THE INTEGRATION OF WATER QUANTITY

AND

WATER QUALITY MANAGEMENT

Leonard B. Dworsky and David J. Allee

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Draft Notes on Policies
to
Encourage Discussion and Debate

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AGRICULTURAL ECONOMICS
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These notes are provided for your information and to stimulate discussion and debate. They concern matters which a Library of Congress - Congressional Research Service Report states were not included in the President's Water Policy Initiatives (WPI). ("It is worth noting at the outset that the water quality-water quantity interface was not considered in the WPI..."; page 1, CRS Report No. 78-138 ENR; An Analysis of the President's Water Policy Initiatives.)

The Workshop Report: Integrating Water Quality and Water and Land Resources Planning [1] developed with the support of the United States Water Resources Council and with contributions from the Council and from several of its members directly (Departments of Interior, Agriculture, Defense (Corps of Engineers) and the Environmental Protection Agency) was published as a joint report by the Universities Council on Water Resources and the Engineering Foundation.

The development of these policy notes lean heavily - but not exclusively - on the Workshop Report. The notes need review. There are additional notes that need to be added to this set. It is anticipated that a policy report will be prepared in the relatively near future dealing with the matters considered in these notes, and under the auspices of an appropriate committee of concerned persons.

Your comments are welcome and should be sent to me at the present time.

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[1] Available from National Technical Information Service, NTIS No. P.B. 263-476.

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The Integration of Water Quantity and Water Quality Management

Introduction[1/]

1. The modern objective of planning and managing the development of water resources is to have sufficient water in the right place, at the right time, and of the right quality to serve human requirements and to protect natural resources and ecological communities other than those dangerous to man. In concept, there should be no differentiation between management for water quality or water quantity in achieving this objective. In practice, however, such integration is rarely accomplished and has become a major problem confronting resource managers and governments. Recent institutional and legislative changes in the United States address the problem by requiring coordination between water quality and water resource planning activities. The purpose of this paper is to examine (1) the nature of the problem; (2) why the problem has occurred; (3) the importance of the problem; (4) a number of major issues associated with it; and (5) some opportunities for its solution.

1/ This introduction is from the paper Integration of Water Quantity and Water Quality Management prepared by Professor Leonard B. Dworsky, Cornell University as one of the papers submitted by the United States for the United Nations Water Conference, 14-25 March, 1977 and subsequently published with other United States contributed papers by the U.S. Water Resources Council, 1977.

The Nature of the Problem

2. Quality is derived from the Latin word "qualitas" and refers to a characteristic or attribute of a substance, and to the degree or grade of excellence. Some waters contain disease-causing bacteria capable of killing people, or contain a high salt content capable of killing crops and other plant life. These conditions represent the lowest levels of water quality for man's use. Natural salt in oceans and estuaries provide the proper quality needed by marine life. Low water quality for some forms of wildlife result from the presence of very small amounts of chemicals, like DDT and PCB's (polychlorinated biphenols) in water. Thus, it is not satisfactory to simply have enough water. World health standards, complex agricultural and industrial processes, and a growing concern for natural systems require that water be of a suitable quality for the various uses for which it is needed.

3. Water resources planning and development has, to date, been concerned with programs having important economic aspects (e.g. navigation, hydroelectric power, agricultural and industrial water supplies); with public health and safety and human amenities (e.g. the quantity of drinking and urban water supplies, the availability of bathing and recreational waters); with the protection and enhancement of natural ecological communities (e.g. fish, other aquatic life and wildlife); and with the protection of land, property and public safety against natural hazards (e.g. floods, hurricanes and coastal zone processes). The management of these water quantity programs now needs to be integrated with water quality considerations.

4. The problem of integrating water quality and water quantity management has far ranging and complex technical, institutional and behavioral elements. Technical elements of principal concern in most water quality-water resources relationships include (1) streamflow regulation; (2) waste treatment technology, including municipal, industrial (including in-plant changes), advanced waste treatment and other alternative technologies; and (3) the optimum combination of (1) and (2) to meet specified planning objectives. In addition, other concerns under specific conditions will include matters such as reservoir draw-off levels for temperature control; reducing high streamflows (flood flows) where they may have a significant detrimental effect on aquatic life or their habitat; salinity control in estuaries and in waters used for agricultural purposes; protection of groundwater resources; and agricultural drainage and sediment management. Acid flows from mines and storm water and combined sewer overflows enter strongly into the water quality-water resources relationship. Increasingly, the concept of overall urban water resources management, including water recycling for groundwater management, salt water intrusion control, or industrial, agricultural or domestic use is becoming more important as resource development and urbanization processes become more intense and complex.

5. Institutional opportunities and constraints are of great significance in determining whether these technical elements will be effectively related in a water resources plan.

6. The United States system of government is characterized as one of shared responsibilities among the Federal, State and local governments. Traditionally, local communities (cities, counties, special districts), have had the responsibility to build waste treatment works. Yet, local government objectives, plans and schedules for water quality management, usually under State policies, have not and are not now effectively related to water quantity management.

7. Similarly, the Federal Government has the major responsibility for managing the flow of water in the Nation's rivers, lakes, and reservoirs. Yet, it was only as a result of legislation adopted in 1961 that the Federal water resources construction agencies (e.g. Corps of Engineers and the Bureau of Reclamation) were provided general authorization to use low flow management technology to assist in water quality control in their water resources plans.

8. Perhaps the most commonly cited institutional constraint on effective water quality management has been the diffusion of responsibility among some 35,000 water and wastewater management entities at the local government level. There is great concern among leading city officials today on the subject of consolidation. Questions are being raised, however, whether "bigger" is "better." Rethinking the role of governments of different size and jurisdiction will be encouraged by relating water quality to water quantity management.

9. State governments have, in a few instances, provided new alternatives to plan and manage water quality. The States of New York, Ohio, Maryland, and California have all enacted legislation to supplement local action when needed (e.g. to construct, operate, maintain, lease, purchase of establish regional quality systems). Arrangements such as these provide opportunities to overcome the twin obstacles of diffused responsibility and rigidity of over-centralization for water quality management, and can lead to improved coordination of water quantity and water quality efforts if these new alternatives are used effectively.

10. Cost-sharing arrangements, too, have been an obstacle against establishing a coordinated water quality-water quantity program. Cost sharing occurs at local government levels; among local and State governments; and under different local-State arrangements for different States within the same basin management region. Federal cost sharing for construction of waste treatment plants and large sewers (but not other means of pollution avoidance) and for low flow regulation (but not other means to improve the instream environment) bear little relationship to common sets of objectives, planning, time schedules or operations. It is evident that those few favored means of quality management which are federally cost shared can be expected, realistically, to be given greater attention in a plan that represents local decisions.

11. Behavioral patterns of water quality and water quantity administrators and groups organized in support of specific programs provide additional substantive obstacles to the development of cooperative water quality-quantity programs. Organizational history, differing basic interests and premises, educational and

technical characteristics of personnel, and the uncertainties associated with change and the threats to security of existing managers and their staffs all tend to maintain the status quo.

Why the Problem Has Occurred

12. Planning and subsequent development of water resources to satisfy human needs dates back to antiquity. The manipulation of water for agriculture, drinking and other domestic purposes, and to serve navigation can be traced from Asia through the civilizations of the Middle East, and on to Greece and Rome. In the Americas, great civilizations flourished in Mexico and Central and South America, and the management of water played a significant role in their greatness.

13. One hundred years ago in Europe, Pasteur and Koch opened the doors of the great age of bacteriology. In doing so, they also ushered in a new concept of quality. The ability to perceive quality in visible objects - cloth, olives, horses - is, too, an ancient ability. Following Pasteur, quality would be perceived in new measures - bacteria and virus, biochemical reactions, invisible constituents harmful to man, plants and animals.

14. The management of water quality in the United States has followed a pattern not unlike many places. The early years of the nineteenth century were concerned with navigation and inland canals to expedite communications and trade. Later, water supplies began to develop and expand in order to deliver adequate supplies to urban dwellers. Floods were of concern, but little could be done to bring them under control in any significant way. In the American arid west, water diversions were initiated about mid-century following the traditional style of early Spanish settlements.

15. During the twentieth century, and primarily during the last 40 years, the major Federal investments have been devoted to flood control, western irrigated agriculture, hydroelectric power generation and inland water navigation. These activities were carried out primarily by agencies of the Federal Government concerned with, and using the technologies associated with, the management of quantities of water. In recent years, these activities often have yielded, in some measure, to new societal goals, with stress on the maintenance and safeguarding of environmental values. Programs concerned with wild and scenic rivers, and land and water conservancy objectives have resulted from this changing value system. In part, environmental objectives have been achieved by placing restraints on these programs through limiting dam building and other structural projects.

16. The management of water quality was initiated in 1887 when the Massachusetts State Board of Health began the first assessment of water quality in the water supplies of Massachusetts. Since that time, public health agencies have maintained a deep concern for the quality of water as a protection against the spread of typhoid fever, cholera and other diseases transmitted through water.

17. The sewage pollution of drinking water supplies resulted in the development by the late nineteenth century of modern water purification technology as part of the armament of public health controls and, following on this success, greater attention began to be paid to the management of sewage and industrial wastes and to strive for reduction of their detrimental effects on water resources.

18. These twin concerns, pure drinking water and water pollution control, together with the effects of water pollution on fish, aquatic life, and recreation provided the primary basis for water quality management until recent years. During the 1960's a growing concern for the environment, and a growing awareness of the unwanted consequences of technological developments such as excessive nutrients, chemicals, and other toxic materials in water have raised new issues to be considered under water quality management. Nonetheless, the major concern continues to be the effects of pollution on public health, including a transition from infectious diseases to a longer term interest in those pollutants that may be carcinogenic.

19. These descriptions largely apply to the United States and to countries that are at about the same stage of economic development. For most of the world, however, safe drinking water supplies and the initial management of sewage pollution of rivers and lakes are continuing tasks of major importance. To these must be added problems of schistosomiasis and other parasite-caused disease involving water. Since World War II, major programs have been mounted against these problems by U.N. special agencies such as the World Health Organization, its Western arm, the Pan-American Health Organization, and by individual countries. That these problems continue to be of high priority is indicated by the resolutions adopted by the U.N. Conferences on the Environment (Stockholm, 1972) and on Human Settlements (Vancouver, 1976).

20. In most countries today, water quality programs continue to be the concern of public health agencies. In the United States the past six years has seen a transference of some of these functions to new environmental agencies; for example, the Environmental Protection Agency in the Federal Government and comparable agencies in State governments. Occasionally, in State government, these agencies have some responsibility for water quantity as well as water quality planning.

21. Notwithstanding the separate nature of the water quantity-water quality programs, there have been attempts during recent years, in special circumstances, to integrate these responsibilities. Thus, we see today the U.S. Bureau of Reclamation increasingly interested in the saline content of irrigation water; the U.S. Department of Agriculture concerned about the transport of toxic substances or nutrients by means of sediment; and the U.S. Army Corps of Engineers devoting much attention to large scale regional water quality planning.

Importance of the Problem

22. The need to consider water quality as a part of a broad water resources development plan was specifically included in a special message of President

Theodore Roosevelt in January 1909 to the Congress of the United States. In it he said, "Accordingly, I urge that the broad plan for the development of our waterways recommended by the Inland Waterways Commission be put into effect without delay. It provides for a comprehensive system of waterway improvements extending, to all the uses of the waters and the benefits to be derived from their control, including navigation, the development of power, the extension of irrigation, the drainage of swamp and overflow lands, the prevention of soil wash, and the purification of streams for water supply."

23. All development purposes were not of equal importance at that time. The urgency of action was dictated by economic and political forces as well as the state of techonological information and the capacity of the Nation to apply it to any particular problem. Thus, navigation of inland waters, the development of falling water to produce electrical energy and the irrigation of arid western lands were given high priority as public needs along with the management of forest lands.

24. The purification of streams was of great concern at the time because of the threat of water-borne epidemic disease, but an alternative and less complicated technology - the production of safe drinking water supplies by the construction of water filtration facilities - was available. Confronted by the need to use limited public funds for the construction of water facilities to serve the growing urban centers, most urban engineers in the early years of the twentieth century recommended that the public funds first be allocated to drinking water, water purification works and sewer systems to carry away human wastes from storm drainage from homes rather than construct works to purify streams.

25. By the 1930's it was clear that the damages created by polluted rivers and lakes were widespread affecting not only public health, but the natural fish, animal and plant life of waters and making the water resources obnoxious because of taste, smell and appearance. From 1950 to 1970, the importance of water quality grew immensely as urbanization, industrialization, and large-scale agriculture increased not only in size but in complexity as a result of great technological advances.

26. Confronted by these conditions, the fears induced by the world-wide spread of DDT, and the threat of other chemicals and environmental hazards, the U.S. Congress--beginning in 1965 and continuing until the present--has placed water quality management among the highest priorities of the United States Government.

