

Coastal Zone Management Problems

Seminar Conducted by
WATER RESOURCES RESEARCH INSTITUTE
Oregon State University



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Preface

Man's rapidly expanding use of the ocean and its shoreline threatens this valuable frontier where the land, the sea, and the atmosphere meet. To the casual sightseer, the coastline looks permanent and enduring---the rocky stretches appear tough, and the beaches seem to be everlasting. However, the beaches are frequently destroyed by acts of nature and man. The urgent requirement for proper planning and management of the coastal area has become recognized only in recent years. There are efforts at both the state and national levels to meet this need.

The coastal zone is composed of the coastal plain, the continental shelf, and the waters which cover the shelf; it also includes the bays, estuaries, lagoons, coastal dune fields, and deltas. The effect of man's activities takes three forms---the impact of numbers of people all competing for use of the areas, the pollution of coastal waters, and the critical modification of the natural balance of plants and animals. This is of world-wide concern. The problems which prevail along the coastlines of the United States are all present in various degrees wherever man has access to the shoreline.

To examine some of the complex relationships involved in the coastal areas, a seminar series was jointly sponsored by the Institute and the School of Oceanography. The weekly seminars were open to the public, faculty and students of all ages.

William H. Buckley
Acting Director

Corvallis, Oregon
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Presented September 27, 1973 by WILLIAM Q. WICK, Director, Sea Grant College Program, Oregon State University.

A Look at the Coastal Zone

I am pleased to have the chance to lead off this seminar series on Coastal Zone Management Problems---for a number of reasons---some official, some personal.

The Sea Grant College Program is officially and deeply involved in coastal zone questions. A major mission area is Coastal Zone Environments. In this area, we are searching for answers to the complex questions on orderly multiple utilization of the coastal zone, including the estuarine and oceanic water masses and associated land management. We aim to contribute to the knowledge base necessary for the wise multiple use of the open coast, to develop technology needed to manage the open coast, to assist planning agencies with problems of coastal development, and to encourage the use of information and technology appropriate to wise coastal management.

Specific projects involve coastal sand transport, groin spacings on beaches, sea and surf forecasting, offshore sea and weather sensing, forces and responses for ocean and nearshore structures, estuarine hydraulics, dredge spoil fate, and economics of coastal areas.

Further, the three-fold Sea Grant approach of training students, research, and advisory services provides us with a complete set of tools to develop and activate coastal zone technology.

Personally, I have lived on various coastal segments of the Pacific Northwest for the past 20 years---in an intimate association with the salt water.

In succeeding weeks of this series, we will have the opportunity to view the coastal zone through the eyes of coastal workers involved in specific management and development problems. I have the mandate today to sample the geography, the uses, and the pressures on Oregon's coastal zone. For comparison, I will illustrate some of the pressures in other areas of the Pacific Basin.

When I discussed this seminar with my sophomore daughter---she said, "Tell them that too many people are using the beach".

What is the Coastal Zone?

Inman and Brush (*Science*, 6 July 1973, Vol. 181, pp. 20-32) refer to the coastal zone as "the unique boundary separating the earth's three domains: the land, the sea, and the atmosphere." They state "the coastal zone is composed of the coastal plain, the continental shelf, and the waters that cover the shelf; it also includes other major features such as large bays, estuaries, lagoons, coastal dune fields, river estuaries, and deltas."

The coastal zones of the world are diverse but share some common processes: mixing of fresh and salt waters, transport of land sediment, and buffeting by the winds and tides, occur on all coasts.

Why is Coastal Zone Management a Problem?

The coastal zone presents problems to managers because it is a desirable focus for human activities, is beautiful, rich in resources, and scarce. The continental shelves and nearshore waters comprise about 5% of Earth's surface area yet nearly two-thirds of Earth's human population lives near the coast.

This human use phenomenon is not new. Oceans were the original freeways. Sheltered bays were the first parking lots. But the competitive use pressures in the coastal zone are increasing dramatically. The sediment load entering the sea from the land has increased by about 100% in the past 100 years, according to recent estimates. The ocean is downhill from nearly everything. Thus, most of the sins of man eventually float to the ocean. In a sense, all land management affects the seas. But pressures on a given segment of coastal zone are variable. Management techniques must also vary.

Major Reasons for using the Coastal Zone

A listing of uses of the coastal zone could fill a book. The reasons for using the coastal zone may be easier to generalize.

Human habitation---in Oregon, a nest in the golden west. Perhaps a little more rain than some desire, but the coast is a good place to live.

Climate---the land, sea, air interface is often a zone of temperature moderation. In Oregon 40°F through 65°F just about describes the range. Natural air conditioning.

Beauty---in sea stacks, surf and sand dunes, coastal marshes. Hopefully no-one's soul is so dead that a seascape fails to stimulate.

Food---man fished before he farmed and probably on the edge of the sea. The sea's bounty is limited, but certainly more than we harvest today. Most of this food from the sea will continue to come from the coastal zone.

Economics---shipping, fishing, recreation, homebuilding, etc.,
focus on the coastal zone.

Symptoms of Excess Pressure on the Coastal Zone

On a worldwide scale, the coastal zone is being destroyed. At least seven of Earth's ten largest cities are built in the coastal zone on estuaries. Land sediment clogs the waterways. Jetties built to provide safe access to the open sea interrupt coastal sand transport. Chemical wastes from the land enter marine food chains. Airports, highways, bridges, and other "useful" structures of man invade the estuaries. To compound the problem, "white man" tends to be a "square animal". When we invade the coastal waters with a structure, we unduly affect the natural hydraulics with our square tendencies instead of building within the flow patterns.

How to Manage the Coastal Zone

Successful management of the coastal zone in Oregon and elsewhere depends on a multi-layered local, state, federal partnership planning approach which will lead to careful zoning including a plan for sequential development. I mentioned local first. Tools must be provided to residents of the coastal zone with suitable incentives to insure that the plan for the Oregon coast or Tillamook bay is a plan designed and activated by the citizens.

Several years ago, in preparing a bulletin "Crisis in Oregon Estuaries" with the Oregon Chapter, American Fisheries Society, I made a list of 40 or more agencies at federal, state, regional, and local levels who had a responsibility in estuaries. With so many groups involved, little progress in estuary management was evident. Based on this bulletin and other studies, some action emerged which led to completion of the Yaquina Bay plan. Lynn Steiger and others during this seminar series will refer to this plan and how it appears to be one successful way to approach a coastal zone planning problem.

Several major tools are either presently active or on the way. Wilbur Ternyik, Chairman of the Oregon Coastal Conservation and Development Commission, will meet with us next week to review the difficult and exciting program of the Commission.

The Coastal Zone Management Act was passed by Congress this year and seems ready for funding. The program is administered through the National Oceanic and Atmospheric Administration, U.S. Department of Commerce.

Oregon Coastal County Commissions and their planning staffs are tooling up for emphasis on coastal zone planning.

A variety of citizen's groups are taking a more active interest in environmental conflicts and planning opportunities in the coastal areas. Among these are the Oregon Environmental Council, Oregon Shores Conservation Coalition, and OSPIRG.

Most importantly, the citizens of Oregon, especially those on the coast are awake and working to solve their destiny.

I propose that local emphasis and citizen involvement is the only answer to the perplexing problem of developing comprehensive land and water use plans for the Oregon coastal zone. Assuredly, such local planning must involve the regional, state, and national agencies who have jurisdiction for resource management. Some of the steps necessary for this kind of local planning process are outlined in the bulletin "Estuary Planning Guidelines" prepared by the Oregon Coastal Conservation and Development Commission.

Summary

The coastal zone is the meeting place of Earth's three domains---the land, the sea, and the atmosphere. Abundant resources, mild climate, natural beauty, and the opportunity to make a living result in pressures for human use. These pressures can destroy the coastal zone unless comprehensive planning for use of the land and water is accomplished. An increasing "bag of tools" is available to help coastal citizens in the planning process. Planning will require compromises--but proper compromises can create harmony.

Presented October 4, 1973 by WILBUR E. TERNYIK, Chairman, Oregon Coastal Conservation and Development Commission, Florence, Oregon.

Operations of the Coastal Commission

The Oregon Coastal Conservation and Development Commission was created by the 1971 session of the Oregon Legislature to prepare and recommend coordinated plans and their methods of implementation for the wise management of the natural resources in the coastal zone. Pursuant to the above charge the OCC&DC has launched an aggressive work program involving a broad range of local, state and federal governments and agencies, and the people of the State of Oregon, in developing a plan for the coastal zone which will provide a balance between the conservation and development of coastal resources.

On January 17, 1975, the Commission will submit a final report for legislative action to the 58th Legislative Assembly, in the form of a series of management policies and standards against which proposed uses of the natural resources of the coastal zone may be evaluated. The plan will also establish a basis for determining preferences between conflicting uses of natural resources.

SUMMARY OF COMMISSION PROGRESS

Early in the biennium the Commission retained a consortium of consultants to design a work program. The products (two reports were provided) did not fully meet the requirements of the Commission, its advisory committee, and the various state agencies closely involved with the Commission. A work design was subsequently developed by Commission staff.

The Commission has outlined a series of resource problems and critical resource concerns in the coastal zone. A number of specific activities relating to the problems identified have been completed. The Commission has developed a set of estuary planning guidelines, assessed the levels of planning in the coastal zone by local, state and federal agencies, launched an aggressive public involvement program, appointed an advisory committee representing a broad range of environmental, conservation and development interests and reviewed and recommended action on a number of issues of coast-wide concern. A number of other activities are presently underway as part of the Commission's projected work program.

SUMMARY OF COMMISSION WORK PROGRAM

The major work program element of OCC&DC is the development of policies and standards for managing the use of the natural resources. This work program, coupled with the extensive public involvement and review process now underway will be responsible for the greatest portion of the Commission's budget and staff time. Each of eighteen resource categories is being inventoried to determine characteristics, extent and value. Performance policies and standards are being developed for each resource based upon its carrying capacity. These policies and standards will be submitted to the Legislature, following in-depth public input and review, for legislative action and subsequent implementation by units of local government and state resource agencies.

Other work efforts of the Commission include a survey and analysis of the major economic sectors in the coastal zone, a coordinated transportation planning effort, coordinated mapping program and a data storage and retrieval program.

ACTIVITIES 1971-1973

In responding to the charge of the Legislature, the Commission, immediately after being funded by the Emergency Board and hiring an Executive Director, held a two-day workshop on June 29-30, 1972, to commence the identification of basic natural resource problems and concerns in the coastal zone. Participants in the workshop included Commission and advisory committee members, state and federal natural resource agencies, representatives of local units of government and interested citizens.

Subsequent problem identification has continued as the Commission developed and refined its work program and will continue to occur throughout the planning process.

The efforts of the Commission during the last six months of 1972 have resulted in the identification of basic resource problems and conflicts in the coastal zone and in the identification of eighteen natural resource categories of critical environmental concern. The problems and resources of critical concern and the approaches to be taken in resolving conflicts are outlined in the following pages.

Problem: The lack of any comprehensive identification, inventory and understanding of unique and fragile features of the coast has resulted in the irretrievable loss of many of these delicate resource areas and the endangerment of many additional areas of major historical, recreational, economical and ecological areas of significance.

Problem: The distinct and unique identities of certain areas are not being adequately preserved and the general public does not widely appreciate these values.

Wise management of natural resources in the coastal zone is hampered by a lack of information on the extent, location and characteristics

of those resources, and by a lack of understanding of resource management problems and requirements by residents of the coastal zone, by the state, and also decision makers at various levels of government.

Approach: At the conference in 1972, a number of natural resource categories and developmental activities were identified as being of "critical environmental concern" regarding a coastal zone management plan. These areas are as follows:

1. Estuaries
2. Wetlands
3. Floodplains
4. Geological Hazards
5. Beaches and Dunes
6. Shorelands
7. Continental Shelf
8. Unique Scenic Features
9. Historic and Archaeological Sites
10. Scientific Natural Areas
11. Wildlife and Fish Habitats
12. Freshwater Lakes and Streams
13. Forests and Watershed Lands:
 - Land treatment practices
 - Vegetation removal
 - Natural resource extractions
14. Agricultural Lands
15. Public Recreation Areas
16. Industrial Lands
17. Residential Lands
18. Aesthetics, including noise pollution

The Commission has directed a consultant to prepare an initial inventory of coastal areas of critical environmental concern; additionally, draft policies and standards are being prepared for the management of resources and activities identified as critical. This task is, of course, part of the Commission's legislative charge. The actual development of policies and standards from these discussion drafts will involve local citizens and officials, natural resource agencies, commerce and industry, public and private interest groups, and numerous other organizations and individuals concerned with the coastal zone.

A major resource management problem has been public awareness and attitudes towards resource use. The Commission is embarking on an extensive public involvement and public information program to create public awareness of the need for resource management, to determine the needs, problems and concerns of local citizens and to gain input into the planning process of OCC&DC.

Problem: Individual safety and property is endangered where developments have been allowed to occur in geologically and flood hazardous areas. The coastal zone has been characterized by serious problems of flooding, slides, and property damage resulting from unwise construction in unstable areas and floodplains. The increasing awareness of state and local jurisdictions to the threat of development in such areas (as well as the recent "Sheffett Decision" in California, where Los Angeles County was held responsible for mud flow damages in a subdivision the county had permitted, has produced interest in studies of potential control measures.

Approach: The Commission has identified floodplains and geologically hazardous areas as initial categories for the development of policies and standards. The Commission is working in close cooperation with the Clatsop-Tillamook Intergovernmental Council and the two respective counties in this effort, as they have already embarked on a program of development controls in floodplains and geological hazard areas. Their effort has been made possible by the completion of a geological hazards study of the coastal portions of Tillamook and Clatsop Counties by the State Department of Geology and Mineral Industries. The OCC&DC will develop policies and standards, with the assistance of the Department of Geology and Mineral Industries, relating to development, etc., in floodplain and geologically hazardous areas for the entire coastal zone as part of this adopted work program.

* * * * *

Problem: Attention should be given to the control of off-road recreational vehicles which are rapidly increasing in number and use, threatening the coastal environment, particularly in the stabilized and partially-stabilized sand dune areas and in other similar fragile resource areas.

Approach: It may be necessary to place specific restrictions upon off-road vehicles (ORV). Regulation and registration of ORV to assure the conservation of sand dune and other critical environmental areas and, at the same time, dedicate certain areas for primarily ORV use, is long overdue.

* * * * *

Problem: Visual pollution of the landscape created by insensitive development and unfortunate signing practices conflicts substantially with the scenic values for which the coastal area is renowned.

Problem: There is an absence of appropriate performance standards and ordinances to insure a high standard of development and level of uniformity in many areas of the coastal zone.

Problem: Insufficient attention has been given to construction (and type of construction) in dune seaciff and estuary areas in order to prevent visual blight and ecological damage.

Problem: Intensive pressure from a mobile, increasingly affluent and ever-expanding population has and is continuing to manifest itself in a wide variety of threats to the physical and economic resources of the Oregon coastal zone.

Approach: Specific environmental management policies and standards for areas of critical environmental concern will be developed by OCC&DC and residents of the coastal zone and referred to the Legislature as specific tools for the implementation of a coastal zone management plan.

* * * * *

Problem: Only a minor portion of the land located on the Oregon coastal plain is suitable for agricultural production. Perhaps the greatest threats to agriculture on the coastal plain (as in other areas of the state) are the inroads made upon agricultural lands by subdividers and road building programs. The State Department of Agriculture indicates these activities, if continued on productive lands, may prove fatal to the viable coastal agricultural economy.

Problem: Poisonous weeds and predators threaten livestock production.

Approach: The development of policies and standards regarding natural resources is only a partial solution to the problems of agriculture (one of the resource areas which the Commission will address in the development of resource use standards is "agricultural lands"). However, additional and immediate steps must be taken to control the aggressive and noxious tansy ragwort which is over-running the pasture and grazing lands of the coastal zone at an alarming rate. Predators, particularly on the southern coast, have created a serious economic hardship to livestock producers. Better acceptable measures for control must be identified and implemented.

* * * * *

Problem: Fishing by foreign vessels has significantly reduced concentrations of certain species of fish in the eastern Pacific off the Oregon coast. This action has resulted in serious economic losses to Oregon fishermen. The unknown long-range effects of foreign fishing activity in coastal waters of the continental shelf over a period of years, may result in a catastrophic and permanent disruption of the fishery of the eastern Pacific.

Approach: The various state and federal agencies involved, directly or indirectly with the fisheries industry, must keep governmental decision-makers, at the state and federal level, appraised of the magnitude of the potentially disastrous situation. The scope of the problem is international and the solution may lie at that level. Additional steps should be taken to support the activities of state and federal agencies and governments to seek change in national policy regarding this issue which is a problem to the New England fishery resource as well as the fishery of the west coast. The seemingly apathetic attitude of the federal government at "Law-of-the-Sea" conferences is alarming in view of the magnitude of the problem.

Due to the delicate balance of this resource, interim measures such as a 50 mile offshore limit should be considered.

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Problem: Uncontrolled collection of certain tidal pool species has reached alarming and dangerous proportions and threatens the existence, in certain areas, of various tidal invertebrates.

Approach: Present laws protecting tidal invertebrates and their unrestricted collection are not being adequately enforced and the general public is not generally aware of such restrictions. Specific areas should be set aside where wholesale collecting of certain species would be prohibited and the public made keenly aware of such regulations. A permit system for collection of invertebrates should also be investigated.

Problem: There is a lack of understanding of the interrelationships of the coastal economy with other social factors, such as population, age structure, levels of income and education, types of employment, and other related characteristics.

The coastal economy is closely interrelated with the physical and other cultural characteristics of the coastal zone, and is influenced by regional, national and international economic trends and developments. However, sufficient organization, interpretation and evaluation of existing data is not available concerning the characteristics and requirements of the coastal economy to facilitate planning and evaluation of proposed improvements and developments.

Approach: The Commission will develop a program to provide needed information on the structure and characteristics of the coastal economy and to identify methods and the type of information needed in identifying "trade-offs" in alternate uses of coastal resources.

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Problem: The present tax structure is too narrowly based for the adequate support of basic public services in the coastal zone. In that the coastal zone is a valuable asset to the State and the Nation, much of the land area is in public uses and not available for local tax valuation. The seasonal influx of visitors regularly over-extends public facilities, and whether tourist revenues are adequate to support these facilities is a matter of controversy. The tax base problem is intensified by the increasing development of the coastal zone for second home and retirement purposes.

Approach: Improved facilities for water, sewer, fire protection, and other needed services must be financed from an expanding tax base within the coastal zone or the development of suitable compensation measures at the state or federal level must occur. While the OCC&DC can provide direction in solving the tax inequities in the coastal zone, the actual solution to the problem lies with the Legislature. It should be anticipated that the report to the Legislature in 1975 will request specific action related to the costs of providing needed service for an ever-increasing transient population in the coastal zone.

* * * * *

Problem: Land appraisal and assessment practices in the coastal zone encourage transfer of agricultural lands, view property and open space to more intensive development. This practice often results in premature or inappropriate development practices. It also works to the disadvantage of certain economic activities such as agriculture and forestry, which are key elements of the coastal economy and landscape.

Approach: A comprehensive review of land assessment practices in Oregon is beyond the scope of the OCC&DC work program. However, in the course of developing a plan for coastal zone management, the Commission will identify (1) the adverse impacts of assessment practices on natural resources in the coastal zone and (2) suggested methods for the use of assessment practices as positive tools in natural resource management. These comments and suggestions would be part of the OCC&DC's recommendation to the 1975 Oregon Legislature.

* * * * *

Problem: Median family income in the coastal zone, and the rate of increase in this income level, is generally lower than state and national averages.

Problem: There is substantial and persistent unemployment in most areas of the coastal zone.

Problem: The seasonal nature of employment in the coastal zone is a hardship for the residents of the area and tends to cause serious shortages of employment opportunities in winter months.

