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WATER RESOURCE MANAGEMENT--REGIONAL PLANNING

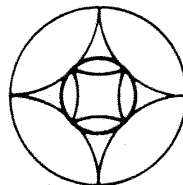
by

Vincent Ostrom

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VINCENT ALFRED OSTROM

WATER RESOURCE MANAGEMENT- REGIONAL
PLANNING*

An analysis of American experience in water resource management and regional planning affords a useful opportunity to examine the development of American institutions in an important segment of American society. The ways that resources are exploited for human purposes is an important key to an understanding of institutional arrangements and public policies in any society. New institutional arrangements and accommodations are initiated. As new problems and opportunities arise in the development of water resource potentials. At the same time, many of the earlier institutional arrangements maintain their continuity of operation within the changing social scene.

This analysis will first turn to a consideration of patterns of local development undertaken by individual proprietors, private agencies and by local government agencies. These developments largely involved single-purpose projects concerned with the consumptive use of water for on-the-land developments. The fullest development of water resource management by local agencies can be illustrated by reference to the experience of the Southern California metropolitan region. Efforts to develop regional solutions in some of the large inter-state watershed basins will then be explored. Specific references will be made to experience in the Tennessee valley and in the Columbia basin.

Patterns organization for local development

The early development of water resources in the United States tended to be a single purpose development in which some individual proprietor would make use of the natural flow of the stream as he found it. These uses might involve the diversion of water into a mill race where the flow could be directed over a water wheel to provide water power for the individual proprietor before the water "was returned to continue its course in the natural channel of the stream. In other cases, local navigation canals and locks might be

* This paper was prepared for presentation at the Ljubljana-Texas Seminar on Social and Cultural Changes in the United States and Yugoslavia to be held at Lake Bohinj, Yugoslavia, August 21--31, 1961, Special acknowledgment is due to Professor George W. Hoffman, Chairman, Committee on Eastern European Studies of the University of Texas, who has been responsible in making arrangements for the seminar.

provided by private entrepreneurs or by public agencies to circumvent local obstructions to navigation. In a similar way, people in a local community might construct and maintain dikes and develop drainage works in order to prevent flood damage to their property. Diking and drainage districts were among the first local improvement districts used to undertake public water resource projects in the United States.

Apart from the individual proprietor who directly appropriated water from a stream to meet his own requirements the early settlers of the arid west tended to rely upon mutual water companies as cooperative organizations to supply water for individual irrigators on a non-profit basis. These mutual water companies were either organized by a group of individual farmers who would pool their resources in developing a common water supply or by a land developer who organized a water company as an adjunct of his land development and conveyed shares of stock in the water company proportionate to the amount of land sold in each farmstead. When the developer had completed the sale of land to local settlers he had at the same time conveyed control of the water company to these same settlers who were then responsible for their own operation and management of the water company. In the course of time, the organization of mutual water companies developed a rather complex structure with new companies being organized by established companies to develop large-scale supplementary water supplies which would then be distributed on a pro-rata basis among the cooperating mutual water companies.

Where private companies have been organized to provide water supplies for a profit, they have uniformly come under state laws governing public utilities. These laws require a company to secure a license of "public convenience and necessity" in order to engage in a public service enterprise and the rates which they may charge for their services are subject to detailed approval by a public utility commission. Private companies providing water supplies as a public service are in effect limited profit enterprises.

The Wright Act, adopted in California in 1887, is generally used to date the rise of the special public district as an agency for the development of public water supplies. Earlier use had been made of special assessment and improvement districts to develop water supply or drainage systems in which local beneficiaries were assessed to pay for the local improvements made under the jurisdiction of local county authorities. The Wright Act, instead, made the general principles of organization in municipal corporations applicable to neighborhoods or communities which sought to develop common water supplies.