27. The rising concern about water quality during the past twenty-five years has been matched by a series of actions to strengthen the idea expressed by President Roosevelt in 1909 about the coordinated development of waterways. In 1961 President Kennedy proposed to accomplish basin-wide management plans for all waters of the United States as had been recommended by the Senate Select Committee on Water Resources. In 1965, a national Water Resources Council was established to provide overall coordination of national regional water developments. In 1972, Congress established a goal of nationwide coverage with basin development plans. Priority was to be given to basins with water pollution problems.

28. While only modest advances have been made, it appears that the United States is on the threshold of developing more integration of water quality and water quantity activities. For example, specific attention was given to these questions by the National Water Commission, established by Congress in September 1968 "to provide for a comprehensive review of national water resource problems and programs...".

29. The report of the National Water Commission was issued in June 1973. On the subject of "Integrating Water Quality Planning with Water Resources (Quantity) Planning," the report notes that considerable progress has been made in getting the various interested water agencies to work together in joint planning programs; and that those representing fish and game, forestry, agriculture, navigation, power development, and the like are beginning to find ways to accommodate their separate interests in the formulation of multi-purpose water development plans. It further notes "Until recently water quality planning has been conspicuously missing from this family of water concerns."

30. The report then describes the procedures established by the Environmental Protection Agency for water quality planning, which included the preparation of basin plans for water quality by each of the States as a condition for the allocation of sewage treatment construction grants to cities. Under this arrangement there was no requirement for a direct tie between these plans and water resource planning conducted by other State agencies or by Federal-State river basin planning commissions. The report concludes this section by noting "An unnatural separation of water quality planning from water resource (quantity) planning, generally, was promoted by this arrangement."

31. The report then refers to the October 1972 amendments to the Federal Water Pollution Control Act which requires (1) areawide waste treatment management planning processes; (2) a strengthened authorization to prepare comprehensive regional or river basin water resource plans for all basins of the United States under the auspices of the Federal Water Resources Council; and (3) States to maintain and incorporate area waste treatment management plans with applicable basin (water resource-quantity) plans prepared by the Water Resources Council.

32. The 1972 Act also established a National Water Quality Commission to review progress under the Act and recommend to Congress any mid-course corrections that should be made. The Commission has reported but the Congress has not yet considered its recommendations.

33. Whether these provisions will in fact bring these two planning processes together is to be tested in the future. But there are strong reasons for expecting that substantial success will be achieved. The United States is committed to the principle of integrated multi-purpose development of its waterway systems. It is becoming increasingly necessary to use the Nation's water resources in much more efficient ways. There is also need to allocate public funds more efficiently. New Congressional budget review procedures will make a strong contribution to this end.

34. Finally, the water pollution control program of the United States is spending at a rate of six billion dollars each year. Water quality is in the forefront of resource management programs in the United States and it is unlikely that it will be carried out without reference to closely related matters, such as other water quantity programs.

Major Issues

35. In January 1976 a working conference of seventy-five national leaders in resource management was convened to see what could be done to identify the main issues that tend to keep water quality and water resources planning management separate; to overcome through practical means the obstacles to their coordination of integration; and to draft recommendations to help bring about a more effective water resources program in the United States.

36. The conference participants were from Federal, State and local governments, universities and private organizations. The viewpoints of engineering, economics, political science, law, public administration, biology, environment and natural resources and others were represented. While the conference was financially sponsored by Federal Government agencies, the actual responsibility for its formulation, execution and report preparation was assigned to the Universities Council on Water Resources, (an 80-member university grouping) as an independent entity.

37. The conference procedure provided for the development of four major background papers: (1) the evolution of water quality and water resources policy; (2) current policies and practices governing water quality and water resources planning; (3) an examination water quality and water resources planning elements that interact on each other; and (4) a discussion of the place of systems analysis in the integration of water quality and water resources planning and development. Working groups on (1) flow management; (2) land management; (3) technology application; (4) conservation; (5) evaluation; (6) program and investment strategies; (7) institutions; (8) research; (9) public policies; and (10) systems analysis were organized for carrying out the work of the January 11-16 Conference.

38. The following issues represent the main lines of the conference discussions and conclusions. The complete conference report is extensive and is available to those seeking more details. 2/

39. Flow management discussions concentrated on the following issues:

- Are changes needed in the policies of the Federal Environmental Protection Agency, operating under the Federal Water Pollution Control Act of 1972 (Public Law 92-500) to provide greater flexibility in allowing stream flow regulation to be used as an adjunct to waste management and treatment at the source of wastes? Since 1972, the present law and its administration have concentrated on waste treatment requiring by July 1, 1977, use of secondary treatment by publicly-owned treatment works and "best practicable control technology currently available" by other point sources. By July 1, 1983,

2/ "Workshop Report, Integrating Water Quality and Water and Land Resources Planning." The report is available through: U.S. Department of Commerce, National Technical Information Service, Springfield, Virginia 22161; No. B.P. 263-475 at $10.50 per copy.

point sources other than publicly-owned treatment works are required to use the "best available technology economically available" for the control of effluents. Mounting costs to achieve a very high degree of waste treatment in relation to benefits received are causing concern. The use of flow regulation where useful and justified, including consideration of environmental effects, is consequently undergoing re-evaluation.

- How can stream flows be maintained to provide for the protection and enhancement of fish, aquatic life and wildlife and recreation? State water laws, particularly in the arid west, do not provide assurance that stream flows will be maintained to provide for certain public purposes. This is a critical problem during crop growing seasons when irrigation is intense or during seasons when stream flows are lowest. If States, which currently have jurisdiction over this situation, do not make needed adjustments in State water laws, the Federal Government, through the Water Pollution Control Act of 1972 under which it assumed full authority for water quality of the Nation's waters, may have to consider new ways to alleviate this situation.

40. Land management discussions concentrated on the following issues:

- How can water, land, environment and energy policies, which are closely interrelated, be coordinated to strengthen national decision making processes and implementation programs? Existing advisory councils to the President (e.g. Council of Economic Advisors; Council on Environmental Quality, Water Resources Council; Federal Energy Council) collect and analyze information and make recommendations for components of national problems. The Congress, too, considers the individual council recommendations in separate committees (e.g. Joint Committee on the Economic Report). These problems, however, are strongly interrelated. Many believe that the time has come to learn how to develop integrated policies at the highest levels of government for those national programs having strong interrelationships.

- What role should river basin commissions have in coordinating or integrating water planning and land planning programs? The Water Resources Planning Act of 1965, which established the Federal Water Resources Council, also provided for the establishment of river basin commissions ultimately throughout the United States. These commissions are composed of Federal and State members having equal rights together with a commission chairman appointed by the President. While the direct control of land in much of the United States has been assigned to local governments, States and the Federal Government have a very large impact on the way land is used. In addition, States and the Federal Government own and manage directly large land-holdings. This is particularly true of the Federal Government in the Western United States. In addition, specific legislation such as the recent Coastal Zone Management Act and many Federal grant programs have a large impact on land planning. River basin commissions now exist in the six New England States (New England River Basin Commission), in the Great Lakes Basin, and in the Missouri, Ohio, Columbia and Arkansas River Basins. The importance

of considering the mutual impact of water on land, and land on water resources is recognized. The development of practical ways to bring this about, considering the institutional obstacles having strong historical routes, is a difficult problem. The river basin commissions may have an important role to play in this regard.

41. Technology application discussions concentrated on the following issues:

- How can information about water quality and water resources and their important interrelationships be transferred rapidly to those responsible for coordinated or integrated water planning and development processes? Information transfer processes have improved immensely in the past five years. The problem has been, for example, that waste treatment designers receive more and better details about design factors. Specific components of the planning and development processes are gaining in-depth information about each specialty. What is needed are programs that can bring to planning and development personnel new information about the advantages to be gained by integrative actions affecting water quality and water resources. Such programs can be initiated by agencies responsible for various parts of the coordinated process prior to changes in water policies. It may be necessary, however, to look to a central coordination agency such as the Water Resources Council to sponsor appropriate workshops and information transfer programs in order to support and stimulate the professional capabilities. Programs of this kind can assist in changing the planning climate as a means of adapting agency and personnel attitudes toward a more useful integrative policy. Information transfer programs of this nature can be undertaken under existing authority and opportunities to carry out such programs should be explored.

- Is new technology needed to predict the impact of various water uses and industrial processes on water quality and water resources? Planning technology has been strengthened in recent years by the development of environmental impact statements required by the National Environmental Policy Act of 1969 (Public Law 91-190). These analyses have been helpful in predicting consequences that might otherwise have been unforeseen. The conferees suggested that there is a continued need to examine water uses and especially industrial process and products to forecast the impacts they may have on water quality and water resources management. An Office of Technology Assessment has been established within the Congress to provide advice on future technological developments in society. Water related agencies also have similar analytical units. These entities can be of assistance in examining current practices to see what improvements may be possible in analytical assessment techniques.

42. Conservation discussions concentrated on the following issues:

- What opportunities are there to affect greater conservation measures in managing water quality and water resources? The conservation of water resources has been given modest attention in irrigated agriculture through

metering; and in industrial water use through recycling processes. The conservation of water quantity has a direct response in managing water quality. Improving water quality provides increased opportunity for more alternatives for water quantity management. Several opportunities were pro-proposed at the conference to improve conservation measures. These include: Federal grants and technical assistance to local governments and water districts; a greater recognition of the more efficient use of water resources and management of water quality by integrating the use of surface and ground water resources and by providing improved coordination of surface and ground water laws; and conservation as an explicit factor to be considered in water quality and water resources planning. The growing scarcity of resources of good quality such as water is matched in other resource areas including iron ore, oil, natural gas, and uranium. Conservation of resources through both efficient utilization as well as reducing the demand for resources is thus a major issue. Attempts to resolve it can do much to bring about the integration of water quality, water resources planning and overall development processes--and should, therefore, be given early attention.

43. Evaluation discussions concentrated on the following issues:

- How can water quality benefits and costs be evaluated in order to have consistent evaluation methodologies among water quality and water quantity planning procedures? Water resource programs, especially those that have strong economic purposes such as navigation, hydroelectric power and urban and industrial water supplies are evaluated quite precisely in monetary terms. Measuring the economic value in monetary terms of improving water quality has been much more difficult or impossible. The task of developing common evaluation methods in monetary or non-monetary terms has proven to be very difficult. This difficulty has contributed to different approaches in planning and developing water quality and water resources.

- Confronted with an energy crisis, what consideration should be given to energy in planning and managing water quality and water resources programs? Water quality and water resources programs are being evaluated increasingly with respect to land and air resources in recognition of the impact of one resource on other resources. Energy is now explicitly recognized as the major driving force for achieving social well-being, and it is proposed that this understanding be included in the evaluation process when planning water quantity or quality programs.

- How can Federal grant programs for the construction of pollution control works be modified to consider alternatives to capital intensive waste treatment projects? Traditionally Federal grants have been applied to the construction of waste treatment works - a capital intensive process - to control water pollution. There are alternative procedures that could be used to control pollution but the laws and regulations governing such grants tend to restrict the use of alternatives such as moderating the use of water through metering and recycling, or controlling land use and development, and distribution of

population in critical areas. New planning programs under Section 208 of the Federal Water Pollution Control Act now authorize a study of new and innovative alternative means to control water pollution. This planning program offers new opportunities to close the gap between water quality and water resources programs and should be pursued strongly.

44. Program and investment strategies concentrated on the following issues:

- What role should the "Principles and Standards," developed by the Federal Water Resources Council to provide a common guide to the formulation and evaluation of water resources programs, have with respect to water quality programs? During the past twenty-five years, the Federal Government has developed and successively refined procedures to guide all participating water agencies in the evaluation and formulation of water resources programs. Until 1972, representatives of the water quality programs participated in the formulation of water resource programs through (1) studying, designing and recommending the need for the management of seasonal low flows; (2) establishing municipal and industrial waste treatment needs in very broad terms; (3) formulating criteria of water quality to satisfy various water uses, and (4) recommending water quality goals which development programs should seek to achieve. The quality aspect of the national program, however, was weak in terms of planning authority for the responsible Federal agency; cooperation among the States and the Federal Government; and in the degree of enforcement and financial aid provided for implementation of pollution control plans. Since 1972, the role of water quality planning in relation to water resources planning lagged greatly as a result partly of law and partly of institutional relationships. In 1976, Congress enacted legislation making the Federal agency responsible for water quality protection--the Environmental Protection Agency--a member of the Federal Water Resources Council. The Council's "Principles and Standards" were designed to apply to both economic and environmental objectives but their application has been largely limited to water quantity programs with some relevance to water quality programs. The importance of water quality and the inclusion of the agency responsible for water quality planning and development as a member of the Water Resources Council requires a new look at the "Principles and Standards." Therefore, the conference concluded that the applicability of the current "Principles and Standards" for water quality consistent with the objectives and programs established by the Congress in the 1972 Water Pollution Control Act needs to be reviewed. Further, the design of amended "Principles and Standards" will have to take into account the need and opportunity to integrate water quality and water resources planning and development efforts. In addition, revisions of "Principles and Standards" should consider their applicability to a wide range of resource management activities including land elements.

