams to provide for irrigation, hydroelectric power, municipal and industrial water supply, flood control, and recreation. The Soil Conservation Service – though operating on a much smaller scale than the other two – builds structures to provide flood control, watershed management, recreation, and some water supply.

This traditional focus of projects will change in several respects. In spite of some current problems in the area of food supplies, former Secretary of Agriculture Hardin has stated:

*Our agricultural production capacity is in excess of available outlets at home and abroad. In 1969, we harvested crops from 294 million acres, and paid for nonproduction on 58 million acres. Our analysts foresee no time in the early future when the gap between our capacity and our food requirement is likely to disappear unless farm prices drop sharply from present levels. Some kind of program is required if we are to avoid being inundated by a flood of crops and livestock [12].*

Research seems to indicate that if crop production were shifted to those regions with the greatest productive efficiency, it would be possible – by about 1980 – to remove approximately 80 million acres from production [14]. Tweeten argues that if all production were carried out with the level of efficiency now characteristic of the two largest classes of farms, output could be increased by 24 per cent with no change in aggregate resource input [21].

The National Water Commission has recommended that there is little need in the next 30 years for federally subsidized water projects for increasing our agricultural land base. There is an apparent further hesitance on the part of some in the Congress to subsidize agricultural production for export [20].

In the new era of concern for energy supply, it is ironic that a very cheap source of energy – the hydroelectric project – is reaching the point where virtually all viable sites have been developed. Recent estimates indicate that while slightly less than 1/5 of the national output of electricity in 1965 came from conventional and pumped-storage hydroelectric facilities, by the year 2020 the proportion supplied by hydroelectric plants is expected to drop to approximately 1/20 [25]. The move away from hydroelectric facilities will be made by transition to coal- and nuclear-fired plants – both of which require large quantities of cooling water. Hence, water will continue to play a vital role in energy production – but less as a direct source of energy than as an expedient in removing waste heat. This change will mean that water development agencies must assume a new posture regarding energy to which we will turn momentarily.

One of the earliest purposes of water resource projects was that of structural flood control. Almost 30 years after the commencement of this program, it has apparently run its course; the circularity that exists in justifying construction of flood-control structures on the basis of damage avoided (benefits) and then not restricting further development in newly protected areas so that avoidable damages once again exceed construction costs is why, after spending an estimated $7 billion on flood control since 1936, flood losses continue to average over $1 billion annually [28, p. 3].

Within recent years, individual states and municipalities are exercising a broad array of police-power regulations to control land use in flood areas. The National Water Commission gave very special attention to nonstructural flood control measures and outlined the steps that it thought should be pursued [17]. Federal agencies have begun to respond and more can be expected in the areas of mapping flood plains, determining flood hazards, making flood plain management plans, and establishing state standards for flood plain

regulation. The Commission urged the U.S. Water Resources Council to be empowered to make federal grants to the states to carry out all of the above activities, but also to assist local government entities in carrying out flood plain management programs. Finally, the Commission has recommended that no federal funds be made available for structural flood control measures unless beneficiaries pay part of the costs, and the state or local government entity regulates the use of flood plain lands to prevent further development that would require yet more structures or be subject to "substantial damage" in the event of a flood exceeding the magnitude of the design flood.

Traditionally, all agencies have added recreation as a purpose to many projects. Supplement #1 to Senate Document 97 has decreed the value of a recreation experience, so project benefits are easily increased by this amount, while the incremental costs of providing facilities for recreationists are low [26]. And, local repayment is required to help defray some of these costs. However, many state conservation and recreation agencies have begun to balk at becoming financially obligated to recreation projects that are, in many instances, afterthoughts. With the National Water Commission recommending an end to the current system of recreation planning, coupled with reluctance on the part of states, there will likely be a significant change in recreation planning by the federal agencies.

The Commission has recommended that recreation be elevated to a high priority program, and that the cost of constructing and operating recreational facilities be assumed by the federal government. This will call for a different approach to project formulation and evaluation than that now in existence.

## Some Recent Events: 1969-1973

As seen in the previous section, the period 1969-1973 would seem to mark the end of an era in the nature of many water resource investments. But, this period also represents one in which several institutional changes occurred. Taking these two forces together constitutes compelling evidence that the federal role in water development is due for some profound changes.

By way of institutional changes, I will discuss three specific events: (1) the work of the U.S. Water Resources Council, (2) the National Environmental Policy Act, and (3) the National Water Commission.

### The Water Resources Council

The task force report to the full Water Resources Council (which arose from

the compromise mentioned earlier) was released in June of 1969 and took the basic task of attempting to apply conventional benefit-cost methods to four planning and formulation objectives: (1) national economic development, (2) regional developing, (3) social well-being, and (4) environmental quality [24]. The expectation was that agency planners would compute the net beneficial effects for each objective. While this approach was criticized from several directions, the most effective criticism was that of the Office of Management and Budget.

Several of us also made a very fundamental criticism of the Council's approach at that stage — criticism that went to the heart of project planning. It was our position that federal water agencies did not conceive and formulate projects to enhance national income, or social well-being, or environmental quality. Rather, projects were formulated to solve local water-related problems.* This does not diminish in "informational imperative" of such undertakings, in fact quite the opposite is true. To meet this demand for information, an impact matrix was suggested for the project region, the contiguous region, and the rest of the nation. For each region, different groups would be listed across the top, while project purposes would be listed down one side. Then, the monetary and nonmonetary impacts arising from a given purpose that fall on a given group in each region could be shown.

In September of 1973, after four years of work by the Water Resources Council, the President signed, in an executive action, the Principles and Standards for Planning Water and Related Land Resources [23]. These guidelines, direct descendents of the Task Force Report, contain the original four objectives as impact categories, but have only two formulation objectives — national economic development, and environmental quality. This means that while regional development and social well-being impacts are relevant information categories, they do not constitute planning and formulation objectives. Impact information is to be compiled in monetary terms where possible, and in nonmonetary terms otherwise. The display format for such information is suggestive of the impact matrix notion we advanced in 1971. Additionally, the role of public participation is given much more emphasis than previously.

## The National Environmental Policy Act

Several months after the release of the Water Resources Council's Task Force Report, the Congress passed the National Environmental Policy Act of 1969

*For a discussion of this view, see [3, 5, 6].

(NEPA). The Act placed an informational burden on the water development agencies that has, at times, generated pressures on the Congress to dilute its impact [10, 11]. The Act declares that it is a national goal to protect the natural environment, and to include in every recommendation on proposals for legislation and other major federal actions significantly affecting the quality of the human environment a statement covering:

1. the environmental impact of the proposed action;

2. any adverse environmental effects which cannot be avoided should the proposal be implemented;

3. alternatives to the proposed action;

4. the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity;

5. any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

Some of the effects of NEPA on federal decision making have been discussed by Ingram and others, but the long-run effects are still uncertain [1, 15, 18]. One thing that is clear is that the arena for involvement in the decision making process has been expanded geographically, as well as at the local level. By that I mean that groups not ordinarily involved at the local level now have access to information on environmental impacts which was formerly not available to them. As such, NEPA represents a transfer of wealth (income in kind) to such groups both at the local level, and at the national level; citizens of, say, Detroit now have information on — and hence are more likely to acquire a stake in — the effects of the Trinity River Project in Texas.

Finally, court rulings in both the Calvert Cliffs and Trinity River cases have determined that the environmental impact statement is to be more than merely an "environmental full disclosure law." More specifically, it is to be a document where a balancing of all benefits and costs is presented, with "consideration" given to all project impacts.*

*For a more thorough discussion of this, see [1].

## The National Water Commission

Finally, we come to the third significant event of the 1969-1973 period, and the apparent focal point of this seminar series. Before turning to a detailed discussion of the report of the Commission, it would be well to reflect momentarily on the membership of the Commission as that relates to the potential for significant change in the nation's water policy. Presidential commissions are convenient ways to create the impression that a problem is being analyzed, and they provide an excuse for doing nothing in the interim. When their report is in, those in positions of leadership can reject the document, embrace it in total, or reject portions thereof. But whatever the reception of the report, latitude for action (or inaction) is restricted if the power base of the Commissioners is insufficient to command their own constituency.

Without meaning to cast aspersions on any of the members of the National Water Commission, it is safe to say that none of them possesses any constituency in the realm of national politics; the force of their recommendations is no more powerful than the political strength of those who will adopt their view of necessary change. With no Congressional or Presidential interest in reform, few will mourn the relegation of the Report to innumerable bookshelves.

By way of contrast, the recently formed National Commission on Water Quality is chaired by Nelson Rockefeller, and consists of Senators Muskie, Randolph, Bentsen, Baker, and Buckley, plus five members from the House of Representatives, and five "public" members. Clearly, the prospects for policy changes growing out of this Commission's recommendation exceed by far those from the National Water Commission.

Although I am certain that the impact of the National Water Commission report will be significantly less than that of the new Principles and Standards and the National Environmental Policy Act, it is nonetheless helpful to briefly discuss the essence of the Commission's recommendations as they pertain to multi-objective planning and evaluation. Several of us have elsewhere written on the policy and research implications of the National Water Commission's Report, and we structured the discussion around those recommendations that pertain to: (1) technological aspects, (2) the bases and processes for decision making, and (3) participation in the process of management and decision making, and the jurisdictional issues inherent in decision making about water resources [4].

The third category of recommendations seems particularly germane to this discussion and I have included two figures from that article. Figure 1 depicts the current involvement of the various participants and major actions or stages in the development of water resource projects. Figure 2 is a characterization of how the process might be structured if the many Commission recommendations were accepted. A major theme throughout the report is that more responsibility – repayment as well as project formulation – should be shifted to the local or state level. Accordingly, the federal role would be diminished as shown in Figure 2.

## Implications

The preceding discussion has concentrated on two basic themes: (1) a change in the nature of future water resource projects; and (2) a change in certain political parameters which govern important aspects of water developments. In the first category were such changes as a reduction in the scope of efforts to irrigate (reclaim?) the arid West, the increasing need for water as an input into thermal energy production, the move away from structural flood-control methods, and the changing nature of recreation as a project purpose. In general, it was argued that the era of the large multi-purpose project was drawing to a close.

Similarly, it was argued that the era of project evaluation by employment of as dubious a monetary statistic as the benefit-cost ratio was also on the wane. Events in the period 1969-1973 that will accelerate this transformation were identified as the National Environmental Policy Act, the new Principles and Standards for Planning Water and Related Land Resources, and the work of the National Water Commission. The latter event was, in my view, primarily a vehicle for articulating many reforms that were, in fact, already underway. For instance, calling for a reduction in the scale of the Reclamation Program had become a generally regarded social goal. Similarly, the increased reliance on nonstructural flood control methods, increased public participation in the planning and evaluation process, and more emphasis among the agencies on improved land and water management at the expense of project construction were already being stressed.

Recommendations that are perhaps more "profound", if indeed that is the word, pertain to more explicit attention devoted to recreation as a central project purpose, a greater degree of cost sharing by direct project beneficiaries, fewer subsidies to particular regions at the expense of other regions, and the encouragement of an increased role for local, state, regional, and nonwater development federal entities in the use and development of water and land resources.

Figure 1

Traditional Mode of Evolution of Water Resource Projects with Emphasis on Major and Minor Participants

| | Publics | | Agencies | | | |
|---|---|---|---|---|---|---|
| | General Public | Direct Beneficiaries | Federal Construction Agencies | Local Governments | State Governments | Nonconstruction Federal Agencies |
| Initiate | | □ | ○ or □ | | | |
| Plan Formulation | | | □ | | | |
| Evaluate Alternatives | | ○ | □ | ○ | ○ | ○ |
| Select Alternative | | | □ | | | |
| Implement Plans | | | □ | | | |
| Bear Costs | □ | | | | | |
| Receive Benefits | | □ | | | | |

□ ⇒ Major Role

○ ⇒ Minor Role

Source: [4]

Figure 2

Possible Model of Evolution of Water Resource Projects Under Recommendation of the Commission

| | Publics | | Agencies | | | |
|---|---|---|---|---|---|---|
| | General Public | Direct Beneficiaries | Federal Construction Agencies | Local Governments | State Governments | Nonconstruction Federal Agencies |
| Initiate | | □ | ○ | □ | □ | □ |
| Plan Formulation | ○ | □ | ○ | □ | □ | □ |
| Evaluate Alternatives | ○ | □ | ○ | □ | □ | □ |
| Select Alternatives | | □ | ○ | □ | □ | □ |
| Implement Plans | | | □ | | | |
| Bear Costs | | □ | | □ | □ | |
| Receive Benefits | | □ | | □ | □ | |

□ ⇒ Major Role

○ ⇒ Minor Role

Source: [4]

But, in general, I see the work of the National Water Commission as having a much less striking impact than either the National Environmental Policy Act or the new Principles and Standards. The obvious explanation is, of course, that the Commission report is nothing more than a list of recommendations, while the latter are, respectively, legal requirements, and Executive Branch operational rules. The Principles and Standards insist that more attention be paid to the monetary and nonmonetary impacts of projects – and the regional incidence of those impacts. This brings a new dimension to project evaluation which – though directed by Senate Document 97 for over a decade now – has been effectively ignored. However, the changing nature of most projects (as discussed in Section II), coupled with the National Environmental Policy Act, indicate that impact analysis is an idea whose time has come. The threat of court battles under NEPA will force agencies to accede to a more open and dialectical process – no longer will a benefit-cost ratio in excess of unity comprise the necessary and sufficient conditions for a "good" public investment.