A municipal corporation is a legal device whereby a local community of people are permitted substantial authority to organize themselves and to govern their own local affairs. The government of a municipal corporation is usually vested in a governing board or council elected by the local people. The municipal corporation is usually vested with authority to enact ordinances, resolutions and by-laws in relation to its purposes and functions which are binding upon the people comprising the corporation, unless contrary to the general laws of some higher political jurisdiction. Similarly, a municipal corporation is usually vested with control over its internal administrative organization and the management of its own affairs. It may purchase, hold and dispose of property. If necessary, it may exercise the power of eminent

domain to acquire property for public purposes. A municipal corporation is usually vested with the power of incurring bonded indebtedness to finance capital improvements, of taxation and of the management of its own fiscal affairs. A municipal corporation stands as an individual before the law: it can sue and be sited; and it has perpetual succession in its corporate name. In general, a municipal corporation has competent powers to develop, operate and maintain a public service program subject primarily to local responsibility and control. It is primarily an instrument of local self-government. Where the people of a local community are able to take public action in furtherance of their common interests.

From a beginning with irrigation districts, the special public districts, organized along the model of the municipal corporation or the quasi-municipal corporation, have come to include a vast range of activities related to water resource administration. In California alone the state law authorizes the organization of some thirty different types of local government districts for various aspects of local water resource administration.

The predominant function of the individual proprietor, the mutual water company, the private utility and the local government agency has been directed to land-related uses of water. In most cases their primary objective is to appropriate a quantity of water from the stream and then to distribute that water to its place of use for irrigation, domestic, municipal or industrial purposes. The generation and distribution of hydro-electric power involves the same principle. The function of flood control and drainage districts is also predominantly land oriented. These districts are primarily concerned with diking, bank protection and drainage facilities which will protect local lands rather than with the prevention of floods by general management and control of a river system through the operation of large storage reservoirs.

The policies established especially by the mutual water companies and the local public agencies involved in water resource management are apt to be related primarily to the interests of the community which is being served by the water agency. The local communities which control their water supplies are often in a position of being able to shape their own growth and development. Since the demands of these agencies are primarily consumptive demands for use on the land they may devote relatively little attention to problems of water resource management which involve in-the-channel uses of the water such as navigation, recreation, fisheries, pollution abatement and main-stream regulation for flood control.

The role of these local government agencies supplying water to irrigators, urban residents, industries, etc. has not been substantially modified with the growth of large-scale river management programs. Their primary interest is in adequate quantities of water to be made available for appropriation to meet their schedule of demand. By storing flood flows, the large river management projects have increased the appropriable supplies during the dry seasons of the year. As a result these local government agencies in meeting the water service demands of their local communities have come to serve as essentially retail agencies while the primary burden of water production rests with these large river management agencies of the federal government.

One area in the United States where local government agencies have dominated the development of water resources is in the Southern California

metropolitan region. This region with a population of some eight million persons is located in a relatively compact area where numerous valleys and the coastal plain are drained by several relatively small coastal streams. The local water supply is fairly well regulated through the availability of large amounts of underground storage capacity in the loose sedimentary deposits of the various valleys or basins and of the coastal plains areas. Supplementary storage has been developed by various municipal supply systems, mutual water companies and by various flood control districts acting in conjunction with the U. S. Corps of Engineers.

The composite of interests involved in regional water resource management tend to be organized in separate single-purpose districts. Domestic, municipal and industrial water supplies are provided largely by municipally owned water systems with some additional reliance upon public utilities and mutual water companies. Most of the water for irrigation has been supplied by mutual water companies and by some of the municipal water systems. Flood control districts are also storing water for conservation purposes and have contracted with various water supply agencies to recharge some of the ground water basins. A water replenishment district in one area and a county water district in another area have been organized to undertake ground water basin management programs and to prevent increased salt water intrusion into ground water aquifers. Some of the county sanitation districts and municipal sewer systems are now planning the reclamation of waste water for recharge of ground water basins.

In addition to the rather intensive management of local water supplies the Southern California water agencies have been instrumental in developing two major sources of water for importation into the region. The first supplementary supply was developed by the City of Los Angeles when it diverted the Owens River across the Mojave Desert through the Los Angeles Aqueduct to a terminus in the upper Los Angeles River Basin. It was the management and control of this supply that largely determined the modern characteristic of the City of Los Angeles as well as the decline of the Owens Valley economy.