45. The work group on Institutions concentrated on the following issues:

- How can the role of the Water Resources Council be strengthened to improve water quality/water resources integrated planning. The Congress, through its

separate committees which have jurisdiction over various parts of water programs, has designed a variety of financial aid programs to assist States, regional, and local agencies implement national policies. These separate financial aid programs tend to maintain a degree of separateness among water programs. The Federal Water Resources Council and the river basin commissions under its jurisdiction might be able to play a much stronger role in bringing water programs together by having responsibility for the separate financial aid programs directed (1) to aid States develop water pollution control plans; and (2) to aid States, develop water resources plans. Additional program responsibility that could be provided the Council and basin commissions includes the management of water quality and water quantity planning funds for direct Federal programs.

- Should the emphasis be changed from strong reliance on Federal water agencies to programs with stronger State and local participation? Federal grant programs have been used to develop stronger State and local water related programs and staffs. These programs have had moderate success. What may be needed are specific program assignments to States under the coordination of a National Water Planning Strategy and under a program that evolves a national plan from the identification of local, State and regional needs. A new and more formal organizational plan to effect such an idea should be examined.

- Can integration of water quality and water quantity programs become effective without reorganization of affected agencies? The organization and administration of water resources programs in the United States is diffused among numerous agencies and between the Federal Government and the several States and localities. The Federal Water Resources Council has developed a "National Planning Strategy" which both reflects existing policy and leads the way toward more effective coordination of national, State and regional water programs, including a much closer linkage of water quality and water resources. The conference participants concluded that it will be necessary to review realistically the capacity of the nation to carry out the main provisions of the "National Planning Strategy" and particularly within the framework of the existing institutional arrangements.

Summary and Conclusions

46. A problem confronting the United States in the management of its water resources is the integration of water quality and water quantity programs. While these two aspects of water management have been pursued vigorously, the activities have been carried out along separate lines.

47. New and strong organizations, national laws and large amounts of money (from both the public and private sectors) have been committed by the United States to managing water quality during the past ten years and particularly during the last five. Water quantity management, too, has been given high priority for most of the Twentieth Century. During the past ten years, beginning with the Water Resources

Planning Act of 1965, much more attention has been given to improved integration of most aspects of water management, as well as closer coordination of the several organizations that have principal responsibilities in this field. There is a strong concensus today that water quality must be managed in closer relationship to water quantity programs.

48. Increased competition for public funds among many public programs (e.g. housing, urban transportation, welfare, health, defense, and resource management) has resulted in increased pressure to achieve higher efficiency and effectiveness not only in the area of water management, but in all programs. The United States is searching for ways to maintain the progress it has made in the past in water quality - water quantity management and to improve its processes.

49. The issues presented in this paper were defined and considered by an independent non-governmental conference of national leaders in water management representing universities, governments, and private agencies. An examination of these issues led to the following conclusions by the conference participants. These conclusions reflect the present stage of the discussions now underway in the United States, and to which the Federal Government is expected to give increasing and early attention.

Conclusions

50. There is general agreement on the benefits to be derived from integrating water quality and water quantity management. Water quality management is no longer concerned merely with the management of sewer effluents from cities and industries. Land effects from agriculture, forestry, mining practices, and urban communities are of increasing significance. Environmental concerns for ecological communities; estuary and coastal zone management; population distribution and the location of economic development; and the safeguarding of natural beauty and other amenities are matters that must be considered in water quality management. These are also essential elements in water quantity management, and it is no longer practical to maintain separate quality-quantity management programs as economic and natural resource programs become more intense, competitive and complex.

51. The integration of water quality and water quantity management programs will require a consideration of Federal executive agencies and Congressional committee reorganization. The degree of integration is uncertain and may extend from total blending of both programs organizationally and financially to a new approach which stresses greatly improved coordination.

52. States and local agencies can play a stronger and substantially different role than in the past in water quality and water quantity programs and in their integration. Under a National Water Planning strategy new opportunities for consolidating financial aid programs to States and for encouraging State reorganization of responsibilities to bring together water quality and water quantity management programs, are options that should be explored. In addition, national program designs need to consider the possibility of a greater and more definitive allocation of initial

field planning responsibilities to the States. Local agencies, now required to develop regional water quality plans including a concern for land planning, may be more effective if provided with stronger State policy guidance on integrating water quality and water quantity programs.

53. All planning options should be available for use in developing integrated water programs. Under certain conditions the management of seasonal low flows in waterways, an important planning option, can contribute to improved water quality programs and enhance overall water resource management. The use of flow management technology should be carefully controlled through procedures specified in the "Principles and Standards" used as a guide for all Federal water programs. Other planning options involving land management and population and economic development matters, as well as structural and non-structural means for solving water problems should be available for consideration.

54. The management of water resources should be improved to protect and enhance natural biological communities and to provide for uses not now protected such as recreational use. Changes in laws and regulations in some western States may be needed to accomplish this. Federal action may be needed to stimulate and encourage State efforts toward these ends.

55. The "Principles and Standards" promulgated by the Federal Water Resources Council should be reviewed to provide for adequate guidance of water quality programs as an integral part of water quantity program activities. The evolution of the "Principles and Standards" which guide water planning in the United States has resulted in environmental quality taking its place as an important concern in water planning programs. There is additional need, however, to review this important guiding document to strengthen the integration of water quality and water quantity programs.

56. Conservation of water by technological and social means should be encouraged to facilitate effective planning and management of water resources. High costs are involved in providing water of suitable quality. Conservation methods can assist importantly in reducing these costs and need to be identified, considered and utilized in a more effective way.

57. A national investment strategy for overall water planning and management should be evolved as a part of a National Water Planning Strategy. The expenditure of approximately six billion dollars annually for water quality together with other water related expenditures in excess of four billion dollars (during 1974) is a major commitment by both the public and private sectors of the Nation. A coordinated investment program can do much to avoid conflict among competing water related purposes. While the ability to completely satisfy a very wide range of competing uses in a large country has substantial limitations, an understanding of the rationale guiding an investment program can do much to avoid continuous and unnecessary conflict.

58. A systematic approach to water problems suggests a concurrent consideration of land, environmental and energy matters. The difficulty of making decisions involving several broad and important sectors of society is recognized. The current practice of making decisions along usual program lines needs examination to determine if such decision processes are adequate to the complex problems of today and the future. The impact of related matters, like land, environment and energy on water management and the development of unforeseen and unwanted consequences among these interdependent elements are among the important reasons why some decisions produced by current institutions are not solving problems adequately. A start should be made in learning how to make decisions involving a larger system of interrelated matters.

Policy Options

The several issues and conclusions described in the introductory paper reflect the discussion that took place during the Workshop on Integrating Water Quality and Water and Land Resources Planning. The policy options presented in the following notes for discussion and debate reflect four areas[3/] considered by the Workshop. These are:

1. Proposed Changes to Relate Flow Management to Other Land and Water Planning Objectives.

2. Technology Application in Relation to Integrated Land-Water Resources Planning.

3. Proposed Changes to Improve Comprehensive Land Management I - The United States.

4. Proposed Institutional Changes to Achieve Harmony in Land and Water Resources Policy in the United States.

A fifth note[4/] is a response to the Natural Resource/Environmental Management question posed by the President's Reorganization Project. Elements of this fifth note have been used in developing the options presented in the other four notes.

These matters are of considerable significance and should be considered in water policy discussions. Warren Viessman, Jr. points out, however, that "... the water quality - water quantity interface was not considered in the (President's) Water Polity Initiatives..."[5/] In addition, he says that, "The reality that water quantity - water quality issues must be dealt with jointly will have to take hold if any real progress in reaching conservation or water development objectives is to be expected."

In addition, the first conclusion drawn by the United States Water Resources Council in its Second National Water Assessment[6/] concerns the Integration of Water Quality and Quantity Management.

3/ The research assistance of Mr. Rick Schwartz of Cornell University, currently undertaking graduate studies at Stanford University, is gratefully acknowledged.

4/ The research assistance of graduate student Mr. Wayne Marks, Cornell University, School of Business and Public Administrationis gratefully acknowledged.

5/ An Analysis of the President's Water Policy Initiatives, Congressional Research Service, Library of Congress, June 26, 1978; pages 2; 33.

6/ The Nation's Water Resources: The Second National Water Assessment by the U.S. Water Resources Council: Summary Report, page 49.

"Perhaps the most significant deficiency in the management of water resources has been a failure to provide adequate consideration for water quality. As a result, it has been necessary to make major investments in an effort to bring water resources up to an acceptable level of quality. Aggressive programs directed at water quality management should have been initiated before major depletions occurred as a result of industrial and agricultural development and urbanization. Now, as an all-out attempt to alleviate water pollution problems proceeds, the need to integrate planning and management of water quality with other aspects of water resources development tends to be overlooked. There continues to be two separate directions badly in need of integration."

Comments on the following five notes are sought. Please address your comments to:

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It is anticipated that a revised set of notes, along with additional options, will be developed to stimulate further discussion.

PROPOSED CHANGES TO RELATE FLOW MANAGEMENT TO OTHER LAND AND WATER PLANNING OBJECTIVES

PROPOSED CHANGES TO RELATE FLOW MANAGEMENT TO OTHER LAND AND WATER PLANNING OBJECTIVES

ISSUE: How can existing institutional and/or programmatic arrangements be strengthened to provide greater consideration and use of flow management in water quality and water resources planning?

RECOMMENDATIONS:

I. The interpretation by the U.S. EPA of its regulations and authority mandates should be modified so that broader issues are addressed. In particular, steps should be taken by EPA so that water resource issues are considered along with water quality.

II. A redesigned Executive Office entity is needed so that agencies responsible for water quality, water resource, land use, and related issues engage in policy coordination and integrated planning tasks with high-level general oversight. A new Council of Natural Resources and Environmental Advisors, established in the Executive Office of the President, would be a desirable effort in this direction. Such a Council would encompass the functions of the Water Resources Council (grants program excluded) and the Council on Environmental Quality.

III. The position of an Executive-level Council (such as described above) can be enhanced with respect to integrated planning through the development of appropriate Principles and Standards. Flow regulation is a technical option that should be considered in comprehensive water resources management (in which water quality, water resources, and land planning are considered together). A socially-optimal water resource policy should not restrict the range of possible approaches that are considered.

IV. Adjustments to state laws and programs should be made as necessary to insure the protection of a wide range of in-stream uses, including ecological, recreational, and aesthetic values. Flow regulation should be considered, where useful in this regard, through a planning process that balances competing demands for power, irrigation, public water supplies, and other developmental uses.

BACKGROUND

Flow management is an area that cuts across water quality and water resource issues, demonstrating the need to integrate planning in these two areas. An effective argument in favor of integrated planning as an adjunct to flow management was made by the Work Group on Flow Management (Asilomar Conference Report). The Group cited a series of water quality objectives that can only be met through a planning process that formulates an optimal solution based on a wide range of techniques and opportunities. The EPA has adopted policies that are relatively straightforward to enforce and convenient to administer. But broad criteria of zonal optimality require that a narrow view be rejected when making wise decisions about the advisability of flow augmentation, preservation of instream flows, reservoirs, irrigation, minimum flows for instream uses, urban flood damage reduction, storm sewage, inland navigation, recreation, power generation, and other water uses. Three factors are significant for such decisions:

1. Water-related projects and land uses inevitably affect both water quality and water quantity, because of resource scarcity, conflicting demands, and competing values. The very nature of the hydrologic cycle, combined with the complex interrelationships between land use and water quality, suggests that a narrow approach cannot be optimal.

2. For each of the decisional area listed above, the existing institutional and/or programmatic arrangements have the effect of limiting broader discussions, ignoring inevitable conflicts, and failing to resolve value clashes. Under the status quo, local and regional needs and national goals are not being met.

3. Yet for each program area, there is a hypothetical means for resolving contested issues, through relatively minor alterations in programmatic mandate or interagency relationships.

4. We hold that the optimal solutions to water-related problems demand a combination of economic, social, and environmental goals. In particular, water quality programs cannot ignore water resource issues except by risking wasted resources and shortchanged environmental aims. Existing arrangements prevent the realization of optimal solutions by reducing the range of available options and by failing to provide mechanisms for broadly based planning.

Two basic changes in public policy are needed in order to recognize the interrelationship between water resource and water quality, as affected by flow management. First, institutional reform is necessary in order to focus diverging governmental efforts to control water quality and plans for water resource allocation. Second, programmatic reform is necessary in order to broaden the field of planning alternatives so that optimal solutions can be formulated.

Why propose institutional change? In the case of water resource planning, it is essential that there exists a dialogue between the right persons so that the important issues are raised prior to the final decision. Proper planning implies that a wide span of relevant interests are recognized and implementational difficulties are minimized. By its very nature, water resource planning distributes its effects widely. In addition to the primary impact of these decisions, such as improved water quality or wider recreational opportunity, there may be critical secondary issues such as changes in land use patterns or displacement of navigational users. These secondary issues are not adequately addressed except through a suitably expanded dialogue.