Problem: The coastal economy is over-specialized. There is an urgent need to diversify the economic activities of the coastal zone to overcome dependence on a few industries and seasonal economic fluctuations.

Approach: The OCC&DC does not have a role in promoting specific developmental uses or activities. However, developing a consensus on necessary and desirable economic activities and securing opportunities for the development of these activities through the coastal zone management plan is a basic task of the Commission.

Through its legislative charge and composition, the OCC&DC has an unparalleled opportunity to address the problems of the coastal economy. The Commission will serve as the means through which approaches to economic improvement can be coordinated, supported, and maximized for the benefit of local jurisdictions and their residents

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Problem: Transportation planning is seriously lacking adequate coordination within the coastal zone.

Transportation planning is a function of federal and state agencies, the Councils of Government, and the coastal counties. There is no unified, coast-wide approach to transportation planning. Additionally, planning activities for airports, ports, highways, and mass transit facilities are often conducted independently and by different agencies.

Problem: Well-planned highway development on the Oregon coast that would provide for adequate transportation routes and not adversely affect aesthetic values or endanger fragile resources is needed.

Highway 101 (the Oregon Coast Highway) is overburdened during the summer months. Highway facilities in many parts of the coastal zone are inadequate for local as well as regional needs. A conflict exists between the need for improved transportation facilities and the impact of those facilities on scenic and fragile natural resources. This conflict is complicated by the increasing polarization of groups advocating and opposing future coastal transportation facility developments.

Problem: Adequate public access to coastal rivers, estuaries and, in some areas, beach fronts is lacking.

Increasing traffic in the coastal zone, and expanding use of natural resources for recreation has led to overcrowding of many beach and water front areas. Parking and foot access has become a problem in both the communities and outlying areas. Uncoordinated project development by various jurisdictions and agencies has not produced sufficient and acceptable access points to important recreation areas. The State Parks Section of the State Highway Division has general policies regarding access to beaches, scenic vistas, etc. Local county parks departments have also attempted to meet the expanding needs. However the problem still exists and is annually becoming more serious.

Approach: An effective transportation system which accomplishes the needed movements of people and goods, and does not adversely affect aesthetic values or endanger fragile resources is consistent with the Commission's goal of balancing conservation and development concerns in the coastal zone.

Presently the State Department of Transportation and its divisions are working with the councils of government and the OCC&DC to establish the necessary processes to assure the coordinated planning needed. OCC&DC is forming a transportation planning committee which will evaluate the transportation planning needs of the coastal zone, supplement and coordinate coastal transportation planning efforts, and identify those areas where recommended trade-offs between conservation and development are appropriate. The committee will be comprised of one representative from each transportation planning committee from each COG, will be coordinated with the State Department of Transportation and will be chaired by an OCC&DC commissioner.

The OCC&DC transportation planning effort will be multi-modal in approach, that is, the needs and requirements of port facilities, airports, and rapid transit will be considered as well as highway construction needs.

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Problem: Public participation in local decisions does not come soon enough due to lack of involvement in the preliminary planning stages and, to some degree, public apathy.

Approach: A public involvement program which honestly addresses the concerns of resource conservation and economic development must have its foundation in maximum participation by residents of the coastal zone, and indeed, the state as a whole. It is upon this foundation that the credibility, and therefore, the success, of the coastal zone management program rests. Planning cannot be done for people, but must be done with people, involving those who will be directly affected by the results of the planning process.

SUPPORTING ACTIVITIES 1971-1973

Estuary Planning Guidelines:

The OCC&DC has developed a set of guidelines to assist local units of government in developing and implementing plans for estuarine areas.

The guidelines are the result of a demand for an approach to resolve conservation and development conflicts and to establish effective resource management tools for land and water resource planning in the 14 estuaries in the coastal zone.

Emphasis is placed on (1) involving a broad range of people from varying backgrounds and disciplines in the planning process; (2) a definite step by step process in developing a plan and management system; (3) basic contents of an estuary plan, and, (4) local, state and federal partnership in solving estuarine problems.

Resources of Critical Environmental Concern

Specific work items are underway to inventory the resources of critical environmental concern identified by the Commission. An inventory of all sand dune areas, both active and recently stabilized is currently underway by the Soil Conservation Service at the request of OCC&DC. A program to identify the extent and value of wetlands has also been initiated. In addition, a discussion draft of the historic and archaeological sites within the coastal zone has been completed. An inventory of the characteristics of each resource will provide the basis from which policies and standards will be developed during the next two and one-half years.

Levels of Planning in the Coastal Zone

A report was published in May of 1972 by the Commission regarding the studies and planning activities by local, state and federal agencies and private groups and institutions in the Oregon coastal region. The document covered the majority of all land use and natural resource planning activities ongoing during the spring of 1972. The report is now being updated with additional information and detail to accurately reflect the levels of planning underway and projected in the coastal zone.

Agency and Governmental Coordination

The Commission has established excellent communications with state and federal natural resource agencies and local units of government within the coastal zone. The assistance and cooperation of agencies, at all governmental levels, has been extremely helpful and much of the Commission's success, to date, must be attributed to such cooperation.

Environmental, Conservation and Economic Concerns Advisory Committee

An Environmental, Conservation and Economic Concerns Advisory Committee was formed by the Commission to insure that a broad range of conservation and development expertise is formally represented in the resource management planning process. The advisory committee is involved at the same level, essentially, as each commission member to insure overall participation in Commission activities.

OCC&DC Coordinating Committees

The membership of the Commission is divided into four regional coordinating committees. The monthly meetings of the committees insures the opportunity for any individual, group, or local unit of government to become involved directly in the decisions of the commission.

Other Activities

The Commission has been involved in responding to items of coast-wide concern at the request of other units of government. Decisions by the Commission on these matters have been recommended to the Governor for action. Such examples are the direction taken by the Commission in resolving the decade of struggle and controversy in Tillamook County regarding relocation of Highway 101. The support for the moratorium on development in the pristine South Slough area of the Coos Bay estuary and the requested action to renovate the dying Tillamook estuary by specific dredging action are additional examples.

WORK PROGRAM

The primary work program elements of OCC&DC include, (1) the development of policies and standards for resource management; (2) economic survey and analyses to provide base of data regarding economic potentials, conflicts and trade-offs; (3) public involvement and information programs; (4) transportation planning; (5) coordinated coastal mapping program, and;

(6) information storage and retrieval program. There are additional points of emphasis in the Commission work program not outlined in this report. The following items are primarily the major aspects of the work program.

Development of Policies and Standards for Resource Management in the Coastal Zone

OCC&DC will prepare policies and standards against which proposed uses of the natural resources in the coastal zone may be evaluated. The criteria that will be utilized in this process will be developed by the Commission in concern with state natural resource agencies and local units of government. A policy is defined as "... a definite course or method of action selected from among alternatives to guide and determine present and future decisions adopted by some authority". Policy planning is important to the OCC&DC in that policies help to define the conflicts inherent in resource use and development and clarify approaches to resolving those conflicts.

A standard is defined as "...any definite rule, principle, or measure established by authority". Standards are an essential and primary component of the coastal zone management plan in that they provide guidance in management decisions, relating to the capacities and tolerances of a given resource for use and development. The OCC&DC commissioners believe standards development must be preceded by an extensive public involvement program which will lead to agreement on broad issues of resource management policy. Only after consensus is reached at the "policy" level regarding resource use can the Commission proceed to the development of resource standards.

Coastal zone resource policies will be fairly uniform guiding principles, but they are not specific proposals for action. The following is an example of the policy level intended:

Waterfront development in estuaries should be restricted to those activities which are directly or indirectly dependent on a shore location.

To effectively serve as a base for the development of standards, the policies developed through the leadership of OCC&DC must be of coast-wide significance and general enough to be uniformly applicable in terms of resource management in the coastal zone.

The initial discussion of resource management policies by OCC&DC took place on June 29-30, 1972, at the Commission's Conference. The Commission outlined numerous local and regional concerns, problems, goals and objectives. Subsequently, these areas of interest were refined into categories of environmental concern clearly of significance in coastal zone management.

Policies will be drafted for the developmental activities and natural resource categories identified as being of coast-wide concern by OCC&DC.

Resource management standards will provide a specific method for decision-making to maximize the benefits of the coastal zone to the people of Oregon.

Standards will be based on sound principles of resource management and related to the physical features of the coastal zone in such a manner that they may be readily interpreted by local officials and natural resource personnel. The following is a standard of the nature intended:

Residences, public buildings, and other development types adaptable to a variety of sites should be prohibited in waterfront areas along estuarine waters.

Standards will be prepared for those 18 natural resource and developmental activity areas previously identified by the Commission, and based on the policies drafted for those categories.

The standards will be directed at common resource management problems and decisions. Standards will be developed first for those natural resource areas for which detailed information is available. Geological hazards and floodplains are examples of such resources. Resource categories will also be listed in order of priority to be used in the development of standards. In this way the more critical areas of decision-making (such as estuaries) will receive primary attention.

Standards will be developed by OCC&DC and its staff, natural resource agency personnel, and by consultants selected by the Commission. Extensive public involvement in the development of standards will continue throughout the program.

Economic Survey and Analysis

A primary task of the Commission is to study the economic potentials and conflicts within the coastal zone. Specifically, the Commission will participate in a study to provide base data regarding economic potentials and conflicts and to identify information for evaluating the balance between economic needs and the needs for conservation.

The Commission staff will continue to support the current economic study of the coastal zone being carried out by the Economic Task Force of the Pacific Northwest River Basins Commission. The study will provide the basis for further in-depth study of economic potentials and conflicts by OCC&DC. The objective of the current study is:

to provide economic input and increase the effectiveness of local, state and federal planning and decision-making in the management of coastal zone resources. State and federal cooperation in support of local participation in the planning process will be emphasized.

Participants in the study include fourteen state and federal agencies as well as local economic development interests. The OCC&DC has assisted this effort by having its executive director act as chairman of the task force.

Each participating agency is to prepare a report in their respective areas of resource interest identifying resource capacities, employment effects of economic sectors (i.e. wood products, fisheries, etc.) and identify external factors such as foreign markets, environmental policies, etc., which influence that economic sector.

A summary report will be prepared outlining the implications of the inter-relationships of the individual agency reports. The language of the summary document will be expressed in lay terms in order to achieve wide public distribution, understanding and use, particularly by public and private decision-making bodies.

The subsequent studies to be conducted by OCC&DC will develop from the information generated in the PNRBC report and will identify economic potentials and conflicts including collection and interpretation of additional existing information and identifying further information needs. It is expected that the study will also identify and discuss economic factors in relationship to fragile areas of the coastal economy.

The results of this study will provide local decision-makers with a detailed data base, and a methodology for evaluating balances between conservation and development.

In summary, it may be said that the economic study is part of the Commission's overall program to:

- (1) Ensure to the people of the coastal zone and the state, maximum present and future returns from coastal resources.
- (2) Balance the rights of the present generation against the rights of future generations.
- (3) Allocate powers and duties as clearly as possible between the private and public sectors.

It is clear to the Commission that the coastal plan must include a system by which decisions can be made regarding economic considerations in resource management.

Public Involvement Program

The OCC&DC is developing a public involvement program encouraging a wide variety of public and private interests to participate in reviewing, responding and selecting alternative management policies and standards for coastal resources. In short, the Commission intends to carry out its tasks by planning with people, rather than planning for people. Commitment, and hence, implementation of a planning program, will only occur if those affected by the plan have been involved in its development.

In addition to its major responsibility of preparing and recommending coordinated management plans to the Legislature, the Commission has an important role as a catalyst, bringing together individuals and groups of varying interests, both public and private, coastal and inland, to focus attention on the natural resources of coastal Oregon.

These individuals and groups can be defined more specifically as:

- Locally elected officials, commissions and staffs
- Environmental, commercial and industrial interests
- Various "publics", (groups, organizations, etc., as well as general citizenry)
- Councils of Government
- OCC&DC Staff
- OCC&DC Coordinating Committees
- Commission's Advisory Committee
- State natural resource agencies
- Federal natural resource agencies and other local, state, and federal agencies having a responsibility in the coastal zone.

The role of the participants is seen as developing and recommending alternative management policies and standards to the OCC&DC. The process involves review and suggestions for revision of an initial discussion draft of broad uniform policies for natural resource use. The suggestions will be incorporated in a second draft which will again be reviewed by participants. This process will be repeated until consensus is reached on a set of policies and, subsequently, standards that can be recommended to OCC&DC.

To assist in this program, the OCC&DC has entered into an agreement with the OSU Cooperative Extension Service to provide an extension agent specifically for preparing and carrying out public involvement and information programs.

A variety of media methods are being initiated which will enable maximum awareness of the need for coastal zone management. These include: publication of a monthly newsletter, development of a slide program outlining the need for resource management and the responsibilities of OCC&DC; video tape information programs on each natural resource category of critical environmental concern; and extensive news releases and other informational methods. A substantial portion of staff time will be spent on this important task.

Coastal Transportation Planning

OCC&DC is forming a transportation planning committee, composed of representatives of the coastal regional councils, the State Department of Transportation, and other appropriate groups and agencies. The purpose of the committee will be to: (1) provide a summary of coastal zone transportation facility requirements to the National Transportation Needs Study, and (2) to evaluate the transportation needs inherent in the coastal zone management program and recommendations developed by OCC&DC.

Coordinated Mapping Program

The primary objective of this program is to coordinate mapping efforts of local jurisdictions and state and federal agencies. By recommending common scales, where possible, and joint development of mapping and aerial photograph projects, a more manageable information base will be available for future planning and resource management in the coastal zone. OCC&DC will work closely with the Oregon Mapping Coordinating Committee in this effort.

Information Storage and Retrieval Program

OCC&DC will collect and develop a great deal of information in developing a plan for coastal zone management. In order that this information be available to a wide variety of users, an information storage and retrieval system must be developed. The system should be designed to accommodate maps, aerial photographs and specialized resource management data as well as conventional reports. The system must be structured to be practical for local jurisdictions involved in implementing a coastal zone plan, as well as effective for more specialized natural resource agencies.

It is not the intent of the Commission to develop such a system on its own, but to rely, primarily, upon an existing agency or institution to develop a comprehensive data storage and retrieval system, perhaps at one of the State universities. The role of the OCC&DC in this effort is to identify the need for such a facility and to assist in the development and collection of data which may then be stored and readily retrieved by agencies, organizations and units of local government in carrying out planning and management activities in the coastal zone.

In order to facilitate planning coordination throughout the state it is desirable that the information handling procedure used in the coastal planning process is compatible with those of the current Willamette Valley Environmental Protection Study and other efforts statewide. The feasibility of such standardization is being investigated.

Presented, October 11, 1973 on behalf of California Coastal Zone Conservation Commission by DONALD W. HEDRICK, Commissioner, North Coastal Region.

Problems on California's Coast

This presentation will include two reports, one depicting the activities and progress of the State Commission which will, in effect, summarize much of the progress achieved by the six regional commissions as well, and the second will specify activities of the North Coastal Regional Commission of which I am a member. Mr. Jack Schoop, Chief Planner of the State Commission, prepared most of the first report and Mr. Jack Lahr, Executive Director of the North Coastal Commission provided the information on the activities of our Regional Commission which is located adjacent to the southern Oregon Coast.

Mr. Joseph Bodovitz, Executive Director of the State Commission, made a talk in mid-June of 1973 to a conference on Organizing and Managing the Coastal Zone held at the U.S. Naval Academy from which I'm using a few introductory statements to lay the background for our topic today.

Last November 7, the voters of California were called upon to decide whether they wished to impose the death penalty (they did), to be more tolerant of marijuana (they didn't), and to protect under proposition 20, the State's 1,100-mile coastline (after a hard-fought campaign, they did).

The California coastline balloting came because a hard-working band of environmentalists had secured the thousands of signatures necessary to get an initiative measure, (Proposition 20), before the State's voters. This in turn came after three years of frustrating debate in the State Legislature, in which opponents of coastline legislation were able to defeat even the weakest proposals.

So, on the morning of November 8, California had a new law, enacted by the people themselves, called the California Coastal Zone Conservation Act of 1972. About 55 percent of the voters who cast ballots at the election---some 4.3 million persons--adopted a new statute that begins with the following words:

"The people of the State of California hereby find and declare that the California coastal zone is a distinct and valuable natural resource belonging to all the people and existing as a delicately balanced ecosystem; that the permanent protection of the remaining natural and scenic resources of the coastal zone is a paramount concern to present and future residents of the state and nation; that in order to promote the public safety, health, and welfare, and to protect public and private property, wildlife, marine fisheries, and other ocean resources, and the natural environment, it is necessary to preserve the ecological balance of the coastal zone and prevent its further deterioration and destruction; that it is the policy of the State to preserve, protect, and, where possible, to restore the resources of the coastal zone for the enjoyment of the current and succeeding generations; and that to protect the coastal zone it is necessary:

- (a) To study the coastal zone to determine the ecological planning principles and assumptions needed to ensure conservation of coastal zone resources.
- (b) To prepare, based upon such study and in full consultation with all affected governmental agencies, private interests, and the general public, a comprehensive, coordinated, enforceable plan for the orderly, long-range conservation and management of the natural resources of the coastal zone, to be known as the California Coastal Zone Conservation Plan.
- (c) To ensure that any development which occurs in the permit area during the study and planning period will be consistent with the objectives of this division.
- (d) To create the California Coastal Zone Conservation Commission, and six regional coastal zone conservation commissions, to implement the provisions of this division."

STATE COMMISSION'S ROLE

The work of developing a coastal zone plan is under way, with foundations being laid for maximum public involvement in preparing it. The most visible activity to date has been the processing of requests for exemptions and for permits to develop lands within the 1,000-yard permit zone. Less prominent, but important, are the more than 30 lawsuits filed by aggrieved parties on both sides of the conservation issue.

Responsibility of the State Commission has been to define and guide the planning program, and to process appeals from permit decisions of the Regions. A brief summary of each follows.

Planning

The State Commission has approved and referred to the Regions an Outline for Planning. It lays out a process for planning designed to permit the participation of large numbers of the public with most of the involvement to occur at the Regional level. It also consolidates the planning elements mandated in Proposition 20 into 13 more readily comprehensible elements.

Since June, all of the Regional Commissions and staffs have been proceeding in accordance with the procedures and the time schedule indicated in the Outline with the exception, as in the North Coast Region, that some grouping of the elements might become necessary. The State staff conducts an active liaison program with all of the Regions, by meetings and by correspondence, to keep all seven of our planning efforts synchronized.

Because of our acute shortage of funds (all of our Commissions are jointly working at a rate of expenditure totalling \$7.5 million through 1976 whereas only \$5 million was appropriated in Proposition 20), we are seeking to get all of the work done either with our own existing staff resources or through foundations or other programs, most especially the Federal Sea Grant program.

Two of the seven elements now committed on Powers and Funding, and Government will be undertaken by researchers at the University of California at Berkeley, funded by the Sea Grant program (a Federal program of major grants to colleges and universities to conduct research on coastal zone problems). A third plan element, Marine Environment, is being undertaken by a volunteer staff headed by a Central Coast Commissioner and staffed by Sea Grant personnel at Moss Landing.

Two elements, Geology and Land and Air Transportation, have been undertaken by members of our regional staffs in San Diego and San Rafael. The final two, Coastal Land Environment and Energy, are being conducted by State office staff.

Permits and Permit Appeals

The permit requirements of Proposition 20 are vital because:

1. It is absolutely necessary to have control over what happens to the coastal zone during the three-year planning period, or much of the planning would be in vain;
2. The review of actual permit applications provides a real and meaningful test for planning concepts--while the planning concepts are being developed--so the public, the Regional and State Commissions and their staffs, the developers, the conservation

and local, State and Regional government agencies affected all go through an education process together.

This is one of the significant differences between the California Coastal Zone Conservation Act and traditional "paint it green and call it open space" planning. The permits give planning an instant, acid test.