Although the Principles and Standards have many faults, and go less far than I would prefer by way of identifying project impacts, they represent a step in the right direction. Indeed, the Corps of Engineers has shown considerable imagination in the planning and formulation of its urban wastewater management program [22]. This effort was underway prior to the official adoption of the Principles and Standards and indicates the extent of existing forces on the respective agencies to open up the planning process to those heretofore excluded.

In closing, traditional project planning and evaluation has generally been directed at solving a local water-related problem, and it took place within a very limited sphere of the relevant publics. And, the unrealistic promise of local economic prosperity was sufficient to legitimize most anything in the name of economic progress. Future water resource planning and evaluation will instead take place with a greatly expanded notion of the relevant publics, and will focus on both monetary and nonmonetary project impacts. It will become imperative to know which regions lose at the expense of others, and within regions "whose ox is being gored." Thus, the unfortunate – and unjustified – dichotomy in economics between allocation and incidence will be laid properly to rest. The size of the "water budget" will probably decrease slightly, but it will be belatedly recognized that its size is a political expression, and quite unrelated to project evaluation methodology. Those economic determinists who lament the public works programs and seek to stop projects by insisting on a more thorough going and strict application of neoclassic economics – to say nothing of a high discount rate – will continue to scorn the dialectic nature of project evaluation.

But, the process will be more open, more explicit, and likely project effects will be discussed more. To those who argue that the "public interest" is discovered by such a process, the new directions in water policy must seem heartening indeed.* As one who has advocated a move in this direction, I too derive satisfaction from this trend. However, this is not to deny that the agencies will continue to exert political influence to keep their respective programs as large as possible. But, the best way to monitor such programs is with an open planning and evaluation process, and with greater cost-sharing requirements by potential beneficiaries. These changes are already upon us to a certain extent, and more are on the way.

*For a discussion of this view, see [2, 9].

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# PROGRAMS AND PROSPECTS FOR WATER POLLUTION CONTROL

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I would like to discuss the National Water Commission (NWC) findings and recommendations with respect to water pollution control in the context of simultaneous activity in the Congress — the consideration by the Congress of the 1972 Amendments to the Federal Water Pollution Control Act (FWPCA). The very fact that these congressional deliberations were going on had a substantial impact on what the Commission finally came up with, and its simply incomplete to talk about one without the other.

Those of you who have had the opportunity to read the NWC report, or even a summary of the report, were probably impressed with the number of conclusions and recommendations. At one of the first meetings of the Commission, Chairman Charles Luce is said to have told the Commission, "If there's one thing we do with this Commission, we don't want a great long list of recommendations. We want to come up with half a dozen very important things on which we can focus Congressional and Executive Branch attention." So they came up with some 200-odd recommendations. By the time you get from one chapter to the next, you begin to forget those that you read at first.

At the conclusion of the Senate hearings on the NWC Report last year, Senator Frank Church wanted to assign some priority rankings to this long list of what's most important. So, he asked the Commission, "What do you really want to call to the attention of Congress?" As a group, the Commission didn't want to do this because there may well have been differences of opinion. So he asked them one at a time — he went around to each one of them individually — "What in your own personal opinion do you think is most important?" And when Chairman Luce was asked, he said, "I think the recommendations that we made with regard to improving the federal clean water laws are the most important." By this, he meant that the zero discharge goal of the 1972 amendments to the FWPCA be abandoned in favor of enforcement of water quality standards established under the Water Quality Act of 1965.

There were other recommendations with respect to water pollution control which also deserve our attention. We will come back to these in a moment. For now, we will dwell on the zero discharge and water quality standards, which are the most important aspects of the Commission's attention to water pollution control.

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## History of Water Pollution Control

To gain perspective, and again it's hard to go back to a point in time and get a real feel for this, it might be useful to briefly review the history of water polution control. Motivation for water pollution control at the turn of the century rested primarily on the prevention of waterborne disease and, on rare occasions, the minimization of local nuisances.

The health side of the coin can be illustrated by the conclusions of the eminent sanitary engineer Allen Hazen on an early study of stream pollution in Ohio. He said, "The question of sewage disposal must be regarded from two entirely different standpoints; namely, public water supplies and nuisance. He offered two options – either treatment of wastewater before discharge or purification of water taken from the stream before pumping to the water distribution system. Purification of water – rather than pollution control – was recommended as the most practical method for the control of waterborne disease. As in Ohio, the alternative was favored nationwide. Installation of water filtration facilities and the disinfection of water with chlorine in the early 1900's produced a dramatic reduction in the transmission of typhoid and other water-related diseases. It also drastically reduced incentive for communities to support programs for waste treatment and water pollution control.

The Ohio experience typifies social attitudes and public policy that prevailed throughout the entire nation during early decades of the 20th Century. Unless an intolerable local nuisance existed, or disease transmission could be traced to contaminated water, people were indifferent to water pollution.

Somewhat greater awareness of the public welfare aspects of water quality degradation began to manifest itself in the period between the two world wars. By then, the indiscriminate discharge of wastewaters from expanding industries and growing cities had produced something more than local nuisances. The quality of entire waterways deteriorated to the point of open sewers. It's incomprehensible to imagine, but it happened. Some major cities even discharged their refuse into rivers right along with their sewage. The legitimacy for this condition was rationalized on the premise that pollution was an inevitable penalty of progress. Pollution was an acceptable tradeoff for many things more highly valued than clean water.

Responsibility for water pollution control during this period rested solely with state government. Federal intervention did not occur until 1948. While some laws were passed and others strengthened, there was little enthusiasm for the appropriation of funds to bring compliance to these state laws.

The prevailing mood might be characterized by:

1. the indulgence accorded municipalities who resisted or otherwise delayed compliance with pollution control orders,

2. the deference shown industrial polluters, and

3. the reluctance to resort to the courts for enforcement of remedial measures — a reluctance that is still with us today at the state level.

Some progress was made in dealing with pollution from the public sector — largely through the infusion of funds during the depression. Quite a few sewage treatment plants were built back in the Public Works Administration days. Of course, the social objective was employment, not water pollution control. This began to set the stage for a more aggressive campaign against industrial polluters who had long maintained it was pointless for them to do anything while municipal wastewater discharges remained unchecked. Spearheading the movement were the conservation organizations such as the Izaak Walton League and the National Wildlife Federation.

It has become fashionable lately to sneer at some of the old line conservation groups, but I'll just remind you that in the days when it took muscle to get the first water pollution control legislation on the books, it was these groups who did it. They rejected the proposition that if people wanted progress they had to make a choice between fish or factories. If water was not fit for fish, they said, it was not fit for anything. This position heralded a growing conviction that public policy for water pollution control should be referenced to goals beyond those associated simply with the prevention of nuisances and transmission of waterborne diseases. Coming from this was the notion that the end to be sought should be the maintenance of water quality conditions in waterways that take into account the satisfaction of a variety of social needs.

## Water Quality Standards

The practice of promulgating standards of quality for waterways began in the northeast and North Carolina. Water quality standards were then extended nationwide by the Congress through the Water Quality Act of 1965. Standards have generally meant three related actions:

1. classification of streams as to their best social use — drinking water, recreation, shellfish, or whatever use the stream may afford;

2. the establishment of a set of criteria which can define the fitness for that use — chemical criteria, temperature, color, and so forth; and

3. an abatement program — to bring compliance with the standards.

The 1965 legislation required each state to conduct public hearings for the establishment of standards applicable to interstate waters within or on its borders, and to submit the standards along with compliance schedules, for federal approval. Once approved, they became Federal as well as State standards. The 1972 Act extended federal jurisdiction to all navigable waters.

The setting for National Water Commission deliberations was the debate in the Congress surrounding enactment of the 1972 Act. This presented major difficulties for the Commission and imposed severe constraints on its recommendations. For the Congress, after all, reflects the will of the people and to present recommendations in clear conflict with the legislation could have discredited the Commission findings — no matter how soundly conceived.

It was clear, for example, that the Commission probably would have come out against municipal waste treatment grants, moving toward a utility system whereby communities could finance the continuing construction and operation of the water pollution control facilities. But in the eyes of most Congressmen, the essence of the federal water pollution control program was federal aid to local communities to control pollution. For the Commission to come out against this at that point would have been a very difficult thing to do. One other thing with respect to the setting that might be mentioned here is the make-up of the Commission Water Pollution Panel. A so-called panel of experts was used as a source of ideas. The panel was largely dominated by engineer-administrator's imbued with the conviction that water pollution control is largely a State responsibility. It was a conservative panel, which thought along traditional lines. Certainly it left its imprint on many of the Commission's recommendations.

The problem with water quality standards was that they didn't work — principally because of difficulties in detecting and assigning responsibility for infractions. With multiple industrial and municipal sources contributing to

pollution, it was very difficult to determine to what degree each was responsible. Questions such as, "How do you separate these effects as you move downstream?" were never answered. There were other problems which are still with us. Water quality monitoring systems were grossly inadequate, planning was more token than real, and the regulatory response was often too late even when infractions were reported.

On top of this, the whole concept of water quality standards was made unreal through the imposition of minimium treatment requirements; namely, arbitrary secondary treatment. The classification of streams, adoption of criteria, and development of abatement programs sounds like a rational approach to maintain the quality for uses that society wants. But then government mandates that every pollution source is going to have to provide secondary treatment and the rationale is destroyed.

## The 1972 Act and the National Water Commission

By the time the 1972 amendments came under consideration, there was widespread disillusionment with past performance, particularly in the Congress. It was politically attractive to go for zero discharge as a national goal.

But, as we shall see, there was a lot more offered by the 1972 Act than zero discharge — much of it very, very good. Water quality standards, coupled with effluent guidelines, were retained together with an enforcement permit system despite the zero discharge and interim goals. Thus, with the lofty goal of zero discharge by 1985, and quality in streams fit for fish, wildlife, and recreation by 1983, we have a potentially workable system of lesser goals in the interim which is entirely consistent with National Water Commission recommendations.

"The American people," said the National Water Commission, "need to know the facts about water pollution." Here, the Commission was thinking mostly of benefits versus costs of water pollution control — pointing out that the citizen who's pushing for zero discharge ought to know what it's going to cost to go all the way to this goal, and ought to know what its benefits are going to be with respect to the costs. The Commission might have gone further here and probed the real content and the real performance of pollution control programs. Also, they might have emphasized that the public ought to know how effectively the water pollution control program is functioning at both the state and the federal level. It is my position that we have really done quite poorly in water pollution control at both levels and that the space between public expectation — based upon a reading of the law, interpretations of the

law, press releases, and so forth — and agency performance is cavernous in most states and to a large degree at the federal level. While academicians, like most of us here, produce reams of papers on sophisticated evaluation and planning techniques, practice has been limited to the most pragmatic accomplishments. It is one thing to talk knowingly of designing pollution control for recognized uses of streams — as did the Commission — and another to accept the facts that what we really have been doing is to arbitrarily build first, primary treatment plants, and now secondary treatment plants everywhere, with no tailoring of treatment to local situations as we said we were doing.

Zero Discharge and Interim Goals: The Costs of Pollution Control

Now under the 1972 FWPCA, industrial sources became subject to the imposition of first, "best practicable," and later "best available," technology. All industrial plants are supposed to be provided with best practicable technology by 1977 and best available technology by 1983. By 1985, the goals call for zero discharge. But it isn't until 1983 that we're even going to be using the best available technology, so obviously we're not going to reach zero discharge within the specified time span.

