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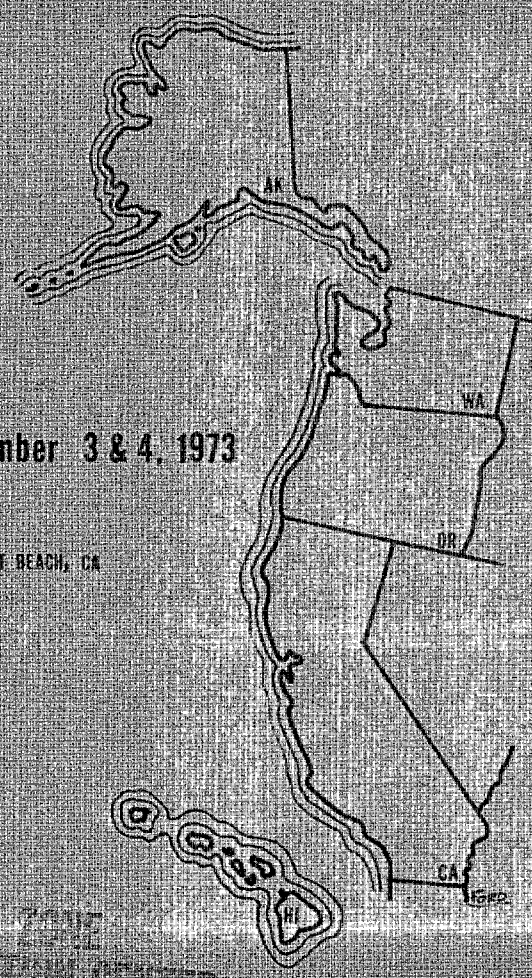

December 3 & 4, 1973

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AND

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Proceedings

Coastal Zone Management and
The Western States Future

Editor: William B. Merselis

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I CAN'T BELIEVE I EDITED THE WHOLE THING!

A great deal was learned from this undertaking:

- I don't plan to do it again for at least six months
- Speed reading does not work for editing
- Slides are hard to describe in writing
- Third-order xerox copies are hard to reproduce
- Volunteer labor is top quality, but not always timely

We had a wonderful conference. All the preparations and work in advance of December 3rd were rewarded by the excellent presentations and contributions of our speakers and the stimulating audience turnout.

The purpose of this conference was to bring together those who work and direct activities in coastal zone management, to promote the exchange of coastal zone management information and concepts, and to present significant study results in both the technical and management areas particularly relevant at the regional level in the Western States. The program emphasis was on the practical, and not the abstract. Sessions followed a single theme and specific papers were supplemented by exchange between speakers and panel provocateurs.

Originally, there was no plan for a proceedings; however, because of the technical excellence of the program, and the scientific and educational interests of the Bendix Corp plus an anonymous contributor, it was decided that a great many people unable to attend could benefit from the conference if they could purchase and read the information presented. Thus, these proceedings were developed.

Special thanks are expressed to the authors who took the time to prepare their papers for these proceedings. The other speeches which were taped and later transcribed, were sent to the author for editing. In some cases, I edited the material and so any errors you may find are probably mine.

Our especial thanks go to the USC Sea Grant Program Advisory Services staff for their excellent support and in particular, to the Coordinator, Byron Washom, for his efforts while serving as head of the Technical Program Committee.

The MTS Los Angeles Region Section officers and the Conference Steering Committee, its Chairman, Eric Nordhausen; Arrangements Chairman, Harold Stanley; and Publicity Chairman, Mickey Milane (listed in the back of the proceedings) contributed many talents and a great deal of time to make the conference a success.

I would like to express my thanks to Kay Dugan, our section Newsletter editor, who not only used her talents to coordinate conference workers on December 3rd and 4th, but also transcribed a great number of speeches. Also, thanks to Ford McFarlane for the cover and for arranging the figures.

Finally, I want to express my sincere gratitude and extra special thanks to my wife, Judy, for all her work in transcribing and final typing.

These proceedings are my recognition of all these efforts.

Sincerely,

William B. Merselis

William B. Merselis
Chairman, MTS/LARS

RESOLUTION OF COMMENDATION

"Motion made and duly seconded, and by unanimous vote of those present, it was moved that:

The members and guests of the Marine Technology Society in attendance at the December 3rd and 4th, 1973 conference held in Newport Beach, California and entitled "COASTAL ZONE MANAGEMENT and the WESTERN STATES" wish to express their appreciation to the members of the CONFERENCE COMMITTEE and to the officers and staff of the MTS-LOS ANGELES REGION SECTION for their efforts in presenting us with an outstanding program. To each of the participating chairmen, speakers and panelists, we particularly express our appreciation for their excellent presentations."

Conference Summation
Byron Washom, Program Chairman

Coordinator
Sea Grant Program
Marine Advisory Services
University of Southern California
Los Angeles, California

For those of you who are taking notes, you can put your pads down for the first time in two days, since my forte is having a grasp for the obvious. I would just like to basically give you my reflections in observing this conference.

First, I would like to look at the audience. The Audience was totally unexpected; not only in size and in sophistication, but even more so in its interest and concern. Two examples. Yesterday in Dr. Stevenson's session they ran about an hour over time. No one was chained to the chair and nobody was leaving even though there was also a cocktail party going on out in the hall. This is the kind of interest that personally surprised me. I'm somewhat becoming a professional conference-goer and very rarely does one see an audience so concerned with the subject matter. Furthermore, I was impressed with how the age groups were so evenly divided. The representation of youth at this conference gives credence to the hope that a continuity of wise use and management of coastal resources will carry well into the future.

As far as the speakers are concerned, I too was impressed with the speakers. Many of the speakers came as personal invitations on my behalf while others were invited by the Chairman, but they all seem to have rewritten their speeches within the past two weeks, because they saw the pertinence of this topic, this conversation, and this conference. Many of them addressed themselves to the energy issue, which I think was most appropriate. In addition, all of them polished their speeches, for it was not a straight

paper presentation. It was a true presentation of the issues.

Finally, I would like to thank my Sea Grant colleagues for there are five different universities represented here. I know their travel budgets are tight and I thank them for using their funds to come to this conference.

There's the output--we have seen the exchange of information and ideas. We have had a learning process, but I think in the audience we have those individuals who are working in the real world planning and making the management decisions. By the nature of the exchange and the learning process that has occurred, the audience is prepared to go back with these new tools to their own activities and apply them to their problems, and issues. In that case, I am very pleased with the conference, Thank you.

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CURRENT FEDERAL COASTAL ZONE LEGISLATION AND ACTIVITIES

Robert W. Knecht
Director, Office of Coastal Environment
Department of Commerce
11400 Rockville Pike, Rockville, Maryland 20852

What I would like to do this morning is to give you a brief overview of the Coastal Zone Management Act and the progress we have made in implementing that legislation during the last year. I would also like to mention a few of the problems and issues that I think will be confronting both the State, local and Federal Governments in the coming years in the area of coastal zone management.

First, I should say that I have by no means all of the answers regarding this new Federal program or of the various roles that different levels of government will play. No State has an approved coastal zone management program at the Federal level and no State has yet received a grant from the Federal Government in coastal zone management so that the program is yet to be tested. Unquestionably, much will be learned in the coming months as the first grants to States are let and the work under the terms of the new Federal Act begins.

As I mentioned, the Act was passed in October of 1972. It established a new Federal program to assist States in developing and adopting rational management programs for their coastal zones. The program is a voluntary one, no State is obliged to join. However, two kinds of incentives are provided in order to encourage States to participate. The first is financial. Three types of grant-in-aid are authorized to be given to State governments and other levels of government that participate through the State. Second, States having approved management programs will have increased leverage in dealing with the Federal Government concerning Federal activities that could potentially affect their coastal zones. That is to say if States adopt a management program that is consistent with the guidelines given in the Act, then Federal activities affecting that State's coastal zone have to be consistent with the State's approved management program.

Three additional aspects of the program are important, it seems to me. The first pinpoints the State level of government as the appropriate level to take the initiative in the coastal zone management field.

Second, the legislation indicates that the Federal role is one of overseeing the adequacy of the process that a State chooses to adopt and not the substance of individual State land and water use decisions. Clearly, the program is not one of Federal zoning.

The statute also clearly recognizes a balanced approach toward coastal zone management. While the Act is aimed at conservation and enhancement of coastal areas, it recognizes the economic and social importance and necessity of certain kinds of development in coastal areas.

Three types of financial assistance are authorized in the Act. First, national grants to assist States in the development of management programs. Second, grants to allow States to implement and operate management programs once they are approved at the Federal level. And third, grants to assist States in acquiring estuarine sanctuaries for research and educational purposes.

The key question, of course, pertains to the content of a management program. What does a management program have to include if it is to be approved at the Federal level? The Act contains 18 specific items that must be included in a Federally approvable program. These are of the following kinds: the State must identify its coastal zone for management purposes; it must list permissable uses within the coastal zone; it must designate geographic areas of particular concern to the State; it must decide on the type of land and water use controls that it will use to manage areas of particular concern to the State. One of the other requirements is that it must demonstrate that it has an adequate process to take account of the national interest in the siting of facilities designed to meet needs which are more than local in nature.

Where do we stand with regard to our progress in implementing this program?

Originally, the Administration delayed in requesting funding for the program because of its close relationship to the land use program still pending in the Congress. However, last August the President submitted an amended 1974 budget request and included a $5 million appropriation request for the coastal zone management program. In late December the Congress acted on the President's request and appropriated a total of $12 million for the program. It is expected that these funds will be apportioned by the Office of Management and Budget to our office sometime between now and December 15.

Guidelines to the States to inform them as to the procedures to be used in applying for grants were published in the FEDERAL REGISTER on November 29, 1973. We expect to have application forms and grant processing procedures ready by mid-December. We expect to be in a position to let the first grant by about February 1.* Between now and June 30, we expect 28 of the 30 coastal States to apply for grants, and to begin developing management programs.

We have now begun the task of developing the criteria that the Secretary of Commerce will use as he considers the approval of a State's management program one, two, or three years from now. We think it very important that States know the kinds of tests that their management programs will have to pass to be approved at the Federal level before they begin the process of developing such programs. Because the development of these criteria is such a critically important aspect of our program, we are attempting to obtain as much comment and input into our considerations as possible.

Toward that end, we have scheduled a series of regional discussions around the country during the next two months. These are scheduled for January 8, in San Francisco and January 10, in Seattle. Several of the meetings are also scheduled for later in the month in Chicago, Boston, and Atlanta and New Orleans. A copy of a draft working paper describing the approach we are using in setting these criteria will be available to the public, State officials, and other interested persons several weeks prior to the regional discussions.

* The first three grants were let on March 13, 1974.

Before closing, I would like to comment on some of the early problems we anticipate as States and local governments begin to confront the task of developing coastal zone management programs.

First, problems that will confront State officials working on the coastal zone management program. Clearly, identification of the coastal zone for management purposes will be a difficult task. The key question will be the extent to which the coastal zone extends inland from the shoreline. It is our intention to give individual States a maximum amount of flexibility in this regard, recognizing that each must tailor its coastal zone to its own particular geographic, economic, political, and social situation.

Designating the areas within the coastal zone of particular concern to the State will also be a controversial exercise. Equally important will be the formulation of goals and objectives for the States' coastal zone management programs. How are these goals and objectives to be reached? How is the public to be involved in this process? What kinds of goals should be set -- increased public access to beaches? -- Reduction of polluted shellfish beds? -- Additional opportunity for recreational boating? -- and so on. Deciding on the appropriate balance between State and local governmental power in coastal land use will be one of the difficult political problems facing each State. The importance of involving local government in the formulation of a coastal zone management program from the earliest possible moment cannot be overly stressed.

We at the Federal level, of course, have our problems too. Acquainting the large number of Federal agencies with missions and programs in the coastal areas of the existence and impact of this new program is a large task. The Act also calls for an increased measure of coordination and cooperation between the Federal Government and State governments in the pursuit of more effective coastal zone management. It is the task of our agency to see to it that this comes about. But the biggest task that lies ahead deals with the "Federal consistency" requirement that I alluded to earlier. We must work closely with Federal agencies to ensure that they understand the implications of this aspect of the program. We must ensure that both State agencies developing managing programs and Federal agencies involved in the carrying out of coastal activities have early and effective dialogues on the consistency (or lack thereof) between Federal and State coastal plans.

In summary, coastal zone management can only succeed if a very close partnership develops between the Federal Government and State and local governments in this field. Without this kind of a three-way partnership, the large potential of the program will not be achieved.

SESSION I QUESTION AND ANSWER PERIOD -- John Armstrong (Session Chairman)

Answer: Robert W. Knecht -- I certainly agree that there are a goodly number of problems at the national, State and local level in the area of land use and the lack of coordination. Certainly, no single mechanism is going to solve all of them, including the new coastal zone management program. The Administration in Washington has put comprehensive land use legislation as its number one environmental measure. At the present time, there are three bills pending in the Congress dealing with comprehensive land use. There is an Administration measure, Senator Jackson's measure (H.R. 10294). Most observers feel that one or the other of these measures will be adopted by the Congress in the Spring. Each of the land use measures calls for the same type of Federal consistency with approved State land use plans that I referred to earlier. I think the theory behind these measures is sound. Whether or not they actually work in practice will depend upon the effectiveness of the administration of these programs, the extent of State participation, the adequacy of funding, and similar factors.

Answer: Robert W. Knecht-- Absolutely, the Federal Government is bound to act in a manner consistent with approved State programs. The types of Federal actions that could potentially be affected are as follows: financial grants-in-aid or subsidies to State or local or private activities, direct Federal action by a Federal agency, or the granting of Federal licenses or permits. These three classes of action must be consistent with approved State and land use and coastal zone programs.

There are some strong forces in opposition to national land use legislation in this country. These tend to be connected with land development and related real estate interests. Whether there interests are strong enough to prevent the passage of a land use measure remains to be seen.

Answer: Robert W. Knecht -- I can only comment from the perspective of the program I represent. As a part of a comprehensive program, States will have to demonstrate that they have an adequate process for consideration of the siting of facilities that are designed to meet more than local needs. The legislative history shows clearly that the facilities referred to include power generation facilities, refineries, and so on. I would think that deepwater ports would also fit this criterion.

In the case of deepwater ports, even though they may be located well beyond the three mile limit, in Federal waters, the Act states that any Federal action that affects a State coastal program must be consistent with it. The implication is that Federal actions, even though taken outside of a State's coastal zone, must be consistent with that State's coastal zone program if the Federal action has impact on the State's coastal zone. The State of Delaware adopted legislation several years ago that prohibits heavy industry from its coastal zones. As I understand it, this legislation is an outright ban on this kind of new development. This would appear inconsistent with the requirement of the Coastal Zone Management Act which calls upon the State to have an adequate process for considering the siting of such facilities. Nevertheless, the State has indicated its intention to apply for a grant to begin the development of a coastal zone management program.

SHORELINE MANAGEMENT: THE WASHINGTON EXPERIENCE

D. Rodney Mack
Shoreline Program Manager
Office of Planning & Program Development
State of Washington
Department of Ecology

Perhaps most of you know that the State of Washington has had legislation for shoreline management on the books since June 1971. Before describing our program and our current status, I'd like to read the legislative findings and policy of the shoreline management act, as I think it conveys the spirit and intent of the law quite concisely:

The legislature finds that the shorelines of the state are among the most valuable and fragile of its natural resources and that there is great concern throughout the state relating to their utilization, protection, restoration, and preservation. In addition it finds that ever increasing pressures of additional uses are being placed on the shorelines, necessitating increased coordination in the management and development of the shorelines of the state. The legislature further finds that much of the shorelines of the state and the uplands adjacent thereto are in private ownership; that unrestricted construction on the privately owned shorelines of the state is not in the best public interest; and therefore, coordinated planning is necessary in order to protect the public interest associated with the shorelines of the state while, at the same time, recognizing and protecting private property rights consistent with the public interest. There is, therefore, a clear and urgent demand for a planned, rational and concerted effort, jointly performed by federal, state and local governments, to prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines.