The permit system defined in Proposition 20 is very explicit. It defines a "permit zone" in which permits are required. This extends geographically 1,000 yards landward from the mean high tide line and seaward to the limit of the State's jurisdiction (3 miles). Any "development" within this large area must have a permit granted by the Regional Commission or, if appealed, confirmed by the State Commission. "Development" includes almost anything of any substance--structures, construction, excavation, discharges, grading, and even subdivision of land right down to lot splits.

The permit zone, significantly, also includes all non-tidal bodies of water lying wholly or partly within the 1,000 yards landward of the mean high tide line--lagoons, marshes, lakes, ponds, etc--and, a strip of land 1,000 feet surrounding them.

It is now clear that the permit activity of the Commissions has been our most visible activity. Literally hundreds of projects were affected when the voters approved Proposition 20 on November 7, 1972. Projects already underway on November 8--the legally effective date of the Act--could qualify for exemption from the permit requirement if they met certain tests of diligence, progress, and investment. The Act is quite explicit about exemptions, so the next step was an interpretation and development of regulations and criteria for exemptions. The major feature of these was that the project had to have final discretionary approval by existing local or State agencies prior to November 8, plus evidence of certain work performed at the site. No flat "moratorium" on development was intended, according to the legal history of the Act. The sensitive period lies between November 8 and February 1, 1973, at which time the Commissions permit procedures were established and any development after that date definitely required a permit issued by the Regional Commission. Or, if appealed, a permit granted by the State Commission.

Now after eight months of positive permit control (February 1) and after nine-plus months of control and procedures on both exemptions and permits, we are entering an interesting stage. The Regional and State Commissions, the developers, and conservation organizations began taking court actions. More than 30 cases are now moving through the courts involving actions of the Commissions. The first to proceed all the way through the State Supreme Court resulted in an opinion on August 22 which greatly affects the actions of the Commissions on exemptions. It's a complex issue but, over--simplified, the decision means that the Commissions must use February 1, 1973--rather than November 8, 1972--as the key date in determining whether or not an applicant qualifies for an exemption. In other words, an applicant apparently does not have to have construction actually underway on November 8 in order to qualify for an exemption.

Setback by Court Decision

The decision, of course, is considered a setback to the Commission's beginning efforts. Some projects which probably should not be built--if the ideals of Proposition 20 are to be realized--will probably now be built, as a matter of law. However, in the longer view it will have only a spotty effect on the coastal zone and the major thrust of the Act is not thwarted.

In our permit actions to date we can demonstrate that many different kinds of projects have been either denied, or sent back to the drawing boards for improvements, or modified and improved as a result of the permit procedure. A vital byproduct of this has been tangible, concrete inputs into our planning concepts. Projects affected range from large coastal power plants in the Los Angeles area to remote subdivisions in the rugged, forested grandeur of the North Coast.

Increments of permanent open space have already been established in built-up coastal areas, as developers of subdivisions, apartments and condominiums, and commercial and industrial centers have been required to provide less density of dwelling units and more open space for both the public and the future residents of the developments. This has meant, in some cases, a confrontation with existing zoning or building codes or plans of municipal and county levels of government. The Act is generous in the authority it gives to the Commissions as regards other governmental jurisdictions, and this includes such environmental enforcement agencies as the water quality and air pollution control districts.

However, some of our actions result in strengthening the pro-environmental programs of other agencies. For example, the State Departments of Fish and Game and Parks and Recreation, have missions that parallel some of the major goals of the Act--preserving estuaries, lagoons, and marine habitat, for example, or increasing public access to the beaches and the coast for recreation. You might say the Act has produced a multiplier effect on other, older government agencies with missions in the environmental field. We are able, in some situations, to help them to do what they want to do but for some real reason are not able to do.

The second part of my presentation includes material from the North Coastal Regional Commission about which I can speak more authoritatively.

REGIONAL COMMISSIONS' ROLE IN COASTAL ZONE PLANNING UNDER PROPOSITION 20

The Regional Commissions, of which there are six, established by the California Coastal Zone Conservation Act, are charged with preparing definitive conclusions and recommendations under guidelines and criteria adopted by the State Commission for the Coastal Zone Plan.

This is to be accomplished in cooperation with appropriate local agencies and will include recommendations for areas that should be reserved for specific uses or within which specific uses should be prohibited. The Act directs each Regional Commission to conduct public hearings in each county of the region prior to adopting these recommendations and submit these to the commission no later than April 1, 1975.

So, in effect, the Coastal Zone Plan will be the composite recommendations of six regions recognizing geographic and natural resource differences for the twelve planning elements adopted by the State Commission. It would be an impossible effort to not recognize the differences between the regions and adopt "wishy-washy" policy statements which would be generalized to the degree of ineffectiveness. As the North Coast Region of Mendocino, Del Norte and Humboldt Counties has the most extensive undeveloped coastline in the state and is the largest of the six, geographically, we feel it is imperative that sound natural resource management or planning principles be applied relative to existing uses---including distribution, densities, and the areas' ability to assimilate development without destroying or irretrievably committing the natural resource base remaining.

While the State has adopted the guidelines and criteria and the framework of the plan (planning elements) it is the responsibility of the six regional commissions and staffs to effectively create the plan for adoption by the State Commission and ultimately the State legislature.

As regards the planning elements, our commission recognized the need to combine or group the elements to fit the inter-related resources of the coast. We grouped the planning elements as follows:

- I. The Coastal Environment
 - A. Marine Environment
 - B. Coastal Land Environment
 - C. Recreation
 - D. Geology
- II. Energy
 - A. Power Plant siting
 - B. Public Utilities
- III. Design and Development
 - A. Would combine the design and intensity of development
- IV. Transportation
 - A. Air
 - B. Water
 - C. Land
- V. Governmental Organization
 - A. Powers and Funding
 - B. Structure
- VI. The Preliminary Plan

Our staff is developing the regional elements concurrent with the other staffs and other volunteer assistance developing the elements on a statewide basis. In other words, we felt we have more than enough to do within the regional complex without taking on the additional assignment of developing a plan element such as energy requirements for the 1200 mile coastline with the limited time, staff, and funding available.

As applicable, statewide or general information data is received from the coordinating efforts of the State Commission staff, a North Coast Regional staff member is assigned to develop the regionally significant data. In other words, we in the region go from the general and zero in on the specifics based on present land uses trends, other agency programs, research, and planning, projections - such as federal and state land acquisition programs for public conservation and recreational needs. In addition, we seek private interest input at the regional level - both from industry and conservation minded organizations.

Considering the myriad programs and varying philosophies at the regional level, our commission has formed committees as follows:

- Planning
- Tax
- Forestry and Wood Products Industry
- Transportation and Population

These units provide interim policy guides and staff direction on the interacting and competing demands for development as well as direct input to plan element development.

In summation, the State Commission has the overall coordinating role for plan development and hearing of appeals on permit matters. The broad guidelines and criteria for planning are established giving the Regional Commissions parameters within which to develop regional recommendations and plan policies. The Regional Commissions are also responsible for interim permit procedures assuring that development proposed during formulation of the Coastal Plan meets the objective and goals of the Act.

PERMIT APPLICATIONS

In mid-August one of the Commissioners requested a summary of permit applications approved, denied and pending. These statistics are shown below:

<u>Type of Application</u>	<u>Approved Aug.</u>	<u>Denied Aug.</u>	<u>Pending Aug.</u>	<u>Totals Aug.</u>
Administrative Permits	152	0	8	160
Consent Calendar Items	95	0	14	109
Public Hearing Items	88	1	9	98

Emergency Permits	10	0	0	10
Claims of Exemption	<u>6</u>	<u>0</u>	<u>0</u>	<u>6</u>
Totals	351	1	31	383

What has been said so far is largely factual and statistical material. I think it is appropriate to add a few personal remarks on Commission make-up and functioning. We are evenly divided between local elected officials and members of the public appointed equally by the Governor, State Assembly and State Senate. We have diverse interests and backgrounds, e.g., rancher, business men, labor, educator, professional forester and housewife, but all members have an intense interest in their assignments and a good record of attendance at regular and special meetings. We disagree about the value of the statute and its future but I think agree that some control is needed over future coastline development. Most of our elected officials believe that cities and counties are capable of handling this task but, in my opinion, the voters of the State disagree and our past record in this regard is undoubtedly responsible for concerned citizens to take the initiative in the form of Proposition 20.

This presentation of necessity has been rather disjointed and lengthy. However, I hope it has given you a birds-eye-view of what's happening in California. As a very small landowner on the Oregon coast I am hopeful that you will be taking similar drastic action. Otherwise, I will be retiring in one big condominium rather than on the beautiful Oregon coast where I purchased a forested lot in 1964.

Property Owner Attitudes and Perceptions

Awareness of estuarine resource abuse is growing in an era when private citizens have an increasing interest in maintaining a "quality" environment. However, the management of most natural resources, including estuaries, has evolved into control by government bureaucracy, encouraged by public disinterest and ignorance in the past. One premise in traditional natural resource management in the United States is that the professional is more knowledgeable than the private citizen. Professionals not only believe that they know more about the natural resource; they also perceive to know the attitudes and values retained by private citizens, and use these perceptions in the formulation of a management program (White, 1966).

Very little statistical data has been collected on public attitudes toward natural resources, reflecting the traditional relationship between managing agencies and the public. Local property-owning citizens constitute one group concerned with any natural resource.¹ Their concern reflects daily experiences, economic factors, and aesthetic considerations. These private citizens should be the most knowledgeable group when considering existing and changing use patterns in an adjacent natural resource. These individuals also are aware of potentials and limitations for development.

To properly manage any natural resource, the attitudes and values local property-owning residents have formulated regarding it should be measured. Although local residents have an inaccurate perception of some facets of the resource, the exact nature of these deviations from reality or facts has not been ascertained. Factual information includes data compiled by representatives of public agencies and institutions. While this set of information is also

¹"Local" is defined as situated so as to have daily visual or physical contact with the natural resource. "Property-owning" includes permanent homes and businesses, but excludes lot holders and owners of mobile homes.

incomplete, it is the best information available. Factual information includes a wide range of subjects, while the knowledge of local citizens is confined to a few topics. If planning and management of a natural resource is to reflect societal needs and goals, data regarding the perception of local residents must be obtained.

The area surrounding Siletz Bay, a small estuary along the central Oregon coast, was selected as an appropriate location to survey local resident perception for three reasons. First, the three communities² surrounding Siletz Bay are examples of the three main types of communities along Oregon's coastal zone. Salishan is an expensive vacation development, including both homes and condominium units. The second community includes Kernville and Cutler City which are two small, economically-depressed villages inhabited by retired individuals and persons dependent on utilization of primary resources. Taft is the service center community for the Siletz Bay region. The economy of Taft depends on the continued attraction of tourists. Secondly, Siletz Bay is an "average" estuary in Oregon, near the mean in size and with a natural community not atypical of estuaries in this state. Thirdly, the historic use and present development pattern at this Bay exemplifies estuarine use in Oregon.

In the past, Siletz Bay has been the focus of thriving lumber and fisheries enterprises. These industries have declined in importance, but the resource has more recently become the center of recreational development, exemplified by second homes and an influx of retired individuals.

Information about local residents was acquired through a questionnaire survey, soliciting responses from 146, or 23 percent, of the households and businesses, in the three communities adjacent to Siletz Bay. The collected data were analyzed by six socio-economic variables to ascertain trends in response patterns when considering specific characteristics of the participants. The six characteristics---age, length of property ownership, temporary residence or permanent residence, commercial or private property owner, community of residence and family income level---are significant indicators of the perception local residents have toward Bay use and development. The six socio-economic characteristics of the respondents are summarized in Table 1.

²"Communities" is defined as a grouping of people rather than a bounded, legal entity.

Table 1. SOCIO-ECONOMIC CHARACTERISTICS

<u>Age:</u>	15-24 (1%)	25-34 (3%)	35-44 (13%)	45-54 (25%)	55-64 (29%)	65 or older (28%)
<u>Length of property ownership near Siletz Bay:</u>	Less than 1 (2%)	1-5 (40%)	6-15 (29%)	over 15 (28%)		
<u>Nature of residence:</u>	Permanent (77%)	Temporary, seasonal, or secondary (less than 6 months) (23%)				
<u>Type of residence:</u>	Commercial (14%)	Private (86%)				
<u>Community:</u>	Salishan (26%)	Taft (39%)	Cutler City and Kernville (35%)			
<u>Family income level:</u>	-4,999 (19%)	15,000-24,999 (12%)				
	5,000-9,999 (32%)	over 25,000 (19%)				
	10,000-14,999 (14%)	refuse (3%)				

USE PATTERNS

The first group of questions concerned use patterns. Uses at Siletz Bay are limited to recreation, waste disposal, and filling and dredging ---reflecting residential, recreation, and transportation demands. The first two questions compared personal use to perceived use by other residents. Table 2 contains the response pattern to these questions. The greatest personal use was scenic and visual effects. In the more active use categories, recreational fishing was undertaken by 61% of the respondents and walking by 58%. When the respondents were asked how they thought other people from the local area used the Bay, the active uses increased by 15% to 42%, while scenic and visual effects decreased by 8%. Some of the respondents must have felt their friends were using the Bay in a more active manner than themselves. Aesthetic appreciation of the Bay may be more of a personal feeling and use. Further, typical conversations probably concentrate on active uses, rather than the scenic qualities of this estuary.

Table 2. USE PATTERNS

- In what way or ways do you use Siletz Bay? (circle more than one)

Fishing (61%)	Shellfishing (34%)	Sewage outfall (3%)
Boating (41%)	Hunting (10%)	Scenic or Visual Effects (79%)
Walks (58%)	Swimming (3%)	Other (specify) (4%)
- How do other people from the local area use Siletz Bay? (circle more than one)

Fishing (91%)	Shellfishing (76%)	Sewage Outfall (12%)
Boating (82%)	Hunting (37%)	Scenic or Visual Effects (71%)
Walks (73%)	Swimming (21%)	Other (specify) (2%)

The next question, summarized in Table 3, includes two additional questions about patterns of use. The four dominant observed uses of Siletz Bay were recreational fishing (98%), recreational boating (97%), shellfishing (89%), and walking (86%). Only 60% of the participants stated that they had observed filling land, and 57% indicated that they had seen dredging occur. At the time of the survey, however, contractors for the Oregon State Highway Division had filled more than 15 acres of marshland adjacent to Highway 101 to a height of eight feet with dredge spoils derived from constructing a new bridge across the Siletz River. Surprisingly few of the respondents, 25%, indicated they had observed sewage outfall. Cutler City had installed a sewage treatment system in 1970, but Kernville and the houses along the salt marshes east of the Bay did not tie into any system.

Table 3. POSSIBLE ESTUARINE USES

- a) In column A, check those uses you have seen at Siletz Bay.
b) In column B, check the use or uses that are most important to you in Siletz Bay.

	A	B		A	B
Recreational Fishing	98%	68%	Shellfishing	89%	36%
Commercial Fishing	10%	5%	Hunting	56%	9%
Recreational Boating	97%	50%	Log Storage	12%	1%
Residential Development on Filled Land	60%	4%	Sewage Outfall	25%	1%
Commercial Development on Filled Land	36%	3%	Filling Land	60%	2%
Commercial Development on Shorefront Property	50%	8%	Bird Watching	54%	18%
Scientific Research	16%	7%	Dredging	57%	3%
General Aesthetic Value	72%	55%	Walking	86%	42%
			Swimming	40%	8%
			Other	1%	0%

An unexpected result of the survey was that only 16% of the respondents were cognizant of "scientific research" around the Bay. Only two respondents commented that they considered this project as scientific research. When the respondents were asked what uses might be occurring even though they had not observed them, only an additional 9% felt scientific research might be occurring. Thus, scientific research, such as investigations by representatives of Oregon State University and public agencies, has not been well-publicized. The low percentage of 25% indicates that the local public is poorly informed and seldom involved in Bay research.

When asked what were the most important use or uses of Siletz Bay, respondents emphasized five recreational categories: fishing (68%), general aesthetic value (55%), recreational boating (50%), walks (42%), and shellfishing (37%). Importance was clearly related to most highly valued personal use by the respondents. All forms of recreation are more important than non-recreational uses to a large majority of residents at this estuary. As a large percent of the respondents were either retired or seasonal residents, this value structure was anticipated.

RESPONSE PATTERNS ANALYZED

Response patterns to these questions were also analyzed by using six socio-economic variables. Older respondents, especially those older than 55, maintained and perceived a less active recreational use pattern. They enjoyed walking and the aesthetic appeal of the Bay. Younger respondents tended to engage in more active forms of recreation and perceived these activities as dominant uses.

Generally, respondents living in the area the longest used the Bay the least, and perceived that others used it less, when compared to respondents who had been in residence less than five years. Several persons who had lived in the area more than 15 years felt recreational fishing, shell-fishing, and hunting were all decreasing uses. "I can remember when" followed by a favorable phrase about past success in a recreational activity was frequently heard.

The temporary residents group had a higher percentage of respondents involved in a few specific uses including walking, aesthetic appreciation, recreational fishing, and bird watching. Permanent residents were much more interested in non-recreational uses. For example, no temporary resident included dredging, filling, and development on filled land and shorefront property in his group of most important uses. This result is not surprising, as most temporary residents bought property in the area for a specific use or group of uses, and tried to maximize these opportunities whenever they reside at the Bay. Permanent residents have more opportunities to both undertake and observe a wider variety of activities in the Bay area.

Many uses were dominated by residents from one of the three surveyed communities. For example, over 70% of the hunters came from Cutler City and Kernville, or, a much higher percentage of respondents from Salishan used the Bay for walking and scenic qualities. Salishan residents expressed interest almost exclusively in recreation. Respondents from Kernville and Cutler City, and to a lesser extent, Taft, were interested in a wider variety of uses. Of the respondents from Salishan, 63% thought walking was an important use, while only 42% of the respondents from Taft and 28% of the respondents from Cutler City and Kernville agreed.

Response patterns for various income levels closely correlated with three other categories: age of respondent, the older residents having less income; nature of residence, the temporary residents being wealthier; and community of residence. Income level did not alter perceived and personal Bay use patterns, except for scenic and visual effects which were enjoyed more by wealthier respondents.

Commercial respondents were more active users of the Bay and perceived greater use by other local residents. Their perception of higher use levels was based on at least two factors; greater contact with the public through their businesses, which were mostly tourist-oriented, and greater personal use of the Bay. Commercial and private participants responded in a similar pattern to the most important use question. Therefore, a majority of both business owners and private residents perceive the optimum future of the local area to be in promoting recreational opportunities. More important,

this pattern implies that minimal conflict should be generated between commercial and private interests regarding the future use and development of the Bay.

DEVELOPMENT ALTERNATIVES

Two questions about possible future development alternatives were presented to participants. These questions and the response patterns are presented in Table 4.

Table 4.

In column A, check the development you desire.

In column B, check the developments a majority of your friends desire.

	A	B
Recreational Marina	65%	68%
Commercial Logging Port Facility	7%	8%
Commercial Fishing Port Facility	24%	28%
Filling Wetlands for Commercial Development	11%	12%
Dredging and Maintaining a Channel in the Estuary	55%	56%
Other (specify)	4%	3%
None of the Above	31%	25%

Only 31% of the respondents felt there should be no major modifications within the Bay. The percentages of respondents desiring each form of modification decreases as the project becomes less feasible in terms of public acceptance, expense, and relationship to the natural resource base. For example, a commercial fishing port, considering the crowded conditions in nearby ports, has a much higher level of feasibility than a commercial logging port. The area to be serviced by a logging port has been mostly harvested, and both the structures and activities associated with a logging port would be considered more detrimental to the natural values of Siletz Bay by many other local residents.

Respondents felt other local residents wanted similar developments. This pattern was anticipated as most people associate with individuals having similar interests. The publicity for proposed developments is reflected in response patterns as a few individuals who did not want any form of development recognized that their friends had different points of view. This pattern also indicates development is a focus of expression and interest while the negative desire of wanting no change, is discussed less frequently.