Integrated planning, therefore, offers the best opportunity for looking at all the relevant issues before making the decisions. Integrated planning through appropriate institutions makes conflict resolution possible.

I. Recommendation I suggests that EPA must change its implicit policy and its explicit regulations, so that broader planning problems are addressed. This might include restoration of a lead agency approach, by which EPA aggressively seeks to have resource conflicts identified and resolved.

EPA has preeminence in the field of water quality research and regulation. Its expertise and authority in this field is generally unchallenged, and its unified and concentrated approach toward water quality planning and research is well-recognized.

But strength in the water quality field does not adequately address the important issue. How shall America properly manage its water resources for the greatest benefit to the public? Water quality is only one side of the water resource issue.

At the time of EPA's birth into the family of federal agencies dealing with water quality planning, in 1970, a three-year hiatus in coordinated water resources planning began. EPA, upon its establishment, failed to assume the role that had been filled by the Department of Health, Education, and Welfare and by the Department of the Interior when water pollution control responsibilities were under their jurisdiction.

It is important to understand the historical context of water resources planning in order to understand the lost momentum that results from the uncoordinated planning. This history has been effectively expressed in a number of published articles (Dworsky, Fairchild). Efforts to coordinate water resources planning are demonstrated by attempts of the Public Health Service to consider flow regulation from the standpoint of both water resources use and quality, under the mandate of the Water Pollution Control Act of 1948.

The Act directed the Public Health Service to develop or adopt comprehensive programs for the solution of water pollution problems in cooperation with the states and interstate agencies, municipalities, and industries. These comprehensive programs were to be developed for surface waters and underground waters and were to give due consideration to all water uses -- public water supply, propogation of fish and aquatic life, recreational purposes, and agricultural, industrial, and other legitimate uses.

The Amendments of the Water Pollution Control Act in 1956, 1961, 1965, 1966, and 1972, reasserted and expanded the federal commitment to comprehensive water resources planning. The 1965 Water Resources Planning Act established one federal agency organized and authorized to achieve coordinated and integrated water planning. That one agency is the U.S. Water Resources Council as established in the 1965 Water Resources Planning Act (PL 89-80).

A major responsibility of the U.S. Water Resources Council and Title II River Basin Commissions, as outlined in the Planning Act, is coordination. The word coordination (or a derivative thereof) appears no fewer than nine times in the Act.

There are two specific activities of the Council outlined in the Act that are particularly relevent to comprehensive planning. They are:

> Sec. 102 "The Council shall...(b) maintain a continuing study...of the adequacy of administrative and statutory means for coordination of the water and related land resources policies and programs of the several Federal agencies; it shall appraise the adequacy of existing and proposed policies and programs...and it shall make recommendations to the President with respect to Federal policies and programs.
>
> Sec. 103 "The Council shall establish, after such consultation with other interested parties, both Federal and non-Federal, as the Council may find appropriate, and with the approval of the President, principles, standards, and procedures for Federal participants in the preparation of comprehensive regional or river basin plans and for the formulation and evaluation of Federal water and related land resources projects.

A three-decade history of experience evolved increasingly sophisticated planning of water resources, in which quality and supply issues were comprehensively addressed. Dozens of reports prepared by the Corps of Engineers, and a series of broadly-based water basin plans have demonstrated the applicability and usefulness of a coordinated approach.

Finally, the reader should note that the concept of "best practicable" water quality is not a new invention of the recent Congressional amendments, but rather, extends a federal policy that existed more than a decade ago. "Best practicable" treatment, for the purposes of EPA, effectively means secondary treatment nationwide. But secondary treatment was a partial requirement of the 1961 amendments, which also addressed water resource considerations.

Section 3(b)(1) (Comprehensive Programs for Water Pollution Control) of the Water Pollution Control Act authorized federal construction agencies to give consideration to storage of water in federal reservoirs for regulation of stream flow to aid water quality control. This section also states that "such storage and water releases shall not be provided as a substitute for adequate treatment or controlling waste at the source." In determining the adequacy of treatment, the Federal Water Pollution Control Administration had established a treatment requirement consisting of 85 percent removal of organic material (essentialy "secondary treatment").

Executive Order 11288, dated July 2, 1966, concerned with the prevention, control, and abatement of water pollution by federal activities established, among other requirements, a minimum treatment level for the 18,000 federal installations and a recommended guide for federal operations involving borrowees, grantees, or contractors. For federal installations, the order required "secondary treatment, or its equivalent, for all waste except cooling water and fish hatchery effluents." A lesser degree of treatment could be approved if the Secretary found such lesser treatment adequate to protect the quality of the receiving waters.

In 1972, when Congress passed major amendments to the Federal Water Pollution Control Act, comprehensive planning was maintained as a mandate for federal programs. Section 102(A) of the Act calls for the EPA Administrator to pay heed to the dual importance of water quality and water supply issues, and 102(B) gives the Administrator descretion over a number of specific federal programs, with respect to use of flow regulation for multiple purposes.

Whether by intention or by inadvertency, the EPA has failed to carry forward the integrated planning that has been mandated throughout the history of federal water programs.

A report of the National Water Commission was issued in June 1973 which addressed the subject of "Integrating Water Quality Planning with Water Resources (Quantity) Planning." The report noted that considerable progress had been made in getting the various interested water agencies to work together in joint planning programs; and that those representing fish and game, forestry, agriculture, navigation, power development, and the like are beginning to find ways to accommodate their separate interests in the formulation of multi-purpose water development plans. It further noted that "Until recently water quality planning has been conspicuously missing from this family of water concerns."

The report then described the procedures established by the Environmental Protection Agency for water quality planning, which included the preparation of basin plans for water quality by each of the states as a condition for the allocation of sewage treatment construction grants to cities. Under this arrangement there was no requirement for a direct tie between these plans and water resource planning conducted by other stage agencies or by federal-state river basin planning commissions. The report concluded this section by noting "An unnatural separation of water quality planning from water resource (quantity) planning, generally, was promoted by this arrangement.

A study by a panel of experts from universities, federal agencies, state and local governments, and the private sector, resulted in a "Workshop Report on Integrating Water Quality and Water and Land Resources Planning" for use by the Water Resources Council, its member agencies, state agencies, and others (Asilomar Conference Report). The report emphasized that EPA has continued to neglect the water resource issue in carrying out its water quality mandate.

The river basin commissions that have been organized under the Water Resources Planning Act (PL 89-90) are attempting to implement that act by encouraging federal, state, regional, and local governments, individuals, private enterprises, and other entities to conserve, develop, and utilize water and related land resources on a comprehensive and coordinated basis.

Regional and river basin plans are initiated by the development of a proposal to study; when funds are available, a plan of study is developed that outlines the work to be done, the agency responsible for the work, the period of time necessary to complete the work, and the associated costs. Although EPA has not fully cooperated in the development of regional and river basin plans, all of these plans developed to date have considered water quality measures, including the impact of flow management proposals on water quality.

EPA has been preoccupied with reorganizing, developing regulations and granting procedures, and stimulating the states to initiate and develop their PL 92-500 303(3) plans and 208 planning efforts. EPA has not provided leadership for nor participated adequately with the comprehensive planning teams.

While the comprehensive planning efforts have sought integration of flow management measures with water quality standards and objectives in some cases, the EPA has not provided the federal leadership and involvement that is necessary for an effective program.

II. Recommendation II suggests that instead of relying on EPA alone to achieve policy integration/coordination at the federal level, a redesigned advisory council in the Presidential Office should be empowered to provide high-level general oversight of land/water agencies. This would extend and redirect some of the existing powers of the Water Resources Council and the Council on Environmental Quality.

III. Recommendation III provides a policy framework within which an Executive-level Council may operate. Flow regulation is one option for achieving the optimal solutions sought under the Principles and Standards. A proper planning job takes flow regulation and all available technologies into consideration - and the policy framework should avoid closing off the range of such options.

IV. Recommendation IV looks beyond the federal level for ways to insure that flow regulation is not automatically eliminated by the statutory framework of state programs.

For example, the preservation of adequate instream flows to support instream uses is sometimes ignored in water quality planning, but it may be necessary to consider this as a trade-off with other uses in water resource planning. If adequate flows are not provided, substantial fishery losses can occur. The degree of loss is partially determined by peaking operations at hydroelectric power plants and by irrigation, industrial, or municipal diversions.

Streams provide habitat for fish and wildlife, create opportunities for recreation, and enhance environmental quality. Water development projects and water use normally modify stream conditions, altering capacity for fish production, creation, and maintenance desirable natural conditions. However, with properly integrated planning, many economic and social goals can be achieved in environmentally acceptable ways.

Many existing water diversions, including reservoir projects, degrade aquatic environments, posing threats to the natural stream values and fish life. On the other hand, such diversions often create recreational and aesthetic opportunities.

The problem of preservation of instream flows is particularly crucial in the western United States where for the most part water laws are based on the law of appropriations, and provisions to guarantee minimum stream flows vary. The alternatives available for preservation of instream flows include:

1. Elimination of reservoirs, which modify release patterns, leaving natural flows in streams.

2. Modifications of release patterns in reservoirs.

3. Modification of highly variable releases by use of small ancillary reservoirs to smooth out the daily or weekly flow variations (i.e., re-regulation).

4. Changing outflow points for irrigation, municipal, industrial, or other water uses so flows may be maintained in the longest possible stream reach.

5. Reallocation of diverted water to instream uses.

6. Use of reservoir operating regulations which prescribe releases or release patterns specifically to protect fishery uses.

All the above alternatives involved trade-offs among diversions for various objectives. These trade-offs cannot be analyzed without integrating the planning for water resource uses with the planning for water quality demands.

Legislation may be needed in states that do not recognize the benefits of minimum instream flows for fish and wildlife. Legal recognition of recreational and aesthetic benefits resulting from instream flow maintenance may also be required. Field studies must be designed to describe adequately the minimum flow regimen needed to sustain a given stream ecosystem without material degradation. Many parameters -- biological, chemical, and physical -- should be considered as a level geared to meet specific study requirements, and suitable methodologies developed to encompass these parameters.

Consideration of flow regulation, augmentation, or protection needs also to become a part of planning regulated to water supply, irrigation, water quality, urban flood damage reduction, recreation, and thermal power generation. Any of these projects requires close coordination between the water resource planner, the water quality planner, and the fishery expert.

TECHNOLOGY APPLICATION IN RELATION TO INTEGRATED LAND/WATER RESOURCES PLANNING

TECHNOLOGY APPLICATION IN RELATION TO INTEGRATED LAND/WATER RESOURCES PLANNING

ISSUE: What institutional and programmatic reforms are needed so that the broadest range of and best available technology are considered in planning optimal solutions to land and water resource problems.

RECOMMENDATIONS:

I. The national water quality goals should be retained as a public statement of the direction the country will take in the coming years. However, a greater degree of flexibility should be built into the system to allow for planning/discussion/negotiation processes that closely relate the public programs to the particular bodies of water in a given area.

II. EPA regulations and procedures presently do not provide the possibility of deviance from effluent requirements and associated water quality standards (presently, secondary treatment), even where the cost-effectiveness and the need for new treatment systems is seriously in doubt. Unless present institutions are modified including the administrative procedures of the EPA and the mandates and guidelines of the Federal Water Pollution Control Act, then the Act will remain a detriment to the application and improvement of pollution control technology.

III. In order to meet the legislated goals and expressed public interest in greatly improved water quality at an early date, rapid technological progress must be made. A new institutional entity must be developed to deal with such issues as treatment technology, energy use, maintenance, economics, and presently unmanaged pollutants, and to insure innovation and progress in application of technology. Such an entity should be formed primarily on the groundwork and expertise of existing scientific/engineering enterprises of the government and may involve only a modification of the relationships between existing agencies.

IV. A program to facilitate the use of advanced and innovative waste treatment technology can be aided by the provision of incentives for industrial research and development, demonstration grants and projects that apply new technologies, and marketing methodologies for disseminating new technology.

BACKGROUND

It is hard to identify specific technological constraints that impede the integration of water quality and water resource development planning. Progress during the last several decades has improved our understanding of, and ability to cope with, the interrelationships between water quality and water quantity considerations. The major issues affecting such integration are institutional rather than technological.

Two institutional issues need to be addressed to resolve the problem of efficiently applying technology for comprehensive, rational planning. The first is the need to utilize all of man's knowledge in trying to solve water resources problems. The second issue is the need to deal collectively with the knowledge and expertise of federal, state and local agencies for the design, construction, operation, and maintenance of water treatment structures. The first issue addresses the question of optimality in water resources planning. The historical lesson is important here. A principal thesis in designing the national pollution control program has been that each river basin is different hydrologically, economically, and in other ways from other river basins. Therefore it was thought that the development of water quality criteria, standards, treatment requirements, and related control matters should be designed separately for each basin or regional unit and for each city and industry in order to achieve the best economy. This theory resulted in the development of a complex national system difficult to administer.