It is the policy of the state to provide for the management of the shorelines of the state by planning for and fostering all reasonable and appropriate uses. This policy is designed to insure the development of these shorelines in a manner which, while allowing for limited reduction of rights of the public in the navigable waters, will promote and enhance the public interest. This policy contemplates protecting against adverse effects to the public health, the land and its vegetation and wildlife, and the waters of the state and their aquatic life, while protecting generally public rights of navigation and corollary rights incidental thereto.

The legislative/political history leading up to the passage of the state's shoreline management act is rather involved, but two key events were probably the most instrumental in the enactment of the law. First, a state supreme court decision in December 1969 found a landfill into one of the state's major lakes to be illegal and ordered it to be removed on the basis that "the public has a right to go where the navigable waters go." The court also concluded that it was not the appropriate

forum for decision making on individucal projects, but that the executive and legislative branches should develop a comprehensive shoreline planning and use regulation program for the state. The net effect of the decision was to cast a cloud on all shoreline development in the state.

Secondly, the Washington environmental council, discouraged by the legislator's failure to enact coastal management legislation in previous sessions, circulated a popular petition to the legislature in a statewide drive and obtained more than sufficient signatures for validation. Under the Washington State constitution, the legislature has three alternatives available to it when presented with an initiative from the people: (1) they may enact into law during the ensuing session, (2) they may reject it, in which case it is placed on the ballot at the next general election, or (3) they may reject the initiative proposed and propose an alternative, both of which then appear on the ballot. The legislature chose to pursue the later course and inacted into law substitute house bill 584 (The Shoreline Management Act of 1971), subject to ratification by the voters. The act contained an emergency provision which made it effective on June 1, 1971 nearly 18 months before its being placed on the ballot.

While there were numerous differences between the initiative and the shoreline act, the primary distinction between the two dealt with the balance of responsibility at the state and local levels of government. The Washington Environmental Council's initiative placed the primary responsibility for planning and regulation at the state level, while the Shoreline Act places that responsibility largely at the local level with the state (Department of Ecology) acting primarily in a supportive and review capacity. As you know, the Shoreline Management Act was subsequently ratified by the voters in the November, 1972, general election.

FEATURES OF THE SHORELINE MANAGEMENT ACT

In geographical scope, the shoreline act applies to all marine water areas of the state, streams with a mean annual flow of 20 cubic feet per second or more, and to lakes larger than 20 acres. It applies to shorelands extending landward 200 feet from the ordinary high water mark and to all marshes, bogs, swamps, floodways, river deltas and floodplains associated with water bodies subject to the act. In all, there are 791 lakes and 965 rivers and streams subject to the act.

Basically, the act requires and defines a planning program and a regulatory permit system, both of which are initiated at the local level. The planning program for each local government consists of a comprehensive shoreline inventory and a master program for the regulation of shoreline uses. The inventory consists of existing land and water uses, generalized ownership patterns, and natural shoreline characteristics. The master program utilizes the inventory information and is essentially a comprehensive land use plan with a strong environmental orientation and includes basic goals and objectives, the designation of all shoreline areas into a categorization system and specific regulatory language. The entire planning function is conducted in conformance with guidelines prepared and adopted by the Department of Ecology and local master programs and are subject to state review and approval before they become effective.

The regulatory phase of the shoreline management program consists of a permit system for all substantial developments and shoreline modification having a fair market value of $1000 or more. There are certain exemptions from the permit system specified in the act. The system is administered locally, again

subject to state guidelines and review. Once a permit application is acted upon by local government and prior to the commencement of development, that decision and the application is required to be forwarded to the Department for review. The department does not have veto power over the local decision, but does have a specified period of time in which to appeal the decision. I might note that any individual or agency who feels aggreived by the granting or denial of a permit also has the opportunity to appeal to the hearings board.

CURRENT STATUS OF THE SHORELINE PROGRAM

Permits were required for all substantial developments from the effective date of the act and the system has therefore been in effect for nearly 2½ years. In that time, the Department has received and reviewed approximately 1800 permits, for projects ranging from residential piers and docks to multi-million dollar highway projects and industrial plants. There are presently 109 permit applications in some stage of appeal, 57 of which have been initiated by the department. Private groups and individuals have initiated 52 of the appeals, with the Department intervening in 20 of those appeals.

While there is no definite pattern to Department-initiated appeals with regard to type, there has been a general tendency to concentrate on fills and over-water construction. In addition preference is usually given to structures set back from the water and to development proposals within currently developed areas.

The planning program is presently underway, with inventories having been completed and master programs scheduled for completion by the end of this year. While the shoreline act stipulates that each city and county is ultimately responsible for adopting a program for that jurisdiction, the actual preparation of the program is being done in various ways: Where regional planning bodies exist, they generally are doing the planning for their member agencies; many of the counties are doing their own program and furnishing some technical assistance to the smaller cities within the county; and several jurisdictions are having their plans done by private consultants. In all, approximately 90 jurisdictions have assumed direct responsibility for their programs, while the county or regional planning agency is doing the plans for the remaining 180 incorporated towns having shorelines.

Upon completion, the master programs are required to be submitted to the Department of Ecology for review and approval. If the Department determines that the program is not consistent with the policy of the act or the guidelines, it must respond back to the local government within 90 days with suggested modifications. That local government then has an additional 90 days to make those modifications and to resubmit the program for approval. On the major shorelines of the state, the so-called "Shorelines of statewide significance," the Department has the responsibility for developing and adopting an alternative program for a local jurisdiction if it determines that the resubmitted master program is inadequate.

STRENGTHS OF THE WASHINGTON PROGRAM

1. Planning and implementation system in one package - The act provides the criteria for shoreline planning as well as the means for effectuating those plans - the substantial development permit system.
2. The act is geographically comprehensive - by including fresh water streams and lakes, the mechanism is provided for managing the use and development of those water -

bodies which have such a direct and significant impact on the coastal zone.

3. State/local relationship - an equitable and workable balance seems to have been acheived in placing the primary responsibility for planning and regulation at the local level, but subject to state overview.

4. State responsibility in the event of local default - a provision of the shoreline act requires that if a local government fails to comply with the planning requirements, the state is responsible for preparing and adopting a program for that government. This provision has proved to be effective inducement for many counties to undertake a planning program, several of which had no prior experience or inclination to plan for and regulate development within their jurisdiction.

5. Citizen participation - while the act places some emphasis on citizen participation, we felt that it was essential to the success of the program and placed a high priority on it in our guidelines. As a result, all jurisdictions within the state have appointed committees to work with local planners (and in some cases have undertaken the program themselves). The state committees range in size from 6 to 60 and statewide there are well over 1,000 individuals actively involved in the shoreline planning program for their city or county.

6. Explicit definitions - the act is relatively definitive in setting deadlines, time requirements, and geographical scope. In some ways this is beneficial, but in others it impairs program administration. For example, a permit for development is generally required to follow the same procedures and processing time whether it is for a single family residential bulkhead or for a pulp mill. There is no opportunity for administrative discretion to expedite the more inconsequential projects. With regard to the 200 foot area subject to the act, such definition has the advantage that it can readily be defined on the ground, shoreline property owners can generally determine when a proposed action is subject to the act, if consistent and each case does not have to be argued on an individual basis. The problem, of course, is that a designation based solely on distance can be environmentally arbitrary, administratively inflexible and wholly inadequate to manage certain shorelines.

WEAKNESS OF THE WASHINGTON PROGRAM

1. Permit system - I have mentioned the problems we've encountered in not having discretion to vary the time requirements on permits. Also single family residences are exempt from the permit system which weakens the program, particularly in those areas where second home development is prevalent. Furthermore, there is no adequate means for monitoring illegal activity on the shorelines to ensure complicance with the law.

2. Appeal Backlog - Because of the time involved in preparing and presenting cases to the shoreline hearing board, and frequently the length of time in reaching a decision, there as developed a considerable backlog of pending appeals. As a result, most developers have not been able to obtain a final decision for at least 90 days and sometimes for up to one year.

3. Staff and funding - The shoreline program is being administered at the state level with a staff of 14, roughly equally divided between the planning and the permit functions. We have a serious need for additional staff, particularly in the specialized scientific fields. An additional shortcoming

is the availability of grant funding for local governments. To date over $500,000 has been provided through our department for planning purposes, matched equally by local government, for a total committment of over $1 million. With the large number of jurisdictions involved, however, the funding has been largely inadequate to meet the cost of the program.

4. Area-wide planning - while the shoreline act does define a state master program as the cumulative total of all local master programs, it does not provide explicit authority for the Department to undertake shoreline planning on a statewide basis to provide a framework within which local programs would be encompassed. It is for this reason that we consider the coastal zone management act to be a vital element in our planning efforts.

FUTURE DIRECTION UNDER THE COASTAL ZONE MANAGEMENT ACT

We view the federal act and our state as being highly complementry, we look toward supplementing our existing shoreline data base with surveys and selected studies in the marine environment. Specifically, we are interested in such endeavors as developing the capability to utilize satellite imagery, conducting baseline studies of water quality and biological productivity, studying currents and patterns of accretion and erosion, detailed studies of selected salt marshes and estuaries, management programs for enhancing the potential for aquaculture, and expanding and improving citizen access and input.

I think, in Washington, that we have a good start in developing an effective coastal management program. We have a management mechanism that was enacted into law, was ratified by a majority of the voters of the state, and is working. We have a great deal of work remaining, however. Administrative procedures need to be improved and streamlined; we need to improve our data base and increasingly cause decisions to be made in light of that information; and we need to ensure that the coastal program is thoroughly coordinated with the plans and programs of other public agencies and private enterprises. Through the Coastal Zone Management Act we have an excellent opportunity.

COASTAL ZONE MANAGEMENT: THE OREGON APPROACH

James F. Ross, Executive Director
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Coastal Zone Management in the Western States Future -- the Oregon Approach. Translated, the title of my talk is "What is the future for coastal zone management in Oregon."

I'm glad to share with you the fact that I studied for the ministry and of all the things I've done, which, of course, have been somewhat limited, I think perhaps that that has been the best background I've had for coastal zone management because you need all the help you can get.

Coastal zone management programs in Oregon have a "good" future because of a "good" past. In the early 1900's Oswald West set aside the wet sand areas of Oregon's coastal beaches as a public highway. In the 1960's, the State Legislature expanded public ownership of the beaches to the sixteen-foot elevation level (vegetation level). The tidelands of the State of Oregon are in public ownership and there is a fill and removal permit system in operation for any developmental activity up to the mean higher high-tide line.

Governor Tom McCall, in 1970, saw the need for a total coastal zone management program beyond the steps that have already been taken. Local officials met the need and created a coastal zone planning committee which was legitimized by the State Legislature in 1971, giving birth to the Oregon Coastal Conservation & Development Commission (OCC&DC).

An important point to recognize is that the State of Oregon has been very fortunate; in Oregon there has been no need for an initiative petition to initiate coastal zone management efforts.

With that history, the OCC&DC was created in 1971 and charged to develop a coastal zone management plan based on the carrying capacities of the natural resources in the coastal zone which would strike a balance between the conservation and development of those resources. The Commission was charged by the Legislature to report back with the management plan on January 17th of 1975.

The makeup of the Commission is bulky, similar to the San Francisco Bay Conservation and Development Commission. There are 30 Commission members, 24 being locally elected officials from cities, counties and port districts. The remaining six are appointed by the Governor at-large from the entire state. There is a clear rationale behind the makeup, however. Those people, or units of government, that will be called upon to implement a coastal zone management program must be involved, have a part in its development. Involvement leads to commitment. It is only through commitment, commitment by local officials, that a comprehensive natural resource management program for the coast will ever be implemented. The bulk of the planning program of the OCC&DC calls for implementation at the local level, and, therefore, officials at the local level must be involved in the development of the plan in order to have the commitment that will lead to implementation.

The jurisdiction of the OCC&DC which, incidentally, has no regulatory or police powers -- it is primarily advisory to the Legislature, covers the watersheds of all coastal rivers and streams out to the three-mile limit. Of course, the Columbia, Umpqua and Rogue Rivers which transcend the Coast Range are only partially included within the OCC&DC area. The product that the OCC&DC is to recommend to the 1975 session of the Oregon Legislature will be a management plan consisting of the following elements:

1. A series of natural resource management policies which can be used to evaluate activities relating to the natural resources in the coastal zone.

2. A series of natural resource inventories identifying the carrying capacities of the resources, their values and characteristics.

3. A management program which extrapolates the policies, relates them to the inventories and relates them to the physical and social economic characteristics of the coastal zone.

4. An implementation program which outlines how the management program is to be implemented.

The basis for the entire program of the OCC&DC has been "public involvement". The rationale behind the extensive public involvement program of the OCC&DC is the attitude that "those affected by a plan must have had an opportunity to participate in its development." If an individual, agency or unit of government has participated, invested a part of themselves, in a planning program, then the planning programs becomes, in part, theirs. And one is not inclined to want to see a part of themselves fail. Therefore, extensive public input is being derived at the beginning stages of the OCC&DC work program -- not after the program has been completed at the public hearing stage. This is not to say that public hearings are not important -- they are. But more importantly, people should have an opportunity to voice their concerns, indicate how they feel the coast should be managed, express their ideas, discuss their problems, and have this as a major basis for the management program. By gaining extensive public input, it is anticipated that there will be considerable public support for the planning program when it reaches the State Legislature. Without this support, special interest groups may carve the program beyond recognition.

It has been my experience that there are three key elements to any public involvement program. First, an <u>opportunity</u> must be provided for any individual who will be affected by the plan to provide input. This does not mean that one has to talk to every individual residing in the coastal zone, owning property in the coastal zone, or who visits the coastal zone. It merely means that any and all of those people must be provided some opportunity by holding a series of approximately 30 workshops in the coastal zone and adjacent portions of the state, open to the general public with an atmosphere that allows a free exchange of ideas, thoughts and concerns. The workshops have proven to be quite successful.

Secondly, the decision-making body -- in this case, the OCC&DC -- must have a commitment to using the public involvement. There is nothing more disastrous than asking the general public for their thoughts and ideas, and then turning up one's nose at the response. The public is not naive. They will "smell out" insincerity and the result will be worse than if no opportunity for public involvement had been provided in the first place.

Thirdly, the public must have, generally speaking, access to the same information used by decision-makers -- just as Commission members must have access to the same information used by planners to arrive at recommendations.

Coastal zone management in the State of Oregon has a "good" future because it has had a "good" past. More importantly, however, it will have a "good" future because it is being based on the general participation of the people in the planning process who will be affected by the plan.

THE CALIFORNIA EXPERIENCE

Joseph E. Bodovitz
Executive Director
California Coastal Zone Conservation Commission

The main thing that I want to demonstrate with some slides is that the coastline of California, some 1,100 miles long, has almost any problem of modern urban civilization, wet or dry. It is important to keep in mind that what we are all talking about is to resolve some exceedingly difficult and complicated questions of conflicts over the use of very limited coastline resource.

(EDITORS NOTE: The slides shown by Mr. Bodovitz indicated the variety and diversity of problems and interests in the coastal areas of California and the great amount of effort that is going to be needed to resolve some of the issues that were presented).

I don't think that anybody who reads the daily newspaper could be unaware of the energy situation and what that is going to mean in terms of planning for any coastal area. For example, it was directed by law to prepare an energy element and only a year ago it seemed that this was something that could be done in a relatively leisure way during the planning period. What has happened instead, is that through the permit process concern about energy, development in the coastal zone will have to be made very, very soon.

As you know there is on appeal now proposed planned nuclear expansion at San Onofre in northern San Diego County that will soon be before the commission. There is also pending now the first of the so called superports at Moss Landing in Monterey County which is to bring the very large tankers in to load and unload and to bring more oil to the utilities. So many things are changing very rapidly that I've been saying to people who ask that the two best books to read about coastal zone management are "The Future Shocks" and "The Quiet Revolution In Land Use Control."