The National Water Commission's position that the goal is unwarranted makes sense. We have not yet made the more rational standards approach work to date. By the time a pollution control agency makes provision for increased future pollution and possible higher uses of streams — and other factors to account for unknowns — it may be better, as a matter of fact, to require uniform reductions in waste discharges at each point of input on a stream. While the more sophisticated approach is interesting as a possibility in water planning and pollution control, it may not be attainable when you have to take so many variables into consideration. What are the factors of safety going to be, what are industrial and urban development going to be in each area, how are the waste loads going to change, what additional capacity needs to be built into the facilities, and so forth? It's very difficult to make these estimates.

As the National Water Commission points out, the estimation of the costs of pollution to achieve compliance with goals involves a compounding of uncertainties. Having said this, the Commission proceeded to pick a number out of the air — $206 billion to meet the 1985 standards 100 per cent of the time. There have been a long series of cost estimates over the past 15 or 20 years. These costs have been derived by going to the states and to the state administrators and saying, "What are the costs to control pollution in your state by a certain period of time?" There have been a lot of problems with

this. For example, the criteria for cost estimates have been very weak and confusing and we've had fifty states operating along different lines. A major difficulty has been the fact that in allocating federal funds, the allocation process has been based upon state needs. So if you're a state administrator and you know that your estimate of needs and costs is going to determine how much money you get, you're going to estimate on the high side. There's an important inflationary factor tied in with this, too. It's sad that we can't come up with a reliable estimate of needs, but we have't yet. And we need to be very careful about the figures that are presented too. Estimates of pollution control costs have varied as widely as the people involved in making them and the purposes behind them.

Cost curves relating unit costs to degree of waste treatment rise only gently through secondary treatment levels. Beyond that, however, costs for each percentage point of pollution removed rise sharply. In terms of present waste treatment technology, the cost of removing the last one per cent of residual pollutants doubles the cost of achieving the first 99 per cent. So it's extremely important to keep those costs at the end of the curve in mind. This is a valid point as long as it's understood that the relationship refers to conventional waste treatment technology. There are other ways of reducing wastes and that's what our objective is — not waste treatment per se. It does not necessarily apply to land disposal and certainly does not apply to industrial in-plant process changes, waste recovery, and so on, which in many cases increasingly provides less costly means for industry to respond to pollution control needs.

A very strong point made by the National Water Commission is that unacceptable levels of pollution are encouraged when society does not require dischargers to include the cost of waste control and disposal as a part of doing business. The use of water to receive wastes has been free, and polluters have been able to shift these costs to the downstream users of those waters in the form of impaired water quality.

Alternative Approaches for Pollution Control

The essence of pollution control, says the Commission, is to correct the misallocation of waste disposal costs. The question is how to do it. To this end, government may employ two different techniques which are not mutually exclusive strategies, these are:

1. economic incentives, and

2. regulation.

Traditionally, except for construction grants, government has relied almost exclusively on regulation. Since the roots of the problem are economic, however, economic incentives also deserve attention.

First, let's look at subsidies. This has been the historic approach in this country. It spreads cost among all taxpayers rather than polluters and encourages high capital cost control measures. The greater degree to which you subsidize and reduce polluter cost, the less they are interested in the cost effectiveness of the total project. The 1972 Federal Water Pollution Control Act Amendments increased the level of the federal share of waste treatment facilities. There was no effort to justify this, and there was no debate concerning the optimum level of federal participation to bring about the desired local response.

While the 1972 Act increased the level of grants for municipal sewage treatment works, it coupled this with the requirement that all grantees develop systems of user charges to assure that each recipient of waste treatment services pays a proportionate share of the cost of operation, maintenance, and replacement. And in the case of industrial users, they must also pay that portion of the federal construction grant allocable to treatment of industrial wastes. In addition to subsidy, we now have an effective kind of economic incentive that might tend to move the industries discharging to municipal systems towards least-cost kinds of solutions to their own problem. The cities can retain 50 per cent of these payments to be used for future expansion and construction and the remainder is returned to the United States Treasury. Thus, for the first time, we have legislative recognition of the need for an equitable sharing of costs and the use of financial incentives to reduce wastes in the most efficient manner possible. This measure was fully endorsed by the Commission. We have been "hung up" in the past by the idea that when we talk about pollution control, we're talking about waste treatment. We're really interested in the best combination of alternatives that gives us the least costly solution to the problem. Very often it may not be waste treatment.

The National Water Commission also endorsed the use of effluent charges for industrial waste sources outside cities. Such charges must be sufficiently high to bring dischargers into compliance with water quality standards in the stream. While the Congress considered effluent charges as an incentive, it was not included in the 1972 Act. I would suspect that political and institutional problems prevented this. Just the implementation, even if it were authorized, would be most difficult. What kind of management agencies would you set up for industrial plants located outside of cities. We haven't yet reached the

point where we have good answers that are politically acceptable to local government.

With respect to regulation, we have already discussed water quality standards and effluent limitations. The National Water Commission recommended that permits be required for every existing or potential point source of pollution including groundwater. There's not much mention of groundwater pollution in the Federal Water Pollution Control Act itself, though there is some reference under comprehensive planning, Section 102, and some other places. With the exception of groundwater, the Commission's recommendations were consistent with the 1972 Act.

While many states have long operated permit programs for the regulation of waste discharges, these programs often have lacked the teeth necessary to make them effective. I can think of one state recently where one member of the Board asked the Staff Director, "What's the status of the states permits? I'd like to see a printout on these." As it turned out, the system hadn't been kept up to date. So again, it's one thing to say you're going to do something, it's another thing to examine performance and see that it's occurring.

The first federal entry into the permit field occurred a few years ago through court interpretations of the 1899 Rivers and Harbors Act, sometimes called the 1899 Refuse Act. There was a flurry of enforcement action taken under that court interpretation, and a permit program was initiated under the Corps of Engineers. However, this had hardly commenced before further use of the Act was delayed by litigation. The matter was verified by the 1972 Amendments to the Federal Water Pollution Control Act which made unlawful the discharge of any pollutant unless the discharger first obtains a permit certifying that the discharge complies with applicable effluent limitations, and that it complies with water quality standards and other requirements. Anyone in violation of a permit is subject to civil and criminal actions including injunctive relief. An interesting feature of the new law is that, under federal enforcement action, a state shall be liable for payment of any judgment or expense entered against a municipality to the extent that laws of the state prevent the municipality from raising revenues needed to comply. So debt limits on indebtedness for local communities, if these prevented the community from financing its share of the cost for a project, force the state to ease the burden on local government.

States are authorized to administer the permit program when approved to do so by the Environmental Protection Agency. A strong feature of the program is that it forces the states to seek new legislation to bolster their own authority to enforce compliance so that they will be able to assume responsibility for administration of the programs. Thus, state laws are also

being tightened in this and other areas as a result of the federal act. When the states fail in their enforcement roles, these may be assumed by the Federal agency.

Comprehensive Water Pollution Control Planning and Management

An area of particular and of underlying importance to water pollution control is water quality planning. It's important to all aspects of water pollution control. This much-ignored activity was given substantial attention by the National Water Commission as well as by the 1972 Act.

Federal legislation has required comprehensive pollution control plans since 1948. Yet, we have been willing to accept the worst kind of tokenism in this area for almost 25 years. This has occurred in the face of sharply mounting public investment in waste treatment works construction, low flow augmentation storage in federal impoundments, and so forth. For more than a decade, "comprehensive water pollution control plans" consisted of little more than lists of all sewered communities in the various states.

If any here have had the opportunity to examine water pollution control plans in any depth, they may have found incomplete and inaccurate data on waste sources and stream quality and almost none of the data needed to determine the capacity of streams to receive waste discharges. Too often, one finds a pyramid of assumptions loosely shrouded in a facade of superficial mathematics. The embarrassment is that more people haven't asked the questions required to bring the situation to light. University faculty members could have contributed much more as a community than they have in planning technology. This is a harsh statement, but I think it's a fairly accurate one.

One of the principal reasons for this state of affairs is that the requirements for planning have always come from the federal government as a pre-requisite for federal aid. There is always a tendency to respond in this situation with the minimum level of planning necessary to qualify rather than to develop planning of substance.

The National Water Commission concluded that water pollution control will increasingly require river basin, system-wide management. The creation of management systems heightens the need for comprehensive water quality planning. Past planning, said the Commission, had too narrow a scope. The search for alternatives has been foreclosed by superimposed single strategies. A "no discharge" goal would likewise inhibit achievement of least cost methods. Planning, said the Commission, must include adequate and

continuous monitoring of water quality and a full consideration of alternatives.

The Commission and the Congress have both taken note of the isolation of water quality planning from water resources and land use planning. This is a very important omission. On the one hand, we find water resource planning separated from land planning, which is indefensible; on the other hand, we find both water quantity separated from water quality and surface water separated from groundwater. The separation is largely institutional in nature. This is the way the agencies developed — one does one thing and another does something else — and nobody brings them together. We ought to think about this more as the federal government enacts land use legislation and the states do likewise. Here is an opportunity to strengthen the planning and management processes through a number of avenues by requiring the identification of substantial water quality problem areas and the designation of boundaries and single representative agencies capable of developing effective areawide management programs. The Act also facilitates the creation of the regional institutions necessary to manage water quality efficiently. Once implemented, all construction grants for projects within designated areas would go to such agencies. The agencies, rather than the state, would determine the use of the money. Their areawide planning efforts are to be supported by 100 per cent federal grants through 1975 and 75 per cent thereafter. Very few of these have been approved to date. The Act facilitates the use of the Corps of Engineers' planning capability and provides the means to incorporate water quality planning into the broader water resource planning through completion of level B studies in all river basins under the Water Resources Council. All of this is encouraging, but Congress hasn't appropriated any money. One wonders how long we must wait for this very important part of the Act to materialize.

Planning, then, is a major emphasis in the 1972 Act. Despite the language, intent, and emerging federal guidelines, it is too early to determine whether this will mature into a genuine planning effort. The pressures for the states to meet only the minimal requirements necessary to qualify for federal dollars are very great. With the short time constraints and the volume of requirements imposed by the Act, it is quite natural for the states to do only the things they have to in order to get federal money. That's the way it seems to be going. There is always the potential hazard that planning will seek the lowest common denominator in this situation and that the process will be more apparent than real. Appropriations and administrative followup will be important determinants. The National Water Commission seemed to be in general agreement with the planning provisions of the 1972 Act, except where these provide for arbitrary effluent guidelines and uniform kinds of action.

## Trends in Water Pollution Control Data

What is happening to water quality? I thought it was interesting that the Water Pollution Control panel, including the directors of the two biggest state water institute programs, said, "We don't have the data to tell you what the trends have been in water pollution control." Both the Commission and the Congress took note of this by expressing dissatisfaction with our inability to answer that question.

For years we have been adding up data on waste discharges as if we knew what we were doing — as if the data were reliable, uniformly meaningful, and so forth. It is appalling that our regulatory agencies have settled for so little in the way of a monitoring strategy and that we in the universities have had so little to contribute. Monitoring has been of little use for measuring long-term trends, response to abatement measures, or contravention of standards. As a matter of fact, most contraventions have probably been signaled by fish kills and these are hardly satisfactory monitoring techniques.

Monitoring strategy would seem to be fundamental to the whole question of water pollution control; yet, we appear to be all too willing to accept the most primitive practices imaginable. EPA is now providing some leadership in this. They are publishing guidelines which can upgrade the process and they are demanding more from the states in their review and upgrading of the process. But we have a long way to go.

The 1972 Act takes cognizance of the status of monitoring (1) by authorizing EPA to develop standards of effectiveness, and (2) through grants to state agencies. The states have to submit monitoring plans this year and starting in 1975, and annually thereafter, they must file annual reports of water quality and information relative to attainment of national goals. Included are a comparison of actual water quality with the 1977 goal of best practicable treatment, recommendations for additional actions to improve water quality, estimates of benefits, and costs of moving the rest of the way to "clean water," and a proposed plan of action to bring nonpoint pollution sources under control. That's quite a lot to turn up.

Deficiencies in monitoring have not been limited to the quality of streams, however. Reporting of point sources has also been incomplete and inaccurate. Owners and operators of point sources are now required to monitor, maintain records, and submit reports on the composition and volume of waste discharges. Except where these involve trade secrets, they are to be made public. It is a proper role for government to require this information. There is

no other way to get it. One finds no National Water Commission disagreement with these provisions of the new Act.

## Summary

In summary, we have examined some of the more important conclusions and recommendations of the National Water Commission in the setting of the simultaneous enactment of the 1972 Amendments to the Federal Water Pollution Control Act. This is the most comprehensive federal water pollution control act in the history of the country.