When a new source of supplementary water supply was sought from the Colorado River, it was no longer politically feasible for the City of Los Angeles to undertake the project alone. Affirmative action by state and federal governments required substantial unanimity of purpose among the different water agencies desiring supplemental supplies on the Southern California coastal plain. As a result, the Metropolitan Water District of Southern California was formed to construct the Colorado River Aqueduct and provide a supplementary supply of water for municipal and industrial purposes from the Colorado River.

The Metropolitan Water District was originally formed with 13 cities as constituent members. The MWD is a special case of a municipal corporation formed by other municipal corporations to provide an imported water supply at the wholesale level. Each of the municipal water systems continues to supply its own local consumers at the retail level. Today, the MWD has become a regional agency comprising an area of nearly 3,500 square miles with a population of over 7,500,000 persons, organized into some 24 constituent units which include nearly 100 different cities.

The pattern of regional administration of water resources in Southern California is based upon a highly pluralistic structure dominated by a variety of local government agencies devoted primarily to single-purpose functions. The high priority of consumptive demands, the small non-navigable character of the streams and the large capacity for underground storage of water has led to a complete subordination of non-consumptive or in-the-channel uses to the consumptive or on-the-land uses of water. The complete dominance of consumptive uses in the Southern California water economy has eliminated many of the most perplexing problems that plague those concerned with the multiple-purpose management of water resources in the large inter-state river systems.

As a result of the absolute priority given to the use of water for consumptive purposes, it becomes relatively easy for independent local government agencies specialized to limited functions to coordinate their activities through a variety of informal arrangements and through contractual agreements. When water is sufficiently valuable, for example, to justify conservation measures by flood control districts and sanitation districts, the water supply agencies can develop appropriate contractual arrangements to take advantage of any conservation measures which can be undertaken. This type of coordination requires a very rich level of communication among the various interested agencies involved and a variety of informal organizations similar to trade associations have been formed to serve this function.

The combined investment in water production and transmission facilities in Southern California is of an order comparable to the investments of the Tennessee Valley Authority. These agencies operate two great aqueduct systems as well as providing for the intensive development and management of local water supplies on the Southern California coastal plain. Currently, they are participating in the final stages of negotiation and planning for a new aqueduct system which will take water from Northern California to supply the growing demands of Southern California.

The commitment to local autonomy and to local self-government implicit in the organization of municipal corporations is jealously maintained by the local government agencies responsible for water resource administration in Southern California. Efforts are made to avoid conflict among the regional agencies and to take a united stand in relation to competitive demands outside the region. The responsible officials in these agencies realize that control over water resources will continue to shape the future of the region and that state or federal control of water resource development in relation to other sets of values may alter the future role of the Southern California metropolitan region in California and the American West. Non-consumptive, in-the-channel uses of water in so-called water surplus areas are often viewed as non-beneficial uses by those who are dedicated to an absolute priority for consumptive, on-the-land uses of water. Water flowing to the ocean is viewed as a waste of water. As a result, conflict over water policy is one of the most pervasive issues in California state politics today.

Patterns of organization for large-scale regional development

Until relatively recent decades, the patterns of water resource management in the United States have been dominated by the individual proprietor, the nonprofit mutual water companies, the limited-profit public utility companies, and especially the various public districts or local government agencies organized to provide special water services for a local community of users.

The function of the state governments in water resource management has been defined largely in terms of the formulation of a body of water law for the adjudication of claims made by competing water uses and for the organization of various legal entities which can undertake local development programs. In addition, state governments have assumed a significant role in the regulation of such non-consumptive, in-the-channel uses of waterways as sport and commercial fishing and pollution abatement. Some states also have developed recreational facilities related to waterways as a part of their state park program. However, the states have done surprisingly little in the construction of water works and the operation of river management programs. This lack of an operational role by the state governments is unquestionably influenced by the fact that state boundaries were formulated without regard to the boundaries of river systems or sub-systems. In fact, a major river was often used as a natural boundary to divide one state from another. The stream consequently could not be placed under the effective control of either state. The only major exception to this situation is the state of California whose boundaries include all of the Sacramento-San Joaquin river system and a number of coastal streams. It is this system which is currently being developed as a part of the California water program.