What progress the nation has made in water pollution control has been by incremental steps. In very broad terms, primary waste treatment was initiated on a substantial basis during the 1920's and the beginning of the 1930's. From the mid-1930's through the 1960's older and obsolete plants have been renovated and new plants constructed, aiming toward the goal of secondary waste treatment. Increasingly, industry has also followed this general path of development.

During this 35-year period much progress was made during the public works programs of the 1930's (roughly a six-year period); essentially no progress was made during the next twelve years as a result of World War II and the Korean War; and small progress was made between 1952 and 1956.

Between 1956 and 1978 annual construction levels have increased from about $200 million to over $5 billion. An important part of this increase must be discounted because of inflation and increases in construction and material costs. By 1978, however, a large portion of the population in urban communities and an equally large portion of the community sewer systems of the nation have been provided with secondary waste treatment facilities.

In 1972, the Federal Water Pollution Control Act [Section 204(a)] mandated that secondary treatment standards must be met by an areawide or state treatment plan [Section 208 and Section 303] in order to receive federal construction grants. The policy implemented by this Act provided an inventory and ranking, in order of priority, of needs for construction of waste treatment works "required to meet the standards of the Act." In effect, this was achieved through a planning process that evaluated priorities for federal spending. After the amendments of 1972, the federal program shifted its emphasis from areawide planning for water quality improvement, to a short-range nationwide target to control gross sources of pollution. This was based on the expectation that a practical, simplified procedure could achieve clean water goals in a relatively short time.

I. Recommendation I suggests that the concept of a uniform national water quality requirement has several advantages, including the elimination of the competitive advantage that a plant in one state may have over a comparable plant in another state with different pollution standards, the simplicity for administration and adjudication, and the provision of a clear, strong mandate. Beyond this, however, we are recommending that a planning process is still needed in order for optimality to be achieved. If the purpose of a nationwide secondary treatment standard was to compensate for the inability of the separate states to adopt flexible programs for clean water - and the legislative history of the 1965 and 1972 amendments supports this view - then a nationwide program may be weakened by its inflexibility and consequent inability to achieve optimal water quality throughout the nation.

What is needed is a policy that is intermediate between the presently inflexibile nationwide program and the formerly ineffective but flexible areawide planning efforts. That policy should maintain a nationwide floor on water quality (presently, secondary treatment) but must also provide a planning process that addresses the optimality issue. Under that type of process, if it is clear that a particular area is adequately served by a subsecondary standard, then that argument should be heard. Alternatively, if secondary treatment is inadequate for a particular water system, then an argument should also be made for upgrading the treatment standard. In addition, a planning process provides a place where conflicting resource needs are addressed, so that areawide clean water is achieved at minimal cost and with minimal secondary efforts.

II. Recommendation II, arguing in favor of the possibility of deviance from water quality standards, questions the purpose of our national water pollution control policy. Is our goal to have secondary treatment plants throughout the nation? Or is our goal instead to provide the cleanest possible water in lakes and streams, that available dollars and technology can provide. If the second goal expresses our true mission - and we feel that this is the mandate of the public - then some form of rational planning is necessary.

It is for this reason that we propose a renewed institutional freedom to plan for the application of best available technology, consistent with the demands of clean water and wise investment.

Legislation and court decisions based thereon have sometimes implicitly or explicitly prescribed the technology to be used in the solution of certain problems. National prescription of uniform technological requirements to be applied over the entire United States, coupled with tight deadlines for achievement such as found in Public Law 92-500, may preclude proper evaluation or assessment of an adequate range of technological and non-technological solutions to water and related land resources problems. Such legislative mandates, therefore, severely limit the choice of techniques that would best lead toward the achievement of environmentally sound and cost-effective solutions to water and related land management problems, because the full arsenal of technological possibilities cannot be considered.

III. Recommendation III concerns the problem of meeting future goals. The federal government does not presently provide sufficient attention to the need to vigorously develop new waste treatment technologies. Present goals of clean water nationwide will not be achieved solely through present technology. Even under the naive assumption that secondary treatment and severely curtailed discharges will substantially clean up the waters, problems of construction cost, energy use, maintenance, and economic operation will continue to exist. New goals will respond to new pollution problems, such as toxic chemicals and sludge disposal. These goals can scarcely be formulated until better and broader options are made available.

An institution must be developed to deal with technology issues that are already severely neglected. Such an institution, which might be based on the engineering expertise that already exists in sections of the Administration, would have an ability to collectively use federal, state, and local agencies for the construction and design of state-of-the-art hardware and systems. Innovative processes will not be tried under the construction programs of the EPA, since these programs are oriented toward quickly meeting strict quality standards. Through a client-consultant relationship with Congress, such an engineering design agency would aggressively pursue technological innovations that offer operational improvements and cost-savings for public investments in water quality objectives.

IV. Recommendation IV suggests additional options for achieving rising public demands for clean water. A program that facilitates the use of advanced waste treatment technology would be aided by:

1. Making it more advantageous for that part of American industry that produces or would like to produce waste treatment hardware to participate more fully in the advanced waste treatment research and development program. The experience of the Departments of Defense and Transportation and of NASA in hardware development might provide a guide as to how this could be accomplished.

2. Arranging for the wide demonstration of advanced waste technologies through a planned program so that public officials can readily see and become familiar with new developments.

3. Applying marketing techniques used to induce the use of other types of public works equipment, e.g. earth moving equipment, trucks, refuse collection, and snow removal equipment, etc.) by public works and other local officials, to the field of water pollution control equipment.

4. The Secretary establishing appropriate requirements and the Congress special subsidies to promote the use of new waste treatment technologies. The program goal in this effort for the next five years should be to construct a pollution control plant that includes some form of advanced waste treatment technology at convenient intervals throughout the nation as illustrations to citizens and officials of what can be achieved with the new technologies.

Our's is a far-sighted view. By accepting and changing to institutions and policies that recognize the need for rational water quality planning and improved technologies, we reject the notion that the 1972 water quality goals are the last word in pollution control.

PROPOSED CHANGES TO IMPROVE COMPREHENSIVE LAND MANAGEMENT IN THE UNITED STATES

PROPOSED CHANGES TO IMPROVE COMPREHENSIVE LAND MANAGEMENT IN THE UNITED STATES

ISSUE: How can existing policies dealing with land use and land management in the United States be coordinated and integrated with water resources and water quality planning and policy?

RECOMMENDATIONS:

I. An effective program to relate water resources, water quality, and land use planning should be designed in accordance with the responsibilities of the several governments (federal, state, and local) that are involved. Different kinds of policy changes are recommended here according to the jurisdiction over the land. Three such kinds of jurisdiction are lands that are strictly under federal management, lands that are strictly under state and/or local management, and lands that have their management shared between the federal and state/local levels.

II. The Principles and Standards should be revised, in conjunction with the states and localities, to provide for or encourage more coordinated and integrated land and water resources planning for federal, federal/state, and state/local lands.

III. With respect to those lands under strictly federal management, coordination and integration with water quality and water resources programs can be strengthened by applying the revised Principles and Standards, in conjunction with an enunciated policy by Congress or the President that refines and redirects the national goals.

IV. Coordination and integration would be enhanced by the establishment, in the Executive Office of the President, of a new Council of Natural Resources and Environmental Advisors, which would encompass the policy-oriented functions of the Water Resources Council (grants program excluded) and the advisory role of the Council on Environmental Quality.

V. With respect to the lands that are owned and/or managed by the states, but with some degree of federal involvement through planning, funding, or technical assistance, a stronger partnership needs to be formed with respect to planning and management, between the federal government and the state and local governments. This could be implemented through revised Principles and Standards and requiring, as a condition of federal cooperation, broader-based studies conducted by the states and localities, to identify the impacts of water programs on the land.

VI. The federal government could further integrate the management of lands shared between the states and federal government by revising those federal grants that bear on state/local water, land and environmental plans. States could be directed to submit land use studies, within federal/state mutually-defined terms, as part of the application for project funding. Without extending federal authority over these lands, this approach would help insure a broader look at land/water-related issues during the planning stage.

VII. With respect to those lands that are owned and/or managed strictly by the states/localities, improved integration and coordination with water programs can be achieved through further Congressional land planning legislation which establishes a specific policy for strengthening the coordination of land and water resources and provides a framework within which non-federal jurisdictions may fashion their own land planning processes.

VIII. Another option with respect to state/local lands is for the federal government to recommend policy changes at the state level to identify and begin to manage land-water relationships. These policy proposals should support the utilization of a consistent set of Principles and Standards for measuring the beneficial and adverse effects of alternatives for achieving each of the several objectives. The Principles and Standards should be revised in consultation with the states to provide guidelines that could be adopted as a basis for their own programs.

IX. A third alternative for integrating land and water planning at the state level is to work through national institutions with substantial state input. The U.S. Advisory Commission on Intergovernmental Relations or the Interstate Conference on Water Problems might be encouraged to undertake a technical document directed at the needs and programs of the states and identifying the linkages between land and water planning while providing guidance for their recognition and resolution. Compatible with this approach would be the establishment of a strong advisory committee of the Water Resources Council providing state input and state guidance.

X. The federal government should put more emphasis on integrated training and retraining of environmental planners and managers, to provide a more highly skilled manpower pool for integrated water and land planning. This can be approached by bringing together and reorienting existing federal and state water and land-related training programs toward a much more integrated effort.

BACKGROUND

In its 1973 Final Report on "New Directions in U.S. Water Policy," the National Water Commission recommended a major shift in the course of federal water policy. "Water resources planning," the Commission argued, "must be tied more closely to land use planning."

In spite of the traditional separation of land and water planning in public programs, it should be realized that land planning is an implicit and inseparable part of water resources planning. The Commission's statement wisely recommends that water and land planning be brought together. However, it is not accurate to go a step further to interpret federal water resource policies as ignoring land-related issues.

Land planning and land management are an unavoidable effect of the programs of federal "water" agencies such as the Corps of Engineers, the Bureau of Reclamation, and the Environmental Protection Agency. Traditionally, water resources planning has considered land impacts as results, rather than goals or bases. The federal water policy has unavoidably affected the development and usage of adjacent lands. Water and land planning have never been, nor can they ever be, separate areas of governmental juri diction.

Consider a flood-control project of the Corps of Engineers. Strictly speaking, the purpose of the project is to manage the flow of water in the river. The ultimate effect of the project, however, is to service the land-based needs of the public. Recreation, power, water supply, and flood control comprise substantial chunks of the supporting infrastructure of man's activities on the land. Navigation, irrigation, and pollution control all serve land-based needs even though such projects are aimed specifically at changing the water regime.

Proposals to assimilate land use issues into federal water policy should recognize that the link has always existed, even if never explicitly perceived. What is needed is an explicit land policy from which the water policy is derived. Land planning must come first, followed and implemented in part by water resources planning.

A coordinated approach to land management has been missing from federal, state, and local government programs. However, a fully integrated, comprehensive national land agency would be counterproductive, in view of the wide local variation of geography, climate, economy, and social values. There must be flexibility, diversity, and creativity at the local level within national land use goals. We recommend national land use planning guidance tempered by a recognition of the historical and cultural setting of regional diversity.

What land use policy currently exists? A neat and compact answer is impossible. Currently, our concept of land use policy can best be described as a "package approach."

Although there are many special purpose land use planning and management programs and agencies that administer programs at the federal and state levels (e.g. Coastal Zone Management, Bureau of Land Management, Federal Flood Insurance Administration, Soil Conservation Service, Critical Areas programs, and Wild and Scenic Rivers), there is no coordinated system of land use planning in the United States. There are provisions of the Water Resources Planning Act, the Federal Water Pollution Control Act, the Coastal Zone Management Act, the National Flood Insurance Act, and the Clean Air Act that mandate land use controls, if necessary, to achieve objectives and goals set forth in those acts.

Although coordination is generally lacking in these programs, they do reflect a strong, positive interest on the part of the federal and state institutions. What is needed is a better recognition of the interrelationships between land and water through refocused institutional goals and programs.

I. Recommendation I is based on the observation that American policies relating to water and land management and planning differ according to the kind of jurisdiction that owns or is otherwise involved in the management of the water/land. Land in the U.S. can be classified according to "strictly federal management," "shared state-federal ownership/management," and "strictly state and/or local management."

Federally-managed lands include programs of national parks and national resource development projects, which are singly-owned and separately-funded.

The second kind of land is administered or owned by the states, but with some degree of federal involvement through planning, funding, or technical assistance. Projects such as reclamation, flood control, development or planning grants, and areawide water quality programs constitute governmental endeavors shared between the two levels.

The third kind of land is that owned and administered by the states and local governments for which the states have the central role in bringing policies for the development and use of land into focus with current economic and environmental realities and increasing public awareness and attitude.