While there are many areas of agreement between the Commission report and the Act, there are sharp differences with respect to national goals. In particular, the National Water Commission recommended:

1. The objective of water pollution control should be to protect water quality standards.

2. Standards should be sufficiently high to protect all existing uses and all reasonable and foreseeable future uses — and should take into account the economic, social, and environmental costs.

3. A national water pollution control program sufficient to achieve water quality standards should be accomplished in ten years and no subsidies should be continued beyond that time.

4. The user pay principle through adoption of service charges should be implemented. We have already taken a step towards this with the municipal user charge requirements.

5. Water quality standards should be implemented through a national waste discharge permit system. This has been implemented, but we don't know how effective it will be yet.

6. States should have primary responsibility for water pollution control with backup from the federal government in case of default. This is a point of strong contention. I think most state people still feel that the federal role is too strong and that more ought to be delegated initially to the states. The federal role ought to be a case of last resort. But with the tremendous flow of guidelines, it's awfully easy to get the impression that the federal government is completely "top-dog" in this arrangement.

7. There should be an expanded program of planning, program evaluation, and monitoring.

8. EPA should be assigned greater discretionary authority to encourage alternatives to accomplish objectives at lower cost. There's always a good deal of concern about the degree to which you add to the discretionary authority of agency administrators. It's easy to idealize that you'll get the best out of this, but you frequently don't. Many people believe that it ought to be fairly rigid.

9. The Commission recommended encouragement of regional waste management agencies, and I think that's probably one of the most important recommendations. Many people feel that we're really not going to get on top of this problem until we have viable regional institutions which have the authority to plan, finance, and regulate the control of water pollution.

The Commission also recommended increases in research and development projects that lead to flexibility and cost effectiveness in water pollution control. Those of us who try to get research money out of federal agencies are not convinced that this part has been effectively implemented.

Last of all, the Commission asked for a Congressional study of program cost effectiveness. One of the provisions of the 1972 Act was to set up a Water Quality Commission made up of Congressmen and Senators – five each – and five people at large appointed by the President. This Commission is presently attempting to fulfill its responsibilities.

# INSTITUTIONAL CHANGES FOR WATER DEVELOPMENT PROJECTS

David J. Allee*

Model institutional arrangements probably cannot be designed well without a knowledge of the politics of the issues those institutions are to handle. Recognition must be given to the need for any agency to mobilize clientele support and that such support comes in many forms and at different levels. Every issue has its own kind of politics. Certainly no design could be implemented without such knowledge. The Wilsonian prescription that politics and administration should be separated must be reexamined. But even more to the point is the common presumption in our analytics that they in fact are separated. Is it reasonable to presume that administrators will be guided by the public interest when it is so hard to know what that interest is, or who represents it? A normative case probably can be made for agreement between the affected parties as an indication of optimality. On a behavioral level an effective level of agreement is obviously a prerequisite to adoption of an institutional design. Those dedicated to the applied aspects of their discipline must be responsive to need for agreement. An adaptation of one model for how consent is achieved in water resources development is sketched below.

## The Politics of Water Resource Development

Who affects decisions and how? What rewards and penalties are offered for involvement? Where in the structure of public affairs are the key decision points? How are consent-building relations established? In sum, how does the decision process affect the content of public policy? These questions form a basis for studying the politics of an issue, and gaining insight into the opportunities for effective agreement about institutional arrangements or other policy proposals. A recent study of the Colorado River Basin Bill by Ingram** suggests that answers to these questions explain more of the content of at least that piece of water policy than do answers to sets of

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**Helen M. Ingram, Patterns of Politics in Water Resource Development: A Cast Study of New Mexico's Role in the Colorado River Basin Bill, The University of New Mexico, 1969.

questions drawn from traditional economics or engineering. Ingram's model needs only minor modification to serve as a general behavioral hypothesis for the recent politics of water resource development.

Water resource development has been, above all else, a locally-based issue, springing perhaps from the diversity of local conditions and the localized nature of the effects of development. Of course, localism is a matter of degrees, not absolutes. Even national defense policy is influenced by local interests in the location of facilities. But initiation of the proposals and the general character of policy content is nationally oriented. Initiation of a water project proposal is typically by a few locally oriented activists. They may first encourage an agency to develop some general specifications of what the project might include. Or they may work to revive interest in a proposal that has been dormant in an agency's files. A recent local drought or flood may have sparked activity by increasing the receptivity of others to a proposal to do something. Agreement is sought on the "something" rather than the reasons why.

Even after some years and many dollars of basin plans the requirement by the system for expressions of vigorous local support seems about as strong as ever. Indeed, the logic of economics and engineering applied to opportunities in a basin seem to provide only a crude screening at best. Virtually every basin plan either proposes specific early action plans that are several times the likely rate of investment or ducks the priority setting problem entirely. And for good reason. The final mix is subject to agreement by a much wider group and many more factors than we have learned how to include in formal basin planning activities. In particular, we have not learned how to link local support and Congressional decision points firmly into the formal basin planning process. A plan is a trial balloon, not a set of decisions. Agencies are not likely to commit themselves to projects selected largely on technical and economic criteria so long as local support is so crucial to the consent-building relations between themselves and the others with whom they share decisions.

The process starts focused upon the project in its local context and remains that way. Over the years procedures have developed to keep the unit of decision as the project and to emphasize these points in the decision structure where the locality has the most influence. Perhaps as a result, the traditional federal water development agencies (the Corps of Engineers, the Bureau of Reclamation, the Soil Conservation Service, and the Tennessee Valley Authority) are highly decentralized. Substantial decision-making authority is vested in the region, district, or state level offices. Washington headquarters are at times more like representatives of the field units, particularly to the

Congress and sometimes the President, than they are centers of command. The Congress with its obvious roots back to the locality becomes the focus for legitimation, rather than the President, in the search for financial and organizational resources to carry out the project. By keeping the unit of decision as the project, its identity with respect to Congressional districts is preserved. Certainly the Office of Management and Budget — the President's major mechanism for agency control — does prepare, with agency help, the basic list of new planning, and construction starts for each year. While not insignificant, Congressional additions and deletions are the smaller part of the final program. But the point is that by maintaining project identity the pressures on the selection of the President's list are such that it does not deviate widely from what the Congress might have prepared if it initiated it.

Looking back over the last several decades, the President and the Secretaries of the several departments have found it advantageous to minimize involvement in water development. Let the localities and the agencies work out their differences, first. The potential losses from controversy between localities override potential voter gains at the individual localities. Instead, the presidential view of water projects is more apt to be as a convenient and relatively low cost place to cut expenditures in tight years and as a way to reward key Congressmen for favors in other fields of policy. Congressmen, on the other hand, either see real voter advantages from direct participation, or at least the need to be involved to protect themselves locally.

Mutual accommodation between projects forms a major basis for a national program. While this is true of many federal programs, it may be more extreme in resource development and particularly water. Navigation and power benefits are enough of an exception to demonstrate the rule. Waterways and port facilities obviously link large sections of the country together. Those that operate upon these facilities tend to be firms of at least regional significance and can identify direct self-interest in the interdependencies between projects.

The same might be said for electric utilities where hydropower is a big factor in their power sources. System interconnections mean that interdependence extends beyond the hydrologic basin boundaries.

But where else has interdependence been a factor in the national acceptance of federal water development programs? Concern for national use of environmental quality values may provide such a focus in the future, but in the past acceptance has been based more upon the belief that water development projects produce regional development and upon the needs of inter-regional consent-building.

This is not to say that water projects have failed to serve nationally expressed goals. Flood control, development of farm land, outdoor recreation facilities, urban water supply are the substance of numerous and repeated statements of national policy. The point is that the strength for the national policies lies back at the locality and forces a different kind of behavior on the part of government than would be true otherwise.

It is, of course, the agencies that plan and carry out the individual projects. With their structure and discipline, traditions and rewards, they are the most obvious participants. Competing with other agencies and among themselves for budget, program and influence — perhaps as vigorously as comparable private corporations — they must strive to accommodate those that support and those that oppose them. Coming as it does from a competition conditioned society, agency leadership is, and probably should be, charged first and foremost with agency survival. Rewards of promotion, recognition and support in future decisions go to those who effectively serve the long-run interests of the organization. In a well functioning democracy, this should correspond with the long-run interests of those affected by the agency — but that is for the normative portion of any analysis.

As a result, agencies are concerned with local support if those who share in their decisions are concerned with local support. But, of course, their interests go much further. In self-protection, if for no other reason, they have an interest in technical competence. At some level of detail they gain substantially in winning acceptance from the integrity of the services they offer. Maintaining this integrity is important to the recruitment and retention of at least nominally qualified professionals. And the individual professions involved dictate some of the elements of acceptable performance. Other rules of the game are laid down in the process of consent-building with other participants. Engineers may have created benefit-cost analysis and economists may have toughened it by constant criticism, but it is probably the Congress that finds it the most useful. It provides a screening, cutting down the field of choice through an accepted device, very often in cases where some other factor, more painful to articulate, is also involved. Considerable resources and expertise are required to challenge a benefit-cost analysis.

Engineering and economic feasibility are the most explicitly developed rules of the game for the agencies. Financial feasibility is often cited and appears largely as a formal test of local support. Agreement to meet cost-sharing rules laid down for that class of project is a kind of equity test in showing willingness to carry the same burden others have been asked to carry. Failure to pass this test endangers mutual accommodation and gives competitors an advantage. Likewise, there are rules about the existence of a federal interest,

particularly in flood protection and navigation projects that only benefit a small number of beneficiaries.

But perhaps above other rules of the game which the agencies are called upon for compliance, and with less in the way of formal guidelines, are the demonstration of high local support and "low" levels of controversy. Congressional hearings on the competing projects run for months and provide a severe test for both proponents and opponents. Projects potentially competing for either authorization or an appropriation number in the tens of hundreds. Those that can marshall supporters in Washington to demonstrate local need have the better chance of moving from study to authorization, to appropriation, to completion. Controversy or a loss of support is often adequate grounds for deferral — allowing other projects to come first.

Conflict easily overloads the decision mechanisms at higher levels. It is there that a relatively small number of people with strong veto power must process a large number of projects. Congressional committees, the Office of Management and Budget, and the Secretaries' offices have a strong incentive to refer projects back to the field rather than to attempt resolution of conflict themselves.

Agencies respond to these realities in many ways. Multiple-purpose principles have not only served technical efficiency objectives but have also aided in the formation of local coalitions and in accommodation of potential objections. Since they control the major information gathering and analytical resources, the agencies tend to put their efforts where the potential for agreement and support is the highest.

Extended technical reviews, the current interest in multiple-objective planning and in public participation programs all have some of their roots in this process of building consent. Each allows for the management of conflict at an early, and in the long run, a less threatening stage of project development. Early accommodation, if possible, is preferred. Demands by reviewers in the agency hierarchy for more refined technical data, on geology or hydrology as examples, may stem from the excesses of professionalism, but it may also be a defense mechanism by the specialist against expected attack. Explicit planning for environmental, regional and social well-being objectives as well as the traditional objective of national economic efficiency, may provide a measure of flexibility. If the recommended plan becomes untenable, it is easier to shift.

A commonly cited problem is that of too many projects in the planning stage and a large backlog of authorized projects. Some $15 billion worth of

projects are authorized — roughly ten times the annual rate of investment. An agency has a difficult management problem. Starting more planning efforts gives more scope for reallocation of effort away from those where conflict arises or support declines. But stretching out the planning and authorizing period increases the strain on local supporters. However, more completed project plans increases the pressure on the system to increase total funding. And a planning start is a form of reward and so is an authorization, neither are as good as a project under construction, but better for a Congressman and local activitists than nothing at all. Hence, the tendency to start many projects into the planning phase seems well rooted in the incentives provided to the participants.

## Conditions for Change in Water Development

A number of factors point toward change in the traditional water resource development process. Local constituencies are less homogeneous due to urbanization. The national consensus on water development — its national constituency if you will — has shifted, perhaps losing much of its effectiveness. Environmental interests while gaining nationally are also developing the capability, and thus the threat, of escalating local issues to a national level. The result is a decline of Congressional rewards for conventional projects.

Urbanization has done more than simply put traditional rural interests into an apparent numerical minority, thus raising the cost of achieving consent for traditional water development. The locally initiated development process may be shaken at its very roots. It has been sustained by an important offset to the costs of participation by local leadership. Local leaders work hard just to get their community's project undertaken for planning by an agency. They work through the whole process of reviews and decisions for the project to be finally authorized and, after more effort, included in the list of new starts for funding. Such effort does not begin to be rewarded by any likely resulting money income enhancement for these participants. Indeed, too large a personal stake in the result reduces their credibility. They are rewarded by earning their own self esteem and that of their neighbors. But this route to esteem is under attack. Perhaps more important, other ways to serve come with urbanization. The weakening of a national consensus about the value of water development may have a direct feedback on the local leadership reward structure. The result is a shift in the cost of decision-making.