Efforts by the states to form interstate agreements or compacts for river basin development have also proved unsuccessful. The Colorado River Compact was once hailed as a regional solution to a regional property but the subsequent experience of the states in the Colorado basin has been one of persistent and endless litigation and controversy devoid of any effective decisions or commitments for regional development. The United States still has nothing comparable to the River Murray, Agreement and the River Murray Commission in Australia to serve as the basis for joint state and federal operations in the management of an interstate river.

In the United States, the federal government represented an alternate level of organization to undertake the development of the water resources of the large interstate river basins. Constitutional responsibility for the development of waterways for purposes of navigation in relation to interstate and foreign commerce was recognized by the United States Supreme Court as vesting exclusively in the federal government. In addition, the federal government held proprietary interests in vast tracts of western land which assured federal control over any water works which might be constructed upon that land. Finally, the federal government possessed significant taxing and spending powers in relation to internal improvement projects.

However, the problem of developing the larger river basins was less one of finding competent constitutional powers, and more one of formulating institutional arrangements which would both recognize the diversity of interests and potentialities for development among the different river basins and the

interdependence of interests within particular river basins. The task of recognizing a diversity of interests and potentialities as between different river basins and the interdependence of interests within individual river basins has posed the central problem in the development of adequate institutional arrangement for water resources management and regional planning.

The Tennessee Valley Authority. The most heralded American experiment in regional development of water resources is the Tennessee Valley Authority. Authorization of the Tennessee Valley Authority came in the early months of the Franklin Roosevelt administration after a prolonged struggle which saw similar legislation before several sessions of Congress. The Tennessee Valley Authority Act stood for an integrated multiple purpose river development program by a federal public corporation with jurisdiction over the whole Tennessee valley, a region impinging upon seven different states. The Act included sweeping powers to provide flood control for the Tennessee basin, the improvement of navigation upon the river, and the development of hydroelectric power. In addition, the TVA was authorized to encourage the conservation and development of natural resources generally in the Tennessee basin and specific reference was made to reforestation, and the production and sale of cheap fertilizers and the proper use of marginal lands. The TVA, thus, was charged with the task of undertaking the comprehensive development of the Tennessee valley which has been a seriously depressed economic area. Since this responsibility was primarily vested in the one agency functioning at the regional level, the program was characterized as an integrated regional approach to comprehensive resource planning.

The organization of the TVA, as a federal public corporation, differed substantially from the usual patterns of organization in the established administrative departments and bureaus of the federal government. The government of the TVA was placed in the hands of a board of directors appointed by the President subject to Senatorial confirmation. The offices of the TVA were required to be located in the Tennessee valley so that the board members and administrative personnel could have intimate and direct contact with regional problems. The board had more discretion about the management of TVA affairs than most federal administrative establishments. It reported directly to the President and Congress. The board of directors had substantial autonomy in operating policies, over personnel problems and enjoyed considerable discretion concerning fiscal matters subject to lump-sum appropriations from the Congress.

In its operations, the TVA defined its program primarily in terms of flood control, navigation and power development. Navigation and flood control were given first priority, in the design of the system and power production was subordinated to that priority. The construction of the major control works on the Tennessee river and its principal tributaries was largely completed in the first fifteen years of the TVA's operations. The Tennessee River floods were tamed. A navigable channel for 630 miles of the Tennessee River was maintained to Knoxville. The power plants on the Tennessee became a vital source of energy in World War II and have subsequently contributed to the industrialization and prosperity of the Tennessee valley.

As a water resource management agency, the TVA is primarily concerned with in-the-channel management and control of the river system for purposes

of flood control, navigation and power production. It excluded power distribution from its operating responsibilities while encouraging the organization of local electric distribution systems by municipal and cooperative organizations in local community areas. The TVA has also divested itself of responsibility for providing shipping terminal facilities and is inclined to look upon the construction of levees and dikes not directly related to the management of the river control system as a local matter which should be provided by the local community.