The older respondents, over 55, and younger respondents, under 35, maintained the greatest desire for Bay development. The younger groups were interested in developing the recreational potentials of the Bay. Most of these respondents seemed to equate their answers with the perceived economic potentials of the region. Some younger respondents stated they had

initially bought their property as an investment. The older group included almost all the individuals desiring a commercial logging or fishing port, as well as many favoring future recreational development. One reason some of the older respondents favored non-recreational development was its compatibility with use patterns of an earlier era, when the Bay had been the center of timber and fishery enterprises.

When considering length of property ownership, the longer term residents desired both recreational and non-recreational development, while the shorter term residents who desired development were oriented toward recreation alone. Answers from older residents and long term residents yielded a similar pattern of perception concerning development alternatives. Younger and newer residents had not experienced the past history of the Bay, and as a consequence predicted future economic growth based on the bay's recreational potential.

RESPONSES SHOW DIVERSITY

Responses from temporary and permanent residents resulted in a significant division of opinion. Of the temporary residents, 61% thought that the Bay should not be developed, while 78% of the permanent residents were in favor of a least one of the five development alternatives. Most permanent residents, excluding retired individuals, depend on the local region for income and employment. The coastal amenities the surveyed temporary residents sought were specific forms of recreation, predominantly non-development oriented. These responses demonstrate that temporary residents perceive an estuary like Siletz Bay as a scarce resource, to be preserved in its present state. The permanent residents saw increased economic value derived from higher levels of utilization, with the goal of attracting more transients.

The fourth socio-economic characteristic, community of residents, yielded results that correlated the temporary resident variable with the Salishan variable. As 78% of the temporary residents dwelt in Salishan and were two-thirds of the respondents from that section, this result is expected. Of the Salishan respondents, 54% did not want any development, while only 27% of the respondents from Taft and 15% of the respondents from Kernville and Cutler City agreed.

The fifth variable, yearly family income, had an effect on response patterns similar to community of residence, as the lowest income group corresponded closely with Kernville and Cutler City, and the highest income range was associated with Salishan. The lowest income groups favored non-recreational development most, the middle income groups responded positively concerning recreation development, and the highest two groupings were opposed to all the development alternatives proposed.

The final variable, dividing the data between commercial and residential ownership, yielded different results, for Salishan, and Kernville and Cutler City contained six of the commercial establishments surveyed and Taft contained the other 15 businesses. Most commercial respondents wanted some form of development, with 37% of this group desiring a commercial fishing

port. However, a surprisingly high 28% of the commercial participants responded negatively to all five development alternatives suggested. Commercial respondents against development included owners of marginal businesses not interested in growth and increased income, and businesses owned by retired people. Some of these respondents also lived in the study area and might retain a conservation ethic for this Bay.

CONCLUSIONS

Differences between local resident perception of use patterns and development potential at Siletz Bay and factual information were found. Six socio-economic variables were determined as good indicators of variations in value systems toward the estuary. Five conclusions from this analysis are presented:

1. Factors including proximity, personal interests, use patterns, economic considerations, and communication with other local residents inhibit formation and maintenance of an accurate perception of use patterns and development potential in Siletz Bay.
2. Value systems are tested and altered in the process of resolving conflict. A majority of these conflicts over Siletz Bay include the same elements; conservation or preservation of an estuary and its ecological system versus development to foster economic return from some facet of the estuarine system, often at the expense of decreasing natural productivity.
3. Two large communities exist, based on analysis of six socio-economic variables. One group, typically wealthier, newer, temporary residents from Salishan and of average age, favor conservation or preservation. The second group is interested in development and includes younger or older, longer term full-time residents living primarily in Kernville and Cutler City. These two groups have very little in common in terms of either background or interests.
4. Local residents did not accept beliefs held by other residents. Most respondents indicated they perceived other residents to have similar ideas when considering development and use of this estuary. This pattern is partially explained by the tendency of people to associate with others having similar beliefs.
5. Most importantly, responses to this survey demonstrate that very few local property-owning residents value the estuary as a resource of natural importance. Rather, they use the Bay to justify personal goals. Those wanting no development see it as a scarce resource, while those wanting development do not feel it is used in an optimum manner.

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Dredging Problems and Complications

The majority of U.S. waterways depend on dredging to insure adequate water depths for shipping. Other minor, but important, functions of dredging include creation of land areas; mining of underwater mineral deposits; correction of erosion; and excavation of sand, gravel, shells and rocks.

Types of Dredges

Dredges can be typically categorized as either hydraulic or mechanical. Hydraulic dredges mix large volumes of water with the sediment and the fluidized slurry is pumped away as a sludge. Environmentally, this type of dredge results in the discharge of large volumes of water that have come in direct contact with the dredged sediments. As a result, these waters will reflect the polluttional nature of the dredge spoil.

The dredged sediments which are termed spoils can be disposed of by several different procedures. For hopper dredge operations, the spoils are collected in large sedimentation tanks (hoppers) aboard the dredge. These are then dumped within the estuary or offshore. For pipeline dredging operations, the sediment slurry usually is pumped to a nearby diked area which is subsequently filled with the spoil.

Mechanical dredges directly resemble dry-land excavation machines and are usually mounted on a barge. This type of dredge is primarily used for projects with rocky deposits and for limited operations. Such dredges create fewer environmental concerns since interaction of the sediments with the water column is minimized. The spoils typically are barged to a land or water disposal site.

Scope of Dredging in the U.S.

Dredging activities remove and redeposit tremendous quantities of material. In the U.S. in 1972, maintenance dredging and new dredging projects accounted for the transfer of over 300 million cu. yds. and 80 million cu. yds. of dredge spoils, respectively. Total costs of these projects exceeded \$150 million (Boyd, et al., 1972).

A soils characterization of the spoil materials of navigation channels which are maintenance dredged annually revealed that:

"By far the largest category (approximately 153,000,000 cu. yds. per year) is that classified as mixed sand and silt. About half this value is associated with the coastal areas of the U.S., and the other half the inland rivers. Approximately 30,000,000 cu. yds. per year of that category including sand, gravel, and shell is dredged from the nation's inland waterways, while the remaining 22,000,000 cu. yds. is dredged from the coastal zone. The ill-defined materials mud, clay, silt, topsoil and shale account for 80,000,000 cu. yds. per year, all but 8,400,000 cu. yds. of which are dredged from the eastern one-third of the U.S. Finally, although the group including organic muck, sludge, peat, and municipal-industrial wastes accounts for only 1,400,000 cu. yds. per year, some of the more pressing environmental problems are associated with this group. Generally speaking, the materials dredged and disposed of in inland waterways are sand and gravel. The moving sand bottoms of many of the nation's navigable rivers have been a supply of sand and gravel for construction purposes for years. Again, generally, in lakes, harbors, and many areas of the coastal zones where the carrying capacity of the water is quite low, the dredged materials often consist of small, light particles such as clays and silts." (Boyd, et al., 1972).

Environmental Concerns

Environmental concerns in relation to dredging have risen due to the relatively fragile nature of estuarine ecosystems and the widespread use of dredging in estuaries. Particular interest has been generated around the two common practices of spoil disposal by either filling marshlands or dumping in estuarine waters. Only the latter case and other dredging activities that could directly affect water and benthic environments are examined in this paper.

Many positive environmental impacts have been documented for dredging in addition to the obvious creation and maintenance of channels. Improved circulation which results from the removal of choked inlets can increase production of shellfish and fish due to the increased availability of food. Increased circulation also can reduce the impact of man-made wastes which are frequently discharged into estuaries. In many cases, dredge spoils are economically processed to produce sand and gravel for construction.

In contrast to the several positive impacts, many potential negative environmental impacts have been cited (Table 1). These impacts result from various physical alterations such as the change in the underwater topography, the removal of benthic animals and plants and the discharge of large quantities of particulate matter into the water column. In all cases, serious degradation of water quality and destruction of ecological systems potentially can occur.

Table 1. Potential Negative Environmental
Impacts of Dredging of Sediments

Alteration of the Estuarine Environment	Environmental Impact
Changed Topography	Alteration of currents, tides, salinity regimes, and water quality
Removal of Benthic Animals	Significant animal kills, alteration of important habitats
Removal of Benthic Plants	Alteration of pelagic and benthic habitats, increased instability of benthic deposits
Discharge of Particulate Matter	Increased turbidities and sedimentation rates, release of soluble pollutants

SCOPE

During the past fifteen months, an interdisciplinary team at Oregon State University, under the sponsorship of the NSF-RANN program, has been conducting research on the environmental effects of dredging in estuarine waters. From this study, much insight has been gained into the potential acute and chronic impacts of dredging on estuarine environments. This paper will consist of listing the potential acute and chronic environmental impacts of dredging, the proposal of guidelines to minimize the acute impacts and the identification of research needs to effectively monitor dredging projects. A proposal by the OSU research team is presently being considered by NSF-RANN for continued studies on the potential chronic, long-term effects (Slotta, 1973).

PRESENT EPA GUIDELINES

The disposal of dredge spoils in estuarine waters is presently controlled by the EPA guidelines termed "The Basic Seven" (Table 2). Any sediments which exceed any of the seven parameters are termed polluted and cannot be disposed of in estuarine waters. These guidelines basically restrict the open disposal of spoils with high organic contents (i.e., highly volatile solids, COD or TKN) and/or high industrial wastes (i.e., high oils greases or heavy metals).

Table 2. EPA "Basic Seven" Guidelines
(after O'Neal and Sceva, 1971)

Parameter	Allowable Percentage Concentration (dry wt. basis)
Total Volatile Solids (TVS)	6.0
Chemical Oxygen Demand (COD)	5.0
Total Kjeldahl Nitrogen (TKN)	0.10
Oil-Grease	0.15
Mercury	0.0001
Lead	0.005
Zinc	0.005

In addition to the chemical analysis of the sediments, the following guidelines are included in the EPA guidelines (O'Neal and Sceva, 1971):

"The decision to oppose plans for disposal of dredged spoil in U.S. waters must be made on a case-by-case basis after considering all appropriate factors; including the following:

- (a) volume of dredged material
- (b) existing and potential quality and use of the water in the disposal area
- (c) other conditions at the disposal site such as depth and currents
- (d) time of year of disposal (in relation to fish migration and spawning, etc.)
- (e) method of disposal and alternatives
- (f) physical, chemical and biological characteristics of dredged materials
- (g) likely recurrence and total number of disposal requests in the receiving water area
- (h) predicted long and short term effects on receiving water quality."

These guidelines have numerous advantages and disadvantages:

Advantages

The establishment of these guidelines for dredging operations was undoubtedly a difficult task. The EPA has made a concerted effort to establish a simple and direct measure of environmental impact. The guidelines have been uniformly applied and have, at least, established a method of controlling dredging. The result of these guidelines has been an increased interest in dredging impacts and substantial effort to obtain more information. Such concerns have been widely overlooked previously.

The guidelines have been instrumental in focusing attention on the polluttional nature of the sediments. Previous to these guidelines, enforcement was based on the degradation of existing water quality. Thus enforcement was only possible after the damage had occurred which was an unworkable situation.

Disadvantages

The limitations and questionable applicability of these criteria has been acknowledged by the EPA. In the publication entitled "Proposed Guidelines for Determining the Acceptability of Dredge Spoils to Marine Waters" (Region IX, 1972), it is stated that "there is no simple method for determining whether or not a sediment is polluted. Pollution cannot be defined by a collection of unrelated parameters with arbitrary and inflexible limits. The permutations of cause and effect are enormous, and each dredging and disposal operation has a unique impact on the environment". Within the above document additional parameters were included to encompass the many potential toxicological problems associated with polluted sediments. Due to the complexity of the proposed monitoring schemes and to the lack of consensus on acceptable levels, these additional parameters were not adopted as criteria. An alternate set of criteria are presently being reviewed (Region IX, 1973). Limitations for certain pollutants such as radioactivity and heavy metals in dredge spoils to be dumped at sea have been included into the criteria for ocean dumping (Ocean Dumping - Criteria, 1973).

The main objections to the use of the listed guidelines in Table 2 center around the methods of sampling and the unknown relations between sediments before and water quality during and after dredging. No instructions, guidelines or standards were included pertaining to the collection, storage, analysis, or interpretation of the collected data. In addition, a general formulation does not exist to predict the resulting water quality after dredging from a known pollutant concentration in a sediment.

Even though the Environmental Protection Agency explicitly stated that the values for the "Basic Seven" represented guidelines and that other factors must be considered, those pollutant concentrations have been established as criteria in some locations. This action has resulted in considerable problems for agencies like the U.S. Army Corps of Engineers which are charged with the task of maintaining navigable waterways. Considerable increase in costs have resulted in certain cases for which little is known about the benefits accrued from such expenditures.

It can be concluded that the EPA should establish a more realistic set of criteria based on an increased knowledge of dredging impacts. The present guidelines were a definite positive step in the right direction, but further refinements are needed. In relation to future criteria, May (1973) has concluded that "the most realistic approach to the dredging problem is to understand the effects of the practice fully before trying to apply extensive restrictions on the dredging industry and those dependent on it. Placing proper emphasis on what dredging does and what it does not do is an important step in insuring that dredging is done with the least harm and that regulatory policies are realistic from both environmental and economic standpoints."

ACUTE ENVIRONMENTAL IMPACTS

The interactions within estuaries are highly complex and involve geological, hydraulic, biological, chemical, social, economic and political factors. Presently, the impacts of dredging are primarily identified as acute changes in the important system properties of one or several of these

categories. However, dredging also induces many potential long-term chronic impacts that also must be incorporated into the decision-making process. To fulfill national goals of protecting our environments, dredging must be regulated and both acute and chronic environmental impacts must be considered. The potential acute and chronic problems and monitoring procedures to regulate their impacts are described in the following sections.

Altered Circulation

Dredging can have a wide influence on estuarine environments by altering the circulation patterns. Many of the biological species are adversely affected by permanent changes in either salinity or temperature which result from the circulation changes. St. Amant (1956) and Waldo (1956) both reported long term changes in biological production to such dredge induced alterations. Some populations such as herbivore *Acartia tonsa* (Johnson and Miller, 1973) are extremely sensitive to specific circulation patterns which can be significantly altered by either spoil removal or disposal.

These studies suggest that dredging that could significantly alter circulation patterns needs to be regulated and at least monitored. The necessary techniques of determining circulation patterns by airphoto analysis have been developed and successfully utilized (Weise, 1973; Burgess and James, 1971).

Physical Removal of Organisms

The most apparent biological impact of dredging pertains to the removal of benthic organisms in the dredge spoil. Although this process probably does result in a large kill of these organisms, the impact does not appear to be significant for localized dredging operations. Harrison, Lynch, and Altschaeffl (1964); Saila, Pratt and Polgar (1972); and Slotta, et al. (1973), all measured an immediate decrease in the infaunal populations after dredging, but a fairly rapid repopulation did occur.

Burial of Organisms

The ability of animals to withstand the adverse effects of burial in areas near the dredge site or in the spoil depends primarily on their behavior and morphology. Species such as large polychaetes and bivalves which can burrow have been shown to survive burial of up to 21 cm of sediments (Saila, Pratt and Polgar, 1971). However, attached sessile species are probably killed by burial of any magnitude. Numerous authors (see Saila, Pratt and Polgar, 1971, for a review) have reported acute kills from burial of various benthic organisms including oysters. Slotta, et al. (1973) reported that readjustment of benthic infauna to former abundance levels occurred within two weeks of spoiling. Thus the impacts in the spoil areas also do not seem to be significant for small localized projects.

The rapid recovery rates at both the dredge site and spoils area have been attributed to a resistant biological population (Slotta, et al. 1973). It has been hypothesized that the dredging related activities such as marine traffic also disturb the benthic deposits at very short time intervals which selects for organisms resistant to disruptions. Thus, acute

biological impacts of dredging in areas subjected to dredging-related activities may not be significant even though large quantities of sediments are removed and deposited.

Turbidity and Suspended Solids

The most commonly reported effect of dredging on water quality is an increase in turbidity and suspended solids. However, almost all investigators have concluded that such increases do not represent a significant impact (May, 1973) (Saila, Pratt and Polgar, 1972) (Mackin, 1962) (Cronin, 1970) (Sullivan, 1973). This conclusion has been reached based on two premises. First, the increases in turbidity and suspended solids occurs over localized areas which pelagic species can probably avoid. Second, periodic high turbidity levels are part of the evolutionary experience of estuaries. Sediments are resuspended by wind, waves and tidal scour and large sediment loads are carried with the winter fresh water flows.

Shubel (1968) has reported a 20-fold increase in suspended sediment concentrations in Chesapeake Bay caused by natural occurrences. With this evolutionary experience, many estuarine animals are tolerant to suspended-solids laden waters. Saila, Polgar and Rogers (1971) cited several examples of tests with fish and lobsters held in waters with several-grams/liter of suspended sediments; no significant mortalities were measured. Thus turbidity related impacts do not seem to be significant in most cases.

Nutrient Release

Nutrients in the various chemical forms of nitrogen and phosphorus are commonly released from dredge spoils which results in significant increases in the ambient concentrations. Cronin, et al. (1970) reported increases near the discharge plume from 50 to 1,000 times ambient total phosphorus and total nitrogen levels. However, no increase in phytoplankton was observed. Windom (1973) also reported large releases of nutrients in his studies of five estuaries on the southeastern coast of the United States.

However, in contrast of Cronin's results, significant algal growth was reported when dredge spoils were placed with the receiving waters in closed bottle experiments. Stimulation of algal growths was also noted at the dredging sites from light-dark bottle experiments. Thus, such phytoplankton stimulation may or may not be significant. In most cases, such factors as the localized nature of most dredging projects, the large dispersion in most estuaries and the decrease in available light from increased turbidity will reduce the potentiality of serious environmental problems from nutrient stimulation.

Oxygen Demand

Dredging operations lead to the release of organic materials and inorganic materials (such as sulfides) which create an oxygen demand within the overlying waters. Under certain conditions, significant reductions of dissolved oxygen concentrations can result during dredging operations (Brown and Clark, 1968). In addition, dredging operations may expose benthic deposits of high oxygen demand which previously had been covered by relatively clean

materials. The settlement of organic material suspended by dredging operations on the surfaces of benthic systems has an increased benthic oxygen demand. The reverse can also be true if dredging operations lead to the removal of polluted sediments.

The exact causes of oxygen depletion resulting from dredging operations are unknown even though at least two studies have been completed on the oxygen demand of resuspended sediment (Seattle University, 1970, and Touhey, 1972). The reported insensitivity of the oxygen uptake rates to both concentrations and salinity of organisms strongly suggests that the majority of the demand is chemical in nature, not biochemical. The most probable species involved are various iron sulfides which are rapidly oxidized. Preliminary studies at OSU have shown that the oxidation $10^{-3}M$ of FeS to $FeOH_3$ and oxidized sulfur compounds occurs within several minutes in an aerobic environment.

The adverse impacts of low dissolved oxygen concentrations on a variety of pelagic and benthic organisms is well documented. Standardized procedures are being developed by the EPA (Region IX, 1973) to enable the estimation of whether DO depressions will be significant.

Free Sulfides

High concentrations of free sulfides within the deposits and the release of free sulfides to the overlying water and atmosphere as a direct or indirect result of dredging operations can be environmentally significant for a number of reasons. First, the release of free sulfides can increase the benthic oxygen demand rate and thus lead to a decline in the aerobic zone of the deposit and a rapid lowering of the DO concentrations within the overlying waters. Second, free sulfides, particularly hydrogen sulfide, are toxic at low concentrations to fish, crustaceans, polychaetes, and a variety of benthic micro-vertebrates (Fenchel, 1969; Servizi, et al., 1969; and Ivanov, 1968). Actual toxic concentrations reported in the literature usually represent only initial sulfide concentrations and thus may be too low due to chemical oxidation throughout the test period. In tests which maintained nearly constant conditions, hydrogen sulfide concentrations below 0.075 mg/l (pH 7.6-8.0) were found to be significantly harmful to rainbow trout, sucker, and walleye, particularly to the eggs and fry of these fish (Colby and Smith, 1967). For these reasons, specific criteria need to be established to regulate such releases of free sulfides.