Also to the point, the water planner, if he ever could, cannot now simply act as a technician to a simple, monolithic, local power structure which provided him with judgments as to goals and objectives. Agency planners, to sustain

their programs, must at least act as brokers between groups with different values and goals. In the more highly fragmented situations, someone must provide a very strong effort to mobilize support. With increasingly complex local interest structures, putting together that local coalition becomes increasingly difficult. More and more often, the appeal of multiple purpose projects and offering more traditional project features in a local package are not enough to achieve agreement.

At the national level, waterway interests have represented an effective constituency for navigation projects, an almost exclusive function of the Corps of Engineers. But more important at the national level than group activity has been a climate of acceptance of federal water resource development projects as a legitimate means to achieve local growth objectives. Along with growing acceptance of arguments that navigation projects are less needed to keep railway rates in check, other approaches to achieve regional development are finding favor. More recently the whole question of economic growth being food for a region has come under sharp questioning. "Growth is good" and "water brings it" are both still very much alive but under strong fire.

At one time, power interests may also have provided a significant national base for project support. But almost all of the large cheap hydro power sites have been developed. Pump storage offers some attraction but is about as feasible alone as combined with other purposes. Power interests are more concerned about coal and atomic fueled plants.

Environmental groups have become a major national force, have created a climate of acceptance for environmental protection and have demonstrated effectiveness in escalating local conflicts into national issues. Whether the index is national polls or Congressmen's mail, public opinion has shifted. Pollution control and keeping stream beds and dam sites in their natural state have become the beneficiaries of this shift to new consensus. Where full federal funding for certain flood control facilities was a possible shift in policy 30 years ago, it is now possible to stop a Cross-Florida Barge Canal when it is almost half completed. The threat of an environmental-development issue moving from the local level to the national arena is enough to affect the traditional process of project approval and funding at its very heart. This has been re-enforced by the Section 102 environmental impact statements under the National Environmental Protection Act and the functioning of the Federal Council on Environmental Quality.

What can we build upon an analytical base like that sketched out so far? We could review the likely consequences of various proposals for reform. That none will be panaceas for any given set of ills seems clear. Separation of basin planning from the agencies that do construction might change the balance of group access and lead to somewhat different accommodation between interests within the range of technical alternatives available. Consolidation of some of the federal agencies could work out advantageously to some interests some of the time and not in other cases. While changes seem to favor environmental interests over developmental interests currently, the net effect of a federal Department of Natural Resources is open to debate. Shifts in state activity and influence, various basin and regional federal-state arrangements, program authorizations and appropriations instead of on a project basis, revenue sharing, regional budgets and other informational devices, public participation, changes in interest group support by public agencies including the universities, multiple-objective planning, and facilitation of multiple means, are just some of the possibilities.

One approach is to view change from the point of view of the agency and ask what might it do that would respond to changing needs, that would take advantage of existing technical and political resources and have some chance of acceptance. Indeed, at this point in the analysis acceptance should be a major criterion. Recommendations that simply follow from normative notions are not enough. Who is better prepared than the analyst, after working through a study of relevant political and economic concepts and facts, to put forward trial balloons?

Newly perceived needs often suggest new agencies, but obviously also offer opportunities for old agencies to add to their social product. Old agencies have advantages of experience and organizational skills. It is not likely that these agency patterns will "fit" the new missions perfectly. And the effect of this fit on the way in which new missions will be carried out is of concern. The ability of the new arrangement to balance properly the interests involved would be a key consideration.

Established patterns of communication and behavior can be utilized for new activities, perhaps using far less energy and effort than would be required to set up a new organization. Or, perhaps more to the point, one agency may be able to expand its functions with small "start-up" costs while another may be straining to organize itself for existing assignments. Such may be the case today for traditional resource development agencies as compared to existing environmental protection agencies.

This is not to suggest that new missions can be added effortlessly by "old" agencies (and their corresponding Congressional committees). Many people have a stake in the existing mix of activities and distribution of territory. This obviously applies to established clientele of both the "old" agency and any agency already in the field. New missions or just the uncertainty that accompanies them may threaten that stake. Funds for old functions may appear to be threatened, at least in the short run, even though the total agency budgets may arise. But this may be more than offset by built-in incentives in any organization to respond to opportunities for support and growth. These include the need to form coalitions for any significant decision and to find means of accommodation between the interests involved. A larger mix of missions offers more potential of facilitating accommodation and coalition building. Also within any agency — particularly one that has run into problems expanding its traditional program — there is likely to be a group of "young turks" who will see a new mission as a means for more rapid advancement. Without that new mission and the opportunities it affords, these "young turks" will go elsewhere.

The support base for water resource development is changing at the local level where project effects are mostly felt. The traditional, growth oriented supporters have found many other public programs that offer a promise of similar rewards. Some of these programs even offer ways to invest in water, and have been growing at a rapid rate. Thus, the pool of potential local supporters is shifting, if not diminishing. Can the traditional agencies act to turn this to their advantage? National environmental interests are growing in effectiveness, but more important, so are local groups. The costs of conflict are rising. Will changes in agency programs facilitate accommodation? Such changes are possible and desirable. Equally, changes in the Congress, the Executive, and at the state and regional levels are in order.

## Some Other Changes to Be Considered

Consider some possible changes that follow from the effect upon the Congress of present trends in support and conflict. If rewards from Congressional participation decline, while at the same time such participation requires more energy, time and influence on the part of Congressmen, the Congress may be amenable to shifting a measure of their role in choice elsewhere. Choosing studies and projects for authorization, and new starts for planning and construction could be made more efficient then, if shared by others. The Congress would be most receptive to changes which cut their costs of involvement and the penalties but left them with as much of the rewards as possible.

Perhaps the most obvious possible shift would be to ask the agencies to carry more of the burden and there is little potential for this. Agencies can be counted upon to follow procedures and use criteria much like those the Congress would follow if it were making the decisions directly. But the agencies have limits on the means they can use to accommodate conflicts. And they will do the best they can in any case to ease the Congressional burden.

Shifting more of the choice role to the states offers some real advantages if that means the use of the ability of the Governors to bargain across a wide range of program elements. Like the Congress in the recent past they could gain support from forcing, facilitating, and ratifying bargains between local interests that would move projects along. They have the staff capacity and the proximity to visualize the possible tradeoffs and to facilitate innovative means that could lead to the accommodation of conflicting interests. The seeds for closer alliances with the federal agencies are already planted and only Congressional acquiescence to a larger role by the states could be standing in the way. Obviously, revenue sharing could produce this change.

But river systems and their management call for a basin and multi-state view – on technical grounds at least. But at the same time, there can be advantages in dealing with the Congress and the Executive at a regional level. The present administration through the Office of Management and Budget is experimenting with regional councils of federal agencies. This suggests that water development could be approached more easily as a part of a larger decision package. But perhaps more to the point, the combined influence of the governors of several states has proven an effective force in channeling and supporting federal investment programs when given more access to the resource allocation process. This suggests an expanding alliance between regional commissions which now deal in many, many kinds of programs and river basin commissions which effectively deal with only water development. Authorization and appropriation on the basis of basin plans might evolve to a reality if such alliances can take an expanding role in the process.

At this point consider a new look in agency project planning which is evolving in response to the current trends in support and conflict. Essentially it is a recognition of the fact that late blooming conflict is a great source of delay and wasted effort for everyone. The answer is to facilitate the early identification of conflicting interests and use project planning as a means of forging more viable local coalitions that can speed the project planning and implementation process. It goes without saying that this will lead to pressures for quite different solutions to old problems and the addressing of new

missions by old agencies. But this new role for planners seems to follow logically from the shifts in support and conflict.

Consolidation of project and basin planning by federal agencies has been discussed for many years and various proposals are current to achieve all or part of such consolidation. Many of these are put forward in the belief that different outputs from the process would result. It is important to recognize planning as a part of the consent building process. Consolidation between agencies of this function could simply shift more of the consent building to the implementation phase. This and other responses could neutralize any effect such changes would have on participation. Unless consolidation is accompanied by other changes in participants and the resource brought to the process, it is not likely to make much difference.

The backlog of projects concerns many. Some see it as an agenda of unfinished work, others as an ever present threat. Both views want the backlog reduced. Suggestions include deauthorization of clearly outdated projects, perhaps an automatic termination of authorization if construction hasn't begun in, say, ten years. This would be using precious decision making capacity to only slight gain to key participants and thus not likely of accomplishment. More to the point for the questions raised by the deauthorization suggestion is more involvement by the Congress in the oversight of post-authorization planning prior to actual construction. And consistent with the possible trend toward regionalized state involvement is the suggestion of a formal review and adoption by the Congress of a five-year financial plan and the use of regional budgeting techniques. These changes would facilitate the focus of attention on the politically meaningful tradeoffs, help shift attention away from the current decision points in the process and hence reduce what little significance the backlog has now. They would shift attention to the regional mechanisms for priority setting. Congress would continue to have the final say but might be presented with packages that were easier to ratify.

Changes in the roles of the various Congressional committees are quite possible now. Obviously, the above shifts would call for somewhat different committee involvement. Authorization committees would put more emphasis on post-authorization planning; appropriation committees would also be dealing with five-year financial plans and regional inputs. But there have been repeated suggestions that it is the fragmentation of committee attention that keeps basin planning from being effective, from allowing agencies to respond to broader social needs. On the contrary, we find such fragmentation to represent meaningful differences in clientele and a potential source of responsiveness and innovation. The Congress will find it useful to increase the

amount of inter-committee coordination as it shifts more of the bargaining to the region. This should greatly improve the technical results of basin planning. The water committees of the Congress could use water as a vehicle for expanding their role in the growing legislative areas of environmental and urban problems. This would increase the efficiency of the whole process.

In addition, the agencies are encouraged to develop new missions and the delivery capacity to implement new means for old missions. Perhaps nothing else by itself would increase the efficiency of the authorization and appropriation process as much. This would take advantage of the organizational capacity presented by these agencies to supply new services needed by the nation. There seems little doubt that there are major areas of need which can be provided by them more effectively than under present arrangements. This would take some of the pressure off of some existing poorly supported and highly conflicting projects. It would provide for a wider bargaining arena and facilitate solutions to problems that accommodate conflicting interests. The result should be far less effort spent seeking agreement on authorizations and appropriations.

## Impact of the National Water Commission Report

In conclusion, it is worth summarizing what the National Water Commission did, or did not do, with the findings of the Allee-Ingram background report* on these issues. One central question pertains to the extent of Federal involvement in the "Water Game" and, on this issue, the Commission report adopts the position that the Federal government should get out. While there is only a modicum of analysis at the beginning of Chapter V to support this position, the Commission was nevertheless very dogmatic. Unfortunately, as a result of holding this notion so strongly, they did not look at any kind of analysis which suggested that there was a role to be played in terms of intergovernmental relations. This role would see the Federal government lending support and leverage to state programs who, in turn, could put some kind of pressure on the local governments. The Commission was dogmatic about the fact that Federal involvement should diminish, but little attention was devoted to the other side of the coin — that state involvement should increase — and even less attention was devoted to analysis of the procedures associated with this reversal of roles and responsibilities. Furthermore, there was little analysis in the report devoted to the states' capacity to perform in the proposed role. This question was conveniently swept away with the excuse "We are a Federal Commission. It is not in our purview to study

*Authorization and Appropriation Processes for Water Resource Development, National Water Commission Report by David Allee and Helen Ingram, Cornell University, 1972.

whether or not the states can do the things we suggest, nor what resources they might need to get them done."

Another notion that the Commission adopted hook, line, and sinker was the principle of beneficiaries pay. This, too, the Commission adopted dogmatically, uncritically and somewhat late in the game. Certainly, they were too late to grapple with the fundamental notion that we live with bribes, especially on an intergovernmental basis. The fact is that one level of government frequently bribes another level of government to do something that they would not do if the bribe was not offered. An analysis of the grants economy or the kinds of bribery systems that operate are not included in the Commission report. Generally speaking, behavioral analysis is lacking in the entire report. Rather, arguments of efficiency and authority are employed to support the conclusions reached and recommendations made. As a result, changes discussed previously in this paper are absent from the whole analysis and were never taken very seriously by the Commission.

Surviving from the Allee-Ingram study are some observations on procedures and needs for river basin organizations – compact commissions in particular. For example, discussion of regional capital budgeting modeled on Corps activities are included in the final report as is a call for a strong link between Congressional activity and river basin planning. Furthermore, the notion of a two-phase congressional authorization approach probably originates in this study.