The subsequent recommendations suggest a need to modify the governmental processes by eliminating fragmentation of line agencies in water and land-related areas in order to provide a better opportunity for leadership toward integrated programs. We need to have water resources and water quality planners at all levels of government assume their full responsibility in land use planning and control, and land planners their responsibility in water quality and water resources planning.

II. Recommendation II suggests that all lands be administered under a clearer mandate to integrate land and water issues. At the present time, however, there is a lack of high-level policy that most effectively relates national goals with land and water programs. This shortfall can be alleviated through an enunciated policy by Congress or the President that refines and redirects the national goals so as to harmonize land and water resources policy.

III. Recommendation III suggests that the new goals and policy of the revised Principles and Standards should be incorporated more formally into federal decisionmaking and be administered more effectively by the Water Resources Council and/or other federal agencies.

IV. Recommendation IV offers an additional step toward high-level refinement of land/water policy. An executive-level Council of Natural Resources and Environmental Advisors, could be called upon to provide objective and analytical advice and to formulate institutional processes and arrangements for achieving the goal of comprehensive planning.

V. Recommendation V looks at the question of how the federal government can insure, in a nonintrusive way, that a land-based approach to water resources management is adopted at the state level. One possibility is to provide a stronger partnership, with respect to planning and management, between the federal government and the state and local governments. Recognizing the political sensitivity of this area of policy, we suggest changes that are highly practical and require no major structural changes in institutions and laws.

An attractive means for providing immediate attention to land impacts of water policies is through revision of the Principles and Standards. States and localities could be required to carry out studies that identify the impact of water programs on the land, as part of their planning process. Such studies would address issues of local economics, social values, growth and no-growth options, and regional setting.

VI. Recommendation VI describes a second step for the federal effort toward integrated land/water planning. By providing a requirement or strong incentive for the states to undertake more detailed land use studies, the federal government could achieve some measure of uniformity in the structure, process, and aim of state planning efforts. Without extending federal authority over these lands, this approach would help insure a broader look at land-related issues while a water management program is still in the planning stage.

VII. Recommendation VII relates to the need for comprehensive land/water planning for lands managed solely by the states and/or localities. Presently, this would be attempted in a framework lacking a single encompassing national policy regarding land use management. A most complex problem in intergovernmental relations is the determination of the specific roles of the various levels of government in the interrelated natural resources development

and management scenario with regards to policy-making, planning, implementation and management responsibilities. At the present time, further congressional legislation seems necessary to provide the financial and policy framework for state and local planning.

State interest in planning for land use in managing natural resources is fundamental to an effective program to integrate land and water planning. An increased state role in land management means a modified role for local government, but not necessarily a diminished role. The abilities of local governments to deal with issues of growth and development in the complex area of natural resources must be strengthened. At the same time, the need to address problems which exceed the scope of local government must be recognized.

VIII. Recommendation VIII suggests a second desirable approach, by which the federal government provides guidance to the states, without infringing on their jurisdiction. The additional guidance could take the form of revised Principles and Standards and consistent planning processes and objectives to be agreed upon by the institutions involved in state/local planning for any particular area.

It is recognized that adoption by the states of revised Principles and Standards cannot be compulsory, however, this "leadership" approach has been effective in the past. Such an approach is exemplified by the state-level adoption of the policies and procedures for environmental review formulated by the National Environmental Policy Act. Without being federally required to implement the NEPA project review process, many states have fashioned their own "Little NEPA's" in order to insure broader application of the national environmental policy.

No new federal coercion is indicated for any of these options. Instead, they provide federal impetus for policy changes that are highly beneficial to the states and the nation.

IX. Recommendation IX recognizes a third possible direction that could be taken for integrating land and water planning at the state level. An existing agency or agencies, such as the U.S. Advisory Commission on Intergovernmental Relations or the Interstate Conference on Water Problems, could be encouraged to identify and recommend solutions to the organizational and policy needs of the states that prevent them from moving in this direction. The Water Resources Council could also be strengthened in this regard by providing for additional state input and guidance through establishment of a strong advisory committee. This would provide additional feedback from the states, thereby helping to achieve an energetic two-way dialogue between the states and the national government.

X. Recommendation X argues that proposals to integrate land and water planning cannot be successfully implemented without adequately trained managers and planners. Integrated planning requires a new breed of planners, and the federal government should provide the impetus in this direction. One possibility is to direct the State Water Resources Research Centers to provide a state-level focal point for research and technical work to integrate/coordinate land and water planning.

Training programs should be reoriented in this regard, including such programs of the Environmental Protection Agency and Sea Grant projects. All levels of government, but especially the local, regional, and state levels, need a greater supply of people with training in these fields. The changes suggested above require only bringing together and reorienting existing training programs in these areas.

PROPOSED INSTITUTIONAL CHANGES TO ACHIEVE HARMONY IN LAND AND WATER RESOURCES POLICY IN THE UNITED STATES

PROPOSED INSTITUTIONAL CHANGES TO ACHIEVE HARMONY IN LAND AND WATER RESOURCES POLICY IN THE UNITED STATES

ISSUE: How can the capacities of and relationships among federal, state, and local agencies be strengthened to improve coordination/integration of water resources, water quality, and land resources planning and management?

RECOMMENDATIONS:

I. A guiding principle of water and land resources planning should be to substantially increase the level of direct communication between public representatives at all jurisdicational levels. This principle can be achieved through a commitment to continuous, interpersonal dialogue/bargaining/negotiation between qualified representatives of the public's interests in this field. Planning for the nation's resources is moving away from federal supremacy in preference to a shared responsibility -- federal/state/local -- that operates to achieve local, state, and national goals. No single level is capable by itself of undertaking final decisionmaking.

II. To move this principle into action, federal programs in land, water, and the environment should provide for representation of agents of entities without whose participation, effective and implementable decisions cannot be attained.

III. A revised institutional structure must provide for the identification and management of spillover effects between political jurisdictions. These effects result from the inability of one jurisdiction to completely internalize the costs and the adverse effects (including economic, social, and environmental) of its land and water plans. In addition, the benefits of such plans spill outside of the boundaries of the jurisdiction that initiates or carries out such plans. Without contact between the planning jurisdiction and its regional partners, spillover effects cannot be managed.

IV. Local and state governments should act as key participants in a structure by which needs are expressed from below and responded to from above. Federal agencies should be authorized to effect this participation, whether through river basin commissions or under new authorizations relating to regional, state, or local planning tasks.

V. The response from above to expressed local preferences should be guided by the nature and extent of the spillover effects at lower levels. The severity of interjurisdictional spillovers at the local level, for example, would favor an active role for the corresponding state and regional institutions. Similarly, the existence of interregional spillovers would favor the need for national-level policy.

VI. There should be established in the Executive Office of the President a new Council of Natural Resources and Environmental Advisors, which would encompass the policy-oriented functions of the Water Resources Council (grants program excluded), and the advisory role of the Council on Environmental Quality.

VII. The existing River Basin Commissions should integrate water, land, and environmental questions stemming from spillovers from below. These groups should be relied upon by the Federal-Regional Councils, as a source of integrated bundles of regionally-negotiated preferences. Linkages need to be developed in close harmony with the economic, natural resource, and environmental policies and goals of the states within their purview.

VIII. The River Basin Commissions' role as lead agencies in regional and project planning should be strengthened, for example, in receiving and allocating planning budgets, setting priorities for planning, and formulating regional plans for submission to the President, the Congress, or the states. Their operational framework and programmatic objectives should be reformulated to integrate and coordinate water, land, and environmental plans.

IX. The framework outlined above relies on an effort to relate the statutory program mandates of the federal agencies, including their programs of financial and technical assistance and research, more closely to the needs of regional, state, and local units. Incentives should be built into these programs to promote comprehensive and integrated planning at state and local levels.

BACKGROUND

Because of the interrelatedness of components of the environment, a convincing argument has been made for the need for an institutional structure that brings together land and water management. Yet we are now at a point where the primary hindrance to integrated planning and management is an "institutional entropy"; that is, a situation where existing structures

absorb an undue amount of energy (political authority and administrative resources) without producing needed coordinated action. The occurrence of overlapping programs, conflicting programs, and the lack of logical, coordinated policy and program structure in the water, land and environmental area, is a predictable outcome of the growth of institutional entropy. The implication is that while energy inputs to the system increase, output in terms of achieving social goals grows at a slower pace.

The system of government in the United States promotes this situation directly. It is a system where at least three levels of government are superimposed one over the other, and collectively given broad general responsibility for solving the nation's problems. Laws and programmatic mandates, the distribution of agency resources, the history of relationships and support present a pattern of varying involvement and capacity. The basic issue, then, is how each of these governmental levels should be strengthened in order to provide for the effective management of water resources, land resources, and water quality problems. A key to improved capability is the relationship between and within levels of government in the exchanges of resources, i.e. authority, expertise, funds, and institutional behavior.

I. Recommendation I is based on the observation that planning of land and water resources is, by nature, a process that demands personal contact and face-to-face communication between members of various groups. Planning is a process by which disjointed or unexpressed public goals are forged into logical, coherent, and workable policy. Our first recommendation stems from the conclusion that in order to make resource planning more integrated and comprehensive, the level of interpersonal contact between affected parties must be improved.

II. Recommendation II suggests, therefore, that planning institutions be restructured or redirected as necessary, to provide better coordination between different agencies and levels of government working on the same problem. In a concrete sense, this means face-to-face communication. Without this high level of interpersonal contact, different planning organs are not likely to energetically respond to or cooperate with the ventures of one another, and integrated planning becomes impossible.

III. Recommendation III derives from the inability of any planning jurisdiction to completely isolate the effects of their plans within their own boundaries. These spillover effects are characteristic of water and land planning in particular, because of the distinction between political and geoenvironmental boundaries.

Spillover effects include unbounded impacts from one locality to another, from one state to another, and from one region to another. They take the form of economic, environmental, financial, and developmental impacts and relationships. The inability of one jurisdiction to pay for a needed project through its own resources, implies a financial spillover to a higher level. When different jurisdictions coordinate around a commonly-supported proposal, the project's benefits constitute a spillover outside of the boundaries of the particular jurisdiction in which the project is located. Recommendation II suggests that spillover effects are the logical agenda over which political jurisdictions should come together for the purpose of negotiation and resolution. The end product moves toward more comprehensive planning.

IV. Recommendation IV asserts the decentralized nature of land and water resources projects. Water quality and water resources programs respond to the needs of state and local units; decisions regarding allocation, use, development, and preservation of natural waters are made mostly at these two levels. National flood control and flood insurance programs, for example, protect investments in local property and structures. Recreation and water quality programs are serving the desires of local users. Navigation and power projects take the form of localized dams, ports, harbors, and other structures that help fulfill local needs. Local jurisdictions are the key to identifying the water and land management problems that are of greatest direct concern. Locals are also the key to implementing programs once they are approved.

Land use, water and water quality management (including planning) is most meaningfully integrated today at the local level with concurrent state support (i.e. legislative, technical, financial, and institutional) where political interest and planning needs are greatest. Other jurisdictional levels -- federal-state river basins or the national government -- can achieve integrated planning only through a partnership with state and local units. A major reason for the importance of the local units in this regard is the fact that projects and plans by any level of government have their real, tangible effects substantially at the local level.

Local comprehensive land-use management is the primary instrument of managed local growth. The right of a locality to assist and constrain private sector growth through appropriately formulated and adopted comprehensive land use plans is being supported in the courts as constitutionally valid. Appropriate plans include a statement of public goals, objectives, policies, and procedures. The mix and level of land and water management can best be determined in the context of local comprehensive land use planning and implementation under appropriate state policies.

V Recommendation V addresses the inevitable problem of spillover effects. While reasserting the need for balancing responsibilities between local, state, and national governments, it is also suggested that power and ultimate authority be concentrated above the level at which interjurisdictional conflict and competition occurs. While water and land use goals are best-expressed at a decentralized level, spillover effects can be internalized only by an overlying jurisdiction.

This reorientation of national, regional, and state governments toward the spillover effects at subsidiary levels, strengthens these lower levels by providing a path of negotiation and dialogue, and ultimate decisionmaking. Conflict exists, but conflict for a purpose: to air the competing views at the lower levels, and thence provide for resolution. The effect is coordination and integration from above.

VI. Recommendation VI expresses the need for coordination and integration of water, land, and environmental planning at the national level of policy. A new Council of Natural Resources and Environmental Advisors would encompass within it, the functions of the Council on Environmental Quality and the Water Resources Council. An executive-level body with considerable technical expertise and accumulated experience at its disposal, could be called upon to provide objective and analytical advice for achieving our goal of comprehensive planning. Through development of policies and guidelines, the group of advisors would help implement a planning process that spans land and water and that recognizes environmental, social, economic, and other considerations.