In regard to other values or uses to be derived from the management of a water resource system the TVA has indicated sensitivity to the problems while avoiding any primary operating responsibility. The TVA, for example, operates no recreational areas or facilities of its own, but has encouraged state and local government agencies to take advantage of the recreational opportunities created by the TVA river control projects. It has maintained a small recreational staff in its division of reservoir properties to advise and consult with state and local officials and with representatives of private groups regarding the development of facilities and the management of programs in the field of recreation. A similar approach has been used in the field of pollution abatement.

The TVA operations in the areas of resource management which relate to the general social and economic development of the Tennessee valley have also been conducted with primary reliance upon previously existing agencies and institutional arrangements. The TVA has defined its role as all agency to provide technical assistance, financial support and demonstration projects rather than to assume operating responsibility in those fields. Its operation methods have emphasized cooperative arrangements, advice and consultation. In these areas the TVA is obviously dependent upon the decisions of others regarding the course of action taken in these cooperative programs concerned with resource management and economic development.

Thus, the TVA has tended to impose functional boundaries upon itself which limit its commitments in relation to interests that diverge from what it has defined as its primary operating responsibility over the main-stream river control system. It is much less than a fully integrated water resource management agency for the Tennessee river basin. It has avoided or divested itself of responsibility for values that relate primarily to local communities of interest. It has greatly limited its operating responsibility for resource management problems that are not directly involved in flood control, navigation and power production. What has been integrated are the dominant values relating to flood control and power production. Other values are realized only as other cooperating agencies are willing to coordinate their programs with the TVA.

These commitments are also reflected in choices made regarding fiscal policy. TVA's commitment to low-cost public power has led to rigid restrictions limiting the use of power funds to finance power developments only. This fiscal inflexibility has led a sympathetic commentator to observe that, over time, the nonpower programs have suffered "both a relative and an absolute decline". These nonpower resource activities, "almost wholly dependent upon congressional grants, have seen their appropriations dwindle year

after year until they are in some instances little more than shadow operations".¹

There is evidence that TVA's initial period of enthusiastic growth and development has been replaced by a more routine administration on an in-the-channel river control program operated as an adjunct of an electric power production and wholesale business. Since the early 1950's, the TVA has expanded its electric steam plant generating facilities until its hydro-electric facilities are being dwarfed by comparison. When hard decisions require choice about the employment of limited funds for resource management activities, those decisions are apt to reflect values which conform to the central commitment of an agency while sacrificing other values with a lower order of priority. In the long-term process, an integrated comprehensive approach to the regional development of water resources is apt to become something less than fully "integrated" and wholly "comprehensive".

The Organization of Columbia Basin Development. In contrast to the valley authority approach to water management problems, the Columbia basin had often been referred to as a "piece-meal" approach involving competing agencies with overlapping jurisdictions. The traditional water resource management agencies of the federal government with their special-purpose orientation are all involved in the administration of water resource programs in the Columbia basin. The Corps of Engineers with its commitment to functions of navigation and flood control is probably the most significant single operating agency on the Columbia River. The U. S. Bureau of Reclamation has developed some of its largest reclamation projects and river control structures in the Columbia basin. The U.S. Fish and Wildlife Service has substantial program obligations in the Columbia with its vital runs of salmon and steelhead as well as other sport and commercial fisheries. The Federal Power Commission has jurisdiction in the Columbia basin over some of the best hydro-electric power sites to be found anywhere in the United States. Only the Bonneville Power Administration among the federal agencies has a regional jurisdiction exclusive to the Pacific Northwest. Bonneville Power Administration is responsible for operating an integrated power transmission grid which distributes hydro-electric power from the various power plants at dam sites to the principal load centers in the region.