What all of us involved in coastal zone planning are doing in short, is shooting at a moving target. We are trying to plan for something in a time of rapid change. I think one of the greatest dangers that all of us must be aware of is the kind of marginal line plan--which is to plan for what was. It is extremely difficult to look ahead. But the logic of this is to emphasis the need to avoid irretreivable convictions, to leave options open as much as possible and to try and manage coastal zone resources so you can use as many different things as possible in a limited area.

It seems to us that the problem you always face is the people who want to have their use go through, whether its a freeway, a power plant or whatever it may be, in a way that prempts other uses. There are many ways when a little ingenuity is used, that many kinds of development can go forward and where the public amenities in the area can be very well protected.

EDITORS NOTE: The following is a condensation of additional remarks by Mr. Bodovitz before the general luncheon, Town Hall West Forum in Los Angeles as edited by Town Hall.

Let me point out that I speak in my capacity as Executive Director of the Commission and that my remarks do not necessarily represent the views of either the Commission or those who comprise it.

While most of the Commission's work to date has been devoted to the granting of permits to those desiring to develop areas within the coastal zone, the planning work is well under way. We are about one year into a three year project, having finished most of the organizational work. The general focus on policy decisions that we have adopted differs from traditional approaches to land use planning. Our feeling is that we are faced with a number of very complex conflicts, involving value judgments as much as anything else, and that until these conflicts are resolved not much can be accomplished. The controversy surrounding superports is typical--should we construct them or not? If so, where? Subject to what safeguards?

The Nature of the Plan

My own view is that, in an area as complex and changing as the California coast, a "plan" cannot be created and then set aside, never to be amended. Indeed, one basic problem with traditional approaches to land use planning is that it tries to deal in a static way with areas that are continually changing in far-reaching ways. Any proposed plan will not be able to provide solutions to the myriad of future problems that the California coastline will face. We face a situation containing a large element of "future shock"--a constantly changing very disoriented situation.

What we are attempting to do to counter this situation is to formulate general policies of statewide importance that will be binding on everyone, based on the recommendations and active participation of the six Regional Coastal Zone Commissions. Thus we've begun a cooperative effort among the six Regional and the State Commissions to arrive at both a statewide policy and regional differences within this policy. It would defeat the planning function if we adopted a statewide policy that was inimical to the interests of one or more of the particular regions.

For example, assume that statewide policy assigned the highest priority to public recreation. Such a policy would be binding statewide; however, within the different regions there would be some autonomy concerning how that policy should be carried out. Should the area be devoted to beaches, or parks, or amusement facilities. In short, we desire to create a general framework for development and then allow for as much local flexibility and diversity as possible. Hopefully there will be provisions for flexibility for city and county planning within a region.

Problem Areas

In planning for future development of the approximately 1,100 miles of state mainland coastline (there is about 300 miles of Channel Island coastline), we face nearly every kind of land use problem imaginable. How can we plan so as to protect the redwood forests in the north and the beaches in the south? Apparently we are successful! We have recently come under attack from developers (for things we have done) and conservationists (for things we haven't done). Indeed, controversy is endemic to our enterprise as we try to weigh and balance competing demands and objectives. Let me restrict my attention to 3 problem areas which seem to be most salient.

Traditionally, property owners felt that they ought to be able to do just about anything with their own property. Recently, however, the concept has arisen that not only is real estate a commodity but it is a scarce and valuable resource which we hold as trustees for future generations. While I'm sure there's a balance between these two views, I know it is a very delicate one and difficult to achieve. While clearly both the private and public interest will have to be assured (both to encourage development and to protect valuable public areas), our goal ought to be the reassertion of a public comern about the coast, and a guiding of private development because of this concern. In brief, we must try to design and encourage private development in ways that protect the public amenities, especially those relating to view corridors and beach access. Simultaneously we must be flexible and avoid any absolute, rigid solutions to complex problems.

The Energy Situation

When Proposition 20 was passed in 1972, it included energy as one of the many elements that the Commission was to consider in its planning. How different the energy situation looks today when compared with 1972! The net result of the energy crisis, I feel, has been to further complicate planning in an already complex area. The obvious manifestations precipitated by the crisis that affect coastal development include superports, offshore oil drilling, and power plants. However, there are some less obvious manifestations as well. What is the likelihood of fairly abundant supplies of energy in the future? Will second-home subdivisions continue their recent popularity in the face of decreasing gasoline supplies?

I'm certain of the importance of these questions, but I'm not so sure of their answers. In fact, I doubt that anyone knows how to answer them now. I believe there will be a great increase in demand for close-in recreation resources, which will exert greater pressure on local public beaches and parks while reducing demand for beach acquisition in more remote areas.

Perhaps the importance of the energy crisis in planning lies in its further emphasis on flexibility. Perhaps we'll need to establish varying policies that conform to energy availability.

In light of the above, let me mention the Commission's recent denial of a permit for the construction of an atomic power generating plant at San Onofre. In the heated debates fanned by the energy crisis, we all seem to have lost sight of the fact that the Commissioners do not vote their own consciences on matters. They simply interpret the law. Consequently a majority of them felt that the proposal before them, resulting in destruction of a large bluff and disruption of marine life due to utilization of large amounts of water to cool the plant, forced them to deny the requested permit. Subsequent discussion with the Southern California Edison Company and the San Diego

Gas and Electric Company has resulted in plan modifications and a rescheduling of their new proposal for February 20. (EDITORS NOTE: Town Hall: the modified plan was accepted by the Commission at the February 20 meeting).

The Future

How shall we use the coastal zone in the future? Clearly we can't open all coastal land for beaches, for if we do there will be congestion and environmental disaster. Just as certainly, however, we do not want to devote all the land to housing. There is no easy answer, I simply wish to point out the complexities of the conflict.

We are attempting to lay down some very broad principles reflecting the developmental goals, and ways of obtaining them, that we have for the coastline. In a sense, we view this as a broad "constitution" for the coastal area, which will continuously guide subsequent development but, as with the U. S. Constitution, will mature and grow over time. The plan should not commit future generations to irreversible allocations of coastline resources. In keeping with this spirit, we view our role as being advisors, as opposed to being experts who should tell you what to do in a specific problem area. In order to serve that function best, of advising you of the many options available and of their costs and benefits, we must have your participation. I actively seek and encourage you to take part in planning your future.

SOME EFFECTS OF THE COASTAL INITIATIVE ON LOCAL AND REGIONAL PLANNING

Jim Perry
Environmental Planning Coordinator
City of Redondo Beach

The initial effect which the Coastal Initiative (proposition 20) had on local planning was a shock! This is not to say that many local planners didn't support the initiative, or that they didn't believe it would pass, only that they weren't really prepared to respond to its requirements due to the fact that they were still recovering from another shock.

Just two months prior to the passage of Proposition 20, the California Supreme Court in the Friends of Mammoth decision, ruled that the State's Environmental Quality Act applied to private projects as well as public projects. In effect, this meant that environmental impact reports had to be prepared for thousands of private projects.

At the same time, local planners were under heavy pressure to complete, or get started on the Conservation and Open Space elements of their General Plans, which had to be adopted by June 31, 1973. Additionaly, planners were also attempting to comply with a new statute which required zoning ordinances to be consistant with general plans.

In light of these other pressures and demands on their time, it might be accurate to describe the state of local planning after the passage of Proposition 20 as Future Shock, which Alvin Toffler defined as "The shattering stress and disorientation induced in individuals by subjecting them to too much change in too short a time."

In addition to these pressures, there were several unanswered questions regarding Proposition 20 which had the effect of lengthening the initial period of confusion.

First, very little was known about the background and philosophy of many of the persons who were appointed to serve on the commissions. Consequently, no one was able to predict what direction the commissions would take in approving and denying permits.

Second, there was considerable uncertainty as to how far inland the permit line extended. Although the act specified 1,000 yards, there were various contentions that the wording in the act might have the effect of bringing the line far inland up rivers and flood control channels. At one time, someone claimed that the City of Sacramento, which was over 100 miles inland, might be included in the permit zone.

Third, no one knew or understood how provisions made for exemptions and exclusions from the act would be administered.

It was not until approximately two months after the act went into effect that the answers to these types of questions became known. At this point, local planning shifted from the confusion mode, into a phase which might be called adaptation or awareness.

Once it was discovered that all building along the coastline wasn't going to be halted, that local planning was not being totally usurped, and that the commissions were doing their best to make equitable and compassionate decisions; local planners began to focus on the opportunities presented by the act rather than the problems.

For example, a number of planning departments along the coast saw in the initiative the opportunity to improve their city's development standards. Prior to the passage of the act by the people, many attempts to upgrade local development standards quickly became bogged down in local politics. The margin by which the act passed gave local planners along the coast the leverage to move forward with major changes in their standards. These changes took the form of increased requirements for parking open space, and landscaping, and decreases in density.

At the same time, planners realized that the same type of leverage could be used to improve the quality of proposals which were submitted by developers, even when such proposals met all local requirements. This was done in some cases by telling the developers, "It may get by us because we don't have the discretion to turn it down, but unless you do make changes, it will never get by the coastal commission."

A variation on this theme was used a few months ago in Redondo Beach. A gentleman came in with a proposal to construct a huge aqua dome just inside the breakwater and adjacent to the pier. His thought was to build an underwater restaurant where people could eat and watch the fish swim by. Needless to say, he was disuaded from pusuing this idea in our city. While it is true that he would have had a very rough time getting this project approved in any event, without the leverage gained by Proposition 20, the project might not have been dismissed so lightly and so quickly.

Despite these opportunities for improved development standards at the local level, there are still several problems from the local standpoint that need to be addressed. These problems center mainly in the area of coordination and communication between the commission and the local planners and elected officials.

At the present time, the coastal cities don't have a clear idea of what types of major projects the commissions will approve and what types they will deny. Decisions on major projects haven't really been consistent enough. In some cases, general guidelines have not been adopted. Without a feeling for what the parameters are, and for what issues and problems the commission will consider regional and what it will consider local, it is impossible for local planners to evaluate the degree to which they should be revising their plans.

Additionaly, there hasn't been enough dialog between the coastal commission planners and the planners from the coastal cities. In effect, neither knows what the other is doing. It is true that the coastal commissions are understaffed and are under tight time constraints. But, nevertheless, I would hope that each regional commission would recognize the value of local

input and make every attempt to take advantage of it. Without the concensus achieved by this type of input at the early stages of planning, the chances for disagreement when the plan is set for hearing will be greatly increased.

I believe that the type of information exchange required can only be achieved through regularly held joint staff meetings between coastal commission planners and local planners.

Turning now from the effects of the Coastal Initiative on local planning, it is also relevant to examine the impact of the act on planning done by regional agencies. These effects appear to have the potential for considerable conflict and duplication.

Perhaps the best example of this potential for conflict may be seen through looking at the functions of the regional water quality control boards. In California we have a number of these boards which are specifically charged with establishing and enforcing standards to protect the quality of water; this responsibility includes regulation of ocean discharges.

Last month at a hearing of the South Coast Commission; Mr. John Parkhurst, General Manager of the Los Angeles County Sanitation Districts, testified that he would like to rely on the judgement of the Regional Water Quality Control Board in setting appropriate ocean discharge standards. This statement was somewhat remarkable coming from Mr. Parkhurst, since he has on many occasions opposed the Regional Water Quality Board on this same issue. The reason for his support in this case was that the Coastal Commission's proposed guidelines included a statement that would require stiffer ocean discharge standards than those required by the Water Quality Board.

Mr. Parkhurst said, and I quote, "It is an obvious waste of the taxpayers money for another public agency to compete with or replace the standard setting functions of an already established public agency."

I take no position on the issue of what the standards should be, as I am sure there are many persons here today far more qualified than myself to make this judgement. However, I do wonder, as Mr. Parkhurst does, if we need two different regional agencies setting conflicting standards for water quality.

Another example can be seen in the area of Transportation Planning. Assembly Bill 69 requires that a State Transportation Plan be adopted and based on adopted Regional Transportation Plans prepared by officially recognized regional agencies. In this region, the Southern California Association of Governments (SCAG) is preparing such a plan.

Proposition 20 also requires that the Coastal Commission adopt a Transportation Element as part of its Coastal Plan. However, there is no requirement that the SCAG plan and the Coastal Commission transportation plan element be consistent. In this case there is no reason to believe that the plans won't be consistant, but nevertheless, the possibility still exists for duplication or conflict if extensive coordination is not accomplished and specific areas of responsibility defined.

In summary, the passage of the Coastal Initiative has had an impact on other regional planning agencies. The magnitude of this effect will depend on how each agency chooses to define its area of responsibility.

There is no doubt that the functions which are now being performed by regional agencies need to be performed by someone. But the passage of Proposition 20 should cause us to re-examine

whether planning for each functional area should be assigned to a special agency or whether one umbrella agency should be designated to do the planning for all of the various function areas.

This is an issue which hopefully will be debated next year when the California Legislature considers legislation to establish state and regional agencies with planning and regulatory powers over land use.

In conclusion, the passage of the Coastal Initiative has been good for planning; not only because is has improved the quaility of planning along the coastline--but because it has served as a catalyst for re-examination of the existing agencies and insititutions which currently have planning responsibilities.

"CURRENT LOCAL PLANNING FOR THE COASTAL ZONE"

Calvin S. Hamilton
Director
Los Angeles City Planning Department

We are in a new era. There is a strong public concern for coastline protection. Plans for coastal communities are being adopted and implemented. Land use and environmental regulatory bodies are proliferating. What have we done as planners? What are we doing in Los Angeles? What problems do we face? What should the organizational strategy be for protection of the California coastline?

Viewed on the whole, local government has done a lousy job in protecting the coastline. Why is that? I think the principal reason is that it is much more difficult for an elected official in a city to make a decision to deny something because his constituents are close at hand. It's much easier for a Congressman to make a tough law because he's a long way away from his local constituents. That's why, on the whole, we've not had the kind of rigid enforcement and the kind of concern that most environmentalists desire along the coastline. In addition, until a few years ago citizens were just not that concerned. Things are different now.

At the local level the environmentalists are making themselves felt, and are supporting needed changes in local shoreline policies. They are supporting the need to plan for change. I've never seen things happen so fast in city planning as during the last couple of years. It is fantastic! Now citizen interest and support has turned things around from a developer-orientated situation to a public-oriented situation.

What about the Los Angeles City's situation? Actually, we don't have much shoreline. Nothing like many counties in California. We have some. Most of the beach area within the city is owned by the public. However, there is a great deal of the property just behind the beach that's privately owned. We do have very difficult problems of access and in some areas the public can't see the beach at all, even though they live adjacent to it.

We have been developing as a part of our General Plan, community plans and technical plans applying to portions of the coastline such as Venice and San Pedro.

Planning for and with people is not easy. The Venice Community Plan was developed five years ago. We have tried to implement part of it through rollback of existing zoning. The difficulty in relating to Venice, and one of the greatest assets in Venice, is its variety. There probably is nowhere in Los Angeles with such variety. There are hippies and ultra conservatives; shopkeepers, artists and artisans and businessmen; blacks, orientals, anglos, Hispanic peoples and elderly Jewish people; poor people trying to eke out a living and people out to make a fast buck. You get everybody in Venice. It's a great area, but as the Coastal Commission has found, its not so simple to plan for such an area because everyone has their own idea about how to plan the community; everyone has their own priorities.

In and around San Pedro you have tremendous interests and problems. There is a very high unemployment rate in the Wilmington, Harbor City, San Pedro area. This unemployment may be further aggravated if we lose the large cannery which is making plans to depart from the San Pedro-Harbor area. That would put 3,00 (mostly Spanish-speaking people) out of work just like that.

There are all sorts of problems in dealing with different kinds of people in Coastal Zone areas.