Overall, the Commission's work may be viewed as an opus magnus. Undoubtedly, it is one of the high water marks of the water field but it indicates clearly that we have a long way to go in understanding just how we can implement knowledge and incorporate academic studies and other inputs into the public decision making apparatus.

# PRICING AND EFFICIENCY IN WATER RESOURCES MANAGEMENT

Robert K. Davis*

## Introduction

Thank you very much for that introduction. I'm glad to be here. I don't know that everyone would agree that I'm one of the foremost authorities in this subject, but I'm certainly one of the outstanding targets having produced a piece of work called "Pricing and Efficiency in Water Resource Management." This study has been identified as the source of a recommendation by a National Commission suggesting that users, rather than continuing to receive very generous subsidies in the form of free or nominally priced services from Federal investment in water resource projects, should pay an effective price for the services that they're receiving.

During this seminar, I'll try to talk about the theory behind the notion that users or beneficiaries should pay an effective price. Then we can spend some time reviewing the recommendations of the National Water Commission and the findings in the background study that we did for this Commission. You also may be familiar with the article "Potential for Marginal Cost Pricing in Water Resource Management" found in Water Resources Research, August 1973. This article is based on the background document. At this point, I could say you can read these references and know everything I'm about to say and I could go home. When I realized that I was being taped today, the thought flashed through my mind, "Why didn't I send a tape of my remarks which could be played?"

I'll probably talk too much economics for the engineers here and not enough economics for the economists. I think probably both of you will benefit — the engineers from having to think about some ideas that don't come out of the usual engineering subjects, and the economists from having to think about some of the practical problems of implementing theoretical ideas.

## The Theoretical Framework

The theory that I have to talk about comes from the concept of the supply/demand equilibrium which we all learned about in the first course of

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Economics. If it's working well, this market equilibrium tells us what is a society's evaluation of a good – the social value. If the good or service is water, and there's a market operating on this particular water service – water supply or irrigation, or waste treatment – and the market finds the equilibrium, the resulting price gives us society's evaluation of the good. So, price in economic theory has information value. It permits consumers to allocate their expenditures, balancing the satisfaction they expect to get from an increment of a good against the price they have to pay. It informs producers as to how much they should produce. Producers, likewise, follow the marginal cost rule.

Of course, the market doesn't always work. There are cases in which the price may be held above this equilibrium position. The most common example of this, I suppose, is monopoly pricing in which production is restricted. If you are a monopoly producer, you have the power to restrict production and force people to pay your price and it may be shown that the resulting profits will be greater under this pricing situation. Furthermore, it can be shown that social welfare is greater if the competitive equilibrium is achieved rather than if monopolists are allowed to follow their pricing rule.

It's also possible for a good to be underpriced. That is, price would be less than marginal cost. In this case, remembering that the supply curve reflects marginal cost, if a price is set arbitrarily low, the consumers would desire to take a quantity which would be clearly more than the quantity which producers would be willing to supply. The only way you can get consumer demand satisfied at this arbitrarily low price is to create a public utility. In the typical public utility, we lose sight of the price-equals-marginal cost rule but are satisfied so long as the total costs of production are covered. That is, price equals average cost.

Electric utilities and water utilities, generally follow this "P = AC" rule of pricing. The same result can also be obtained in the provision of public services such as street cleaning or outdoor recreation simply by not paying attention to the incremental costs of production but by believing that the good is good and, therefore, a certain quantity should be produced. There's a certain "requirement" for street cleaning or for outdoor recreation. So we provide it. Typically, in this kind of a situation, users don't pay the full cost and this involves a subsidy. Subsidization is associated with many kinds of public services.

In the area of water resource investment, this problem often prevails. Price is zero or nominal and is less than marginal cost. The problem has been labeled the "evaluation-reimbursement" dichotomy, and is as follows. In benefit-cost

analysis, we think of benefits in terms of consumer willingness to pay, analogous to a demand function, and, in designing a water resources project, we pay attention to marginal costs and we follow the rule marginal benefit = marginal cost which is equivalent to price = marginal cost. So we say the project is going to be a certain scale as though a price were going to be charged. But then because of the administrative rules of pricing, Congressional policy or whatever, no price is charged, or a nominal price is charged, resulting in an excessive quantity of the service being demanded. When production is increased to satisfy this excessive demand, the associated costs of providing this additional quantity exceed the benefits of producing that quantity. Clearly, the additional quantity is produced at a net loss to society. Now, if the quantity is not produced, but demand is allowed to reach this high level as, for example, in some outdoor recreation areas, there is congestion.

If you think of pricing municipal water or pricing the water for irrigators below marginal cost and the desired quantity is available, then the last increment is being produced at a net loss to society. This can mean substantial quantities of irrigation water and municipal water would be produced at a net loss. If it's a free service like outdoor recreation, and the quantity is fixed, the result is congestion which, in effect, reduces the value of the service to all users. There would be a lowered value as indicated by a shift in the demand curve.

Thinking in terms of the growth of demand, this pricing rule leads to a use of the facility which exceeds the design capacity and, in turn, leads to premature expansion in the provision of the service. Premature expansion, I think, is a known fact in provision of electric power and provision of municipal water and also, in some cases, in the provision of municipal sewage services. Thus, by divorcing pricing from the public investment decisions in water resources, we are warping economic evaluation. We are encouraging inefficient use of the resource.

Herein, of course, lie my biases. I assume that the objective behind the public provision of water services, whether navigation or irrigation or water supply, is efficiency. That is, the social investment objective should be the maximization of the net benefits to be enjoyed from the resources investment. Without some marginal cost pricing, or some equivalent administrative rule to allocate the services, we find uses being made of the services that are, to all intents and purposes, less valuable than the cost of providing the service.

Is there a rationale for this violation of the efficiency objective? Yes, there is. There is an alternative to the efficiency view concerning the objectives of water resource development and that alternative is the developmentalist's view. This says that investment in water is good for regions in that it sponsors economic development, population growth, industrialization, increased production, the better life, and all the things associated with development. I don't think the argument is settled. The rationalists seem to be composed of most economists, some engineers, and some political scientists. The developmentalists include most Congressmen, most water resource agency administrators, and many state officials.

The National Water Commission, I think, has joined the fray and has come out on the side of the rationalists by saying such things as "the West has been won; it's time that we took a look at the benefits and the question of who's benefiting and who's paying for water resource investment." In fact, the Commission has been very clear in calling for full-sharing of the costs by the beneficiaries. The National Water Commission has suggested a turn in our water resources policy in this area.

As we review practices, we find very little application of these rules of pricing in the water resources field. I think, as a result of this, we find that powerful pressure groups have grown up around the water resource agencies. This represents an imperfection in the public sector. We talk frequently about imperfections in the private sector. Certainly, one imperfection in the public sector arises when a public service is being produced and there is an identifiable beneficiary group that can organize themselves to the extent that too much of the public service will be produced. There will be an overproduction of that public service. There is a counter part of that rule in the private sector where a public good is being produced by a private activity and the beneficiaries are disorganized. In this case, the private sector will not produce enough of that public service or public good. This is the basic rationale for public investment – public activity – in the production of goods and services. But I think we discovered an imperfection in the public sector – one that has to do with the overproduction of public goods under certain conditions. What the National Water Commission and what economists like myself and the former Director of the Bureau of the Budget are saying is that if you want to correct for overproduction of this public service, you have to believe first that there is overproduction, and then you have to charge effective prices for the service. Without effective pricing, and through the activities of pressure groups, you get conjuries of unfortunate influences. It's difficult to get an honest benefit-cost analysis out of an agency that's under pressure from its clientele group to produce the service. Furthermore, the clientele group, as Congress has demonstrated more than

once, will go through the Legislature if necessary in order to direct a favorable benefit-cost result or at least create the auspices for favorable benefit-cost results.

Congress issued a directive quite recently saying that the criterion for evaluating the benefits of waterway projects shall be the savings to shippers based upon existing railroad freight rates. There are two things wrong with that, one of which is that existing railroad freight rates are not based on price = marginal cost. They are based on price = average cost. Thus, in the case of railroads, the relationship I've been discussing is turned on its head. In the railroad business, marginal cost is lower than average cost and if the railroads were charging marginal cost, freight rates would be lower than if they charged average costs. What we wish to know in evaluating the savings to shippers on waterways, is the marginal costs of the alternative mode — not the average costs. Congress says that you shall use the average cost for evaluation purposes and, as we have just seen, average costs are higher. The second problem is that the railroads will lower their tariffs and retain some of the traffic that would otherwise go to the waterways once there's competition from the waterways. Thus, legislative language has boxed us in, and there's no doubt what groups were behind the language.

More recently, Congress told the President that he doesn't have the authority to establish the discount rate for the evaluation of water resources projects. The President's Water Resources Council has issued rules to the effect that the discount rate on water resource projects would be 6-7/8 percent which would be one percent higher than the current 5 -7/8 percent. Congress reacted by taking this authority away from the President and legislating the 5-7/8 percent interest rate. Again, this was a break for water resources projects. Now, I can't believe that if effective pricing rules were followed, these powerful pressure groups would exist and the decision process would be as warped as it is.

## National Water Commission Policy on Pricing

The Water Commission dealt with both pricing and cost-sharing and I'm not going to take the time to try and separate the two issues. Certainly, cost-sharing is the more general policy area. Pricing, in addition to its role in resource allocation, is one means for affecting or achieving cost-sharing. The National Water Commission made it clear that they wished to test the beneficiaries' willingness to pay; i.e., to find out what the demand curve really is, by requiring a greater sharing of costs on the part of local beneficiaries. They argued both that this is efficient in the terms of economic

theory and also that this is fair. This, you might wish to challenge. However, there is a good argument for saying that greater cost-sharing on the part of the beneficiaries is not only efficient; it is also equitable. It has to do with the income level of the beneficiaries of water resource projects.

Let us consider some example areas. First, municipal water. The present practice varies from having no rates at all — that is, no price for water — in which the incremental amount is free, to having rates, or some price which if multipled by quantity gives the total water bill. If a community simply charges a fixed fee and allows you all the water you want to use, there is no price because it doesn't relate to the quantity you want to use. Typically, we find uniform rates over time; that is, equal winter rates and summer rates. Also, we find water users on municipal systems paying the same rate regardless of whether they are miles from the pumping center or whether they are next-door to the pumping center. Obviously, there is a difference in the cost of service but it is not reflected in the rate. It made sense to us and to the National Water Commission that there be seasonal differences in municipal water rates to reflect the fact that in most areas the summer season is the peak season of use because of lawn sprinkling, and it is this summer season peak usage which is requiring expansion in the capacity. Therefore, the peak load pricing rule would tell us that those summer users who are using the extra quantities of water should be paying for the expansion of the capacity. Higher summer rates than winter rates would be in order for municipal water. Similarly, zonal rates should be adopted to take account of the cost of service in different zones. Finally, a front-foot benefit assessment on property owners should be introduced to recover the cost of installing the service. Existing users should not be asked to pay for new service thereby implicitly subsidizing new users. Costs of extending the system should not be recovered through the water bill; a separate charge should be made. The municipal sewage area has been affected most recently by the 1972 Water Pollution Control Act Amendments. This act requires that, for any community receiving a grant for construction of a sewage treatment plant from the Federal government, the industrial users will repay their share of the Federal grant portion of the cost of that facility. Some very persuasive evidence is coming in that says that if you charge industrial users on the basis of the strength of their wastes and the particular problems which their waste may create in the sewage treatment plant, dramatic reductions in industrial waste production will take place. That is, the industrial users will respond to pricing. Clearly, industrial users should pay the costs which they impose upon the municipal sewage treatment works.

Navigation probably is one of the best examples of subsidies to beneficiaries. The benefits flowing from navigation are very large. Hundreds of millions of

dollars worth of benefits are being distributed free of charge by the Federal waterways program. It would be quite feasible to impose a user charge on the barges and the pleasure craft which use our navigable waterways in the form of a charge to cover the operation and maintenance costs of those waterways. In addition, it would make great sense to charge fees at the locks. The locks are now very heavily congested in many of the heavier used waterways. There are long lines of barges and pleasure craft waiting to get through the locks on waterways such as the Ohio River. Congestion costs arise in terms of lost time; i.e., the costs of tying up an expensive towboat and barge together with the time of the operators and crew. Congestion costs are a strong argument for some locking-fee system that will reduce congestion. Of course, the waterway operators are one of the most powerful water resource lobbies that we have.