Heavy Metals

The release of heavy metals from polluted sediments as a result of dredging has been postulated by many authors and has resulted in specific guidelines being developed by the EPA (Table 2). However, in sediments where sulfides are being produced, the possible chemical transformations from resuspension become quite complex. Presently it is unknown whether heavy metals will be released from sulfide bearing sediments.

Ferrous sulfides are common minerals in anaerobic sediments and are probably responsible for the characteristic black color. Preliminary studies at OSU have shown that heavy metals absorb both $Fe(III)$ oxides and $Fe(II)$

sulfides. In addition, the heavy metals are readily co-precipitated in both Fe(III) oxides and Fe(II) sulfides. From these results, it is hypothesized that heavy metals will not be released to the water column upon resuspension and either will be absorbed, co-precipitated and incorporated within the sulfide-bearing sediments; a similar hypothesis has been proposed by Windom (1973). The hypothesis is in agreement with the data reported by Windom (1973) and May (1973) in which heavy metals present in the dredge spoils were not released to the water column.

More research is required to elucidate the important mechanism occurring in this process. Present data are not adequate to establish exact criteria.

Toxic Hydrocarbons

Important hydrocarbons in relation to the toxicity of dredge spoil include the organochloride insecticides, the organophosphorous insecticides and the polychlorinated biphenols. The possible adverse effects of spoils contaminated with these compounds are numerous; however, direct cause and effect relationships are virtually non-existent. More research is needed in this area in relation to monitoring methods and acceptable criteria.

CHRONIC ENVIRONMENTAL IMPACTS

As described in the last section, the acute impacts of dredging are highly complex and not well defined. Even less is known about the extent of chronic or long term environmental impacts. These chronic impacts include not only dredging but also such activities as shipping, industrialization, and urbanization which alter the environment in complex ways. The measurement of such chronic impacts requires an understanding of the important geological, hydraulic, biological and chemical factors which control the interactions in estuaries.

Presently, the impacts of dredging have been primarily identified as acute changes in important system properties. Little is known of chronic impacts for two reasons. First, chronic impacts are not so immediately apparent upon examination of a problem. An understanding of the system properties is often required to sort out the chronic problem from the multitude of other changes. In reference to dredging, the understanding of important system properties has been almost non-existent. Second, the detection of chronic impacts requires reasonable lengths of time, and few research efforts have been funded for periods over twelve months. For our proposed NSF-RANN studies we have identified several chronic impacts which we feel should be examined. These will be briefly discussed in this section.

Particle Size Change

A dominant feature of hopper dredging activities is the resuspension of bottom sediments. As a dredge suction head passes through a dredge site, surface sediments are drawn into the head and pass to the hopper. Some of the material around the suction head is disturbed mechanically and thrown

into suspension. Heavier particles settle out after the disturbance passes, while lighter particles remain in suspension due to ambient turbulence and may be transported from the original site by local currents. The material which passes into the hopper is initially in suspension, but the heavier particles settle to the hopper bottom. The lighter particles remain in suspension and some are returned to the estuary water column via the hopper overflow.

At the spoil area, the contents of the hopper are released and settle to the bottom as a slurry. Surface shear during descent and impact-induced mixing at the bottom resuspend a portion of the material; again, the fines may be transported from the spoil site. As a result of repeated resuspension and settling and the subsequent loss of fines, it has been found that dredge spoils may contain smaller fractions of fines than occur at the dredge site.

Specifically it was observed on the Coos Bay hopper dredge project that a five-fold increase in mean particle size occurred in the spoils immediately after spoiling and persisted for two months. The escaping fines probably contributed to long term siltation in the adjacent shallow areas.

The dependence of animal populations on a specific particle size distribution has been clearly identified. Rhoads and Young (1970) reported that suspension feeders and benthic infauna are largely confined to sandy or firm mud bottoms. Sanders (1956) showed that suspension feeders in Long Island Sound comprised 80 percent of the organisms on coarser sediments, but only 6 percent on fine sediments. Selective and non-selective deposit feeders were the dominant forms in fine sediments. Thus it can be concluded that changes in particle size from dredging operations probably seriously affect the distribution of the benthic populations.

Reduced Sediment Turnover

Polluted spoils standards have promoted the practice of spoil deposition behind "water tight berms" and/or in diked, sacrificial channels. In either case, a sediment system results in which the bottom deposits have increased stability over their previous condition. With this increased stability the sediments are turned over less frequently and the build-up of anoxic, sulfide-bearing sediments can result. In addition, more organics are deposited in this relatively quiescent region which further encourages the growth of sulfate-reducing bacteria. The end result can be a significant reduction in the biological populations present before spoiling.

Increased Sediment Turnover

Dredging can increase current velocities by several methods including the removal of inlet choking, channelization or the removal of eel grass. These increased current velocities will subsequently increase the turnover of the sediments, which, as the reverse of the previous case, can also adversely affect the biological communities.

Resistant Biological Communities

Preliminary studies (Slotta, et al., 1973) have suggested that the benthic infaunal communities may become modified in an estuary which has repeated dredging into a relatively resistant community. This community may have become adapted to a more or less continual resuspension of the sediments and its persistence may actually depend on this turnover. The turnover may depend more upon the prop wash of large ships than on the continual maintenance dredging. Regardless, the biological community will exhibit characteristics commonly attributed to communities in polluted environments and will not be significantly altered by dredging.

RESEARCH NEEDS

In relation to monitoring of dredging projects, we believe the following research areas should be emphasized:

Improve Monitoring Requirements

A system needs to be developed in which the required parameters to be monitored vary with the degree of pollution. Some easily measured parameters (e.g., volatile solids) which roughly correlate with pollution potential should be used to determine both the sampling methods and the required parameter to be monitored. For low volatile solids (<2% by dry wt.), little additional monitoring would be necessary; for high volatile solids (>10% by dry wt.) many tests both before and during dredging would be necessary. Such a system would tend to optimize the funds spent for monitoring.

Release of Heavy Metals and Toxic Hydrocarbons

In many cases sediments exceed the present EPA criteria for heavy metal concentration. Research needs to be initiated to determine if heavy metals can be released from dredge spoils under natural environmental conditions. If such releases are minimal as have been reported in the literature, then consideration should be given to new, more realistic criteria. Additional studies are required to elucidate the important transport mechanisms and the environmental impacts of the chlorinated hydrocarbons which are known to exist in high concentrations in certain sediments.

Turbidity

The exact role of turbidity as a controlling factor is relatively unknown for estuaries. Work concerning long term increases from all man-made activities including dredging and the possible impacts of such increases should be established.

Turnover of Benthic Deposits

Man-made activities of estuaries will undoubtedly alter the rate at which benthic deposits are turned over. Natural causes include tides, currents, freshwater flows and benthic burrowers. Important man-related causes are

dredging, ship props, anchor dragging and channelization. The interrelationship and importance of each of these activities needs to be further examined.

CONCLUSIONS

- 1) Present monitoring technology is available to determine all important parameters in relation to dredging projects.
- 2) Improved criteria are required to specify which parameters should be monitored.
- 3) More research is necessary to elucidate cause and effect relationships especially in relation to chronic impacts.

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Environmental Planning Methods

I have recently participated in a study entitled "General Planning Methodologies for Oregon's Estuarine Natural Resources". The purpose of my talk today will be to briefly discuss some of the general recommendations of this study. For a more complete background, the interested reader is encouraged to consult a number of previous publications (1,2,3,4).

In the study, we have used the term "strategic" to designate broad comprehensive planning and the term "tactical" to designate more limited and localized planning. My comments today will be primarily directed toward the strategic aspects of environmental planning for Oregon's estuaries.

THE DIVERSITY APPROACH

The diversity approach forms the basis for the strategic planning recommendations. This approach calls for the uneven distribution of man's environmental influences. Developmental efforts are clustered within a number of selected systems and regions while specific steps are taken to prevent and even reduce development in others (1,3). This approach specifically places a high value on environmental variety, including a wide range of essentially untouched ecosystems. Under this approach, decisions to preserve ecosystems should be as binding as decisions to develop others.

The principle general advantages of this approach are briefly reviewed below:

1. the probability of large scale irreversible change is reduced without the requirement of identification;
2. the probability of large scale dominating environmental change is reduced without the requirement of identification;
3. the preservation of developmental diversity concentrates development and provides undeveloped controls for comparison and study;

4. environmental options are preserved, thus providing greater capabilities of adjustment to indeterminant and changing value systems and unanticipated environmental impacts;
5. a high quality of life is related to a variety of potential experiences provided by a diverse environment;
6. the self-organizing capabilities of ecosystems are preserved without the requirement of complete knowledge of these systems; and
7. a balance is provided between conservation and development in a more workable manner, from a management viewpoint, than a method which tends to establish uniform policies and guidelines.

The diversity approach can best be employed by considering the collection of Oregon estuaries (excluding the Columbia) as a basic managerial unit, rather than considering each estuary separately as the basic unit of management. A mixed approach which calls for an unevenly distributed variety of development and conservation actions among this collection forms the fundamental basis for the recommended environmental strategy for the Oregon estuaries. The diversity approach also encourages the use of clustered communities with intervening open spaces within regions selected for development. This approach is not intended as a substitute for reasonable controls of excessive growth of population, resource use, and environmental demands, but rather is intended as a complement to such controls.

STRATEGIC DESIGNATION OF ESTUARINE SYSTEMS

The term "estuarine system" includes both the aquatic regions and adjacent lands. Within a number of the larger estuaries, several relatively complete estuarine systems can be identified. For example, the South Slough near the entrance to Coos Bay can be considered as an estuarine system which is relatively separate from the other, landward portions of Coos Bay. Smaller estuaries (such as Netarts), however, should be considered as single estuarine systems. In all cases, an estuarine system designated at the strategic level must be relatively complete and thus must contain a wide variety of estuarine habitat types. Opposite shores of an estuary would not qualify as separate estuarine systems at the strategic level. Within the collection of 15 Oregon estuaries, approximately 20 to 30 estuarine systems can likely be identified at the strategic level.

FUNCTION CLASSIFICATION

The terms production and protection (1,8) will be used as descriptions of the primary reliable functions of estuarine systems. "Production" will refer to man's use of estuarine systems for the highest yield of those goods most useful to man (not to be confused with biological production). "Protection" will refer to the self-organizing capabilities of estuarine systems and the larger marine systems of which estuaries are an integral part.

The environmental strategy presented herein calls for a mix of production and protection estuarine systems.

Developmental efforts refer to the construction of facilities and modification of estuaries and adjacent lands for the primary purpose of increased production while conservation refers to the prevention of developments. Both development and conservation are used above in the context of actions and decisions. Specifically, a conservation action involves more than a decision not to develop; it involves action to prevent development. Different ratios of development and conservation efforts are recommended for the estuarine systems within the collection of Oregon estuaries.

Three classifications of estuarine systems (production, mixed, and protection) can be identified based upon their primary reliable function and the relative developmental and conservation efforts. The following paragraphs will expand on the appropriate developmental and conservation actions and uses for each of these three classifications. The use of the above classifications has been based to a large extent on the inadequacy of available information and not on the willingness or lack of willingness to employ it. The production classification should not imply that sound environmental practices within such systems can be abandoned. The best available information should be utilized in order to minimize adverse environmental impacts.

Production Systems

These estuarine systems will include the principal industrial and residential centers. Facilities for power, waste disposal, transportation, etc. should be provided in a manner which encourages the best use of the available resources. Within production estuarine systems, the best available information should be employed to minimize adverse environmental impacts and to provide a useful and aesthetically pleasing environment for the residents of the area. Intensive use recreational facilities should be provided and a variety of areas should be set aside for such purposes. Within such estuarine regions, environmental diversity should be encouraged for aesthetic, sociological and environmental reasons. Specifically, cluster communities with intervening open space should be encouraged where feasible. Shoreline development should be restricted to those activities which require water-front locations.

Mixed Systems

Limited business, industrial and residential activities would be included in such designated systems. A wide variety of ecological habitats within such estuaries would be selected for preservation in relatively undeveloped states. A greater emphasis, as compared to production estuaries, should be placed on maintaining the reversibility of actions and environmental changes. Camping, hiking, boating, fishing (commercial and recreational), farming, logging, and related activities would be permitted under stricter controls than those of production estuaries. Heavy transportation facilities, such as shipping, which require significant maintenance dredging, should be avoided. Restrictions, zoning, public purchase of lands and conservation easements, water and waste water facilities, and transportation systems should

be developed to encourage cluster housing with open spaces rather than the more conventional dispersed housing which results from one-acre or similar zoning.

Protection Systems

Industrial, residential, and business development in such designated estuaries and adjacent lands would remain at present levels, or where feasible, be reduced. Additional industrial, residential, and business development would be severely restricted, and in all cases confined to very limited regions. Transportation facilities would be minimal and, where additional environmental protection is warranted, reduced from current levels. Limited recreational activities such as hiking, boating, fishing, hunting, and camping in restricted areas could be encouraged under controlled conditions. In all cases, the influence of all man's activities should be kept at minimal levels. Such designated systems would have a high research and educational value. Different types of estuarine systems should be included in the protection status. That is, within the sub-set of protection systems, system diversity should be given a high priority.

PRINCIPAL STRATEGIC RESPONSIBILITIES

Strategic environmental planning for Oregon's estuaries should generally not be involved with detailed design planning of specific projects within individual estuarine systems. The major responsibilities of strategic environmental planning recommended herein is to provide for a developmental and functional diversity among the collection of Oregon estuarine systems and to encourage a clustered development within those systems selected for development. Such strategic responsibilities are not substitutes for the current regulatory responsibilities of county, state and federal agencies but rather are complementary responsibilities dealing with broader concerns.

IMPLEMENTATION

There are no standard established procedures or programs for the placement of constraints sufficient to maintain a variety of estuarine systems in a protection status or to provide for cluster community development with intervening open space within developed regions. There are, of course, a variety of individual constraints (e.g. zoning, building codes, etc.); however, they are not now compatible with the diversity approach. Moreover, the justification for much existing zoning (i.e. satisfactory operation of individual septic tanks) is extremely shortsighted in that it establishes community development patterns which are environmentally unjustified on a long term basis. A number of mechanisms, however, can be identified which, given effective leadership, have the potential for establishing protection estuarine systems and encouraging cluster communities.

The Pacific Northwest River Basins Commission (with the participation by federal and state agencies) appears to now provide a mechanism for coordinating federal plans, functions, programs and resources in a manner

compatible to the proposed environmental strategy. Specifically, the commission could establish policies and guidelines for preserving developmental and functional diversity among the collection of Oregon estuarine systems.

It would be difficult for any agency or group of agencies utilizing federal funds to violate these policies and guidelines without violating the spirit and, in some cases, the letter of the National Environmental Policy Act of 1969. (7) Moreover, it would be difficult to justify federal funds unless state and local plans were reasonably compatible to these policies and guidelines.

Currently, consideration is being given to including the Salmon River estuary into the Siuslaw National Forest. Such an arrangement could provide for the management of this estuary as a protection system, although conservation efforts, including additional purchase of lands and easements, beyond those currently recommended (10) would likely be necessary to assure a protection status as defined in the context of the proposed strategic environmental plan.

The Coastal Zone Management Act of 1972 (5) section 312, makes available to coastal states grants of up to 50 per centum of the cost to establish marine sanctuaries. Such funds could be used to establish protection estuarine systems. In the hearings preceding the passage of this act, the Alsea and Netarts Bay were specifically identified as potential marine sanctuaries. Netarts and Sand Lake have also been recently identified for possible refuge status (9).

Land use legislation is currently being implemented at the national and state level. Actions taken under this legislation can additionally contribute to the implementation of the environmental strategy presented herein.

Enforcement of strict regulations on individual sewage disposal systems coupled with sewerage plans which purposely do not provide services in areas where developments are not desired can serve as an effective means for encouraging cluster communities and preserving open space (6). Gravity sewers can be provided in regions designated for development while interceptors are avoided or force mains are employed in designated open spaces. This approach not only can encourage the preservation of open space, but can provide economic savings (6).

Without effective decisions, economic considerations will force all estuarine systems toward the production classification, thus reducing the functional diversity. Moreover, the establishment of production systems, either by decision or by default, is relatively irreversible. That is, it is easier to allow an estuarine system to develop toward a production system than it is to transform a production system into a protection system. The designation of protection systems must therefore receive the highest immediate priority. The uncertainty of how best to select protection systems should not be used as an excuse for delaying action.

Uncertainty should rationally encourage a policy of preserving options and any reasonable decision to establish protection systems will preserve more management options than a no-decision default. The expenditure of management options during periods of organizational and decision delay is a serious problem which may require interim controls, particularly in areas as critical as the coastal zone. A moratorium on developmental activities, particularly those of a relatively irreversible nature, may be warranted within such critical zones.

Finally, the authority to implement the proposed strategy must be balanced by a responsibility toward the fair treatment of local residents. The cost of implementing this strategy cannot be borne by local residents alone, but must be financially supported by the larger public.

A BASIS FOR PUBLIC EVALUATION

The next several years will be extremely important with regard to the future developments within the Oregon coastal regions. Decisions reached or avoided during these years will tend to establish patterns of development which will become increasingly more difficult to alter. It is important that the public honestly evaluate the effectiveness of the numerous decision and planning bodies concerned with the Oregon coast. Such evaluations must provide support for meaningful leadership and initiative while applying pressure against those bodies which, for various reasons, may be incapable of contributing to meaningful environmental management. Below are provided four steps which I believe can assist in such public evaluation:

Step 1

Assume that the Oregon coast will be developed in essentially the same manner as southern California and the coastal regions of the northeastern United States. Communities will blend together and lose their individual identities, open space near residential areas will be eliminated, energy and resource consumption will increase dramatically, pollution levels will increase and shoreline areas will become increasingly inaccessible to all but the uppermost income levels. These are not doomsday predictions but rather are facts which have already happened elsewhere and which we can logically expect (in fact, my descriptions are rather mild).

Step 2

Ask the question---are these the conditions which we really want? There are two portions of this question. The first is a value question: are these conditions desirable? The second is a moral question: do we wish to leave these conditions for our children?

Step 3

If the answer to the above question is "no" (i.e. the conditions are not desirable and we don't want to leave them to our children)

then it is up to the decision (or planning) bodies to prove that their recommendations will avoid these undesirable conditions. If they avoid such proof, then we must assume that the answer to the step 2 question is "yes".

Step 4

The good conditions or occurrences that a plan or recommended policies can obtain should be discussed only after the decision (or planning) bodies have completed step 3. That is the good things obtainable from a plan should be discussed only after it has been proven that the overwhelming undesirable conditions will be avoided.

The public must not be sidetracked from these most basic steps. Many decision bodies are capable of essentially deciding nothing in a very impressive way. Their maps may be colorful, their photographs may be beautiful, their statements may be idealistic, their data may be voluminous, their "benefits" and "costs" may be quantified, and/or they may even utilize extensive computer output. Yet, despite such an awesome array, they simply do not address themselves to the basic problems (particularly step 3).

Often their only real recommendations are to conduct further studies on subjects which will not likely be controversial. I am in favor of more studies, but, too often such future studies are merely means of avoiding controversial decisions. Finally, there is a tendency for some decision bodies to declare that those decisions which are not part of established practice are beyond their areas of concern or authority. This declaration is particularly distressing when one considers that it is the very failure of established practice which has motivated the political pressure for improved environmental planning.