Los Angeles City has adopted several community plans relating to the coastal zone area. I've already mentioned the San Pedro and Venice Plans. These need to be revised. The Wilmington-Harbor City Plan implementation includes proposed redevelopment of an older area that has a few new houses, but mostly older and where housing and other uses are mixed in with oil wells. The Westchester-Playa del Rey Plan still is pending final adoption after 3 1/2 years of struggling and a tremendous amount of energy and input from the public and the Councilwoman of the district. There has been an enormous amount of conflict between this community and the adjacent Los Angeles International Airport. Now the City's new Department of Environmental Quality wants to start all over again with a whole new round of hearings and a new plan. This after, I suppose, 200 or 300 public meetings and discussions and all sorts of changes. So it is and has been somewhat frustrating. Now we have the new Coastal Commission getting involved. The Pacific Palisades-Brentwood Plan is due for completion in the summer of next year and we are working very hard to coordinate with all the numerous agencies and governmental jurisdictions relating to that area.

Well, not only do we have the Coastal Commission at the local planning level, but in addition, we have SCAG (The Southern California Association of Governments) which wants to take over part of the City's traditional responsibilities for planning and coordination relating to the coastal area. And there is the County Air Pollution Control District Board which says "We're going to control what you're permitted to do in Los Angeles." And the California Water Quality Control Board which says that, "We are going to attempt to get together with the Air Pollution Control Board and agree on what we're going to require you in Los Angeles to do." And the Federal Environmental Protection Agency (EPA) that comes out with edicts and says, in addition to all these other state agencies, we are also going to control what you are going to do. And the U. S. Department of Transportation and so on.

Well, a local planner really scratches his head and says, "What the heck do we do?" "What really is happening?" "How do we analyze it?" "How do we respond?" "How do we exercise leadership?"

We made a chart to see where we stood. There were so many different conflicts and different agencies telling us what to do that on the local level many were in conflict - one with the other.

Now, in addition to State and Federal jurisdictional considerations, a City like ours must relate to its neighbors within the Coastal Zone. The City of El Segundo, just south of the Airport, is building an enormous office complex and we wonder what will be the need for accessibility to that particular area through Los Angeles. Culver City's boundaries run in and out of the City of Los Angeles in the Venice, Westchester, and Playa del Rey area. The City of Santa Monica, whose airport has a lot of employment around it, or used to when Douglas was going full rate. Now the airport is going to shut it down. Their proposal is to build a shopping center and office complex on the property. Most of the potential shoppers will have to travel through the City of Los Angeles.

Then you have county islands - like Marina del Rey. They have been building like mad with all those apartments. In my opinion, they have over-built terribly; with just a 4-lane road giving all the access, and no original provision for public transportation whatsoever. And again, all the access is through the City of Los Angeles. Growth pressures from the Marina are having a tremendous impact, particularly on the community of Venice, but the City of Los Angeles has no authority over the Marina its impact on neighboring land values. And what about Howard Hughes, who owns a lot of land and an airport south of the Marina? We wonder what he is going to do with all that land; when and if he decides to do something.

Well, these are just some of our considerations. We must consider how our actions in Los Angeles will affect our neighbors and how their actions will affect us. None of us can plan in a vacuum.

Another of the difficulties faced by the local planner is just how are we going to rationalize the relationship between actions so the private landowner or developer can have some guidelines? Take the local zoning requirements and Environmental Impact Report requirements, add to that Proposition 20, and add to that the other state agencies and their requirements and interpretations, and add to that the EPA edicts. If you are a developer who wants to develop property legitimately and in a logical way, where do you look for direction? You can't imagine how frustrating it is to the developer who wants to do a good job but comes up against such a multiplicity of different governmental agencies and actions which result in delays and financial losses.

To give you an example, some of our plans for the Santa Monica Mountains running inland from Pacific Palisades to the UCLA Campus will be subject to the review of the Coastal Commission. But the mountains also are within the jurisdiction of a new State Recreation and Parks Commission on the Santa Monica Mountains which has been given prime responsibility for that area. For years we worked hard with existing agencies and property owners to come up with good plans. Now the new State Commission is telling us to scrap our plans because they feel the mountains are their responsibility. All those years of effort and public funds to say nothing of the hours and hours of time on the part of private citizens and developers and the Councilmen of the District. Well, you can imagine the difficulty in trying to convince the state people that you can't start from zero - you have to start from some point.

It would be too easy to say let the state do it and let them take all the flak. But I don't believe in using any other agency as a scapegoat any more than I believe that local jurisdictions should give up local controls. However, we at the local level have not been doing the job we should have been doing. We have had an opportunity to do a better job and we haven't done that job. This is how, in my opinion, we should do it.

First, we should continue to inform and assist the Coastal Commission in any way we can by giving them our plans and giving them access to our data, knowledge, experience and viewpoint. We've got to determine jointly just what kind of goals in a decade we're going to have for the coastal area. You can't deal with Venice or with Pacific Palisades the same as you do with Mendicino County. They're two very different areas and that has to be recognized.

Second, it seems to me we have got to have a comprehensive approach. The whole problem with these ad hoc groups is they tend not to look at things in a coordinated overall fashion. That was my biggest argument against Proposition 20; besides having it locked into the constitution. I would be the first to agree that local planners have not looked at the coast comprehensively. But I believe it is our responsibility as local planners to bring the best of our thinking on coastal matters within the Los Angeles area, including the SCAG area, to the Coastal Commission. There ought to be regular meetings with the Coastal Commission staff and local people. Up to now there have been no such meetings. I have assigned people from my staff to attend the meetings of the Coastal Commission but many cities do not have sufficient staff to assign for such a commitment of time. Furthermore, attending meetings is not sufficient for getting down to the discussions necessary to get at the problems and solutions relative to the coastal area.

There will be a continued proliferation of entities with responsibilities relating to the coastal zone. It is really going to get horrendous. I don't know how its going to be resolved except by cooperation which results in convincing and meaningful actions to protect the coast and enable good development. It will continue to be frustrating to cities, landowners, developers, public bodies, and others, due to the delays caused by inter-jurisdictional confusion. We must recognize what has gone on in the past and get caught up, so to speak. Then we must determine quickly our future goals and objectives and begin taking decisive cooperative regional and local action.

This is my responsibility as a local planner, to make Proposition 20 work, at least in Los Angeles, and do everything I can to help with the rest of Southern California and the state as a whole. Locking Proposition 20 into the State Constitution may not have been the best way to go, but I, and a lot of other people, voted for it because the political entities responsible had not done what they could and should have done to protect the California Coastline.

Now we've got to make it work. We have to make it work in a way that's not going to completely frustrate everybody by being eratic and imposing yet another layer of government on an already complex situation. We have to make Proposition 20 work by getting all the entities responsible to work together for the benefit of all California's citizens, future citizens and visitors.

THE COUNTY OF LOS ANGELES AND THE COASTAL COMMISSIONS - A CASE OF CHALLENGE AND RESPONSE

Barna S. Szabo
Chief Deputy to
Supervisor James A. Hayes

I would like to thank you for the opportunity of being able to speak. I was assigned this particular task just about an hour ago, and I am not very well prepared. The Supervisor, by the way, is doing his duty; he is over at the Coastal Commission voting on several items which are of major consideration for this area.

One of the things that I was glad to find out about this morning is that, perhaps for the first time in recent history, the County and the City of Los Angeles found a community of interest in several areas of mutual concern due to Proposition 20. (They say misery loves company) That doesn't mean that the County, especially Supervisor Hayes, whose views I represent, feel that Proposition 20 is something of a problem. By saying that, now I would like to address my comments to areas of probable concern that a number of people here are perhaps negative on Proposition 20 and its impact on local government.

I think there is no doubt that Proposition 20 is here with us and it is a reality. The problem here is that we are all concerned about how to make it more effective in terms of its implementation and, if necessary, to bring about some structural changes in the Proposition which could improve its operation all across the State.

In line with that argument, I feel that I could point out some of the concerns that we have had in our office at the County level. The first one deals, to some extent, with the structural problems that we encounter with Proposition 20 because of the way it was designed. Unfortunately, I think it was set up in such a way that the cart was put before the horse and possibly the problem arises from that particular situation. We are now going through a permit phase, as you know, and then later the disposition of permits will be shifted into a lower gear. Finally, the whole operation will go forward to the planning stage. Perhaps, the whole situation should have been reversed and the Proposition should have called for some sort of resource inventory of the coastal areas.

Then some way, priorities should have been established by the commission as to how those resources should be developed or not developed. In light of those priorities and in light of those available resources, definitions could have been outlined and the permit process could have taken a more clear-cut, more comprehensive, and more understandable role. I think this is a problem which confronts local government, and its citizens. When people deal with the Regional or the State Commission, quite

often they can't understand, can't make rhyme or reason out of why certain permits are or are not approved. The guidelines have not been given to them and no apparent guidelines are followed by the Commission members themselves. Obviously, here an improvment can be made soon, so individuals or corporations or whoever needs to come before the Coastal Commission will be provided with some predictability by knowing what the probable chances of approval or denial might be.

Now, regarding the previous cases that Mr. Hamilton and Mr. Perry talked about of particular frustrations in terms of planning with the Coastal Commission and clarifying some sort of a rational method of cooperation, perhaps I can turn to the example provided by the County in this area. This is something of a recent development. A few days ago the County had set up a task force. What we have done is assigned about 22 individuals who have expertise in all facets of planning to go right down the alley and follow exactly the same plan elements that Coastal Commissions are required to plan. There are 13 planning elements that the Coastal Commissions have to go through and they have to follow a time table which is a strict element per month and done in conjunction with particular public hearings and gatherings of data, etc. Obviously, this is a very difficult job for the Commission and what we want to do on a County level is to give our expertise and our data and plan right along with the South Coast Regional Commission. Some of these people have been assigned full time to this task.

One resistance to this idea was, of course, the matter of cost. The County has no off-setting revenues. We have to provide this from our own resources and perhaps smaller cities and counties might not have the resources to assign such a large number of people to a Coastal Commission. I believe our task force is larger than the staff at the Regional Commission level.

We have suggested to some of the cities in our County that perhaps they could coordinate their efforts in the same way. They could put together their task forces and then meet with their Coastal Commission on a regular basis. We do that every month. We establish a date as to when the meeting will take place, what the addenda will be, what the Commission's needs are then examine how we can help them in terms of expertise and in terms of cutting down on their heavy work schedule.

A third problem that is encountered is the sheer volume of material that comes up at the Coastal Commissions on a weekly basis. This creates a tremendous physical problem to the public participants, and the Commissioners. For example, Supervisor Hayes has the full time job as County Supervisor and is also a member of both Commissions--Regional and State. He spends all day Monday at the Regional Commission; he spends all day Tuesday at the Board of Supervisors' meeting; then spends every other Wednesday at the State Coastal Commission. So in terms of the physical impact, the Coastal Commission task is a major and very dramatic one. The Supervisor has suggested to individuals and Legislators that at least one alteration could take place in the Initiative and that is to provide for an alternate who could attend the Commission meetings and in some cases vote on certain matters. Unfortunately, to adjust the Initiative in such a manner is a complicated problem that would take a two thirds vote in both houses of the State. I think that there is definitly a need, especially in this area, since the work load is so extremely heavy.

Finally, I think one point that has not been emphasized here and should be looked at, is that many of the major and most controversial decisions of the Regional Commissions will most likely be appealed. They have been appealed in several

cases, and there are appeals pending before the courts. Perhaps what is important here is to establish some sort of coordinating mechanism or some sort of information system whereby the courts could also understand what is going on in the coastal zone area; what the Regional and State Commissions are doing so they could have a better understanding of the situation when they make their findings within the legal framework. The cooperation with these two entities--the County and the Commission--is very important, otherwise they may be going off into entirely different directions and further increase the public frustration that has emerged over some of the decisions of the courts on the Commissions during the last year.

Coastal Planning for The Irvine Company

Donald C. Cameron
Director of Urban Design
The Irvine Company

Good morning, and thank you for asking me here today to participate in this very worthwhile conference.

I come before you for two rather different reasons. The first is to welcome you as a representative of The Irvine Company, the historic landowner of the site of these proceedings and an adjacent 83,000 acres. These lands extend from the ocean to Riverside County, 22 miles inland, and cover the coastal hills, a central valley which is the site of the new City of Irvine, and a portion of the rugged Santa Ana mountains to the north. For the past 13 years the Company, through its own planning staff and consultants, has been developing extensive, detailed, long-range physical, fiscal, social, and political plans to bring about the orderly and meaningful transition of this vast, productive resource from agricultural to urban use. It has been, and continues to be, a fascinating task. I hope that many of you will have an opportunity to see some of the areas developed to date before you leave Orange County.

The second and more pertinent reason for my being here is to explain to you one of our current projects: an important, complicated effort which relates directly to all of your interests and concerns. One of our most valuable, and as yet undeveloped, assets is what we identify as our "Coastal Community", a 10,000-acre area extending from the urban edge of Newport Beach to the urban edge of Laguna Beach, and from the ocean to the ridge line of the San Joaquin (coastal) hills. This site is approximately 5 miles long with 3.5 miles of undeveloped beach frontage, and approximately 3.5 to 4 miles wide from ocean to ridge. The entire site falls within the planning area mandated to the California Coastal Zone Conservation Commission created by the passing of Proposition 20 (Coastal Initiative) in November 1972.

This site is part of the 35,000-acre Southern Sector of the Irvine Ranch, which extends from the San Diego Freeway to the coast. A plan was developed for this sector by the Company and adopted by the County as the official General Plan for the area in 1964. This plan was indeed "general" and was intended as a broad guide to more detailed future planning of smaller portions as they were ready for development.

Beginning in 1969 and continuing into 1971, a much more complete study was undertaken by the Company for the Coastal Community dealing with environmental issues, public policy issues, social and economic issues, and resulting in a much more detailed land

use and circulation plan than had been included in the 1964 County plan.

In 1973, in keeping with State law, the County of Orange began updating previously adopted plans for undeveloped areas which were anticipated to be developed by 1983. As a part of this updating process, the Company was prepared to file its Coastal Community Plan as a General Plan amendment.

Before the presentation material was completed, however, it was reviewed by the Company's Political Strategy Committee. In light of the passage of Proposition 20 and the subsequent creation of the State Coastal Zone Conservation Commission and the South Coast Regional Commission, new requirements for Environmental Impact Reports, changes in both public and governmental attitudes toward environmental matters, the deletion of the coastal freeway on which the plan was in part based, the fact that the new City of Irvine is studying this area as a part of its General Plan, and other related matters, the Company decided not to present its plan to the County, but to restudy the entire 10,000-acre area.

Following in-house discussions, discussions with the Chairman and Executive Director of the State Commission, and discussions with the Chairman and Director of the Regional Commission, the decision was reached to create a multi-agency study committee to address questions relating to land use policy for this area and public interest in acquisition of land for park use.

This committee will have its first meeting in December 1973 and comprises representatives of the following agencies or organizations:

- The Irvine Company
- California Coastal Zone Conservation Commission
- South Coast Regional Coastal Zone Conservation Commission
- State of California Department of Parks and Recreation
- State of California Department of Transportation
- County of Orange
- City of Irvine
- City of Laguna Beach
- City of Newport Beach
- Orange County Environmental Coalition
- Planning and Conservation League
- Sierra Club, Angeles Chapter

The present schedule calls for a meeting every three weeks, with one or more meetings required to deal with several major tasks or topics. The Irvine Company and its consultants are responsible for producing the needed technical data for each meeting in consultation, at least, with agency staff representatives. Outside expert witnesses will be called in to make presentations on specific subjects as required.

The first major target date is in June when, hopefully, a consensus opinion regarding land use policy can be made to the Regional Commission. The complete program is expected to last most of 1974. It is not anticipated that enough information will be generated on which to base a new General Plan study for this property until early 1975.

The process we are outlining is purely voluntary, but, in all candor, totally necessary. We do not want to go through the complete planning process three times: once for the County, once for the Regional Commission, and once for the State, each time using different criteria. We want to work with all the agencies in our study group to establish mutually acceptable

criteria on which our final plan can be based.

This may be a naive approach, to expect that we can obtain the kind of concensus we require, but we are hoping that the importance of the project and the excitment of the process might help us to reach our goal.