The other area in which the Water Commission had a positive recommendation for effective pricing was irrigation. The history of pricing and cost recovery in our irrigation program makes interesting reading. Right at the beginning of the 1900's, when the program was new and there were still some conservative principles around, Congress said that there shall be 100 percent repayment of irrigation projects and that repayments should occur in 10 years. In 1914, Congress extended the repayment period to 20 years. In 1926, the repayment period was extended to 40 years. The fiction of 100 percent repayment was still retained as desirable. In 1939, immediately post-depression, Congress essentially said that you can take forever to repay your irrigation project costs. Now, the argument was that repayment should be based on the ability to pay which has been interpreted by the Bureau of Reclamation as being 75 percent of the irrigator's net gain. Throughout this discussion, I have been talking about willingness to pay. Now, we are talking about ability to pay and the charges made to irrigators completely ignore the alternative uses of the water. Furthermore, a realistic interest rate is not charged to irrigators at present. Prices are not renegotiated; that is, a project that was established in 1920 with a certain interest rate charged for the water still has that rate in effect. The repayment period is now deferred for 10 years before the payments start. There is no recognition that the costs of providing irrigation water vary over space and time as in the municipal water supply example. The prices charged irrigators do not reflect any resultant external cost, the best example of which is the increased salinity of the return flow from irrigation projects. Present practices now favor an undercharging of irrigation water if there is conjunctive use of groundwater in order to prevent over-pumping of groundwater. We would recommend that if over-pumping of groundwater is a possibility, you impose a groundwater tax instead of reducing the charge on irrigation water.

In our study, we also looked at hydropower, fish and wildlife habitat, outdoor recreation, and flood damages. Only in fish and wildlife habitat, where we are dealing with a fugitive resource and where it seems impossible to relate the beneficiaries to the costs of production, does it seem generally infeasible to impose effective pricing. In outdoor recreation, in flood damage abatement, in shoreline protection, and in hydroelectric power generation, it seems feasible to impose effective pricing. However, institutional problems, political realities, and some just plain, hard practical problems make collection of fees difficult in these areas. These factors regulate these areas to being less promising than those in which the National Water Commission made their recommendations.

# THE CHANGING LAW ON SOCIAL VALUES IN WATER USE

Philip M. Glick*

## Introduction

I shall try to cover, in the time that we have, three topics. The first, public rights of access and use of shorelands and beaches for water recreation; second, ways of providing legal protection for the social values of instream water use — instream water values. I'll give that term a better definition later. And third, flood plain management, usually referred to as nonstructural measures to supplement structural measures for flood control and flood protection.

I'm going to go rather hastily over the first two topics in order to allow enough time for the third topic, which is more complex, and in some ways more important than the first two despite the great importance of the first two. But I don't want to go so rapidly over those first two that you have trouble following me. If you don't understand something that I've said, please don't hesitate to raise your hand and ask a question.

In a sense, the three topics that we're going to be talking about fall under two major problems that American society faces in the third quarter of the century. The first problem involves recreational facilities; the need for additional public recreational facilities, ways of getting them, and ways of protecting them. This includes access to shorelines, shorelands and beaches for water recreation, and protection of instream values. The other problem is how to reduce losses in life and property due to floods.

With respect to the first problem, which comprises the first two topics to be addressed, we have today in the United States a much greater, and growing demand for public recreational facilities. Water ranks very high in the area of recreational facilities. People love it, and more and more people want to make use of water. Now, the reasons for this accelerating growth in public demand for water facilities for recreation are very obvious. First of all, we have an expanding population. Further, we're a population with more leisure time. Life styles are changing; sports dress is becoming far more popular. And finally, greater affluence is typical in our society. The combination of this expanding population with more leisure time and more money to finance leisure activities, is creating a tremendous burgeoning of the public demand for recreational facilities.

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Now let me give you a statistic in order to provide you with a geographic framework about the first two topics we're discussing — a statistic about our shorelines, shores, and beaches around water facilities. We have 17,000 miles of shorelines in the United States. In 1960, the National Park Service recommended to Congress that 15 per cent of this, or 2500 miles, ought to be acquired by governments — national, state, and local — in order to provide for the foreseeable public recreational needs of access to shorelands for the rest of this century, perhaps to the year 2020. Of this 2500 miles that the National Park Service estimates would be needed and recommends be acquired in public ownership for public recreational use, only 1100 miles are now in federal or state ownership. That leaves 1400 miles of shoreline yet to be acquired.

Now of course, the easiest way for the public agencies to acquire the necessary shorelands and beaches is to buy them. They can buy them or acquire them by eminent domain if the private owner isn't willing to sell. While public funds are limited, a large amount of public acquisition is essential and will need to be resorted to, as recommended in this report that I've just referred to.

Nevertheless, direct public acquisition is not the only way to provide public access to shorelines. What about the very great amount, the larger part of the shorelines in the United States, that are, and certainly will remain, in private ownership? Some of those can become available for public recreation. Water, by its very nature, has always been regarded as a public asset. No man owns any particular water. He may own a right to use certain portions of a stream for stated purposes and for stated periods of time, but water is special. It is public in nature, and the law has been reasonably able and reasonably quick to recognize its social value. Now, there are two major ways in which privately owned shorelines and beaches can become available for public access and public use. First is a rather obvious but rather limited way. Through adverse possession — what lawyers call "prescription" — the public may acquire the right to use particular privately owned beaches. Any use which continues under the law for a period of time — most states say for seven years — is an adverse possession against the owner if he failed to interfere with the public use. As a result, the public has acquired a right of use as a matter of law which the landowner no longer can interfere with. Alternatively, the owner may dedicate a section of his shoreline or beach to public use, for example, by recording a deed to that effect. Or by sheer custom of continued permission by an owner of public access, which perhaps is another name for "adverse possession" and "prescription," the shoreline

may become available for public access and use. But these two methods alone obviously aren't going to give us very much of privately owned shorelines and beaches for public use. Another way was developed many years ago – centuries ago – in Great Britian in the development of the Common Law. The United States, of course, in inheriting the British common law and adopting it, and adapting it, has that method also.

In Great Britian, the courts developed the notion that the shores and beaches of navigable waters are held subject to a public trust. The king was the trustee and the general public was the beneficiary of the shores and beaches which were the property to which the trust attached.

Notice, only the shores and beaches of navigable waters were included, which poses the question, "What is a navigable stream?" Well, Great Britian is an island, and most of the waters of Great Britian, including all of the rivers and many of the lakes, are tidal waters. So the British courts said that tidal waters are the test and definition of navigable water. And the tidal river is navigable all the way from its mouth to the highest point of tidal influence.

When the United States adopted the commonlaw and the federal government succeeded public ownership of land that the Crown held in Great Britian, the courts were quick to see that the tideland test would not hold in the United States. And I've included in the list of citations that has been distributed to you, some of the names of cases and reports that will help you trace the development of the American doctrine. The American Doctrine in brief is: waters are navigable if they are navigable in fact, or if they can be made navigable, and are portions, or can usefully become portions of continuous commerce. Furthermore, Congress can regulate the use of navigable waters under the Commerce Clause of the Federal Constitution, and the states can regulate them under the state's inherent regulation power. So in the U.S., the shores and beaches of any navigable stream, thus broadly defined, are subject to such a public trust. As a result of this, the public has a right of access and use.

Let me summarize this way. If the lake or stream is not navigable, or for that portion of a stream that is not navigable, privately owned shorelines and beaches are not subject to public access. If the public comes there to fish or to swim, they are trespassers. They can be ejected and are subject to damages and injunction. But if the stream is navigable, then there's a public trust which creates the right of public access and the state and local community can build the necessary roads, provide the necessary sanitary facilities and drinking water, do the policing, do the cleaning up, protect against riots, and

theft, etc., and the public has such access even though the shore and beach is privately owned.

Now, you know of course, that under the General Police Power – the power to protect the health, safety, and welfare of the people – state legislatures can regulate privately owned land. They can regulate privately owned shorelines and beaches too. But the power to regulate can not be used as a disguise for taking away from private ownership the rights of beneficial uses of the land. That would be expropriation, which is a taking of land without compensation and is not permitted. If the local government feels strongly that the particular land is needed, and there is no public trust because the waters are non-navigable, then it can acquire it, but it must pay for it.

There are three needs on this topic – three important needs to help the slowly changing law on the subject. First of all, every state ought to pass a statute vesting in a single state agency the power to determine what additional shores and beaches need to be acquired in public ownership to provide adequate public recreational facilities, making it the responsibility of that agency to promote the recreational use and do the policing and development necessary of the shorelands that are acquired.

Secondly, we need a federal statute. The federal government owns a great deal of land. It can do very little to influence local land use. I don't have time today to distinguish in full between federal and state regulatory power over land use. The states do, however, have broad powers to regulate land use. Traditionally in the United States, we look to the states and localities to regulate land use, not the the federal government, even though the latter has certain powers in some cases even over local land use. In brief, the federal government can regulate land use only so far as necessary to carry out one of its specifically delegated powers. One of these is the power to regulate commerce. We need a federal statute, specifically directing and not just authorizing, the Forest Service, and the Park Service, and the Bureau of Land Management to regulate use of all federal lands, so that lands and waters within federal properties, particularly in national forests, and in national parks, and in national recreational areas, are developed to promote better public access and public use. The third need is for Federal grants to States to help finance purchase and development of lands for public recreation.

In January 1974, the Bureau of Outdoor Recreation issued a report to the Congress entitled "Outdoor Recreation: A Legacy for America" which is a magnificently comprehensive report on general outdoor recreation needs and foreseeable demands. I've cited this also in the page of citations. You will find in this report an excellent discussion of four major recommendations. One of these pertains to wetlands. The Bureau of Outdoor Recreation recommends

developing a national comprehensive inventory of wetlands so that we will know where they are. This will facilitate public acquisition where public acquisition is important, and will facilitate public assistance to privately owned wetlands so that we don't drain them for less needed purposes and destroy one of our most valuable assets — an asset to human beings and an asset particularly to fish and wildlife. Secondly, the Report recommends that "superlative areas" within and adjacent to the federal and state lands be identified and that these be given high priority in future public acquisition in order to round out existing lands so that the total parcel of federal and state publicly-owned lands may be available to promote public recreation. Third, they recommend that federal agencies be prodded into opening up under-utilized areas on federal land suitable for public recreation. The final recommendation is that encouragement be given to private land owners to develop recreational facilities adjacent to their farms where they can charge fees and use this as an additional privately-owned recreational facility that is available to the public for a fee. That's all the time we have for discussion of the public trust doctrine and public access and use of shorelands and beaches.

## Legal Protection for Social Values of Instream Water Use

We want to talk next about ways in which we can improve legal protection of instream water values. What do we mean by instream water values? There are four major valuable instream uses. First, the sheer aesthetic value of enjoyment of water. For this water use you don't have to take water out of the stream as you do when you pipe it out for a municipal water supply, or when you pipe it into a ditch to be used for farmland irrigation. The sheer aesthetic enjoyment of water in place. Lakes, rivers, and running brooks are things of beauty. What would the lyrical poets ever have done without lakes and river and running brooks? We can walk along them. We can go boating on them. Just being there, just walking hand-in-hand along the beach is a use and an enjoyment of an instream water value.

A second value, of course, comes from recreation. Swimming, and boating, and surfboarding, etc. Fish and wildlife habitat is a third instream water use. And then finally, but less well-known, water has a self-purifying capacity. When pollutant chemicals or sewage are dropped into water over a period of time the water will purify itself completely through chemical reaction, if the water quantity is sufficient, and the sewage will have disappeared — disappeared chemically from the water. What do you do, however, particularly in the 19 arid and semi-arid western states of the U.S. (19 because of the 17 familiar western states plus Alaska and Hawaii)? In these states, there often isn't enough flow in the stream for self-purification. You can add flow. You

can put water into the stream. That's called low-flow augmentation for water quality control. You augment the amount of water in the stream in periods of low flow, in order to improve quality and help the water purify itself. However, you have to have water rights in the western states if you want to be able to protect the augmented water supply that you put in to assist water quality control. In the absence of a water right, a public agency may pour water into a stream to improve its water quality and then somebody else can come along and divert that water for irrigation purposes, and you're back where you were before. However, under the typical water law in effect in the 19 western states, it's very difficult to acquire a water right for low-flow augmentation.