In addition to these functions performed by federal agencies, the states have had important operating responsibilities in controlling stream pollution, in regulating both commercial and sport fishing and in operating fish hatcheries in cooperation with federal fisheries programs, in developing and operating recreational facilities, in determining water rights among different types of consumptive water users, and more recently, in comprehensive planning for the multi-purpose development of local water resources. The states of Washington and Oregon, in particular, conduct major programs in their fields of responsibility for water resource administration. Local government agencies or districts also perform essential responsibilities in the operation of local distribution systems for electrical power supplies, irrigation, municipal, water supplies and for the maintenance of local levees and channel

¹Roscoe C. Martin, "The Tennessee Valley Authority: A Study of Federal Control." Law and Contemporary Problems XXII (1957), p 574.

improvements for flood control. Several private electric utilities maintain extensive service areas in the Columbia basin. Both privately-owned public utilities and the publicly-owned utility districts and municipal power systems operate large water control projects which produce a portion of the power load distributed to their local customers.

The evolution of regional planning and water resource management in the Pacific Northwest has been marked by persistent conflict as well as the growth of research and planning activities and of negotiating and consultative arrangements for dealing with issues which arise over conflicting values. Controversy or conflict may mean that important values are at stake and that these issues need serious airing before decisions are reached. Under what circumstances, for example, should a run of salmon be destroyed in order to increase the production of hydro-electric power? Should a municipal power system be required to provide substitute facilities in spawning grounds and rearing ponds to preserve the fisheries and in recreational facilities to enhance the enjoyment of water sports? How such questions are resolved is important in determining the conditions of life in any region.

The growth of regional interests in the Pacific Northwest has been associated with the development of institutional arrangements for the preparation of research studies and planning reports and for fuller communication, consultation, deliberation and negotiation on a regional or inter-agency basis. The first effort to give a general regional focus to considerations of regional resource planning was the organization of the Pacific Northwest Regional Planning Commission as a part of the effort of the National Resources Committee (later the National Resources Planning Board) to deal broadly with questions of social and economic development. Its report on Regional Planning, Part I: Pacific Northwest was an important milestone in formulating basic perspectives regarding problems of regional development.² The development of the water resources of the Columbia River formed the central part of that report.

The Regional Planning Commission's concern for the development of a public power policy which would encourage the general economic growth and development of the Pacific Northwest region led to the creation of the Bonneville Power Administration and its low-cost public power policies. The Regional Planning Commission was also instrumental in organizing the Northwest Regional Council of Education, Planning and Public Administration to provide a common agency for the organization of research activities and a common forum for the exchange of ideas among professional personnel of the region's academic institutions, planning agencies and public administrative agencies concerned with resource problems and economic development.

Changing conditions of war and peace and of national politics and public policy led to the demise of the Regional Commission, of the Northwest Regional Council and of other particular institutional arrangements, but these have been replaced by rich and varied institutional arrangements for planning, consultation and negotiation on an inter-agency, regional basis. Many of the primary resource agencies have regional advisory committees which have

²National Resources Committee, *Regional Planning, Part I: Pacific Northwest* (Washington: US Government Printing Office, 1936), 192 pp.

become a part of their planning and decision-making process. Inter-agency intra-departmental and inter-agency interdepartmental field committees have seen extensive use. The departments of Interior, Agriculture and Commerce have maintained regional representative to facilitate coordination among and between departmental agencies. Finally, many of these arrangements have been coordinated since 1946 with the organization of the Columbia Basin Inter-Agency Committee. The CBIAC, as it is generally known, serves in part as a forum for tile exchange of ideas and a conference for the negotiation of inter-agency interests. It also provides an important means for professional administrative personnel to coordinate operations through the work of the vital work of the vital water and power committees. As these arrangements have led to decisions and to programs of action, basic operating commitments have been formed which require the various operating agencies to take each other into account in the conduct of a coordinated resource development program. Today, the Corps of Engineers is dependent upon the Bureau of Reclamation, which operates the larger up-stream reservoirs, to provide its principal regulation for flood control. The Bonneville Power Administration depends upon the coordinated operations of the Bureau of Reclamation, the Corps of Engineers and a variety of publicly and privately owned electric power systems to produce the electric power transmitted over its regional grid. All of these electric power facilities are coordinated in a regional power pool. The financial feasibility of most of the region's reclamation projects are in turn dependent upon the pricing policies of Bonneville Power Administration. Some of the most imaginative work in engineering of fish facilities is being done by a private electric utility and by a municipal power system.