With the cooperation of people present like Mr. Bodovitz, we may succeed. It is a big undertaking and I am going to ask you all to wish us well.

Thank you.

PRESERVATION OF ARCHAEOLOGICAL RESOURCES IN THE COASTAL ZONE

Gordon Mellis
Public Antiquities Salvage Team
California State University, Fullerton

The prehistory of California, as exhibited in Archaeological sites, is a valuable natural resource. It is as important a resource as water, minerals, and plant and animal life. Archaeologists are vitally concerned with the preservation of this natural resource, but archaeological resources continue to be destroyed at an ever-increasing rate. This crisis will not last long however, for once these remains are destroyed they are gone forever and will never be replaced.

In California, a large percentage of the known sites (40-50%) is located along the coast. These coastal sites are extremely important to the cultural history of California, because they represent a distinct cultural tradition which was based upon the exploitation of coastal resources by the prehistoric residents of the coastal zone. One of the ways in which this distinct cultural tradition manifested itself; a unique social structure based on a stable food economy. This was quite different from the varying economical adaptations of interior settlements. Thus, to lose coastal sites through destruction would not only deprive archaeologists of much of the available prehistoric record, but it would also mean the obliteration of information about a unique lifeway.

Those sites that are located along California's coast have been the hardest hit by rapid development. Proportionately more sites are being destroyed along the coast than in the interior, because the vast majority of construction goes on near the coast (for example, it is estimated that approximately 75% of the sites in Orange County have already been destroyed, while in parts of Los Angeles County the destruction rate has run as high as 95%). Another factor in the large-scale destruction of coastal sites: inhabitable locations are being exploited today the same as in prehistoric times and in many cases these locations are coincident.

Because archaeological resources are non-renewable, and because there has already been widespread destruction of archaeological sites, it is critical that steps be taken to protect the remaining sites. This is, however, a very serious and difficult problem. The major problem confronted when seeking to protect those sites which still remain is that archaeologists do not know where all of the sites are. There has never been a systematic survey of the coastal zone for archaeological resources, nor has this ever been done for the rest of the state. We feel that there is a crucial need for regional and/or county programs for the investigation and preservation of archaeological resources. We feel that the following proposals, if implemented

would go a long way toward solving some basic problems which are currently being encountered in environmental impact studies and which we feel are being handled in a less-than-adequate fashion.

A) We feel that there is a need for a regional or county archaeological agency which would be able to develop an overall plan for archaeological investigation for that area. Such an agency would also be able to over-see and coordinate the work of the various archaeological groups in the area so as to insure maximum cooperation. This agency would also be apprised of all development plans in their earliest stages and would be able to act quickly in evaluating the area for possible archaeolocial investigation (see paragraph F below).

B) A systematic survey for archaeological resources done at the regional or county level, is of the utmost importance. It is currently impossible to make an intelligent, scientific evaluation of the importance of certain archaeological resources, because the known sites in California, particularly along the coast, represent a biased sampling of sites. Known sites represent, almost exclusively, areas in which construction has already taken place or is taking place; while there is no archaeological information for other vast areas of the coastal zone. The present system for site location is hopelessly inadequate. In many cases sites are located during an on-the-ground survey of the property which is carried out as a part of the developer's required Environmental Impact Report. If a site is discovered, however, there are usually only a few weeks available during which the archaeologist must determine the importance of the site by testing, must negotiate with the developer for funds for excavation if that is deemed necessary or desirable, and must carry out the actual excavation work, which is itself a time-consuming procedure. This process nearly always succeeds in delaying the work of the developer (during which time the developer is, naturally, losing money), but very seldom succeeds in providing the archaeologist with enough time to carry out anything but the most hasty of salvage programs, let alone a meaningful scientific research design.

C) In addition to the above proposal we would like to see the development of a comprehensive archaeological resource map which would rank areas of critical comern with respect to planned development. We at California State University, Fullerton have already completed a map of Orange County showing known archaeological resources and soon hope to complete similar maps for Los Angeles and San Diego Counties. We have found these maps very useful in our research in locating areas of archaeological importance in the southland area. Since the coastal zone in the south comprises portions of San Diego, Orange, and Los Angeles Counties, it would be fairly easy to supplement these maps with further data gained from the systematic county-wide surveys proposed in paragraph B.

D) Once an agency is established to coordinate archaeological work, then those archaeologists who are interested in a particular area could get together to work out a means of systematic investigation based upon critical construction areas. These critical construction areas could be assigned to various investigators whose specific research interests or expertise might be suited by investigation of such a site. Thus, each archaeological group could pursue its own specific areas of archaeological research interests.

E) There should be developed and initiated a plan for alternative measures to site destruction as a standard procedure in initial stages of development planning. As with historical landmarks, there are certain prehistoric sites which

may be of sufficient importance that they should be preserved intact. If this is the case, then planning for such preservation must occur early in the development plans so that the developer has adequate time to work around the site and so that adequate protective measures may be taken to protect the site from indirect impacts such as vandalism and theft. Another example of an alternative to site destruction: It may be possible to arrange for the preservation of the site for future generations by burying it. After carefully recording exact information on the location of the site, an archaeologist could supervise the burying of a site under a layer of sterile fill of a specified depth. Such a measure would allow the developer to proceed with his project, but would insure protection of the site until such time as the land is again available for further archaeological research. If measures such as these were part of a standarized procedure for evaluation of a site during the initial development stages, then a standard course of action could be taken from the very beginning of the project.

F) If an alternative to site destruction is not possible, then archaeologists must be given sufficient time to salvage as much scientific information as possible prior to destruction. If all of the above proposals were in effect, the archaeologist could evaluate the direct and/or indirect implication of the development upon archaeological resources while at the same time enabling a sufficient degree of sophistication to be utilized in preparing and carrying out possible research proposals. The advantages of this are obvious: If the archaeological research were begun early, the archaeologists would have enough time to gather the maximum amount of information from the site as well as be able to finish their work well ahead of the bulldozers. Thus, archaeologists would no longer have to struggle with a developer's timetable (to the dissatisfaction of both parties).

G) There must also be a set of guidelines established by which all archaeological work would have to be done, for several reasons. First, it would help to prevent the exploitation of archaeological resources by inadequately trained, non professional archaeologists under the guise of environmental impact reporting. Second, it would facilitate the scientific comparison of data due to the standardization of guidelines used in obtaining that data. Third, the guidelines would give counties and contractors a yardstick with which to measure the effectiveness of any archaeological work done with respect to the preparation of a Environmental Impact Report. Fourth, it would eliminate time consuming and costly resurveys of areas due to inadequate original reports. The Society for California Archaeology is presently working on a standardized contract for Environmental Impact Reports which may be useful in the coastal zone.

H) Generally, archaeological institutions are not financially equipped to undertake archaeological planning on their own. The financial responsibility for archaeological planning rightly belongs to those who benefit from use and development of the coastal area. But professional consultation by universities, colleges, and museums is necessary for effective archaeological planning.

We at California State University, Fullerton, having an interest in public archaeology and wishing to preserve this part of our cultural heritage, are willing to assist in any way we can in the development and adoption of an overall plan for the investigation and preservation of archaeological resources in both the coastal zone and the rest of the state.

SESSION I: COMMENTS-DISCUSSION
QUESTIONS & ANSWERS

MR. BODOVITZ - Comments

I want to respond to a couple of things that were said earlier. For those of you who are from outside California you must wonder if you have wandered into a family fight and I hope that what is going on is clear enough. A couple of things that Mr. Hamilton said seems to me has broad applications and to anyone involved in cloastal planning anywhere would be worth dwelling on for a moment.

First the need for people involved in coastal zone planning to begin to work very closely with local planners and local people who have experience in an area. He pointed out that much of what his staff has been doing is working with the staffs of the new coastal commissions trying to acquaint them with the history of planning in these areas. Mr. Hamilton also made the point of which I agree with enthusiastically, that even though one is involved only in the coastal areas it is extremely important that they have as comprehensive a view as possible.

My own experience is that it is very hard to do anything else. It is not a solution to the problem just to keep something out of the coastal zone and shove it somewhere else.

The point is that some of these things go a couple of notches more subtle than that. The Venice area was mentioned by Mr. Hamilton and perhaps that is a good example of the kind of problem that we are struggling with. We would very much like to know what the local position is and what the people in the Venice area want.

As Mr. Cameron pointed out they have meetings and meetings and meetings and it is an extremely difficult job. I would say that the coastal commissions have been able to help the city carry out its agreed upon policy. For example there has been proposed down zoning in certain areas and that its possible and indeed on appeal the state commission has insisted that things not be permited to get in under the wire, but to try and cooperate with cities position in this down zoning.

There is another proposal in Venice though that illustrates some of the difficult problems for all of us involved. Its a proposal by the City Parks and Recreation Department for a bike path on part of the beach that would involve paving a part of what is presently unpaved beach for the bike path. The city councilman in whose district this would be, does not want it and another very distinguished member of the city council does want it and the City Parks and Recreation Department changed after the election. It is not at all clear to us whether they do or do not now want it. Hearings were scheduled by the City Parks Dept. to help decide whether or not it does or doesn't want it. The

hearings have been scheduled and then cancelled. Now the commission would only like to do the right thing, whatever that may be.

The point here is that often the coastal commission or whoever is sitting there gets to be in a position to take the heat for whats a very difficult decision which amounts to supervision at the local level. I think the instances in which the coastal commission has been at odds with what a local government wants have really been very few. Thats not to say they are not there. One of the biggest discussions that the regional commission in Los Angeles and Orange Counties just had was with the City of Newport Beach over the question of parking. The local commission has been generally requiring two off-street parking spaces for each new residential unit in Newport Beach on the belief that unless there is adequate parking in new buildings there will be that much more parking on the streets and it will then be that much more difficult for the public to get to the beach. But after considerable debate the City of Newport Beach ended up not agreeing with that point.

This brings up another point that fits into the area of federal, state and local regulations. Very often the municipalities in planning for beach front access is planning for the access of the people in that municipality and will provide that everyone in that city be able to get to the beach. But the problem has been, where do the people from the inland areas go when they want to go to the beach. That city figures it is somebody elses responsibility, I'm stating this perhaps unfairly to the local people because from their point of view they are doing what they said. But again this is one of the difficulties if the features of the ecean really belong to everyone, how does everybody get there without going through somebodys city or county. Who provides the roads and who worries about all those other kinds of things.

Finally, one thing with regard to Proposition 20. Because many of the initiatives in California do wind up in the constitution, there are many people who think Proposition 20 will likewise. But, it is only a statuate, it is not in the Constitution and the commission must submit thier plans to the Governor and legislature by a particular date and the commission goes out of existence on a particular day unless there is action to the contrary. I think this means a very healthy pressure on everybody. Recommendations do have to be prepared and deadlines to have to meet and 1976 will be the year of decisions.

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MR. ROBERT KNECHT - Comments

I would like to comment just briefly on the state reports we have heard this morning. We have heard something of the work in Oregon, the State of Washington and California. I found them from my point of view to be very encouraging. I think it is clear that these three states here represented are in advance of most of the efforts going on in the rest of the country. Many of the other coastal states are watching what is happening here with interest. I think it is going to be instructive to see how these three programs fare with time. Yet they are all a little different.

California's program is basically a permit system that holds the line of development while a plan is being developed. I think one of the key questions is will all of this activity and energy that has to go into the permit process detract from a rational planning program or can what it has learned in the

permitting process be coupled into the planning process in a some almost real time basis.

In Oregon, as we heard, the test is a little different. There is no permit system other than the one that the state has in being anyway so the plan is being developed on a time scale. Hopefully, in time before irreversible development takes place.

The State of Washington is sort of a combination or a high grade between these two as I see it. A lost of valuable experience will be obtained here on the est coast, including Hawaii for the other coastal states of this country. Hawaii is really advanced in terms of land use and coastal planning. They are often sited as the state with the most comprehensive land use approach already in existence. Of course, they have had it somewhat easier because they were formed as a state more recently than any of the other coastal states except Alaska.

Jim Ross emplasized the extent to which local officials are developing a plan, though local elected officials for the most part are pulling that together, one would have to ask whether or not the Oregon state officials will then accept it as their plan. A plan that they can support for the entire state and get behind it when the time comes. Clearly, I think, the essential ingredient, as have come up time and time again this morning, is to have the local officials, regional officials and the state officials, public interest groups and public groups all working together from the beginning so that the plan that is finally put before the people can be considered our plan in the broadest possible sense.

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QUESTION AND ANSWER PERIOD - SESSION I

Question: Mr. Cal Hamilton asked Mr. Knecht: On the Federal level, what do you see as a federal rationalization of the conflicting approaches to land use? Do you honestly believe that the Nixon adminstration is going to anything about it? I believe there are very severe restrictions on major development. Local Proposition 20 has severe restrictions, then they put on surcharges like on parking. There a number of federal agencies giving advice to many local agencies often in conflict with state agencies.

Answer: By Mr. Knecht - I certainly agree that there are a goodly number of problems at the national, State and local level in the area of land use and the lack of coordination. Certainly no single mechanism is going to solve all of them, including the new coastal zone management program. The Administration in Washington has put comprehensive land use legislation as its number one environmental measure. At the present time, there are three bills pending in the Congress dealing with comprehensive land use. There is an Administration measure, Senator Jackson's measure (H.R. 10294). Most observers feel that one or the other of these measures will be adopted by the Congress in the Spring. Each of the land use measures calls for the same type of Federal consistency with the approved State land use plans that I referred to earlier. I think the theory behind these measures is sound. Whether or not they actually work in practice will depend upon the effectiveness of the administration of these programs, the extent of State participation, the adequacy of funding, and similar factors.

Question: From Mr. Hamilton - including existing funding guidelines?

Answer: By Mr. Knecht - Absolutely, the Federal Government is bound to act in a manner consistent with approved State programs. The types of Federal actions that could potentially be affected are as follows: financial grants-in-aid or subsidies to State or local or private activities, direct federal action by a Federal agency, or the granting of Federal licenses or permits. These three classes of action must be consistent with approved state and land use and coastal zone programs.

There are some strong forces in opposition to national land use legislation in this country. These tend to be connected with land development and related real estate interests. Whether there interests are strong enough to prevent the passage of a land use measure remains to be seen.

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Question: How can national and state goals be reconciled with the pressures of the energy crisis?

Answer: By Mr. Robert Knecht - I can only comment from the perspective of the Program I represent. As a part of a comprehensive program, states will have to demonstrate that they have an adequate process for consideration of the siting of facilities that are designed to meet more than local needs. The legislative history shows clearly that the facilities referred to include power generation facilities, refineries, and so on. I would think that deepwater ports would also fit this criterion.

In the case of deepwater ports, even though they may be located well beyond the three mile limit, in Federal waters, the Act states that any Federal action that affects a state coastal program must be consistent with it. The implication is that Federal actions, even though taken outside of a state's coastal zone, must be consistent with that state's coastal zone program if the federal action has impact on the state's coastal zone. The State of Delwaware adopted legislation several years ago that prohibits heavy industry from its coastal zones. As I understand it, this legislation is an outright ban on this kind of new development. This would appear inconsistent with the requirement of the Coastal Zone Management Act which calls upon the state to have an adequate process for considering the siting of such facilities. Nevertheless, the state has indicated its intention to apply for a grant to begin the development of a coastal zone management program.

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Question: What proportion of the time and staff is spent on day to day permits and what re the long range plans?

Answer: By Mr. Bodovitz - I don't know that I can give you figures particularly in the south coast region where there is such intense development along most of the coastline in Los Angeles and Orange County. Obviously a great deal of the time is spent on permits. But I'd like to go on a bit because I think the implication of that question is important. The implication being that permits are somehow different from planning, and that if we just could somehow get rid of all these permits we could do something wonderful called planning.