And here let me interrupt myself since I gather that most of you are not lawyers and take a minute to explain the two major water law doctrines in the United States. In the eastern states we follow the riparian doctrine. A riparian owner is an owner of land that abuts a body of water and the riparian owner has the right to use that water and to have that water flow past his land undiminished in quantity or quality. That's the essence of riparian law. It works fine within broad limits in the East. It worked fine in England where the doctrine was founded. But in the western states, because it became so important to pipe the water out of the streams to irrigate the dry lands, they developed the appropriation doctrine. And briefly the appropriation doctrine provides that you first have to acquire a water right – a right to use water – by filing an application. And you must divert water from the stream, put it into a ditch and carry it somewhere. In addition to the diversion, the water must be applied to a beneficial use. Furthermore, the right attaches only to the specified quantity of water for which you've applied and for a specified period of time during which you may do the diverting.

Since you have to divert water <u>out</u> of the stream, a big block is created with respect to protecting water <u>in</u> the stream. Let me give you a Colorado case by way of illustration. The legislature of Colorado provided that any Water Conservation District – and there are a number of them in the state of Colorado – may acquire a water right to protect instream uses, particularly fishing. Well, one River Conservation District did just that. It filed an application to acquire so many acre-feet of water in a particular stream in order to protect fishing in that stream. Then a power company wanted to acquire a water right for an amount of unappropriated water. If this earlier Conservation District's rights were valid, there would not be enough unappropriated water left in the stream for the power company. So the power company filed suit, claiming that there is no right under the Colorado

doctrine; i.e., under the appropriation doctrine, to acquire a right to use water in the stream. You must divert it and apply it to a beneficial use. Furthermore, Colorado has a constitutional provision which says that no application to divert unappropriated water shall ever be denied. The court didn't want to hold the statute unconstitutional. So it ruled in favor of the power company on the premise that surely the legislature knew about this requirement of diversion. It could not possibly have intended to ignore so many years of Colorado court doctrine. Therefore, the power company was right and the Conservation District could not acquire a right to use the water instream.

Other western states have struggled with this problem of providing additional protection for instream water uses. Montana in 1963 enacted an interesting two-year trial statute. It said no state or local agency may act to alter stream channel flow without first coordinating with the Montana Fish and Game Commission. This worked successfully for two years, and therefore, the legislature made the statute permanent. This meant that if any state or local agency ever wanted to change water flow in a way that would interfere with fish and game conservation and development, the Montana Fish and Game Commission would have to clear it and could recommend changes in the proposed project in order to protect fish and wildlife. This has become a model, and a number of other states have enacted statutes similar to Montana. Utah has two statutes, one giving certain authority to the Governor, and another giving certain authority to the State Engineer. The Governor may authorize withdrawals of water that will leave the water instream to protect instream uses. The State Engineer, in another statute, is authorized to deny applications to divert water to the extent necessary to protect instream uses. The trouble with the Utah approach is that neither the Governor nor the State Engineer is eager to exercise these powers because of the overwhelming pressure of public opinion to protect water for irrigation in the state of Utah. Utah is still struggling to find a more workable way to protect instream uses.

The state of Washington has suggested a very interesting way. It authorizes the Department of Water Resources to establish minimum water flows for specific stretches of streams to protect any instream values — fish and wildlife, aesthetic, recreation, and preservation of water quality. This is a complete and comprehensive statute which authorizes a state agency to act. Oklahoma has adopted a similar approach except that it is applicable only to certain scenic rivers actually named in the particular statute.

What about the situation in Virginia? You have the right to be especially interested in that. Well, Virginia does of course recognize the public trust

doctrine for navigable waters. On the other hand, Virginia has taken no action, either by court decision or statute, specially to protect instream water values. And in the case of Boerner v. McAllister in 1955, the Supreme Court of Virginia said that only the riparian owner has a right to use the adjacent waters for recreational purposes. The public can be enjoined as trespassers.

In this discussion of the Public Trust Doctrine of public access rights to shorelands, and of the experiments that some western states are making to find ways to give legal protection to instream water uses and values, I have drawn very freely on two excellent reports written by Richard L. Dewsnup, a Utah lawyer, for the National Water Commission. These reports are items 1-A and 1-B in the list of citations I have given you. They are up-to-date, very well written, and I recommend them for further study of these problems.

## Flood Plain Management and Protection

Let me turn now to flood plain management. This is a much broader issue than just land use regulation. Flood plain management means protecting lands against floods, promoting good land and water use, preventing dangerous land and water use, and reducing damages to life and property from floods. Now there is one fundamental concept that everybody needs to have clearly in mind if he is to understand flood control. Visualize a running stream with a large, elongated oval all around it. This area is the flood way and comprises the land surrounding and immediately adjacent to the stream or lake. Water will inevitably flow onto this floodway when it overflows its banks in times of floods. Now the floodway belongs to the stream; it belongs to the lake. A river has to overflow its banks during periods of melting snow in the mountains, for example. A river simply has to overflow when there's more water rushing into the particular reach or stretch of a river than it can normally accommodate between its banks and upon its bed. And the overflow rushes onto the floodway. Anybody who chooses to build in and occupy a floodway has to accept these "constitutional rights" of a stream. And the public must recognize that it will constantly have to bail out and rescue people every single time there's a flood if it permits houses and other structures to be built within a floodway. If the public wants to reduce flood damages, and the cost of dealing with damaged property, and of saving lives and looking after flood evacuees in times of emergency, and so on, then the public is going to have to face up to the need for regulating and limiting the use and occupancy of floodways.

You can use floodways for pasture; you can use them for fish and wildlife; you can use them for wetlands; and you can permit structures that are

floodproofed and prohibit all others. You can use the floodways in all these various ways. You don't have to isolate them, or just limit them to fish and wildlife. However, if you permit expensive residences and important industrial structures to be built on the floodway, inevitably they will be flooded and flooded frequently. There will be hazards to life and property. This will increase public liability and that just isn't the way to run a railroad.

Now around the floodway there's another, still larger oval, called the flood plain. Now you cannot exclude use and occupancy from flood plains because it's too much valuable land. Some of the best lands in the country are flood plains. Most of the city of New Orleans, possibly all of it, is on a flood plain. You're not going to destroy the city of New Orleans and evacuate all of the population. But the regulation of land in flood plains doesn't have to be nearly as severe. Floods of magnitude may come only once in 50 or 100 years – hence the engineers' terms "50-year flood," and "100-year flood" – but those terms refer to floods of a certain height, and volume, and speed of flow. You may have a 50-year flood three times in a ten-year period although it is unlikely. According to the law of averages, a flood of those dimensions is apt to come only once in 50 years, so that a local government may decide to permit only structures of a type strong enough to withstand 50-year floods within that part of the flood plain closest to the floodway. Beyond that, it may permit weaker structures provided they're strong enough to survive a 100-year flood. If you don't regulate or restrict land uses at least to this extent, then you ought to recognize that you are certain to increase the amounts of flood damage.

Discovering in 1967 that the Army Corps of Engineers, the Bureau of Reclamation, the TVA, and the Departments of the Interior and Agriculture had been studying flood plain management and state and local regulation of land in flood plains for many years, the Water Resources Council organized a particular project to build on the work of these agencies and prepare a model state enabling acts and model local ordinances for flood plain regulation. All of these agencies joined the Council in directing and financing these studies. A state enabling act would be a statute that a state legislature could pass authorizing local communities to adopt ordinances, usually in the form of an amendment to a local zoning ordinance, which would regulate the use and occupancy of floodways and of floodplains. The Water Resources Council and the cooperating Federal agencies asked for help from the University of Wisconsin, its law school, and its political science and economics departments. The results of this project have been published in two volumes. They contain three different alternative enabling acts for the states to choose among, together with a full discussion of the legal and administrative

problems involved. One alternative merely enables local governments to regulate by ordinance. A second enables the state to give technical assistance and guidance to local governments in drafting and enforcing these local ordinances. The third provides for state action alone. At the very least, as a sort of additional subalternative, one version provides that if the local governments fail to use their authority, then the state agency may decide that the State must step in and enact a suitable regulatory ordinance for the particular county or other local area.

In the interest of strengthening local control, it is desirable to provide all of these alternatives and let each state make its own choice, and let the localities act within the choices that they have. It's better to encourage and educate than to dictate and compel. However, a responsible society must be willing to exercise regulatory power and the coercive power of government in order to maintain the basic essentials of sound public finance as well as public health, safety and welfare. I believe that this is a principle not only thoroughly in accord with democracy and free enterprise, but one that will underpin and protect the democracy from self-destruction.

What will the typical local ordinance do? It will define the floodways of the locality and describe their boundaries. It will define and bound the areas of the flood plain. The ordinance will be a protective instrument so that one won't buy a house without knowing that one is buying within a floodway or flood plain. It will establish encroachment or other boundary lines. It will provide that nobody may build within the encroachment lines without a permit. That's the most effective way to enforce this kind of an ordinance. It will provide for floodproofing and require it under stated circumstances. It will exempt pre-existing uses because they must be protected under constitutional requirements. But it will provide that pre-existing uses cannot be expanded or modified without a permit. It will provide for suitable public education, and it will also arrange for state assistance and federal guidance.

To be valid under the State and Federal constitutional due process clauses, and to be protected against other constitutional attack, every ordinance thus adopted has to be based upon sufficiently detailed and sound engineering, economic and political study so that the courts can see from sworn evidence in court that the particular prohibitions and requirements of building a particular kind of structure within a particular portion of the floodway or floodplain are reasonally required, to protect the public interest, given the flood history of the locality and given the particular nature of the local terrain.

While regulation is the cornerstone of floodplain management, there are a number of other tools which support the regulation. There's the unification and broadening of federal, state and local basic data collection; there's flood forecasting and flood warning services by the National Weather Service, Corps of Engineers, SCS, TVA, etc. Delineation, mapping and description of flood-prone areas prepared by the federal and state agencies in advance of ordinance adoption is valuable in helping the localities. Integrated land and water use plans and programs must be adopted because an ordinance ought to fit into a long-range program. Public education on the comparative costs of flood hazards and control methods is important. You need also revision of building codes and subdivision codes to support the occupancy and use regulations of the ordinances. You need to develop suitable state and local public policies to influence the location of roads, utilities, and water and sewer facilities, so that roads will not be undermined every time there is a serious flood. You need technical assistance on floodproofing. You need provisions for evacuating populations from fringe areas, and emergency assistancy programs, and last you need flood insurance.

Congress has enacted national flood insurance that is administered by the Federal Insurance Agency of the Department of Housing and Urban Development. Under the National Flood Insurance Program, there are two types of insurance: first, actuarial insurance, where one pays the actual cost of the insurance protection on the basis of actuarial records, and second, subsidized insurance. Federally subsidized flood insurance is sold only in communities that have adopted ordinances to regulate use and occupancy of floodways and floodplains. Thus Federal Flood Insurance becomes an additional encouragement to state and local adoption of enabling acts and local ordinances.

## Summary

The three problems we have discussed all relate to wise use of the nation's land and water resources. Our expanding population needs additional facilities for public recreation. We should remove existing legal obstacles especially in the western states, to protect instream uses of water, both for recreation and for improving water quality. And we badly need to supplement the building of levees, dams and reservoirs for flood protection with broad programs of flood plain management that are based upon state and local regulation of the use and occupancy of floodways and flood plains. Thank you very much.

[The following list of citations was distributed to participants in the seminar.]

Citations for Seminar

1. Richard L. Dewsnup:

   A. "Public Access Rights in Water and Shorelands." Issued by National Technical Information Service (NTIS), July 1, 1971, Acquisition No.: PB205 247.

   B. "Legal Protection of Instream Water Values." Issued by NTIS, September 17, 1971, Acquisition No.: PB205-003.

2. "Navigable" Waters in U.S.

   A. The Propeller Genessee Chief v. Fitzhugh, 12 HOW. 443 (1851).

   B. The Daniel Ball, 77 U.S. 557, 563 (1870).

   C. Barney v. Koekuk, 94 U.S. 324 (1876).

3. States recognizing a public right to use shores of non-navigable waters: Citations in Dewsnup, 1-A above, p. 14.

4. Virginia rule on public access to shorelands: Boerner v. McCallister (1955), 197 Va. 169, 89 S.E. (2d) 23.

5. Books, articles and cases cited in Dewsnup, 1A, p. 71; and in 1B, p. 58 (Bibliographies).

6. "Outdoor Recreation – A Legacy for America," U.S. Dept. of Interior's Bureau of Outdoor Recreation, January 1974, Government Printing Office, Washington, D.C.

7. "Regulation of Flood Hazard Areas to Reduce Flood Losses," U.S. Water Resources Council, Washington, D.C., Vol. 1, 1971; Vol. 2, 1972, Government Printing Office, Washington, D.C. Vol. 1, $2.50; Vol. 2, $2.00.

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