In short, planning and decision bodies are often reluctant to make recommendations which would result in outcomes significantly different from those which would occur without the recommendations. It is, however, the need to direct future outcomes to more desirable states which forms the very basic justification for environmental planning. Any decision, recommendation, or plan which seeks to change the course of outcomes, moreover, should expect to receive resistance from those with vested interests in maintaining the existing course of outcomes. Those who are reluctant to deal effectively with this resistance are betraying the very purpose of environmental planning. Those who are willing to face the difficult task of meaningful environmental planning however, deserve public support and I hope that my suggestions will encourage such support.

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The Coast as Seen by the Corps of Engineers

I certainly welcome the opportunity to take part in Oregon State University's Fall Seminar on Coastal Zone Management Problems. The subject is interesting, complex, and important. Coastal zone management is of direct concern to those who live and work along the coast. It is also of concern to those who make the considerable personal effort to spend their hard-earned money and limited free time in visits to enjoy the many attractions of the coast. Man's use of the coastal zone definitely affects the populations of fish and fowl and aquatic mammals, especially as our rapidly increasing people population uses more and more of the coastal area.

Residents of inland towns, cities, and farms throughout our nation are also affected by how the coastal zone is managed, one specific example being the current studies in Congress and by industry on establishing deep-water ports. Whether or not we have deepwater ports will affect the prices our citizens receive and pay for many commodities. The other lecturers in this seminar are covering a number of important and fascinating problems in managing the coastal zone.

For my part, I am going to concentrate on the role of your Corps of Engineers in carrying out both the coastal development and the coastal protection functions assigned to it by the Congress. A short prologue will help to put us in proper perspective by explaining---What is this U.S. Army Corps of Engineers?, and How did it get into this business anyway? Once that is done, we can proceed to --- What does the Corps do?, and How can it be used to help in developing coordinated overall management of the coastal zone?

This wonderful outfit I work for ---your Army Corps of Engineers--- dates from the Battle of Bunker Hill, when Richard Gridley was appointed Chief Engineer to plan and dig a trench system against the expected British attack. Following the Revolutionary War, our nation had to build forts to protect harbors previously protected by the British Navy. It had to enlarge and improve these harbors as our commercial trading ships, freed at last from British colonial restrictions, began a rapid expansion into world trade that caused the number and size of ships to increase by leaps and bounds.

President George Washington saw a danger to the continued national existence because of the lack of engineers and lack of educational facilities. So, he recommended that Congress establish a military academy at West Point, under federal control, to educate young men as officer-engineers, which Congress did in 1802. West Point was the only engineering college in the U.S. until one of its professors established Rensselaer Polytechnic Institute at Troy, New York, in 1824. Army engineer officers, subject to the orders of the President and dependent upon appropriations by the Congress, then as now, were used in leading roles to explore, map, and build national projects as the people of the young United States expanded westward across the Appalachians and down the river valleys to the Great Plains. These military officers were the only available skill in the government for planning, designing and building the federally funded forts, lighthouses, breakwaters, and national roads needed to make commerce possible in the newly-opened country.

Large privately and state funded works, such as barge canals and the newly invented railroads, were often assisted by furloughing military engineers to work on those projects. In 1824, responding to pleas for help from many settlers in the Ohio River valley, Congress directed the Army Chief of Engineers to clear snags and bars in the Ohio River so farm crops could be barged to market. Since that time, Congress has used the Corps as its engineering consultant, directing it to study water resources problems raised by citizens, and to recommend feasible solutions, if any, using specific evaluation rules set by the President and Congress.

It is interesting to note that over half of all the studies made have received a negative recommendation by the Corps. If Congress determines that federal monies should be used to correct the problem, it usually tells the Corps to do the work. The broad and diverse expertise which the Corps has developed by working on thousands of water problems in the past one hundred and fifty years has been of great value to the growth and security of our nation:

- A. Mississippi River levee work since the 1870's has made possible much of the rich agricultural development in the central states;
- B. Building the Panama Canal, after two capable foreign ventures had failed, greatly boosted our world trade;
- C. Building the nationwide flood control system starting in the 1930's, has greatly protected tens of millions from what used to be frequent floods;
- D. The tremendous support of our war effort in the 1940's, including managing the development of the atomic bomb;
- E. Because of our demonstrated capability, NASA asked us to construct the complex Kennedy space launch facilities;
- F. And, of course, all during this time we have been building and maintaining the 19,000 miles of improved navigable waterways and 500 ports serving the nation's commerce.

The Corps has been active also, for over 100 years, in protecting some of our unique natural areas and their flora and fauna from destructive development. The U.S. Army and its Corps of Engineers managed and protected Yellowstone, Yosemite, and the other national parks from 1872, when Yellowstone Park was created, until the National Park Service was set up in 1916 to take over that work.

The Corps is now active in a new role to which it was directed only three years ago by both the Administration and the Congress. This new role is making urban studies, where our contribution is to study on a wide area, multi-disciplinary basis means of economically handling storm drainage and wastewaters including sewage. These studies are providing expert analyses and alternatives for use by political bodies at all levels in deciding what they might do about this very perplexing problem of modern urban life.

The Corps was put into urban studies because it had the in-house multi-disciplinary expertise to do such work, and because it could react quickly.

A SERVICE ORGANIZATION

You can see by the recitation so far that I am convinced that the Corps is a capable, responsible outfit. It gets its orders, people, and funds through the President from Congress. We are a service organization whose reason for being is to do what the people want. We are unusual among most governmental bureaucracies in that we are truly multi-purpose in studying problems. Most of our projects include a number of different purposes established by Congress when it authorized the work: flood control, navigation, power production, recreation, enhancement of fisheries, municipal water supply, etc. Our staffs include economists, biologists, and sociologists, as well as engineers. They are well-versed in considering many interests and various alternatives when developing feasibility studies.

We grow and shrink in size according to the work program we are given to do. Right now we have about 500 officers and 25,000 civilians. We get no separate appropriation from Congress to pay our salaries, which we do pay by charges against our project funds, the same as in private business. We do most of our engineering in-house and contract for most of the actual construction. We think we are modern and progressive, and we know from experience that we always have to keep trying harder to do a better job of what the nation wants. Here is an example from 'way back some 40 miles into the wilderness behind Dworshak Dam. Our construction people found and saved this Osprey nest (slide) when clearing the reservoir area. They were practicing "The Corps Cares."

That finishes the prologue and sets the stage for What does the Corps do?, and How can it be used to help in developing coordinated overall management of the coastal zone?

The general problem in looking at the coastal zone is one of supply and demand--how to reconcile the current and projected needs of people with the limited supply of shoreline resources, and in a socially, environmentally, and economically acceptable way. As an example of a national shortage of coastal resources, publicly-owned recreational beachfront in the United States amounts to slightly more than one inch per person, and three-fourths of that is in only five states, one of which is Oregon.

To explain how the Corps looks at the coast, let me tell you a little about each of the jobs Congress has given us to do there.

Navigation projects are primarily to assist in the development, conduct, and safety of waterborne commerce. Other objectives of navigation works are to promote seafood production and recreational boating. Local examples of these projects are Depoe, Tillamook, Yaquina, and Coos Bays. Another well-known navigation project is the 105-mile deepwater channel from the mouth of the Columbia River to Portland. Using ship locks incorporated into the eight power and flood control dams along the lower Columbia and Snake Rivers, barge traffic will soon be able to go from Astoria to Lewiston, Idaho, about 500 miles inland.

Permits. The Army Engineers also are responsible for administering certain laws for the protection and preservation of navigable waters, including issuing permits for work or structures therein. We publish regulations for use of the waterways, including disposal grounds, fishing areas, restricted areas and danger zones, and establishing harbor lines. Although the extent and coverage of permits is in a state of change now, I can tell you with certainty that all changes are for more widespread applicability and more complete control than in the past, with all structures such as these requiring federal permits.

Cost Sharing, or the costs which must be paid by local interests, is an integral part of federal navigation projects:

A. Commercial navigation projects usually have the federal government paying the full cost of building and maintaining the general features, such as jetties and main channels. Local interests pay the costs of terminal facilities; dredging of berths; furnishing lands, easements, rights-of-way, and spoil disposal areas; make necessary changes in utility lines; help pay for bridge alterations, and make a cash payment in case of land value enhancement from areas filled with dredged material.

B. Recreational navigation projects can find the federals paying up to 50 percent of the navigation facilities costs, and the locals the other 50 percent plus land, easement, policing, public wharf, and service facilities costs.

C. Small navigation projects, not to exceed \$1,000,000 total federal share, may be built without specific authorization of Congress when they will substantially benefit navigation. These small projects must meet the same requirements as large projects in economic justification and local contributions.

Coastal protection activity by the Corps began in 1930 and has been gradually increased through various legislative acts. One common purpose in all beach erosion projects is to protect life and public property. The natural beaches and dunes form a defensive barrier against storm-driven waves. Their preservation, then, protects adjacent inland areas, and also makes available recreational opportunities for the rapidly growing and increasingly urgent need of the American people. This urgent public need was set by Congress in 1968, in response to wide-spread and increasing beach damage, especially along the Eastern seaboard. It directed the Chief of Engineers to study the condition of the nation's shorelines and to develop means for protecting, restoring, and managing, to minimize damage from erosion.

The resulting report is the first national appraisal of beach erosion. It shows generally where erosion occurs, estimates the costs of typical protective measures, and pinpoints the more urgent problem areas. Specific projects or construction are not recommended in the report. In the language of the authorizing Act, there are many factors to be considered in determining whether remedial measures are justified in any particular case. Since there was no area where shore erosion poses an obvious immediate threat to human life, the economic factor tends to be the major one in determining areas where action appears justified.

As a matter of interest, there were only three areas identified in Oregon where remedial action may be needed to prevent loss of large capital investments in public navigation facilities-- Clatsop Spit at the Columbia River mouth, Bayocean Peninsula at Tillamook Bay, and the mouth of the Siuslaw River. At each place, continued erosion threatens a breakthrough which would outflank the entrance works. We are keeping an eye on these places.

This national shore erosion survey report will be of long term value to all agencies interested in coastal matters, and especially the part which concerns guidelines for comprehensive and multiple-use planning. It is a good example of some Corps work that is not concerned with a construction project.

The Coastal Engineering Research Center was set up in the Corps by Congressional authority in 1930, to carry out a broad program of basic research in coastal oceanographic phenomena, and to develop improved engineering techniques for coastal protection. Much model work for coastal projects is done at the Corps' well-known Waterways Experiment Station at Vicksburg, Mississippi. Tidal models of Grays Harbor and Port Orford are now in progress there. Our own Bonneville Laboratory models problem areas of the Columbia River.

Beach erosion projects, just as do navigation projects, require local contributions. The amounts vary, depending upon the use and the owner of the property. Congress has declared "the policy of the United States to assist in the construction, but not the maintenance, of works for the improvement and protection against erosion by waves and currents, of the shores of the United States. . .". Federal participation is greatest where the protected shore areas are publicly-owned and public use is encouraged--this can be up to 70 percent of the cost. At the opposite end of the scale, no federal

funds are authorized for privately-owned areas with no public use. In addition to cash contribution, local interests are required to provide the usual lands, easements, etc., as for flood control and navigation projects.

There is yet another Corps activity which may be involved in coastal zone problems. It is the Flood Plain Information Studies program, in which we develop information and advice on what are the flood hazards---size, extent, and frequency---in specific places. This is done only for those cities or counties that ask us to make a study, is done at no expense to the locals, and gives them a good hydrological basis for their own zoning and regulating functions. This is one of our fastest growing programs, and may eventually mean that we can stop building flood protection works to protect development that should never have been in the flood plain to begin with.

Now let's take a quick look at what actual work the Corps is doing along the Oregon coast this year. There is one construction project, building the South Jetty at the entrance to Tillamook Bay, which we expect to complete in 1974.

On the maintenance list, we are dredging existing works at Coos Bay, Yaquina Bay, Tillamook Bay, and at the mouths of the Columbia, Rogue, Coquille, Siuslaw, and Chetco Rivers. We are also doing some revetment work near the mouth of the Siuslaw to keep it from cutting a new mouth across the south spit. This is one of the danger spots listed in the National Shoreline Study. Most of our work is in the planning area. We are studying the Siuslaw bar to see if improvements to the entrance are warranted.

At Yaquina, we are finishing a look at enlarging the channel dimensions from Newport to Toledo.

The current study on the Umpqua is whether or not to extend the training jetty to join the shore end of the south jetty.

The study at Tillamook Bay, for improvement of navigation channels and an additional small boat basin, is temporarily in abeyance at request of local authorities.

Finally, at Chetco, we are just starting study on a request to extend the south jetty 500 feet to match the length of the north jetty.

No presentation of what the Corps does is complete until we mention environmental impact statements (EIS).

The National Environmental Policy Act of 1969, requires that each federal agency prepare an environmental impact statement, describing the project, alternatives considered, benefit and cost information, the estimated effects on the environment (including economic, social, and biological effects), and all comments by agencies, groups and individuals concerning the project. The EIS is a formalized presentation of factors and alternatives needed by decision makers at various levels to arrive at a considered, informed decision. We in the Corps firmly believe that the EIS is a necessary tool to help us carry out our functions, and we have put very substantial resources into preparing them. It is the best way yet devised to

insure that all relevant aspects are considered when making an important decision. It is already resulting in projects that meet the broad interests of the people as a whole, better than was the case only a few years ago.

Our attempt to get public involvement in the studies we do for Congress goes back many decades. In recent years, there has been a great upsurge in such involvement, tied to the growing public interest in the environment. We like to emphasize our current activity by calling it "fishbowl planning", with everything out in the open. If you have the opportunity, attend any of the Corps' public meetings and see democracy in action. Each person can, at least, get the chance to publicly express his views, pro or con. It is a great experience.

The Corps' work is coordinated with all other interested agencies and people. We attend, for example, whenever possible, the meetings of the Oregon Coastal Conservation and Development Commission, and will make any contribution from our fields of expertise which might help develop the coordinated, comprehensive problem solutions towards which we all strive. We are happy that the Corps was able to take an active part with OSU by helping fund the new publication, "General Planning Methodologies for Oregon's Estuarine Natural Resources", by Professors Bella and Klingeman. The message that I would like to leave with you is:

The Army Corps of Engineers will continue to work hand-in-glove with all others responsible for the management of the coastal zone, will see that our own work fits into the broad management framework, and will do our share of the necessary teamwork for everyone's benefit. That is what is meant by---the Corps cares.

Estuarine Management Problems

According to a recent brochure titled "General Planning and Methodologies for Oregon's Estuarine Natural Resources:" ". . . the general goal of environmental planning is to improve the quality of life as perceived by this and future generations" (Bella and Klingeman, 1973). The authors of this statement realize that this is a very subjective statement, but being engineers rather than sociologists or biologists they have failed to realize how far from reality they may be, even when writing "under a severe time constraint of six months." S. P. R. Charter, who, it must be admitted, has a less severe constraint upon his time for thinking things through, has commented to this point:

"Much is now heard of the 'upgrading' of the Quality-of-Life as a goal to be achieved through our technological capability. There is a curious quantification to this quality-of-life --- a curious belief that the larger the quantity of things with which we surround ourselves, the greater the quality of our lives. There is an even more curious belief among many, especially of the young, that if we reduce the quantity of things surrounding us, the quality of life will be enhanced --- automatically. Neither belief recognizes the fact that the quality-of-life is one of the constant variables within the complex of human response and expectation. Once basic need is met, the quality-of-life is not quantifiable. It depends so very much upon the individual's aesthetic autonomy and response --- and these are neither quantifiable nor fixed for all his time. It is through such autonomy and response that we can begin to comprehend something of the multiple meanings of the quality-of-life. If we are to uncouple technological promise from technological threat such comprehension is essential."

But even this does not bring us to the real point of planning for managing an environment, which is of course the environment itself. Here again we find some ambiguity and contradiction, for we are told that estuaries are not fragile systems and by inference unmanageable, yet at the same time that we must manage them, even if we do not know how (Bella and Klingeman, page 32):

"Estuarine ecosystems and the larger marine systems of which they are a part are not fragile systems. If they were fragile, there would be some rationale for rebuilding them to provide a more reliable basic life-support system for man. These systems, however, are highly reliable self-organizing systems which man cannot hope to replace. Therefore, maintaining the capacity of these systems to reliably self-organize must be among the highest priorities of environmental management. Such management must be based on a firm recognition of the inadequacy and bias of available information. This inadequacy is particularly relevant to tidal estuaries because of their complexities and interrelationships with oceanic systems."

In another recent commentary on problems of estuary utilization and management our colleague, William Q. Wick, examines the conflicts between uses which require filling and alteration of estuaries and the need for compromise to preserve other values. A quick reading of this piece suggests it may be interpreted as a plea in justification of filling, but as a parting shot he states "Proper compromises create harmony. Man inspired changes must conform to nature's dynamics in the estuarine environment. The planning task is never easy." (Wick, 1973).

ASPECTS OF NATURE

What seems too easy to forget in our urge to be good citizens and demonstrate to both sides that our hats are at least a fashionable shade of grey is that an environment, if it is worth preserving either for its natural features of productivity of fish or bird life or because it is pleasing to look at, must be managed in terms of environmental, not human criteria. The fish or the birds are not going to becloud the issue with socio-economic or turbid engineering reasoning; if the place will not support them, that is the end of them. If their passing is a human tragedy, it is perhaps somewhat relative. Who, for example, really misses the Great Auk or the Passenger Pigeon?

Nevertheless, aspects of nature are part of mankind's amenity, of his "quality of living," whatever that phrase may really mean to one group of people as contrasted with another. And it is not always necessary to rise and cry with alarm and shout peril to get something done about critical situations, although such action is brush fire fighting, not planning or management. It may be planning to have a fire station in the neighborhood, but we don't plan the location or time of the fires.

Wetlands and estuaries are definitely fragile environments; they can be destroyed simply by filling, and perhaps irrevocably. What happens to them as a result of civilization and promoting a greater quality of life for shipping, boatmen and sewer districts can only be altered by stepping backwards. As George Seddon, in his fascinating book on the coastal environment of Western Australia remarks "Many problems of conservation can be reduced by wise planning, but not this one." (Seddon, 1972). His chapter on the wetlands, which did not cry "Alas!" for the poor birds but simply stated the percentages of populations left has stimulated a movement to save what is left and perhaps reclaim some of the remaining area by unfilling. Reclaiming, in the engineer's vocabulary, means

filling up or destroying of the marshlands.

We need not go as far as the remote shores of Western Australia to find an example of such environmental retrogression, and in the name of improving the "quality of life" at that. The upper part of Newport Bay, California, was headed for massive infusion of marinas, water ski courses, a racing course, grandstands and parking lots, as well as roads, bridges and other improvements to produce revenue at the expense of the individual sense of aesthetics some people like to associate with "bird watchers and lily pickers."

But this has all been turned around; the local commissions have turned down some of the development plans (Cunningham, 1973) and the development corporation has run into legal and public relations difficulties. The upshot of this is that Upper Newport Bay may be rehabilitated by judicious undoing of some of the works of man, such as removal of abandoned dikes constructed for salt evaporation works and unfilling certain areas to enable natural marshlands to be reconstituted. The earth removed would be used for a nearby freeway. Not, perhaps, a universal good in the opinion of all concerned, but nevertheless an acceptable compromise.

A somewhat similar situation is that of Bolinas Lagoon, where public outcry against a Harbor Commission project to convert almost the entire lagoon to marinas resulted in formal abolition of the Commission, a fate deserved by other Port and Harbor Commissions, and the establishment of a plan in behalf of the environment. In both Upper Newport Bay and Bolinas Lagoon, the justification for reverting to environmental rather than exploitive uses is that the environment itself is part of the quality of life, or as George Seddon puts it, the sense of place, of these regions.

NEED FOR FACTS

Another bay, somewhat larger, is Tomales Bay which has never had much commercial development, but has supported, in the past, oyster beds and herring fisheries. It has been protected from overtly unfavorable development because of its dangerous bar at the mouth. Here we find an active group protesting and opposing all change and innovation in behalf of maintaining the lovely isolated sense of place that is so obvious to all who have contemplated this brooding landscape along the San Andreas Fault.