At the risk of offending those of you in the audience who are planners, I don't have a mystic thing that something called planning will solve all their problems and out of a permit process grows understanding about what the pressures are, and what the issues are that help you reach sensible policies in planning.. The kind of planning that we are emphasizing is kind of apolicy

planning or decisions about the coast. There is an enormous amount of data available. If anything, we have got more data than we've got people to read. The problem is what will we do with it all. What types of decisions are going to be made, what things should have priority. Should there be super-ports or not, should there be power plants or not, should there be high density or low density housing or no density housing, should the coastal zone be given priority for other uses? These are the things that are value judgements and must be based on as much information as we can assemble.

Here is an example of one of the planning considerations thats grown out of a permit application before us recently. A developer proposed (and the matter came on appeal to the state commission) a recreational vehicle park in the Malibut area of Los Angeles County (recreational vehicles such as campers). There was great opposition to it but out of the controversy about the park came about what we think is going to be a very important policy, or at least a question that may lead to a policy; and that is where there is land in the coastal zone that is obviously going to be developed (that is, it is not going to be put to any public purpose) should the development that benefits the few have priority over a dvelopment that benefits many. Or, to put that into other terms, if the area isn't developed as a recreational vehicle park, it is going to be developed for housing, the cost of which would be quite high, such that a large element of society will not be able to afford to live in that part of the coastal zone. But remember, if the site were used for a recreational vehicle park then there would be other people that could use that land and enjoy the coastal zone albeit temporarily.

Now thats not saying that the whole coastal zone should be one large recreational vehicle park or anything of the sort. It is saying that there ought to be very clear standards regulating how these things are to be planned. The point I'm making is that great chunks of the coastal zone are already going for high income houses and the commission in dealing with this matter came, tentatively at least, to the concept that where development is to take place there is certainly a strong case to be made for resort hotels, commercial recreation and things that will allow a large number of people in a variety of income brackets to use the coastal zone rather than having it go for higher income housing.

Now I wouldn't say that those issues couldn't have been developed in a planning report that someone might have prepared but I do say that they would not have come out move vividly or more dramatically than they did through the permit action. Thus I would say that whatever time was spent on that permit could reasonably be charged to planning.

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Question: I still would like to know how much time is spent on the permits?

Answer: By Mr. Bodovitz - It is very hard to have a ledger to say where you put the time. I'm sure there are many more hours spent on dealing with permit applications than there are hours spent on the formal part of planning. I don't know what the ratio is, maybe 2 to 1 in terms of staff hours. All I'm saying is that many of the things that you put on a permit side of the ledger could be charged to planning. In terms of answering the phone, talking to applicants, and so on, that takes a great number of staff hours.

Question: What procedures do you expect to develop in making specific decisions where areas have detailed planning. Let me give you an example; we have, as I have indicated, planning for everyone of our (or in process) 70 communities within Los Angeles and we are begining to implement them. On top of that you are going to encompass a good many of those by the 5 mile planning limit. What procedures do you anticipate setting up so that some how or other there will be a resolution of this at the planning stage so that we do not have a lot of discussions and fights? I'd really like to have work plans both at the local level and at the state level that would agree.

Answer: By Mr. Bodovitz - We share the same objective and I think Mr. Barna pointed out the county has already set up a kind of task force to work with the regional commission and the hope is that everyone will come up to the same place. We would encourage all the localities to do exactly that. There will be hearings held before the regional commission of all the plan elements. I think the best procedure to have people from the municipalities in contact with the regional commission staff. I think there will be problems in the decision, but I really don't know of any way to set up a formal procedure at this stage that would work to everyones advantage.

The point is that there is a great inducement on our side to want to work these things out as early as we can and as soon as you see things that are going to be in conflict, I think that is the time to pop up and say, look we're headed for a problem here or it looks in likelihood that we'll be in agreement on this thing. But I suspect its because we are talking about the policy decisions, and that those things are going to have to come first. I don't see the coastal commission ever getting to the level of detail of the normal municipalities or local government land use programs. We don't begin to have the time or the money and I don't see a need for that. It seems to me that if we can arrive at these kinds of policy decisions that we shouldn't get into the detailed level of design. The kind of example I gave before were determined indeed as a policy. I think that would let everybody go about planning within that guideline.

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Comment by Mr. Barna Szabo

On your point of to think of precisely why we appointed a task force. We were very much concerned as to what would happen to our general plan on which we have conducted extensive hearings, over one year of hearings, on several items and we're hoping that the coastal commission staff would aquaint itself with that plan. If necessary critisize it at this stage so that we can work out the differences that might exist. What we have suggested, is perhaps if they have to hold hearings on these planning elements, we can hold those hearings in conjunction with one another.

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Question: How many local groups are meeting with your task force?

Answer: By Barna Szabo - Our problem at this time is that the local groups have not organized. For example the various civic or citizens groups have not given us or the commission input or other coordinated coherencies that would perhaps be helpful.

As to Joe's comment, out of permit processing there flows somehow an understanding of how policies should be if there is long range planning. I think thats true much more on the state level than on the regional level and I think that we should make that

qualitative difference. The state level is a little more coherent and trained and gives a better understanding to the commissioners, even when they consider permit approval.

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Question: If social planning is a proper function of coastal zone management, what kind of strategies or guidelines would any of them recommend to provide low cost housing in the coastal zone?

Answer: By Mr. Bodovitz - Speaking personally and not necessarily for the commission, it seems to me that that is something that very definitely is due and should be taken into account. Now thats the easy part and as you pointed out, how you do it is something else again. It seems to me that in this are some ingenuity is what is needed and maybe I can give you an example, again from Los Angeles, where this was done.

One of the concerns of the Los Angeles regional commission has been accessibility to the beaches in Venice which as Cal Hamilton explained is a very tight congested area and where any more additions to traffic, since streets are not being widened, and parking is a problem - - makes it that much harder for the public to get to the beach. The regional commission with jurisdiction over that area has generally been very tight on the number of offstreet parking spaces there must be for each unit.

The commission had before it a developer who wanted to build a relatively small numer of units but felt he couldn't provide as much offstreet parking as would have been required to meet the standard. A young lawyer from one of the anti-poverty legal groups suggested to the developer that maybe there was a way to solve everyones problem and that was to guarntee that a certain number of the units in that building would be for the low income elderly under a leased housing program with the city. The rational being that the elderly people would agree not to have cars and therefore there would not be a need for as much offstreet parking and the elderly who very much want to live in this area near the beach would be accomadated. The result was, a certain number of units in that building through cooperation with the city are going to be leased for the low income elderly housing and as a result the parking demand for the building will not be so great. What is being approved is a project that seems to be one that meets two or three objectives all at once; the developer is happy, the commission is happy, the city is happy (it got some low income housing where it didn't expect to get it) I'm not saying this could necessarily be reproduced on a large scale but ingenuity can sometimes go along way.

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Question: To Mr. Bodovitz - How much, if at all, is the California coastal commission involving other existing state institutions, particularly universities and other agencies?

Answer: By Mr. Bodovitz - We are involved with everybody we can. We really have no desire, nor time, nor money to reinvent the wheel, so we really do rely on the expertise and knowledge of people like Cal Hamilton and his staff, the State Fish and Game Department, the state geologist and the Army Corps of Engineers. There is really no shortage of this kind of expertise available and we are trying to make maximum use of it. We have people from all of these agencies reviewing all of these things that are of particular concern to them.

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Question: To Mr. Bodovitz - The state and nation has some immediate energy considerations and I'd like to know what the state commission is doing to insure that these are dealt with in California on a comprehensive basis in the coastal zones. For example, if San Onofre and their plan is not accepted and if we don't have offshore drilling then somewhere else there will probably be more marine terminals.

Answer: By Mr. Bodovitz - The implication is that the coastal commission should be doing all these things, and I think this is something a reasonable man could differ with. I'm not sure that a commission with limited permit and planning responsibility is the right commission to be coordinating the energy policy for the state. There was a bill in the legislature that would have set up a state energy commission, it was highly controversial, it narrowly got through both the houses of the legislature and then the governor vetoed it. I gather that there will be efforts to revive that kind of measure.

It seems to me that the coastal commission is called upon to make these energy decisions more because there is an absence of that kind of coordination. I think our feeling about it is that we have to take part to those kinds of decisions and point out concerns affecting the coastal zone. But, I thing that in the terms of broad policy it is not something we alone should do.

In regard to San Onofre the staff recommendation on that is not that the plant cannot be built, but that it cannot be built in the way it is now being proposed. This leads to one point I meant to emphasize earlier and that is the challenge all this has in coastal zone planning.

The pressure that is hard to resist is the challenge we are trying to meet to provide for balance in the coastal zone. I don't think there is anybody who believes that all development should be stopped or conversely that everything should be left just as it is. The problem, under the pressure of changing conditions and in light of the energy crisis, is how to protect the environment of the coastal zone while allowing necessary development to go forward. That is the basis of the staffs concern with the present San Onofre proposal. It is easily possible to have a power plant in that area, with little or no environmental damage, if that being the case, it seems to us both unnecessary and unlawful to allow something to be built in an environmentally harmful way.

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Question: To Mr. Bodovitz - No one has really commented on the coordination efforts or requirements between the three states on the west coast. Is it being considered and if so where are we in the planning process?

Answer: By Mr. Bodovitz - There is certainly no formal coordination. It seems to me there may perhaps need to be some sort of coordination, but again, as Cal Hamilton pointed out the planning differences just within California are so great and the problem differs so much from area to area that I'm not sure that we could get this type of coordination.

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Question: Just along that basic principle, if you have rules and regulations and permits and other things that can hamstring a developer in California, if the developer is really interested he's going to run up to Oregon before they finish their planning or go to Washington. It seems to me that a real necessary evil, so to speak, is to have coordination so that you can all benefit from each others mistakes.

Answer: By Mr. Bodovitz - I'd say that is true in only a very limited number of areas. For example, if one state didn't want a superport and another would actively encourage them that might have an effect but my knowledge of that would still be that oil companies want to take their business where the people are and that would have more to do with decisions perhaps than how each state might see it. The question of a developer going from one place to another, I think depends on where the market is. I don't see someone who wanted to build a condominium and a swimming pool in La Jolla being satisfied in Portland.

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Comment by Mr. Robert Knecht

Looked at from the federal level, I think the problems are different in various parts of the country. Clearly in New England those six or seven states are closer together on a good number of problems because so much of their coastal planning and management is regional (that is interstate) in character. The same thing is true in the southeastern part of the country to a certain extent and in the gulf area as well. But with the west coast it is different and we have seen that regional coordination will be needed in the Pacific northwest, especially between Alaska and the state of Washington and the state of Oregon, in regards to some of the problems; in particular, deep water ports, marine transportation of oil and so on, to meet the energy requirements.

But, perhaps it is less required in California in general. We look at it as having two parts when the state submits its management program for our approval it will have to list what it thinks the regional considerations are like and what mechanisms it proposes to develop taking into account the regional problems. We think of them in two cases, the question of consistency and uniformity across the boudries from one state to the next where you might have some sort of localized or interstate aspects to be dealt with, and then with the problems of scale size where you are dealing with large scale phenomena like energy generation and distribution of deep water ports. It needs to be done within a regional basis.

Comment from Audience directed to Mr. Knecht

Relative to coordination between the states and to connect some of this. It seems to me that it is reasonable that we might expect the federal government to take a role in addition to their usual standby role of federal funding in terms of the coordination between states. This is a regional area for an agency which transcends things too active, and I hope that we'll be able to look to the federal government for aim in this area. I know it is an area that has had a lack of emphasis.

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Comment by Theodore R. Gillen waters, office of the President, Oceanic Research Institute, Newport Beach, California.

Throughout all of these discussions of state and federal legislation and implementing regulations there is one essential element noticeably missing, i.e., emphasis on the necessity for greater funding for research and its application to projects whereby decision makers can make realistic and sensible decisions about land use based upon the carrying capacity of the offshore, nearshore and inshore waters, as well as the atmosphere related thereto. As near as I have been able to ascertain many of our recently created commissions in this atate are spending too much time trying to enforce unreasonable moritoriums and not enough qualified manpower and money is being spent upon

utilization of already known facts that will result in an acceptable overall plan for the state waters and the lands adjacent thereto!

Question and Answers after Mr. Ross's presentation

Question: The problem with public participation or homogeneity seems to; one, facilitate that you don't have alot of diversified inputs, two, the size of the public (say you are dealing with 160,000 on the oregon coastal zone, and three, do you involve residents from the Willamette Valley who may be the main users on the Oregon coast in your public participation?

Answer: By Mr. Ross - Yes, and don't think that we don't have diverging interests either. We do. All of California is coming ..no not really! We are launching in January with a series of six public workshops in other parts of the State of Oregon covering the entire state. If you are familiar with the state, one in Portland, one in Salem, one in Eugene in the Willamette Valley, one in Medford in the Rogue Valley, one in Bend in Central Oregon, and one in Pendleton in eastern Oregon. And the commission, by the way, does have a committment to taking input, not just from people in the coastal zone, but also people from the state at large. And interestingly enough, due to probably the number of second home owners on the coast, our coastal workships have had a lot of participation from people in the Willamette Valley, primarily.

Question: Would you comment on two things: one, the financial backing that the commission has from the Oregon legislature and secondly, the type of background or technical expertise which is represented on Oregon's commission?

Answer: By Mr. Ross - We do have a unique situation in Oregon. We have funds from a number of sources. General fund money from the State of Oregon and also we have contributions from local counties. We don't have a lot of money. For the financial period from 1973-1975 we have $120,000 from the state, about $80,000 from local county contributions and the rest we have to find from federal sources. From HUD 701 we have $100,000 and we are looking for other sources, obviously the Coastal Zone Management Act of '72 for more money.

On the level of expertise of the commission, we have a staff of eleven people, we have six professional people on our staff. We are really a quite small staff. The level of expertise....one of the things for which we are very greatful for is the natural resource agencies of the state who have been a tremendous assist to us. They have helped enormously. We have used a lot of their staff people in doing some of our work. We also have an advisory committee which is made up of a broad range of interests from the economic oriented, development oriented to the various conservationist organizations. This advisory committee, nineteen members strong, has been of tremendous assistance. Most of our technical expertise actually comes from state natural resource agency people who are assisting us on sometimes practically a full time basis.

QUESTIONS AND ANSWERS

Hamilton was asked a question from audience:

Question: Did you recommend to the Mayor that an EIR be prepared for the Los Angeles Harbor, even though there is an existing Harbor General Plan?

Answer: Our view is that each element of the existing General Plan requires an EIR. When the Harbor Element (Plan) comes up for review and Council approval it will be accompanied by an EIR. Each element of the General Plan must be reviewed every five years.

We will have 150 elements in the General Plan. We will prepare an EIR on each of those elements. At the present time we have about 45 elements in various stages of process including adopted plans. We don't have an adequate staff to go back and do all 45. Each element in the General Plan should have a complete EIR. The task of preparing EIR's for the adopted plans, including the Harbor Plan will take place over the next three years.

THE ENERGY CRISIS, AND THE CONSEQUENCES OF OFFSHORE OIL DRILLING

D. J. Everitts
Manager
Energy and Mineral Resources Development
California State Lands Division

Well, the news about our current energy supply is good, and bad, too. We are all becoming familiar with the bad news. I saw in Sunday's paper that gasoline was selling for 52 cents per gallon in San Francisco. The marine station in my neighborhood was out of diesel fuel, and the local service station operator told me he had been cut 7,000 gallons of gasoline last month, and was going to be cut 10,000 gallons this month. Simply put, we are running out of cheap energy.

The good news, of course, is that the head geologist up in the sky laid down ample crude oil supplies in Alaska; he made sure that there were large deposits of oil shale and coal available; and he has even kept us from blowing ourselves up while we learn how to harness the atom; and given time and acceptable environmental reports, we'll survive.

In the meantime, we here in California must rely on conventional sources of oil and gas to supply 89 per cent of our energy consumption. The State uses 1.3 million barrels of crude oil a day, a third of which is imported. It burns nearly 6 billion cubic feet of natural gas a day, most of which is imported from Canada and the Southwest.