VII. Recommendation VII expresses the need for coordination and integration of water, land, and environmental planning at the regional level, achieved by enhancing the role of the River Basin Commissions. Strengthening the river basin commission as a participant in water quality accommodation in project planning could come about from a more effective role in broader planning, in the style of 208 and level B. The present commissions are not providing the potential arena for effective bargaining and negotiation, because neither the water quality nor the water development agencies have an incentive to take them seriously. The commissions could be strengthened by increasing their environmental projects, and by relying on them to provide coordinated regional bundles of agreed-upon preferences for water use goals and the projects to fulfill them.

VIII. Recommendation VIII emphasizes the value of the River Basin Commissions as participants in regional and project planning. The commissions are needed to cope with the unavoidable spillover effects between the states and localities in the same region. The river basin commission is a logical extension of an institutional structure that rises upward from the local governments to achieve coordinated planning.

In the river basin commission structure, face-to-face communication and negotiation can occur through regional periodic planning sessions as well as ongoing personal contact and consultation. Properly organized and suitably strengthened river basin commissions can provide nationally-consistent associations of persons knowledgeable and politically interested in the future of their localities. They offer the best chance for expressing a sense of "regional community," which is needed in order to cope with the spillovers among the state and local units.

A major problem of a structure of shared federal/state/local responsibility for water and land planning is that of insuring equitable and consistent timing, sequencing, and funding of related projects in different jurisdictions. We have argued that face-to-face, continuous consultation is the only appropriate route for addressing these interjurisdictional spillovers. The river basin commission provides a realistic structure for continuous interjurisdictional communication, and a route for contact between the federal level and the state/local level.

IX. Finally, Recommendation IX calls for an effort to bring federal-level policy into consistency with the institutional arrangement outlined above.

Traditional federal planning of water projects is losing ground as a logical basis for serving the national interest in comprehensive environmental planning. The federal role should therefore be directed toward carrying out their programmatic mandates so as to manage spillovers among states and regions: uniform financial support, technical and research assistance, and promotion of consistent planning arrangements among different regions. The federal government should seek to coordinate land and water programs and relate them to state and local needs by revision of programmatic mandates and operating procedures as necessary.

The greatest achievement of increased integration and coordination of water quality, water development, and land planning will come from expanded institutional capacity to express, refine, and formalize social goals, and make decisions that will achieve these goals. This approach also addresses the modern problem of spillover effects, and the need to consider land and water management in the larger frame of planned economic development and social growth.

RESPONSE TO: NATURAL RESOURCE/ENVIRONMENTAL MANAGEMENT
PRESIDENT'S REORGANIZATION PROJECT

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PRESIDENT'S REORGANIZATION PROJECT

Executive Summary

The major thrust of these comments is that the time is now ripe to link the development, utilization, and conservation of natural resources and the environment with improving the economic, social, psychological, and biological components of man's health. Proper environmental and natural resources management must weigh each of these elements on equal terms with an objective and analytic framework. To effectively integrate these components, two mechanisms are proposed; one procedural, and one organizational.

Comprehensive, Coordinated Natural Resources and Environmental Planning

To procedurally coordinate federal programs and to integrate the above interrelated elements, comprehensive, coordinated natural resources and environmental planning is recommended. To be effective, this planning schema must integrate with policy development and a mechanism for implementing the policy and planning recommendations. The Congress long recognized this need, beginning notably with debate over the proposed "Resources and Conservation Act of 1960."

Council of Natural Resources and Environmental Advisors

The proposed organizational mechanism to tie together policy/planning/administration is a new Council of Natural Resources and Environmental Advisors. The Council would replace the Council on Environmental Quality

and would absorb the functions of the Water Resources Council. As an objective and analytic body not predisposed to an advocate's role, the Council would develop policies and guidelines for implementing a comprehensive, coordinated planning process which would accommodate environmental, economic, social, and other considerations.

Reorganization of Federal Programs and Agencies Over Time

The Council could explicitly recommend -- over time -- reorganization opportunities to the President. This role would reflect the dynamic nature of federal government, would avoid delaying implementation of current programs, and would allow opportunity for accommodating the special interests -- both public and private -- which currently participate in the federal system. This slower pace of reorganization would avoid tackling a too encompassing reshuffling of federal agencies at one time.

Joint House-Senate Committee on Natural Resources and Environment

To insure that Council recommendations receive considered, active, and coordinated study, a Congressional counterpart to the Council is proposed. This counterpart would be in the form of a Joint House-Senate Committee on Natural Resources and the Environment.

Views on Reorganization

Reorganization should consider the following options after appropriate study:

-- The impetus for a Department of Natural Resources is far enough along to now warrant enactment.

-- Resource planning activities -- especially those of land and water -- should be integrated within the already established river basin commissions.

-- The federal construction agencies -- Corps. SCS, and Bureau of Reclamation -- should apply their expertise to new national needs such as pollution control systems, water quality management, and transportation systems.

-- Regulatory and enforcement powers should generally be the responsibility of the agencies charged with the relevant affected programs.

-- Research should be linked with the agency responsible for program implementation and, for seeking new knowledge not directly related to immediate problems, a research agenda similar to that of the NIH should be considered.

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OBJECTIVE OF ENVIRONMENTAL AND NATURAL RESOURCES MANAGEMENT

The proper organizing of the management of natural resources -- minerals, water, land, plant life, and animal life -- and the environment -- land, air, and water quality -- must primarily serve to enhance the well-being of the individual citizen. Such enhancement can only come about by recognizing that development, conservation, and utilization of our natural resources and environment must be inextricably tied with and oriented to improving the economic, social, psychological, and biological health of man.

POSITION TAKEN IN THESE COMMENTS

Proper environmental and natural resource management cannot occur without effectively integrating environmental, economic, social, psychological, and biological considerations into a comprehensive and coordinated system , where each such component is accorded co-equal consideration and the interdependence of such components is recognized. Though important for other reasons, reshuffling and consolidation of agencies and departments does not in itself guarantee that each of the above components and their interrelationships will be systematically incorporated into a coherent environmental and natural resource management schema. Comprehensive and coordinated environmental and natural resource planning, inextricably linked with policy formulation and administration of policy guidelines, planning recommendations, and programs, with oversight by an objective and analytic body, is a necessary first step toward developing such a schema.

HISTORICAL SUPPORT FOR ENVIRONMENTAL AND NATURAL RESOURCE MANAGEMENT POLICY/PLANNING/ADMINISTRATION

The National Environmental Policy Act and its antecedents focused much discussion -- Congressional, Executive, and citizen -- on Policy/Planning/Administration. This discussion notably first concentrated on the proposed Resources and Conservation Act of 1960, S.2549*, introduced by Senator Murray and reintroduced by Senators Engle and McGee in 1961, and by Senator McGovern and Representative Ullmann in 1965. The Bill set forth a national policy to promote conservation, development, and utilization of natural resources and

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* Proposed Resources and Conservation Act of 1960, Hearings Before the Committee on Interior and Insular Affairs, U.S. Senate, 2d Session, January 25, 1960, U.S. GPO, Washington, D.C.

proposed the establishment of a Council of Resources and Conservation Advisors to recommend policies to the President to promote the conservation and utilization of natural resources. As well, the Bill would have established a Joint House-Senate Committee on Resources and Conservation to study, among other things, means of coordinating programs in order to further the policy of the Bill and to recommend Congressional action on Council recommendations.

Significantly, in 1960, Senator John F. Kennedy spoke on the campaign trail of needs similar to those Congress recognized:

> As our needs mount and our population grows, it will become increasingly essential that we consider all our resources in light of their relationship to each other--as well as to the economy as a whole, and the needs of our people. That is why I support efforts to establish a Council of Resources and Conservation Advisors in the Office of the President--a council which will engage in overall resource planning and policy, which will assess our national needs and recommend national programs to meet them. *

Senator Kennedy's recognition of the relationship of resources to the economy and of the need for a Council to engage in overall resource planning and policy is particularly noteworthy; this type of recognition was to continually resurface before and after NEPA's passage.

Policy/Planning/Administration

Repeatedly, the importance and interrelationship of Policy generation to Planning formulation and Administration of the policy, planning, and programs were emphasized prior to NEPA's passage.

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* Hon. John F. Kennedy, Campaign Speech in Durango, Colorado on June 25, 1960 in "Resources and Conservation Act of 1961," Hearings Before the Committee on Interior and Insular Affairs, U.S. Senate, 87th Congress, 1st Session, April 13, 1961, USGPO, Washington, D.C., p. 18.

A National Policy on the Environment

Representative Dingell focused debate on a national policy for the environment in introducing his Bill, H.R. 7796, The Environmental Quality Act of 1967. The House Subcommittee on Science and Astronautics included specific policy suggestions in its 1968 report, "Managing the Environment." Professor Lynton Caldwell of Indiana University prepared a paper, "A National Policy for the Environment" for Senator Jackson's Committee on Interior and Insular Affairs and called for a means to continuously revise policies.

Planning

In addition to Kennedy's remarks and provisions of the Resources and Conservation Act, Interior Secretary Udall advocated comprehensive planning in his book, The Quiet Crisis. Professor Caldwell strongly advocated comprehensive planning integrated with administration. The 1968 "Congressional White Paper" on a national policy for the environment also noted a need for long-term planning and accommodation of conflicting resource uses.

Administration

The administration of a national environmental policy was a concern of the Resources and Conservation Act, the Annual Conservation Yearbooks of the Interior Department, and a 1961 proposal by President Kennedy to strengthen the Council of Economic Advisors to include environmental oversight. The National Academy of Sciences in 1962 recommended establishment of a federal natural resources group to act as a central environmental intelligence agency and the Federal Council on Science and Technology also recommended establishment of a permanent interdepartmental committee on natural resources to identify and evaluate policy alternatives. Of course, debate over Representative

Dingell's Environmental Quality Act and over Senator Jackson's predecessor of NEPA, S.2805 (first introduced in 1967), long focused on a Council on Environmental Quality to implement policies of the Acts.

Intimately related to the above three areas was discussion about information issues such as needs for studies on ecological interdependencies, information gathering, coordinated research efforts, and comprehensive, organized knowledge. Also of primary importance were institutional and decision-making issues such as review and coordination of governmental programs, coordination of policies and plans, and incorporating environmental values into decision-making.

POST-NEPA DEVELOPMENTS

The Congress was quick to realize that NEPA inadequately addressed their long-debated issues. In June of 1970, barely six months after NEPA's passage, the House Subcommittee on Fisheries and Wildlife Conservation held hearings on amending NEPA to provide for an Environmental Data Bank. In 1971, the Senate Committee on Interior and Insular Affairs held hearings on establishing an Environmental Policy Institute and State Environmental Centers. Though the Council on Environmental Quality (CEQ) was to appraise federal programs in light of NEPA's policy, the Council lacked authority to require compliance with its recommendations. The CEQ's authority to issue regulations was clouded and only partly clarified by President Nixon's issuance of Executive Order 11514 which permitted the CEQ to issue "Guidelines" (and only recently have the guidelines been changed to "regulations" under EO 11991, issued by President Carter on May 24, 1977).

THE ROLE OF THE CEQ

Added at the last minute prior to NEPA's passage, Section 102(2)(C), requiring the preparation of environmental impact statements, was an "action-forcing" mechanism aimed at incorporating environmental values and considerations into the federal decision-making process. Aided by this tool, the CEQ has attempted to redress the imbalance between development pressure and conservation interests. Subsequent to NEPA's passage, the Act itself, the CEQ, and the impact statement requirement appropriately worked within an advocate's posture to protect and enhance the quality of the environment.

A NEW COUNCIL OF NATURAL RESOURCES AND ENVIRONMENTAL ADVISORS

Although the magnitude of the CEQ's influence on federal decision-making may be debated, it is undoubtedly true that the preparation of impact statements has indeed brought about projects better tuned to mitigating adverse environmental impacts; the Alaska-Canada Natural Gas Pipeline well serves as an example. It is also true that a new generation of federal managers and decision-makers who recognize the importance of environmental factors has come to the forefront in the past 10 years. Hence, a strict advocate role may now be less necessary. In fact, the objectives of advocates of environmental and natural resources protection may now be better obtained in another light, that is, where environmental advocacy is active and legitimate input -- coequal with pro-development positions -- in a comprehensive environmental and natural resources planning process. A planning process would respond to environmental interests in the actual decision-making, rather than having those interests considered after a decision has already been made, as often has been alleged. Consequently,

it is no longer appropriate that the CEQ assume an advocate's role. Rather, what is needed is a planning process where impact statements are viewed as necessary information documents, coequal with economic, social, and other material. Further, and most importantly, what is now needed is a Council of Natural Resources and Environmental Advisors that is objective and analytic. Two other reasons support this.

First, the courts have been involved in litigation over a host of issues related to environmental impact statements. Although the project delay brought by litigation has valuably given decision-makers reason to plan ahead for environmental impacts, the judiciary has found itself in a position of weighing the merits of development versus conservation arguments on a case-by-case basis. These arguments would be more profitably entertained in the early stages of formulating comprehensive environmental and natural resources plans -- where negotiation and a sense of objectivity nurished by planning principles can lead to mutually acceptable outcomes.