One would wish, however, that those protesting all development would have more solid information at their command. Too often one gets the impression that because their hats are white, they need not be armed with facts; to protest the building of a motel on the grounds of its incompatibility with bird life while at the same time tacitly approving of a plan to build a bird study center that should frighten away most self respecting birds is not the way to carry the day (or better, the year or decade) with the hearing officers when the pressure increases.

To put it another way, these are not the times when an upright man can be secure in his virtue and leave his arrows at home while the savage beasts tremble at the sound of his voice --- if indeed there ever were such times, even in the days of Q. Horatius Flaccus. And it should not be forgotten that in the movies at least the white hats were always in the end quickest on the draw, and the deadliest shots.

These bays, or estuaries, are relatively small, and it might be said that commerce and industry can spare them since they have never been significant anyhow. Our large estuaries pose more refractory problems. It may well be that politics, or lack of agreement as to jurisdiction and conflicts of local sovereignty, will do the Chesapeake Bay in before the power plants, steel mills and chemical works complete their job. We discussed all that a couple of years ago in Maryland (Hedgpeth, 1972); and I have not heard that there has been much change, although the Corps of Engineers now has its model of the Bay under construction which is expected to solve all the problems if people will only believe what the model tells them (see Robinson and McKay, 1973).

SAN FRANCISCO BAY

On the pacific coast we are more fortunate, perhaps in having San Francisco Bay within the boundaries of a single state. While the San Francisco Bay Conservation and Development Commission has its problems with nine counties and dozens of municipalities, it is an agency of the State and is functioning. Its rationale, however, is primarily in behalf of the physical environment, the control of filling, dredging and construction. Unfortunately there was little concern for the environment of other creatures than man in the initial stages and adequate understanding of the San Francisco Bay region as an ecosystem is still lacking.

There is no organization with jurisdiction over the entire system. It remained for the most heavily industrialized county of the area, Contra Costa, to carry the fight for water rights for maintenance of fish and wildlife to the hearing rooms and secure at least a modification of proposed diversions into the California Water System that would have endangered the maintenance of the Delta area. The amazing part of all this has been the general lack of understanding of the San Francisco Bay region as an estuarine system. I sometimes think this has been due in part to using the appellation "estuary" for that narrow strait between Oakland and Alameda. Those of us raised within sight of that particular body of water, as I was, gained a strange idea of an estuary from that happenstance.

The history of the San Francisco Bay area as a natural resource in itself has been instructive, both from the viewpoint of the environment and how man has changed it, and in terms of this subjective matter of "quality of life."

As we view the system from the historical perspective it is obvious that the first purpose of San Francisco Bay (in the broadest sense) was to provide food (Figure 1). This is amply attested to by the more than 400 shell middens left by the Indians on the shores of the Bay. In Indian times as now the San Francisco Bay area was one of the most populous regions in California, but the base for this population was the ecologically natural base of abundant food supply.

Perhaps only a few thousand Indians were maintained in this natural system under a sustained yield basis, but it appears to have been a stable culture that endured for more than 3,000 years. This culture came to an end, at least symbolically, with the establishment of San Francisco in 1776, five days before the Declaration of Independence. Now only seven years before the second century of occupation of the Bay Area by the destructive, anti-ecological culture of allegedly civilized man, there is serious concern by many that we may not last the next hundred years. Probably we will outlive the gloomier prophets of

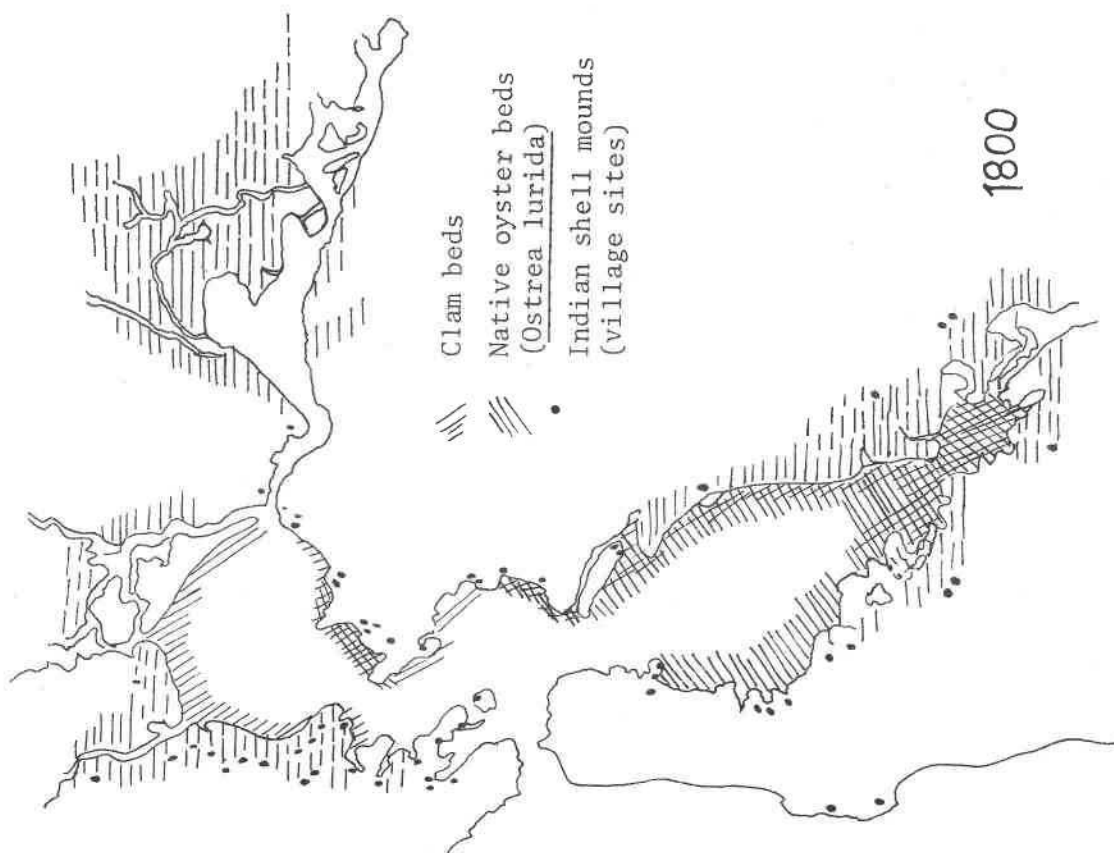


FIGURE 1. Resource utilization by the original natives of San Francisco Bay. (Location of mussel beds not mapped but most abundant in sloughs and marshes of northern and southern parts of the Bay).

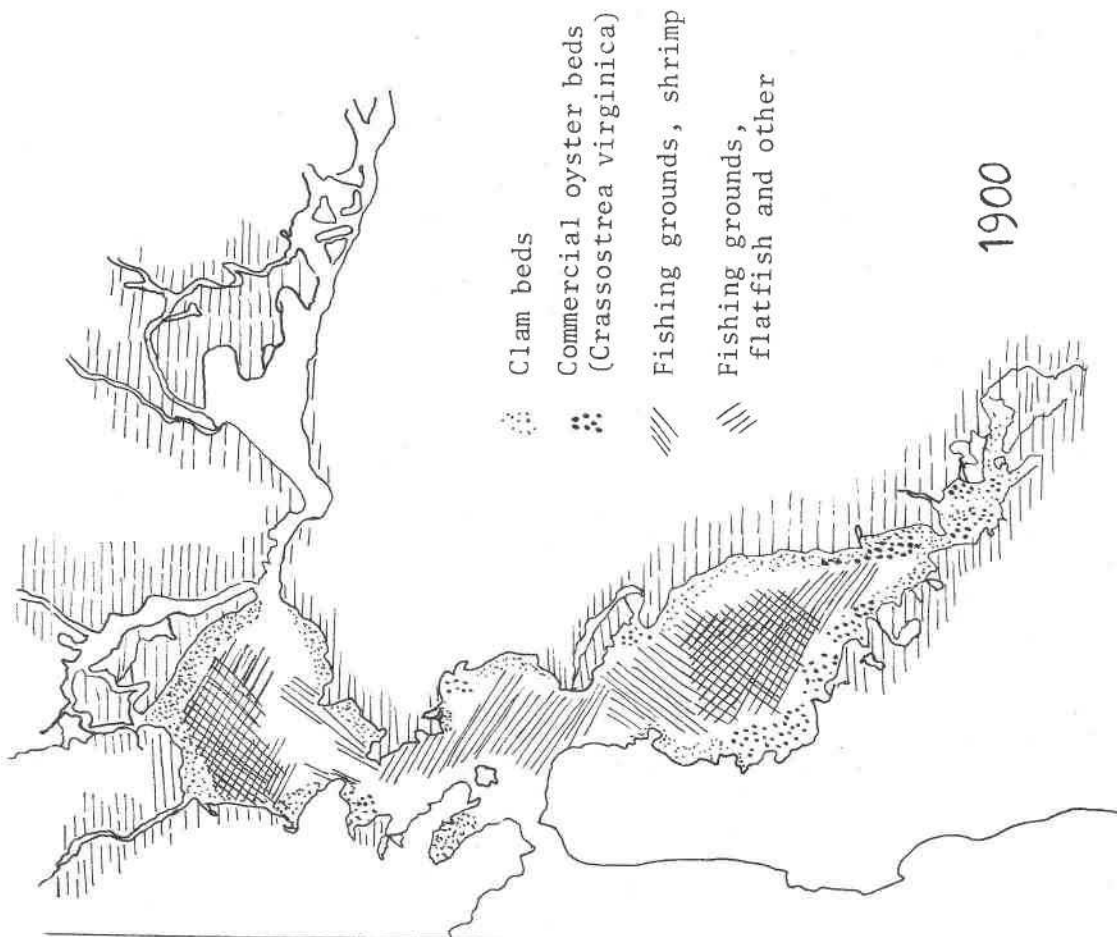


FIGURE 2. Areas of resource utilization in pre-pollution times (to about 1900).

doom, but it is inconceivable that we can endure in this locality for 3,000 years at the present rate of violent environmental exploitation.

In any event, man's first purpose for nature, as a resource for food, was served in San Francisco Bay to a significant degree after displacement of the original culture for at least a hundred years, until 1876, or perhaps until 1900 (Figure 2). However, even by 1876 there were indications that pollution from sewers was locally offensive, and the reliance on the resources of the Bay proper declined, although such resources as fish whose well being depended on the estuarine and Delta reaches of the Bay continued to be important, and still are.

The second purpose that man found for San Francisco Bay was to serve his commerce. The Indians paddled across the narrower parts of the Bay on rafts of tules, but the use of the Bay for commerce was negligible until mid 19th Century. Although the shell mound cultures may have exported as much as a third of their harvest to the interior, it was probably carried overland. In terms of human history the sequence has probably been the same everywhere --- man first settled on the shore for food, then he ventured upon the waters, first for fishing then for exchange of goods with other cultures.

In San Francisco Bay fishing came after commerce, and oyster culture, developed last of all, had the shortest run. In the older, more established cultures, cultivation of the spacious tidal flats of the Bay would have been one of the first purposes developed.

The third purpose to which we have put San Francisco Bay has been the most short sighted and destructive one of disposal of mining wastes and later of sewage. At first little notice was taken of the use of San Francisco Bay as a cesspool, but the steady shoaling of the Bay from hydraulic mining debris did receive notice.

However, the prime reason for stopping this rapid shoaling was not that it was filling the Bay but that it was destroying prime agricultural land. Yet, before this accelerated sedimentation was stopped by court order in 1884, one of the most significant events in the biological economy --- or ecology --- of San Francisco Bay took place, the introduction of the striped bass from the Atlantic coast (Figure 3). We now suspect that the remarkable success of this transplantation was in some way related to the silt loads of the river, either by protecting young fish from predation or enhancing the hatching of the floating eggs of the striped bass, which seem to do best in a certain amount of turbidity.

FILLING THE BAY AREA

With respect to the use of the Bay as a cesspool, there is too much talk of "response" of waters to introduced materials, the capacity of the bay to "accept" waste materials and dilute them to concentrations that are inoffensive to man or not overtly deleterious to aquatic life. This purpose, which is considered a "benefit" in the lexicon of the sanitary engineer, is an anti-ecological approach to the environment. It says essentially that man's purpose is to abuse nature. In a multiple-use scheme for exploitation of the environment it is the anti-ecological purpose that may have the most effect on the environment, bring into action a sort of Gresham's Law for ecology --- that bad environments will drive out good environments. Filling the Bay would

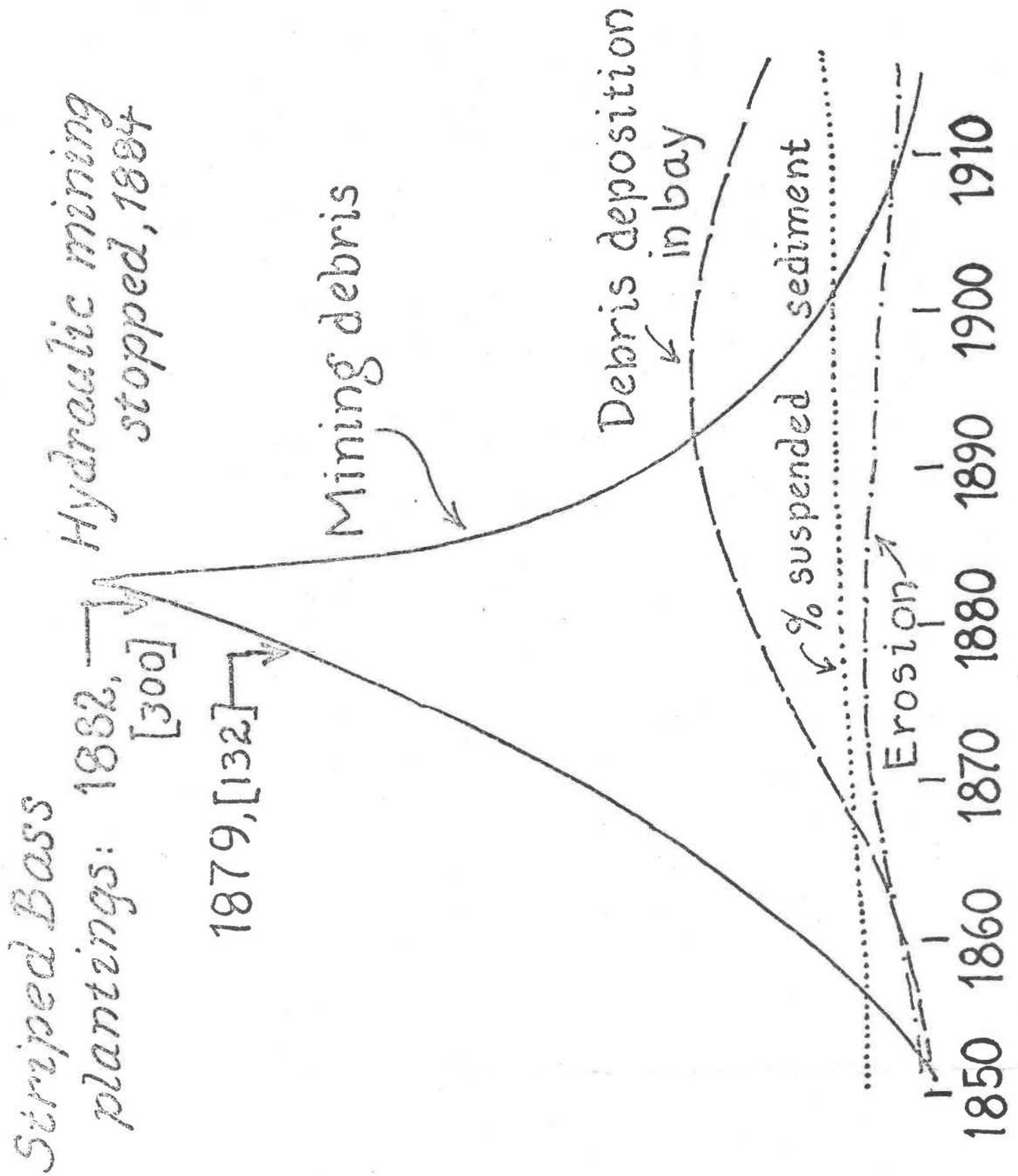


Figure 3. (Partly after Gilbert, 1917)

of course destroy the Bay entirely, and can hardly be considered a legitimate purpose in terms of the natural environment (Figure 4).

This brings us to a purpose that was not realized or understood until fairly recently, that is, the Bay serves as a moderator of our climate because of its surface area. It seems tautological to say that the Bay Area without the bay would not be the Bay Area, but such proposals as the Reber Plan to dam it off completely and fill most of the shallow areas were certainly made in ignorance of the importance of the surface area of the present bay. Its ameliorating influence on local climate depends directly on its circumstances as a body of water subject to tidal fluctuation.

Even the Kaiser Engineers, in their elaborate reports on the cloaca maxima of the Bay Area, concede that San Francisco Bay is a "unique natural resource," yet their proposals are made either without reference to the effect of other engineering designs for the total system, or on the assumption that they will inevitably be constructed. The reassurances that as many purposes as possible will be served by the proposed alterations in the natural environment may sound like good engineering, but such a plumber's apocalypse is bad ecology.

The problem overlooked here is that reduction of an environment to the lowest common denominator of multiple engineering purposes (and protection of fish and agricultural lands appear to be afterthoughts in the plans) may have a synergistic effect. All of these modifications may act together to produce an effect greater than the sum of the separate parts, and the Gresham's Law of ecological environments could operate to produce the least favorable environment for every purpose of both man and nature.

One can reflect on the past --- and the future --- in terms of the question, what is the best bay for human needs? Naturally, we must always be homocentric, but we ought not to forget that we may not necessarily know what is best for us even though engineers, especially sanitary engineers, seem to think they have this information. Had the highly destructive Renaissance man never come along, the highest and best use of the Bay would obviously be what it was in 1800, a place to live and gather food.

Within a hundred years commerce and industry had invaded the region, the aborigines were gone and the dominant use of the the bay as an externalizer of costs --- in other words a sewer --- was ascendant. Within forty years commerce, long considered a prime use and that which justifies so much of the activity of the Corps of Engineers, was beginning to wane from the upper reaches of the Bay and Delta. This is the stage for several of Oregon's small estuaries today, especially Coos Bay. The great bulk of the mills along the waterfront and the clutter along the Marshfield docks are utilitarian and money producing, but there is obviously a sacrifice of amenity in behalf of the needs or desires of others who may never see the town.

This may well be considered a legitimate "trade off" but it will not be surprising to witness in a few years time such a movement as at San Francisco Bay in behalf of the people who must live with these trade offs. Perhaps this is the most important aspect, sometimes forgotten even by those who must live with the environment they modify, that we are tampering with our own dwelling place as well as with the support system of the other living beings on our planet.