If projections are correct, California's energy consumption will more than double by 1985, and, with alternate energy sources such as nuclear, geothermal, coal and solar not developing as fast as hoped, oil and gas will still be needed to supply approximately 70 per cent of those requirements.

There are three basic approaches to supply the short-range need for oil by Californians: (1) increase imports of foreign petroleum; (2) reduce demand growth; and (3) accelerate the development of domestic oil and natural gas production.

If current trends continue, the United States will be importing about 40 per cent of its total energy supply by 1985. This will, of course, add to the increasing balance-of-trade deficit, and would aid in placing the national economy at the mercy of foreign powers, some of which already are using oil as an economic weapon. In fact, there is no guarantee that foreign producing nations will continue to provide us with hydrocarbon products, or, if they did, would take out dollars in payment.

The increase in demand can be partially satisfied by increased efficiency in the use of energy. Currently, only about half of the total energy utilized by this nation contributes to productivity. Improved technology will ultimately

mitigate this problem, but not in the immediate future. Energy can be conserved by limiting personal consumption, but not without significant effects on American life styles, employment, and economic growth. Moreover, reduced consumption would interfere with other State and National goals, such as an improved environment that requires additional energy.

The third approach, that of development of domestic petroleum resources, can mitigate the problem until alternate sources can assume the load. Full development of the State's offshore and onshore resources, including the Federal Outer Continental Shelf, coupled with California's eventually expected share of Alaska North Slope oil, could make California essentially independent of unstable foreign supplies in the short range.

It is the third approach, that of increasing domestic production, that has been the consideration in the study that I am reviewing here today.

(Description was given at this point of the State Lands Commission and the State Lands Division)

Despite the exceptional record of petroleum producers operating on State-owned tide and submerged lands (no major spills or blowouts from more than 925 offshore wells), the State Lands Commission acted promptly after the 1969 oilwell blowout on Federal Outer Continental Shelf lands to ban new drilling or exploration by its lessees offshore California. The State Lands Division was directed to make a technical review and report on the Platform A occurrence, and to take a hard look at procedures and spill-containment capabilities on all leases authorized by the Commission. Shortly thereafter, on February 27, 1969, the Commission further acted to postpone the date for receiving bids for an oil and gas lease on a parcel of State-owned tide and submerged lands in the Channel.

On July 31, 1969, the Commission considered the Division's technical review and report, and concluded that it was in the public's interest to continue the moratorium. Pending adoption of more stringent drilling procedures and development of effective spill-containment and recovery devices, recommendations for drilling new wells on existing leases would be considered by the Commission on a well-by-well basis if there were unique circumstances that justified such drilling.

CURRENT STATUS

The drilling ban on State-owned lands continues, and the Commission has consistently assured Californians that the ban will remain in effect until the oil industry demonstrates that it has developed adequate oil-spill containment and recovery systems, and that the Division's more stringent procedures have been adopted.

As a result, although the Commission has recognized that wells drilled or redrilled from the uplands do present special circumstances and has approved such wells on an individual basis, only twelve wells have been approved from filled islands and no wells have been approved from platforms since January 29, 1969.

More recently the Commission has considered the excellent record of oil-well drilling and production on the State's offshore leases; it has noted the establishment of a State oil-spill contingency plan; and it has reviewed recent studies made by State agencies indicating the increased importance of offshore oil reserves in the light of present crude-oil and natural gas shortages in the United States. It therefore on April 26, directed the Division to conduct an in-depth review of current Commission policy concerning drilling and producing on existing

oil and gas leases on State-owned tide and submerged lands.

Public hearings were held by the Division in Los Angeles and Santa Barbara, and testimony was received from government agencies concerned with possible oil spills, from the oil industry, and from other interested groups and organizations.

A basic and necessary assumption in the review was that there is always some small risk of an oil spill inherent in offshore oil operations. The hearings, therefore, were directed towards three basic questions:

1. If drilling is resumed on State offshore leases, what can be done to minimize the chances of pollution from an oil spill?
2. If a spill does occur, what would be the consequences?
3. What alternatives are available for obtaining crude oil?

Further the hearings addressed themselves only to those questions as they related to existing facilities on existing leases. They were not concerned with the issuance of new leases or the issuance of any specific well permits.

Five main points were discussed: energy, geologic hazards and seeps, drilling and producing procedures, containment and recovery, and impact areas.

I have already discussed the energy problem. It has been our conclusion that State lands offshore California are not geologically hazardous.

I should say something regarding drilling and producing procedures, however. The State Division of Oil and Gas and other regulatory bodies have significantly strengthened their controls since 1969, through both new laws and administrative procedures. Each offshore oil and gas lease issued by the State Lands Commission contains a specific provision prohibiting pollution or contamination of the ocean or the tidelands. These are not new provisions, however. More than 1300 wells (from both uplands and offshore) have been drilled on State lands without a major incident of pollution, largely because of State operating practices enforcing the lease prohibitions. The State Lands Division has proposed procedures which consider the specific geologic and engineering conditions that led to the 1969 Santa Barbara oil spill, and formalize many of the practices that have resulted in California's excellent record. At the same time, the number of safeguards to be observed by offshore operators is increased.

The purpose of the procedures is to allow recovery of oil and gas from beneath State lands in an orderly and safe manner without conflict with the environment or jeopardy to the health or safety of workmen engaged in those oil and gas operations.

Oil spills occur primarily due to personnel error, equipment failure, and inadequate design of equipment. The procedures address themselves to such problems, and contain detailed engineering requirements on well programming, blow-out prevention equipment, testing procedures, and supervision and training related to these subjects. The operator is required to maintain close on-the-job supervision of drilling operations on a 24-hour basis, and a representative of the State is required to perform a variety of daily inspections of procedure.

The procedures will add cost to the production of oil, both to industry and the State, but safety must be the overriding consideration. Support was given to this concept by one simple statement made by the City of Santa Barbara Envirnomental

Quality Control Board when a representative testified that if one State requirement alone had been enforced by the Federal Government on its Outer Continental Shelf leases, "Santa Barbara would probably not have been subjected to the disastrous pollution in 1969."

Containment and recovery has been a major consideration--for obvious reasons. The first step in oil-spill control is prevention. There is no necessity to spill oil on the water. Past State Lands Division regulations and practices have served to prevent any major oil spill. The new procedures are designed to preclude a spill even further. In the unlikely event, however, that a spill does occur, organization, preplanning, equipment, and training are necessary to "fight" the spill.

In 1969 neither the oil industry nor anyone else had the equipment or organization to deal quickly and effectively with a major oil spill in the open sea.

Since that time, the National Oil and Hazardous Substance Pollution Contingency Plan has been developed to provide a pattern of coordinated and integrated pollution reponse between the spiller and Federal, State and local authorities. The State has developed its own plan, which can function either within the Federal plan, or independently, as required, and industry has established a formal Pacific Coast network of cooperative response teams.

Significant efforts have been expended for research and development in the areas of containment and recovery, not only by industry, but by EPA, the U.S. Coast Guard, the National Science Foundation, the U.S. Navy, NASA, and many others. Money has been expended for the procurement of equipment, large inventories have been built up, and additional equipment is on order or will be ordered.

Finally, although it may be categorized by some as "enlightened self-preservation," industry, in the conduct of offshore drilling operations, has testified it will " not knowingly incur risk of accidents by conducting sensitive phases of (their) operations during hazardous weather conditions." Should such conditions arise, "all necessary precaution would be taken, including, if necessary, suspension of the critical phases of drilling operations in progress."

Now to the matter of "consequences of offshore oil drilling." Four major areas of possible adverse impact were discussed. They were (1) the matter of esthetics, (2) the involvement with navigation and ocean traffic, (3) the economic impact of such operations, and (4) the effect of operations on the marine environment.

Little can be said regarding the matter of esthetics. Oil operations have existed on the California seacoast for more than 70 years. If the drilling moratorium is lifted only on existing leases and existing platforms, the visual impact of such operations will be essentially the same as it is now. There will be little if any change in operations visible to the untrained eye. A person either likes or does not like platforms on the marine landscape. Energy is a State-wide problem and oil must be drilled for and produced where it occurs.

Parenthetically, whether or no resumption of activities on State lands would affect the Federal Government's decision on Outer Continental Shelf lands is conjectural. Operations on the Shelf have never really been curtailed to the same extent as on State lands. Additional platforms have been installed since the blowout, and over 200 additional exploratory and development

wells have been drilled. Further, the Administration has already withdrawn its support from a bill to terminate 35 of the Federal leases in the Channel.

The impact of existing offshore oil and gas producing operations on navigation and ocean traffic is minimal. Sea lanes have been established along the coast of California, and the existing platforms and islands are not within the prescribed coastal sea lanes. The existing platforms are located precisely geographically, and are indicated on all official navigation charts for any given area. Therefore, not only do such structures act as an aid to navigation, but, further, have been used as energency havens in more than 150 documented instances. The additional impact of renewed drilling also will be minimal, and will consist of some additional boat and helicopter traffic. In fact, new drilling, and the associated new oil production, could easily result in the need for fewer imports, thus decreasing tanker and boat traffic. A study by the California Resources Agency indicated that 75 per cent of all oil spilled between 1956 and 1969 resulted from vessels, and, of these 90 per cent were tankers. From a purely environmental point of view, therefore, resumption of offshore drilling may be far less hazardous to the environment than continuation of the moratorium.

There is always some small risk of an oil spill inherent in offshore oil operations. In the unlikely event that a spill should occur, the activation of contingency plans will substantially reduce any deleterious effects. Additionaly, it is clearly the responsibility of the spiller to mitigate any damages that might occur. In the case of the Santa Barbara oil spill, the companies invoved not only have expended large sums for beach cleanup, but have, in fact, paid in excess of $7 million in other claims.

Testimony presented by the City of Santa Barbara has indicated that the State, the County of Santa Barbara, and the cities of Santa Barbara and Carpenteria sustained a considerable loss in terms of income tax, sales, tax, property tax, hotel and motel bed tax, and unemployment and disability taxes. Whether such losses are compensible must be settled by the courts.

State Lands Division revenue estimates indicate that more than $176 million in future royalties to the State have been deferred, if not lost, by amendments to the Public Resources Code made as an aftermath of the 1969 spill and that prohibit drilling in specific areas (sanctuaries). In addition, if the ban on drilling and leasing continues, it is estimated that over $70 million in revenue will have been lost between the time of the inception of the moratorium to December 31, 1978; or, to put it in perhaps more significant terms, daily production in the Santa Barbara Channel, for example, has dropped from more than 600,000 barrels per month at the time of the spill to just over 300,000 barrels per month for the month of September 1973, and at least one facility was shut down completley because of the company's inability to initiate drilling. More than 200,000,000 barrels of oil have been effectively locked up in reserves created by the sanctuaries established since 1969, and nearly 58,000,000 barrels of produced oil have been deferred, if not lost, as the result of the moratorium, from oil reserves on existing State leases. Finally, the oil industry testified relative to another aspect of the matter that concerned principally the interests of the oil companies themselves, and, in their words, " that is the fact that the State drilling moratorium has deprived the lessees of State offshore leases of the right to drill on these leases for an unjustifiable and excessive period of time, particularly as to drilling from existing platforms. . . . The companies holding these leases have been denied the right to conduct further drilling, and this has been done

without any compensation for the substantial losses suffered by the lessees as a result of these delays. . . ."

Perhaps one of the most hotly debated subjects is that of the ecological impact of offshore oil and gas operations. Arguments against resumption of drilling summarize the more important points of the effect of oil spills on the environment by saying (1) large spills and chronic pollution of the sea have presented a threat to certain species of birds, (2) the immediate killing of shallow-water marine life may be great and recovery slow, especially of pre-existing balances, (3) chronic pollution and coating of shores can reduce the habitat along the high tide line in rocky areas, and (4) oil can be a long-lived contaminent containing toxic and cancer-producing substances.

Proponents of the resumption of drilling hasten to point out that such conclusions may be true, but are based on research done in closed areas in which refined oils were spilled.

In the case of the Santa Barbara spill, heavy rains and flooding complicated interpretation of data gathered. Although there was a significant mortality rate among the waterfowl population at the time, there has been no evidence reported that bird habitat was permanently damaged, thus indicating that such impact was only temporary. The Department of Fish and Game reported that it is known that California crude oil has little lethal effect on marine mammals, such as the seals, sea lions, and whales.

The Santa Barbara Channel in particular is highly contaminated by oil because of natural seeps, and it is probable that organisms in that area have developed a natural immunity to crude oil. In addition to this natural immunity investigations have indicated that the effect on marine life by crude oil was minimized primarily due to the ability of the organisms to migrate down to greater depths, to close up their shells until high tide, or to produce a mucous-like coating for protection.

The Department of Fish and Game has also reported that, notwithstanding the social impact of oil spills, there is substantially less damage to living marine resources by spills of California crude oil on the open ocean waters than there is by spills of processed oils in more restricted areas, and has concluded that, simply put, it is because crude oil on sea water degrades much more rapidly and is less toxic than processed oils. The Department's experience has shown that, except for bird life the damages from crude oil spills have only a temporary effect on the marine environment. The fact that an abundance and variety of species live and breed in the Coal Oil Point area, where an average of 50 to 70 barrels of oil a day continue to seep naturally lends further credence to these theories.

To summarize, our study has led us to conclude that:

1. There is clearly a shortage of cheap energy that can only be partially remedied by fuel economies and efficiencies.

2. It appears from present projections that by 1985 California will have to import 85 per cent of its oil from outside the State. This will result in increased tanker traffic with its inherent risks of oil pollution.

3. Existing platforms are not navigational hazards, but instead are aids to navigation for shipping, and have in the past served as points of safety and refuge.

4. The geology in the Santa Barbara Channel is not unique, nor do the specific conditions that existed at Union Oil Company's Platform A exist on State lands. There is, however, a lack of adequate information concerning the nature of natural seeps and their relationship to oil on the beach.

5. The ecological changes from the Santa Barbara Channel spill were short term by nature, and most of the resulting problems related to esthetic, recreational, and economic matters.

6. Over 1300 wells have been safely drilled on State-owned lands, largely due to enforcement of past procedures and regulations. The State has drafted more stringent procedures that are designed to preclude oil spills and that would have prevented the 1969 blowout on Federal Outer Continental Shelf lands.

7. Advances have been made in equipment and recovery systems that were not available in 1969. These systems provide rapid response and will function in the seas that are expected to occur most of the time. Proposed procedures require curtailment of critical operations during adverse weather conditions.

8. All conditions of the moratorium imposed by the State Lands Commission have been met.

ALTERNATIVES

There appear to be three options open to the Commission:

1. Continue the drilling moratorium.

2. Lift all drilling and leasing bans and proceed with an accelerated development program.

3. Lift the drilling moratorium and authorize resumption of drilling operations on a lease-by-lease basis.

To continue the moratorium is to ignore that there is a serious shortage of cheap energy in the short range. It is to deny the importance of the fact that in over thirty years more than 1300 wells have been safely drilled on State-owned lands without mishap. It is to not recognize either the development of more stringent procedures and regulations by the State, or the advances in spill control, organizations, and equipment made by the oil industry.

Carte blance lifting of the moratorium with no restriction on development nor leasing, might initiate drilling activities on approximately eighteen offshore State leases; at least one parcel would be considered for leasing in the near future; and it is possible that as many as three more platforms would be required. Such a program would be responsive to the growing energy problem, but would not necessarily be responsive to the public's desire to protect more fully the existing marine environment.

A more effective approach is represented by a lifting of the ban on a lease-by-lease basis. It is responsive to the energy problem, it reflects environmental concerns, and it recognizes the development of more stringent operational procedures and advances in spill-controll capabilities.

RECOMMENDATIONS

With these thoughts in mind, therefore, the Division will recommend to the Commission that:

1. The State Lands Commission adopt the proposed operating procedures.

2. The drilling moratorium be lifted, and drilling operations be resumed on a lease-by-lease basis, such resumption to be predicated upon review by the State Lands Division for compliance with the procedures and upon final approval by the State Lands Commission.