Second, the mandate of the CEQ, as stated in NEPA, is to, inter alia, review programs with respect to their effects on the conservation, development, and utilization of natural resources and to recommend national policies to improve environmental quality to meet the conservation, social, economic, health, and other requirements and goals of the Nation. As NEPA's policy states, the federal government should promote the general welfare and create and maintain conditions under which man and nature can exist in productive harmony. The social, economic, health, and environmental components are inextricably interrelated. Promotion of the general welfare, taking into account all such components, is a task not for an advocate council, but for a council capable of directing and formulating policies which are in the best interest of Americans, policies which do indeed promote a harmony between man's activities and the environment, rather than a council which may suffer an imbalance, where either a production or conservation orientation is the predisposition.

A new Council of Natural Resources and Environmental Advisors, perhaps similar to the Council of Economic Advisors and co-equal with the Office of Management and Budget, is needed and must assume an objective role. This Council would replace the CEQ and in addition would acquire the functions of the Water Resources Council. The process in which conflict and competing interests will retain potency is the comprehensive environmental and natural resources planning process over which the Council should have control by formulating policies and guidelines. Further, just as coordination within the Executive Branch is advisable, it is also needed within the Congress and between the Congress and the Executive Branch. This, too, was recognized in the Resources and Conservation Act when a Joint House-Senate Committee on Resources and Conservation was proposed. The Congress should establish such a committee to study recommendations from the Council and the President and to engage in its own studies on natural resources and the environment.

SUMMARY

Before and after the passage of NEPA, the Congress, Executive Branch, and concerned citizens long discussed the need for a national statement of environmental policy, the need for comprehensive planning, and the need for administration of the policy and planning. NEPA and the CEQ were attempts at addressing the policy but insufficiently accommodated planning considerations and failed to provide mechanisms to administer the policies and plans. These three components -- Policy/Planning/Administration -- are necessarily interrelated and must be intermeshed in a system which can effectively and continuously deal with the formulation, implementation, and revision of policies in the context of comprehensive planning. Though environmental advocacy has served well in the past, what is now needed is a non-advocate agency capable of doing policy analysis and of providing guidance to the President on policies

that will enhance our environment and natural resources while promoting development and utilization of our natural resources to further the well-being of Americans.

PRINCIPLES TO GUIDE PLANNING AND THE ESTABLISHMENT OF A COUNCIL OF NATURAL RESOURCES AND CONSERVATION ADVISORS

In proposing comprehensive planning and a new Council, principles should be developed in order to formulate a planning framework. Among such principles may be:

1. The management of natural resources and the environment should have as its primary purpose the betterment of the well-being of man. Such betterment can only result with recognition that the conservation, development, and utilization of natural resources are inextricably linked with economic, social, psychological, and biological factors.

2. Planning must be interrelated with policy formulation and administration of programs, projects, and policies. Policy/Planning/Administration must form a system with provision for continuous revision.

3. The environment is interrelated; hence, the structure managing it and man's activities impinging upon it should mirror this interrelationship. This requires coordination vertically -- among federal/regional/state/local levels of government -- and horizontally -- among federal agencies, departments, and commissions.

4. Comprehensive environmental and natural resources planning should maximize expression and self-determination of local needs and interests within guidelines set out at state, regional, and federal levels.

5. Realignment of federal agencies involved in natural resource and environmental management is secondary to developing a comprehensive, coordinated, and collaborative approach to environmental & natural resources planning, including an organizational means such as a Council of Natural Resource and Environmental Advisors to implement planning and policies.

6. Since each federal unit has its own mission and interests to pursue, coordination of federal programs and their compliance with planning policies and guidelines must be insured by an overseeing body granted the powers necessary to perform these tasks.

SPECIFICS OF THIS PROPOSAL

Detailed description of the makeup of a Council of Natural Resource and Environmental Advisors and the operational characteristics of a comprehensive, coordinated planning process is beyond the scope of these initial comments. However, it is felt that a sense of a new direction to be taken can nonetheless be obtained herein -- guided by the historical discussions on Policy/Planning/Administration, by the evaluation of the proper role of a council to be one of objective policy analysis, and by the principles set forth to focus thought on the framework of a policy/planning/administration system for managing natural resources and the environment.

APPLICABILITY OF A NATURAL RESOURCES AND ENVIRONMENTAL PLANNING PROCESS

Environmental and natural resources planning is already being carried out -- but only in a piecemeal, non-coordinated manner. Air quality planning is carried out pursuant to the Clean Air Act; various levels of water and related land-use and facility planning are carried out under the Federal Water Pollution Control Act; and present and future uses of forest and range are assessed under the Forest and Rangeland Renewable Resources Planning Act and coastal plans are developed under the Coastal Zone Management Act. The machinery of planning is thus already in motion in a host of areas, but nowhere are these efforts coordinated, nor are interrelationships currently adequately dealt with. For instance, numerous lakes in the Adirondacks in New York State are becoming increasingly acidic -- the cause seems to be air pollution (sulfates forming acid rain) blowing eastward from the Great Lakes industrial area. Comprehensive, coordinated planning is the next logical step to effectively deal with such interrelationships.

Interrelationships between ecosystems and community economic and social needs are important considerations which must also be sumsumed under a planning process. The people of Sanibel Island in Florida received national attention and commendation for their attempts to effectively promote a harmony between resource conservation and utilization; planning was an integral component in their efforts. Florida has experienced numerous other examples where a comprehensive environmental and natural resources planning approach -- involving negotiation directed by planning principles and guidelines -- could have mitigated some controversy. Examples would be the proposed cross-Florida barge canal, the proposed Miami Jetport, mining of phosphate beds in western Florida and their water quality effects, swamp draining and resultant parched and fire-prone lands, lowering of the fresh water table from residential development, conservation of the Florida Keys and the fragile coral reefs, and so forth. Though these problems have or are being addressed in one or another form, a comprehensive planning approach could aid negotiation and the enhancement of human well-being and may have prevented some of the problems by exercising long-range perspectives and anticipating future needs.

CONCLUSION

These comments have taken a broad perspective and have focused on the "big picture." In a historical perspective, the position advocated herein -- comprehensive, coordinated environmental and natural resource planning as an integral component in a policy/planning/administration system, with oversight and guidance by a new Council of Natural Resource and Environmental Advisors -- is the next logical step. Taking this step would mean beginning to establish a framework within which we can grow and learn as we go. Perhaps a 10-year trial period would be in order for skilled staff to work within and massage such a system. If we do not seriously consider this alternative, expectations

that we can reshuffle administrative units and thereby successfully achieve coordinated efforts in managing natural resources and the environment will be greatly diminished.

ORGANIZATION COMMENTS: ENVIRONMENTAL AND NATURAL RESOURCES AGENCIES

Reorganization of agencies other than the CEQ as herein prescribed should be guided by a set of criteria applied on a case-by-case basis. Sample criteria may be:

-- The underlying purpose the agency serves. (Is it a purpose shared by other agencies?)

-- The openness of administration. (Would relocation improve communication?)

-- The degree citizens have access to the organization. (Would reorganization open doors for citizens?)

-- The success of the agency's program. (Would the program more effectively accomplish its objectives within a different structure?)

-- The ability to resolve conflict. (Would conflict be more easily resolved within another structure that is more amenable to negotiation and mediation?)

-- The fulfillment of Executive, Congressional, and citizen expectations. (Has the agency distorted desires as expressed in its mandate?)

There is no neatness to any reorganization attempt. On one hand, arguments may be made that the soil protection functions of the Soil Conservation Service should be transferred to a new Department of Natural Resources since its basic orientation would be toward land management, and that the SCS's dam construction operations should be transferred to the Corps of Engineers. But on the other hand, the SCS may serve its purposes well where it is. In this argument, the SCS would be viewed as a multiple-purpose agency with ties to interests in water quality, water supply, soil conservation, small watershed protection and with established relations among rural and agricultural families.

The significant question to pose is -- Do the programs of various agencies really come together? And, is a reshuffling of agencies, bureaus, and departments necessary to develop this cohesiveness? Or, can internal improvements be made within the existing structure? Or, does the recommendation of comprehensive environmental and natural resources planning, with oversight by a Council of Natural Resources and Environmental Advisors, have sufficient promise to tie programs and policies together in a way that reorganization, in itself, never can?

Regardless of approach, states and localities react to federal programs and policies and consequently reorganize their structures and programs. If federal programs are not tied together, then states and localities may mirror this fragmentation. Simple reshuffling of programs without addressing underlying problems of bringing things together may wreak even more havoc on lower levels of government by retaining fragmentation while severing former affiliations and channels of communications.

The Role of the Council of Natural Resources and Environmental Advisors in Federal Reorganization

Centrally concerned with coordination of policies, plans, and programs, the proposed Council of Natural Resources and Environmental Advisors will be engaged in an on-going process of evaluating the proper organization of departments and agencies in order to effectuate a cohesive approach to environmental and natural resource management. In integrating Policy/Planning/Administration into an interactive system, the Council will confront the task of reorganization over time. Spreading this task out over a period of several years does not unnecessarily delay needed reform. On the contrary, by instituting a comprehensive planning process intertwined with policy formulation and administration, the Council will be immediately taking the most valuable step

toward bringing federal programs together. With the benefit of time, the Council will acquire important feedback on how well federal agencies mesh in a planning process and exactly where policies and programs conflict or overlap. The Council will be able to develop well-defined criteria by which to rigorously and systematically contrast one agency's programs with another's. Further, engaging the Council in such a process will obviate the disruption of government -- personnel shifts, severing of lines of communication, realignment of priorities and functions, etc. -- following a sweeping reorganization attempt. Such disruption, magnified at lower levels of government, could itself last a period of years. Severence or entanglement of political ties alone may either thwart or prevent a sweeping reorganization.

The Council would essentially be in a position to recognize the dynamics of government and engage in a process of evaluation rather than a "one-shot" approach. This dynamic process could effectively product a series of recommendations to the President and the Congress over time. Hence, questions of whether a single civilian survey agency should be created, whether research and data services should be consolidated, or whether lead agencies should be incorporated into a coordinating schema will best be addressed by the Council. The Council, then, could order priorities in addressing questions such as these and could follow these priorities in its recommendations.

VIEWS ON REORGANIZATION

These remarks focus on (1) a Department of Natural Resources; (2) Consolidation of Resource Planning Activities; (3) Construction Agencies; (4) Regulatory Independence; (5) Research; and (6) Delimiting Ocean/Coastal/Atmospheric Management.

Department of Natural Resources

A proposed Department of Natural Resources is a long-standing commitment which may now be ripe for enactment. Since the Department of Energy has absorbed Interior's energy-related activities--the various power administrations, power functions of BuRec, and certain mineral leasing functions--it is now fitting to examine those other functions which properly belong or should belong to Interior.

Having relinquished its energy functions, Interior may now be more appropriately relabeled as a Department of Natural Resources. Such a department would retain control over its current water and land functions and may in time assume jurisdiction over related natural resource areas.

Consolidation of Resource Planning Activities

Perhaps more than other relationships, land and water resources must be considered together. For instance, many water pollution problems result from land uses--agricultural practices producing runoff pollution, industrial or municipal waste treatment units discharging toxic pollutants, etc. With watersheds crossing state boundaries, intergovernmental coordination of policies, plans, and programs is essential. The already established river basin commissions could readily include the assessment of and planning for land and other environmental impacts resulting from development plans. Importantly, the commissions should be linked to the economic development needs of regions as determined by economic development agencies and regional entities established by governors' conferences.

Construction Agencies

The federal government's construction activities well respond to critical national needs. Acting upon Congressional mandate and citizen desires, the Corps of Engineers, Bureau of Reclamation, and Soil Conservation Service have consistently displayed the highest professional and technical abilities (while recognizing that human failure may produce a unique and regrettable disaster such as the Teton Dam occurrence). These agencies are honest, effective, financially scrupulous, and responsive to citizen concern. It is appropriate now to use the resources of these agencies in a broader capacity to enhance the public welfare. New national needs--water quality management, pollution control systems, transportation systems, etc.--could be met by applying the talent of these agencies.

Regulatory Independence

Responsible regulatory actions must promote the programs, policies and mandate of the relevant agency; in this sense, regulatory enforcement should not be geared to enforcement for enforcement's sake, but should address specific requirements of the agency and should serve to further the purposes of the agency, which, consistent with the agency's Congressional and Executive mandates, ultimately are to further the public's interests and welfare. In recognition of this inter-relationship, the agency charged with the responsibility for a programmatic area should also possess the regulatory and enforcement power to effectively pursue its goals, unless special cicumstances dictate otherwise.

Research

Similar to the above argument for regulatory functions, research ought to be linked to the agency with responsibility for program execution. This is premised on the fact that effective program changes should reflect new knowledge as derived from supportive research. Further, research would receive impetus and direction from programmatic needs. Research should be designed to seek fundamental

new knowledge as well as seek to answer more immediate problems. To the degree possible, the openness of a research agenda like that pursued by the NIH should prevail.