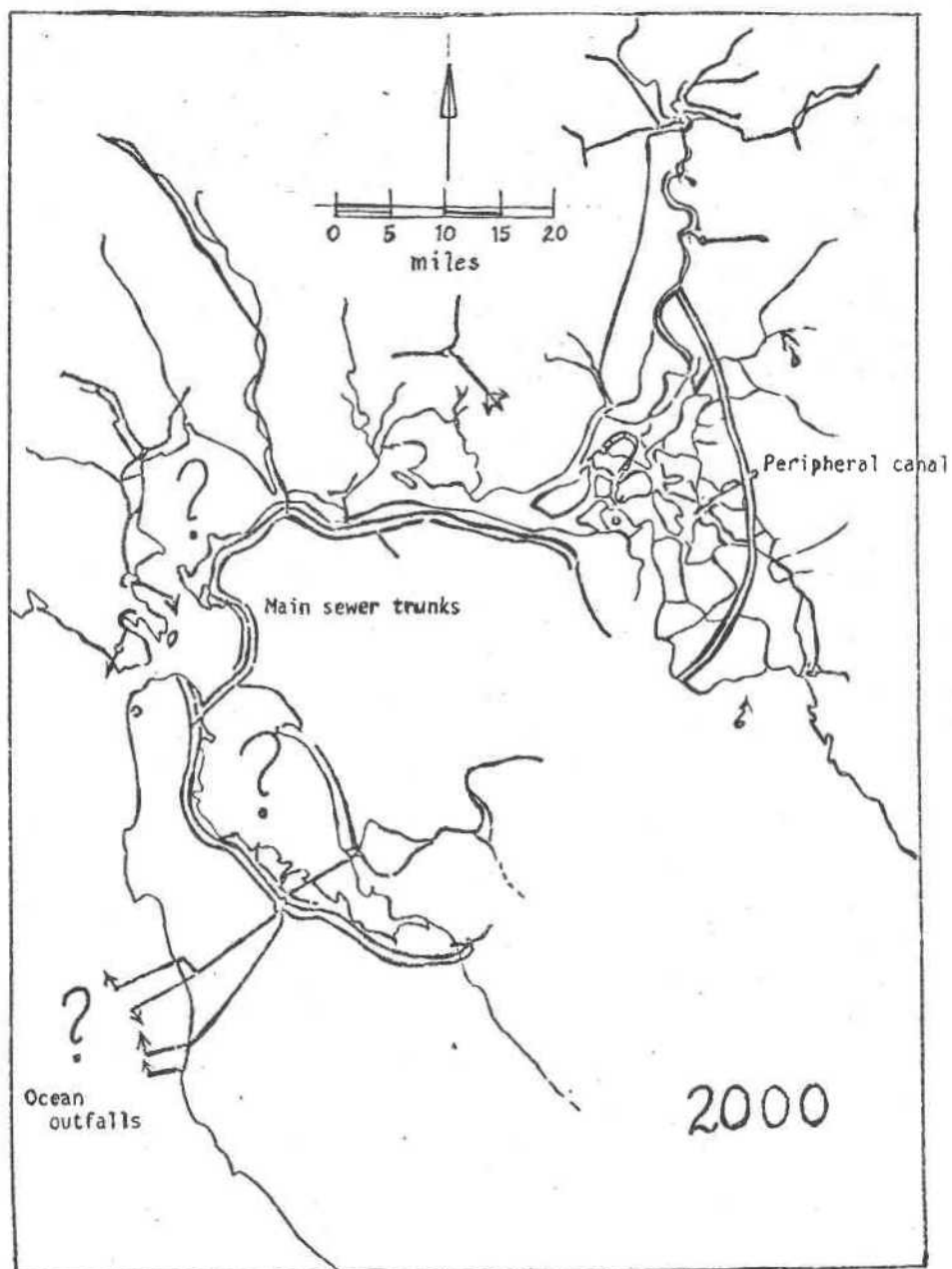


FIGURE 4. Extent of proposed diversion and plumbing projects, by year 2,020.

In a previous statement, prepared for the National Water Commission, I attempted, by way of summary, to state my own ideas of the principles of planning. Most of them are still valid, indeed some are yet to be tried (Hedgpeth, 1973):

Maintenance of estuaries as viable, ecologically healthy entities requires, first of all, a sense of obligation and dedication to the management of estuaries as environmental entities; the "estuarine conscience," as in Aldo Leopold's "ecological conscience," is the prime requisite.

Not all governmental and economic entities involved in a estuary can be equally sovereign; jurisdiction and decision-making power must be entrusted to some central management for each major estuary.

Filling should be considered basically a form of pollution; the most permanent and irreversible kind.

The environment of an estuary includes the watershed of streams flowing into it, and the entire drainage basin of an estuary must be dealt with during some phase of the management process.

Management, data storage, interpretation, research, education and meeting and hearing procedures should be conducted in a permanent center for each estuary or group of estuaries.

The continued reliance on consultants and other advisers to produce development plans, management studies, and proposals for monitoring programs is diverting funds from needed activities. The broad national policy is that estuaries must be preserved and maintained, and it is time that we begin to do just that.

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Presented December 6, 1973 by HENRY RICHMOND, Attorney for OSPIRG, Portland, Oregon. OSPIRG is an acronym for Oregon Students Public Interest Research Group.

Coastal Zone Legislation

In October 1972, Congress passed the Coastal Zone Management Act of 1972 (S 3507, Public Law 92-583), establishing national policy:

"Section 303 (a) to preserve, protect, develop, and where possible, to restore or enhance the resources of the Nation's coastal zone for this and succeeding generations.

"(b) to encourage and assist the states to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programs to achieve wise use of the land and water resources of the coastal zone giving full consideration to ecological, cultural, historic, and esthetic values as well as to needs for economic development,"

COASTAL MANAGEMENT PLAN GRANTS

Under the Act, coastal states are eligible for grants from the Secretary of Commerce, acting through the National Oceanic and Atmospheric Administration (NOAA) to help coastal states prepare a "management program for the land and water resources of its coastal zone".

A states coastal zone management program must include:

"Section 305 (b)

(1) An identification of the boundaries of the coastal zone subject to the management program;

(2) A definition of what shall constitute permissible land and water uses within the coastal zone which have a direct and significant impact on the coastal waters;

(3) An inventory and designation of areas of particular concern within the coastal zone;

(4) An identification of the means by which the state proposes to exert control over the land and water uses referred to in paragraph (2) of this subsection, including a listing of relevant constitutional provisions, legislative enactments, regulations, and judicial decisions;

(5) Broad guidelines on priority of uses in particular areas, including specifically those uses of lowest priority;

(6) A description of the organizational structure proposed to implement the management program, including the responsibilities and interrelationships of local, area-wide, state, regional, and interstate agencies in the management process."

A completed management program must provide for:

"Section 306 (c)

(8) adequate consideration of the national interest involved in the siting of facilities necessary to meet requirements which are other than local in nature."

and

"(9)...procedures whereby specific areas may be designated for the purpose of preserving or restoring them for their conservation, recreational, ecological or esthetic values."

including "estuarine sanctuaries" [as defined in Section 304 (e)].

To receive federal money to help operate an adopted coastal zone management plan, the Governor of the coastal state must designate an agency to receive and administer such grants.

Governor Tom McCall provisionally designated the Oregon Land Conservation and Development Commission (LCDC), proposed by Senate Bill 100, the MacPherson land use bill. Under Section 16 of Senate Bill 100, the Land Conservation and Development Commission "may" delegate any of its functions to OCC&DC, provided, however, that the LCDC give prior approval to any OCC&DC action under the delegation.

OREGON COASTAL CONSERVATION & DEVELOPMENT COMMISSION

The OCC&DC is the 1971 Oregon Legislature's response to the serious land and water use problems which now threaten permanent damage to Oregon coastal natural resources.

Composition

Senate Bill 687, which originally proposed OCC&DC, provided that the voting members of OCC&DC would be 24 port commissioners, county commissioners and city officials from the seven coastal counties.

Former Douglas County Senator and now OCC&DC Commissioner, Al Flegel, played a key role in drafting Senate Bill 687.

Environmentalists were able to amend Senate Bill 687 so that Governor McCall could appoint six additional members, one from each of the four OCC&DC districts, and two from the state at large.

Eight of the present members of OCC&DC represent the following coastal port authorities:

- Port of Astoria
- Port of Tillamook Bay
- Port of Siuslaw (OCC&DC Chairman)
- Port of Umpqua
- Port of Newport
- Port of Toledo
- Port of Coos Bay (OCC&DC Secretary)
- Port of Gold Beach

The first executive director of the OCC&DC (part-time July 1971 - March 26, 1972) was Paul Coyne, general manager of the Port of Siuslaw.

Two of the OCC&DC's principal officers are port commissioners. OCC&DC Chairman Wilbur TERNYIK is from the Port of Siuslaw. He is a self-employed sand dune stabilizer. OCC&DC Secretary Robert YOUNKER is from the Port of Coos Bay. He is in the real estate business.

Policy

ORS Chapter 191 describes OCC&DC:

that: "191.110 Policy. The Legislative Assembly finds and declares

"(1) The coastal zone in this state is an important and valuable part of the natural resources of this state and that because of its value there exists a need for its protection through the development and maintenance of a balance between conservation and developmental interests with respect to such natural resources.

"(2) There exists a conflict in the development and use of the natural resources of the coastal zone among industrial interests, commercial and residential development interests, recreational interests, power resource interests, transportation and other navigational and other marine resource interests.

"(3) To further the policy of this state in the protection, preservation, development and, where practicable, the restoration of the natural resources of the coastal zone, a commission should be established to develop and prepare a comprehensive plan for the conservation and development of the natural

resources of the coastal zone that will provide the necessary balance between conflicting public and private interests in the coastal zone."

The Oregon Coastal Zone includes that part of Oregon between California and Washington, and west of the crest of the Coast Range to the extent of the state's territorial jurisdiction.

Duties

The functions of the OCC&DC are specified:

"191.140 (1) Study the natural resources of the coastal zone and recommend the highest and best use of such resources.

"(2) Not later than January 17, 1975, prepare and submit a report, including the findings of its study, a proposed comprehensive plan for the preservation and development of the natural resources of the coastal zone and any maps, charts and other information and materials that are considered by them to be necessary in such report, to the Governor and to the Fifth-eighth Legislative Assembly of the State of Oregon.

"(3) Not later than January 12, 1973, prepare and submit a preliminary and, if possible, a final report of their progress in the study and formulation of the comprehensive plan described by subsection (2) of this section to the Governor and the Fifty-seventh Legislative Assembly of the State of Oregon.

"(4) Advise the Governor from time to time on the findings being made by them and propose policies and interim measures for implementation by the Governor and state agencies that they consider to be necessary for the proper preservation and development of the coastal zone prior to completion of its comprehensive plan for the coastal zone."

Comprehensive Plan

"191.150 Plan content. (1) The plan described by subsection (2) of ORS 191.140 shall reflect a balancing of the conservation of the natural resources of the coastal zone and the orderly development of the natural resources of the coastal zone. Such plan shall be prepared in a form designed to be used as a standard against which proposed uses of the natural resources of the coastal zone may be evaluated. In the event of conflicting uses of the natural resources of the coastal zone, the plan shall establish a system of preferences between such conflicting uses that are consistent with the control of pollution and the prevention of irreversible damage to the ecological and environmental qualities of the coastal zone."

In 1971-1972, the OCC&DC received the following county contributions:

Lane	\$10,000
Douglas	10,000
Lincoln	3,000
Clatsop	3,000
Tillamook	3,000
Coos	-
Curry	-
	<hr/>
	\$29,000

The Emergency Board of the Oregon State Legislature initially refused to give OCC&DC money. Rep. Stafford Hansell (R. Hermiston) opposed Emergency Board funding of OCC&DC because he did not like the commission's membership. "That is like having the fox guard the chickens." (Eugene Register Guard, April 24, 1972)

In May, 1972, the Emergency Board agreed to match county contributions, as contributed, up to \$40,000.

On July 1, 1972, OCC&DC was still operating on the original \$29,000 because no 1972-1973 contributions had yet been received.

In fiscal year 1972-1973, OCC&DC received the following state-matched contributions:

Lane	\$10,000
Douglas	10,000
Lincoln	3,000
Clatsop	3,000
Tillamook	3,000
Coos	-
Curry	3,000 (March, 1973)
	<hr/>
	\$32,000

Also, OCC&DC has received \$30,000 under a Section 701 grant under the Housing and Urban Development Act of 1956.

In addition, the dollar value of the "work concepts" prepared by Battelle Northwest for, and paid by, Local Government Relations, Oregon Executive Department, but used by OCC&DC, was approximately \$12,500.

OCC&DC's 1973-1975 general fund budget request of \$120,000 was approved on December 6, 1973. Local (\$120,000) and federal matching (\$414,870) money would provide OCC&DC total revenue of \$654,870.

Under ORS ch. 191, OCC&DC is a temporary planning agency which is to terminate after OCC&DC presents its proposed coastal comprehensive plan to the Oregon Legislature in January, 1975.

Presented, December 6, 1973 by RICHARD BENNER, OSPIRG Intern, University of Oregon, Eugene, Oregon

Planning for Diversity

Estuaries, wetlands, beaches and rocky headlands belong in usufruct to all living things. Yet, decisions about the use of these resources have been made by those insensitive to their importance or too sensitive to pressures for their development.

In fact, land- and water-use planning on the Oregon coast is a conceptual failure. We have depended on two basic tools --- zoning and restrictive regulations --- which have proved to be insufficient. Regulations are enforced by over 240 local, state, and federal jurisdictions on the coast, not one of which is charged with consideration of the total environmental impact that a proposed activity may have.

Zoning, as an instrument of control over poor development practices and abuse of natural resources, is severely handicapped. Two of its most serious limitations are associated with exclusive local control; susceptibility to political pressures from developers, and lack of regional perspective. Mechanisms which have been written into zoning ordinances to provide flexibility --- variances, amendments, and conditional uses --- have instead legitimized the slow destruction of comprehensive plans.

Oregon has not been slower than other states to recognize the failure of exclusive local control. The Legislature has acknowledged that local control should yield to state control on questions of paramount state interest.

Perhaps the first recognition that land- and water-use were of paramount state interest was the Dry Sands legislation passed in 1967, which declared the public interest in Oregon's beaches.

In 1971, the Legislature passed Senate Bill 10, which required all Oregon counties to complete zoning and develop a comprehensive plan. The last session of the Legislature passed Senate Bill 100, which designates areas and activities of critical state concern.

CREATED THE COMMISSION

The response of the Legislature to the situation on the Oregon coast was Senate Bill 687, now chapter 191 of Oregon Revised Statutes. The coastal zone, says Chapter 191,

is an important and valuable part of the natural resources of this state and that because of its value there exists a need for its protection through the development and maintenance of a balance between conservation and developmental interests with respect to such natural resources. (191.110 (1))

To develop a plan to restore that balance, the statute created the Oregon Coastal Conservation and Development Commission and charged the Commission to "prepare and submit a comprehensive plan for the conservation and development of the natural resources of the coastal zone."

The legislation established a 30-member commission composed of 6 persons from the state at large chosen by the Governor, 8 coastal port officials, 8 coastal county officials, and 8 coastal city officials. Thus, to effect a redistribution of decision-making power from local governmental bodies to a regional body, the statute created an unwieldy commission overwhelmingly controlled by local governmental officials. Not a very auspicious beginning.

What's the OCCDC's comprehensive plan supposed to look like? The policy section of the statute says that the plan must provide for "the conservation and development of the natural resources of the coastal zone that will provide the necessary balance between conflicting public and private interests in the coastal zone."

The most important, and unfortunately the most ambiguous word in that statement is "balance." What does balance mean? And how do you plan for a balance? In terms of coastal zone management, "balance" has two meanings: an equilibrium between two opposing forces, or a state of harmony in which differences and suitabilities are acknowledged. For the OCCDC, does balance mean equal amounts of conservation and development in all areas of the coastal zone, or does it mean development in areas best suited for it and conservation in areas which ought to be preserved? Professor Bella calls the first kind of balance "dispersed uniform development"; he calls the second a "balance for diversity."

Using the first approach, a plan sets broad, uniform policies and leaves local bodies to determine how conservation and development shall be mixed in specific areas. Using the second approach, a plan establishes different policies for different areas, guiding local bodies in deciding how to balance conservation and development in specific geographic areas.

OSPIRG's reading of the OCCDC work program is that, to this point, the Commission has chosen the first approach. Its program calls for a series of general, uniform policies concerning 18 areas of critical concern

which will be applied equally up and down the coast. I will read from the OCCDC's major publications. The Interim Report, published last winter, says that the commission will submit a report to the 1975 Legislature "in the form of a series of management policies and standards." The policies and standards will be "fairly uniform guiding principles." The Overall Program Design, also published last winter, says the balance will be achieved by developing "a series of management policies and standards" for the 18 critical resources.

SINGLE SET OF POLICIES

That is, a single set of estuary policies will be applied without differentiation to all estuaries. A single set of wetlands policies will apply to all coastal wetlands. The OCCDC's filling and dredging policies, for example, will apply equally to Coos Bay and to Netarts Bay and Sand Lake.

OSPIRG feels that this approach endangers both the environment and the economy of the Oregon coast. What protection can a single dredging policy, which must apply to what is happening in Coos Bay, offer to the Salmon River estuary where no dredging is taking place? What protection can a requirement that all domestic sewage discharged into estuaries go through secondary treatment offer to Sand Lake, where there is no sewage discharged?

OSPIRG chose the second meaning of the word "balance" as the best way to maintain and encourage diversity of environment and a healthy diversified economy. The OCCDC's management plan must establish different policies which offer special protection to some estuarine areas and which offer special funding priority for ecologically sound development in others.

In fact, we think the legislation demands this interpretation. Section 191.150 (1) of the statute reads:

In the event of conflicting uses of the natural resources of the coastal zone, the plan shall establish a system of preference between such conflicting uses that are consistent with the control of pollution and the prevention of irreversible damage to the ecological and environmental qualities of the coastal zone.

The Commission is also charged to recommend the highest and best use of coastal resources. The OCCDC must, therefore, consider the best coast-wide use of estuaries and wetlands least likely to cause pollution and irreversible harm to the ecology.

Beginning with estuaries, the most valuable and threatened resource on the coast, the OCCDC should classify Netarts Bay, Sand Lake, Salmon River, Alsea Bay, and South Slough of Coos Bay as "protection" areas. And the Commission should classify Coos Bay and Astoria as "development" areas.

Protection areas should be managed to preserve, to the greatest extent possible, the diversity and integrity of natural resources. Sewage, filling, dredging, home-siting, and waterfront development policies for example, must be more restrictive in these areas than in other areas.

Development areas should be managed to encourage man's habitation and activities in a manner consistent with avoidance of significant ecological harm. Special priority should be given to these areas for limited state and federal port and highway development funds. In other words, the Port of Astoria should get Corps of Engineers money to conduct an estuary and siltation study before the Port of Nehalem gets money to reconstruct its jetty system.

Classification of estuaries and designation of preferred uses in specific areas is not OSPIRG's hairbrained scheme. There have been calls for special protection of undisturbed estuarine areas in Oregon since 1968. Professors Bella and Klingeman from this University have urged the classification of estuaries and the uneven distribution of man's activities among natural resource systems. The Florida coastal management plan recommends classification of land and water areas, as do the Maine, Hawaii, and Washington plans.

FEDERAL FUNDING REQUIREMENTS

And, of great importance to the success of the Oregon effort, the Federal Coastal Zone Management Act of 1972 calls for classification of uses as a prerequisite to federal funding of state coastal management programs.

Section 305 (b)(3) of the Act required a state to include "an inventory and designation of areas of particular concern." State programs must also include "broad guidelines on priority of uses in particular areas." These requirements are expanded in proposed rules recently published in the Federal Register by the National Oceanic and Atmospheric Administration (the agency administering the federal program). The "priority of uses" requirement, the rules say,

should build upon the State's findings and conclusions reached concerning "permissible uses" and areas of "particular concern." These decisions should assist the States in establishing preferred uses tailored to specific areas in its coastal zone.

The key language in these rules is "specific areas" and "preferred uses tailored to these areas." The Act requires more than designation of estuaries and wetlands as resources of critical concern. It requires the identification of specific geographic areas --- specific estuaries, for example --- and the assignment of preferred uses to those areas.

The point is that, unless the OCCDC changes its planning approach to protect differences between unlike areas, Oregon's most undisturbed estuarine areas will continue to be slowly destroyed, its 15 coastal ports will continue to compete for limited development money to the detriment of the entire state, and the Oregon coastal management program may lose critical federal assistance. The approach that OSPIRG and many others have recommended is to plan for environmental and economic diversity based on classification of estuaries.