These inter-agency operations have made regional, inter-agency institutional arrangements an imperative necessity in the Pacific Northwest. Independence of action without regard to other coordinated values has become intolerable. Similarly, changing requirements and conditions do not permit a simple ordering of values in which one set of values can be arbitrarily rejected or subordinated to another set of values. A system for water resource management and regional planning must be able to tolerate conflict until the issues can be clarified, adequate intelligence organized and decisions negotiated for arriving at effective resolution of any controversy. If the diverse interests can be negotiated and decisions reached, programs can then be coordinated, each with the other, through a variety of operational agreements and contractual arrangements.

The differences between the patterns of water resource management and regional planning in the Tennessee Valley, and in the Columbia basin is largely one of degree rather than one of kind. The TVA has a relatively more dominant position in the control of the Tennessee river than any one of the water management agencies exercises in the Pacific Northwest. At the same time, it is important to recognize that problems relating to fisheries and irrigation are of greater significance in the Columbia's economy than in the Tennessee valley; and that these values pose some of the serious elements of conflict and contradiction over water resource planning in the Columbia basin. In both basins there is a fundamental inter-dependency in interests and in administrative operations. This inter-dependency means that coordinated administration for comprehensive development must depend upon consent and cooperation

Where conflict does arise, adequate arrangements must exist for the organization of intelligence, the clarification and negotiation of interests, and the formulation of effective decisions. If such conflicts cannot be resolved at the regional level, they ultimately become the object of national political decision-making in either case.

In conclusion

American institutions in water resource management and regional planning have become exceptionally complex and varied. They reflect diverse communities of interest in relation to a wide variety of inter-related uses or values. The existing structure of American institutions has gradually evolved over the course of a century's experience. No single model of organization has seemed to meet all of the requirements for water resource management and regional planning.

The foundations of the structure are provided by the individual proprietor, the non-profit cooperative association, the limited-profit utility companies and the local government agency or special public district. These are the agencies which have been devoted primarily to on-the-land developments related to water resources. Their orientation is to the individual enterprise or to the local community and the way that particular water use patterns will affect the future of that enterprise or local community. These agencies have continued to be the primary instruments in the consumption and distribution of goods to be derived from water in relation to land developments.

Only in more recent decades has the problem of river management of large inter-state river systems come to the fore. The purpose of control is to secure optimum yields of various benefits or goods which can be derived from a river system. Both in-the-channel and on-the-land uses require consideration in a river management program. Different patterns of uses bear one upon the other and must be regulated to take each into account. The use of a stream to discharge waste products, for example, may have detrimental consequences for its use for recreation and fish life. Each project must also be operated to take account of all other projects if a river is to be controlled in an optimum way. No project stands alone nor does any function or use stand alone.

Contemporary experience is also indicating that river basins do not stand alone, either. Long-distant electric transmission lines are creating the conditions for inter-regional grids which can take advantage of complementary power demands outside a particular river basin area. The California water plan anticipates extensive inter-basin transfers of water supplies. One of the critical factors in the Colorado basin is the large proportion of water being exported from the basin. The Canadian province of British Columbia has plans for the integration of power projects on the Peace River with those on the Columbia River.

American experience would seem to indicate that no single organization can take all of the different communities of interest and patterns of use into account. Any particular method for constituting the hierarchy of an integrated organizational structure can account for only a limited range of values. Problems of water resource administration and regional planning will always

involve substantial questions of inter-agency and inter-governmental relationships. The perplexing question is how to constitute the patterns of organization among diverse agencies and jurisdictions which will be sensitive to changing values while at the same time, permitting effective decisions for comprehensive resource development? It appears unlikely that any single approach to this problem will provide the exclusive answer.