3. The State Lands Division be directed to develop and implement a program for the identification of sources of oil pollution both natural and man-caused on the beaches.

The report has been submitted to the State Lands Commission informally, and will be considered at a public meeting to be held in Sacramento on December 11, 1973.

REBUTTAL TO MR. DONALD EVERETTS' SPEECH

Editors Note: This rebuttal was allowed by the MTS board. These words do not represent MTS or its members but are allowed in that time did not allow the rebuttal to be presented at the open meeting.

My name is Steven Travis, and I'm here representing International Surfing Magazine. I live at 1707 Paterna Road, Santa Barbara.

I'd like to offer a rebuttal to Mr. Donald Everetts' speech on the third of December, in which he outlined some of the reasons behind the decision to resume drilling for petroleum in the Santa Barbara Channel.

Evidence of natural seepage of crude oil in the channel dates back from the time of Cabrillo, who made a note of oil bubbling up from what is now known as Coal Oil Point (Deveraux Point, to those familiar to Santa Barbara) near Isla Vista Beach in Goleta. According to long-time residents of the area, a greater amount of oil has been deposited on the beach since the construction and operation of the drilling rig offshore from Coal Oil Point. In 1973, a "minor leak" of 40 barrels a day was found at the same rig; the leak was examined by Coast Guard divers, who found that the source of the leak was not assertainable. In other words, the leak could have been part of the natural phenomenon recorded by Cabrillo, it might have been initiated by the oil rig itself, at the spot where the line enters the "dome," and it also might have been caused by the activity of the rig, thus fissuring an area adjacent to the drilling site. Mr. Everetts theorized that instead of making the ocean floor more vulnerable to seepage, drilling and procurement of oil in the Santa Barbara Channel will serve to alleviate pressure that has produced natural seepage observed in the past. It seems to me that this argument may be used by either proponents or opponents of the resumption of drilling. More directly, drilling has yet to be proven as an environmental plus in the Santa Barbara Channel. The argument, which I read in full in the State Lands Commission Report on the resumption of drilling in the Santa Barbara Channel, appears to be inconclusive.

Another point that was made in the report, was that capabilities for recovery operations, should a blow out occur, have been proven to be "effective in seas up to five feet." Records of swell height in the channel showed that seas of 8-10 feet or more represent less than 2% of the total wave activity. Do we need any other example to refute this argument than what happened in January of 1969? A large swell, bringing breakers to a height of 8-9-10 feet at Rincon Point swept into the channel from the Pacific Northwest at the same time that the blow out was at its peak. Surfers from my area recall a lone man out with a board at Hammond's Reef, NORTH of platform "A." He rode waves regardless of the oil, and returned coated from head to foot with goo. His hair had to be cut off, but he was smart enough (we would hope!) to stay away from the mess. Sea birds and homeowners were among those less fortunate, in light of the fact that their habitat was the scene of the greater catastrophe; the oil remains. Crews sent out from Union Oil and the government were commended for their role in clean up operations, falsely, it seems. For the oil that washed ashore by the moderately large seas was buried below the mean high tide level. As winter swells and accompanying currents wash the sand

from the beach, heaps of oil from the 1969 platform "A" disaster appear. When the sun shines under predictably warm conditions brought by "Santa Ana" winds, the hardened oil once again becomes a nuisance and a hazzard to the lives of birds, molluscs, and marine plant life, and certainly to residents of Santa Barbara.

I offer my remarks as a surfer, that is to say one who is interested in a healthy future for marine recreation, and as an environmentalist concerned with this hasty decision, undoubtedly made to counter present shortages of petroleum products, yet before facts are known concerning the fuel crisis.

MTS/LARS December 3 & 4, 1973
Coastal Zone Management and the Western States' Future
Session II - Technological & Management Strategies For
Increasing The Coastal Carrying Capacity

The Honorable Dennis E. Carpenter
State Senator, 34th Senatorial District

We have been riding a really enjoyable crest of a new preservation and conservation attitude or movement, and with legitimate grounds for dissatisfaction and criticism over our past management of the land and water and coastal area. I do agree that we should be attempting to increase the carrying capacity of the coastal zone. And, I think that is the central issue. There are many who want to utilize a framework of devices and procedures that prevent the necessity for having to expand that capacity. I tend to feel, and during the course of my comments I think you will see where I have been on these issues, that I agree with opponents of growth in terms of philosophical position, but I would prefer to concern myself with increasing the capacity issue as it applies to our coastal zone and the waters of California. I do not feel that I have that choice. It is my impression that the crush of humanity and the necessity for economic survival in our state have placed us beyond the ability to indulge ourselves in drawing back from our utilization of land and water in the coastal zone of California. We have an area of discussion going on in Orange County--which is generally conceded to be one of the more pleasant places to live--wherein, the Board of Supervisors is grappling with the issue of what is the optimum population number for the county of Orange at a given point in time approximately some ten years from now. While our population today is the in the neighborhood of 1.8 million, many are saying it is the second most populous county in the state. They are wrestling with the problem in somewhat of a vacuum, in my judgment, because I have told them that in my opinion the population figure for Orange County should be somewhere around 500,000 people. And I have offered to serve on the selection committee with regard to who should stay and who should leave--and I think this really points up what our problem is in the coastal zone of California. We are past the optimum and the choice decisions, and we have now only the more difficult decisions of ordering our priorities in order to accommodate the problems we have already created by inaction, moreso I think, than by stupidity. And I think these people in the preservation and conservation movement, if nothing else, have tended to focus on the very important social problem that brings us all together in meetings like this and with regard to legislation in our own businesses and our own considerations. I have had, in the past few months, more than 100 people--immediate residents of my vicinity here--some of whom I have had arguments with in the last year, as I took time off voluntarily on my own to campaign against Proposition 20, not because I didn't believe in its precepts and the planning required, and not because I did not share in the condemnation of the errors we had made, errors of omission

and commission in prior years--because I do and I did then. But because I was very much opposed to the procedure that it represented--and I have had more than 100 of my friends come to me who voted for Prop. 20 and they want out. Why? Because as a concept it was attractive to them, and it was on that basis that it became the law of the land in California. As a philosophical treatise, it was perfect. But we, everyone, recognizes the needs and the problems of this type of conservation, but these 100 people had found themselves the owners of land within the coastal zone, and they never knew what the problems were in a practical sense, and now they have come to realize that it hurts, and accordingly, they have, if you will, changed their positive attitudes with regard to this particular phase of legislation.

I want to take issue with some comments that Mr. Gruen made in particular, indicating the voice of the people as it applies to Prop. 20. I think people in the planning and preparation industries that relate to this type of development control, and how to do it properly and planning our resources, are becoming a very important segment of our business society--because I do not feel that the people of California understood and voted for Prop. 20 on the basis of knowing what was involved. I think they responded to the general philosophical presence of the recognition of our errors of the past of omission and commission which resulted in bad planning and bad use, in general, with which most of our citizens agree. But I don't think they really accepted the structural and procedural concepts of Prop. 20 in any way. It is part of my feeling that legislation by the public at large, sitting as a legislature at large in the State of California, which we will have in increasing amounts, is a very deleterious and unnecessary exercise, and we are putting the people through a way of governing ourselves that is both unworkable and most unfair. And those who are treated unfairly in this process have no recourse, and that isn't the intent of representative government.

So Prop. 20 is only one of many, many examples, and I can agree with many of the concepts: the pornography control bill which was defeated, Prop. 14, and many others which are tremendous and massive legislative programs submitted to the people at large. Prop. 1 that we had this year is a concept with which I am wholly in agreement and would support, but is one which was incapable of being understood by the people. And if we talk about an enlightened electorate making these choices, the proponents know going in that the people will not understand it and they will be emotionally pushed into a procedure that they would not otherwise accept if they understood it.

One of the second areas I want to talk about is public acquisition. The existence of Prop. 20 and the increasing attitude of the public of recognition, particularly in Southern California, of the evaporation of open space in the coastal area has created a healthy situation in terms of public recognition of the need for acquisition of private property. And you will see running through this, so I am not giving any revelations, that to me one of the major issues involved is the class struggle and the analysis of proper governmental intervention, dealing with the proper and fair handling of what I call private property rights. Because we do not have the Irvine Company, and Mission Viejo and other great land-holding organizations ultimately to deal with. One can be somewhat impersonal and unconcerned about this, but I am concerned about you and me, and the mass of our population who are going to be faced with exactly the same choice that they had with Prop. 20--this year, in the Legislature and probably in the following year if that fails, and I think that it probably will, on the ballot in the form of what we now call "Preprint Assembly Bill No. 1", which for simplication, I will merely call "Prop. 20 applied state-wide." And this is going to, I think,

bring home to more citizens the issue of who is affected by this type of regulation and procedure. If you happen to like it, of course, one can, I think, take a great deal of satisfaction and comfort from the fact that these generalizations could have some grounds for possible success. But I think spurred by Prop. 20 and a new public recognition of the desirability of reserving areas, we are finding an increased interest and support for acquisition of property. I'm much involved in this myself. As a fiscal conservative and probably the lowest spender in the state legislature, I am co-author of, and much involved in, all the acquisition funding that we are now undertaking at the state level. Why? Because it's acceptable to the people and to me, it is the only fair way for the government to do its proper function when we talk about reserving areas, because to reserve areas by regulation which says to you, the citizen, you may continue to own your property and pay taxes on it, but you may not use it for anything, is totally unacceptable. The political framework which our constitution envisioned is violated, and I think that we are going to have to come to grips with an increasing public necessity for expenditures of money. And they are going to be expensive, but I think that will be one of the least foolish ways that the government has ever spent money. I happen to be of the opinion that it does not spend very many wise dollars. The lack of money has been a substantial problem. The other areas of public expenditures must be increased, and as Dr. Craven indicated, the massive federal support they have had fr, in my judgment at least, a fairly far out project, off-shore utilization for urban and industrial and other purposes, is still something worth examining. And the sum of $70,000 a year, I submit to you, is probably less than the daily loss of pencils which are broken by irate federal employees.

It strikes me that the order of priorities will require us to demand of government at all levels an application of substantial and increasing portions of public money to the type of research and development which is necessary in this area. I think we have to take into account the economic necessity for continuing to utilize our coastal zone, and I touched on that briefly in the opening. There is no way for us to go back to living on roots and berries in the coastal zone. It is just unrealistic for us to try and consider backing down to a different utilization of land mass and the water than at the point which we find ourselves currently. I think the ability to accomplish these things is tied up in politics, if you will, as it translates into public support, because the funding that would be required must come from the pockets of all the people in the state of California as well as in the rest of the nation.

Other aspects, externalities if you will, will come to the fore. For example, consider that 56% of the land mass of the state of California is already publicly owned. Unfortunately, the very large regions involved are inland where they are to a lesser degree, subject to the proper and total utilization by the masses of people in the coastal areas. Also, in the coastal zone area, when we remove from the public tax roles properties by acquisition, if you will, or by other means, I foresee and I will be very active in the examination of the public tax rearrangement by which we would induce and encourage less development in the coastal area we are going to create an economic problem in local government for local services on which we all rely and which we demand in increasing quantities. And that will be an erosion of the tax base which this highly economically usable land creates in the coastal area. That's another economic factor in public acquisition.

Some people will say to me today that some of the good things that are happening indicate a possible reversal of the conservational trend that we have enjoyed or decried, depending on your

point of view, in recent months or years. And it's very difficult to analyze this. Some say we've overracted when we talk about preservation in terms of acquisition of land and control of private property and what have you. Obviously, I am one who has said on occasion we have overreacted and this is a danger--and I reiterate a danger, because I think it would be extremely negative for us as a people recognizing certain other problems now being imposed on us to reverse a way of thinking that, to me, in the long run, will have far more benefits than it does negatives. And I think that when we look at this thing, for example, that we now call the "energy crisis", people are already talking about the necessity of having, for example, to go back into the ocean and to seriously construct a host of oil islands for the purpose of actual drilling. It may be that that's a necessity, but it demands a trade-off by the public and an acceptance of something that has conclusively been unacceptable for many of our people to date. It may be that when we talk about colder homes and the loss of transportation freedom and other factors that a shortage of oil represents, that we must find ways to utilize this. And then the technology will be the key to it. Because I happen to think that you can have it both ways and that this type of utilization of resources can be done technologically so that we do not end up with any kind of willy-nilly or dangerous type of implantation in terms of oil drilling or nuclear plants or what have you. I think we must have progress, but then it will be up to technology to tell us how to do it and to perform it without the increased danger.

And I speak from a position of some strength because we have successfully avoided the construction of any type of off-shore drilling in my area, which is a decision in which I have participated and I still feel--not being from Santa Barbara or other areas that might be more dramatically affected--I speak in the philosophical sense. The dangers that I see from overreaction by some groups and segments of our society really is the vehicle by which problems become publicly known so that at least an issue is created and a change or result can come about. If we have, in some areas, gone too far in the preservation or conservation theory, then the potential of that is the failure to recognize, by leaders of those movements, the dangers of going too far so that we will find, for instance, that the public is now unable to consume oil at the lasciviously wasteful rate that we have, and I do and everyone of you do, I am sure, then it's going to be healthy if we learn some better habits. But the inability to recognize that those types of demands placed on the public will cause consideration of conservation and preservation to go out the window. The man who loses his job, or the man who cannot get to work or what have you...if these problems become so acute, there will be, I think a loss of interest by the public in conservation orientation, which I think would be tragic. We would lose all the good ground that we have gained. So I think that good planning in this area and in philosophical areas is essential if we are to keep the ground under us that we have already made.

I've touched on the state-wide land use control provisions, and on the prospects that we will be working on in Sacramento this year, and I will reiterate some of the considerations I feel are valid, such as the issue of whether or not local control is better than the regional or state-wide planning, which is the direction in which we are moving.

I personally feel that local control would be, and is, a better vehicle. Why? Because in the political process the only form of government to which the average citizen has accessability is local government. There are very few people who have the ability to communicate and articulate in a meaningful way with elected representatives in Sacramento, or who have that same ability in

that great institution in Washington, D.C., which I often refer to as the great untethered marshmallow--it is uncapable of attack. And I think that the problem is that we are going to be dealing with the rights, not just of the people who have a consuming passion and a good passion for conservation and preservation and better land use and control, but with the people who have no rights, because the decisions will be made without consideration of them and without the ability to do it, I think in a fair way. I submit that the procedure is equally important as the goal we are trying to accomplish. And it is necessary to safeguard these things.

I often used to hear the argument in the Prop. 20 battle that local government has done a terrible job in the coastal zone of planning, and I very much agree with that statement. They did not do a good job in local governing. But why did they not do a good job? They did not do a good job because they were responsive to the people. We didn't ask them to do a good job. We never demanded that they do a good job. We equated in the State of California: progress equals growth. We didn't talk about quality growth, or type of growth, or location or anything. This state was built on the philosophy of growth to the point where it is today. And this has created an economic problem from which we cannot back away without pure chaos and disaster, but problems from which we must unwind ourselves in a logical and intelligent manner. So I think that they did what we wanted them to do, and as a prior speaker indicated, if you will look at the type of people who are getting elected in many of the local government positions, and the attitude of many of the older people who have been on planning commissions and city councils and supervisorial boards for years, those attitudes have changed, and there are very few places left in California where you can do anything you want to or get anything you want to done. And don't for a minute conceive that appointed and not elected officials are going to be more intelligent and fairly administer to the rights of the people in regard to property management. They are not. And don't conceive for a minute that the degree of honesty in publicly elected officials is going to increase the further you get from home, because the opposite is true. I think that we are losing sight of probably the best vehicle for representative government we've ever had, and the only vehicle in my judgment where everybody can get a fair shake, and that's through the vehicle of local government as opposed to regional and state or federal control on something we consider as important as private ownership.

I think that one of the problems or one of the deep faults that we have undertaken, and many of you, if you happen to be involved in water research and usability factors, may think otherwise, is that we have substantially ignored the issue of the water in favor of the land considerations. Those considerations are certainly logical, because we happen to be on land and that's where we spend most of our time. At the same time, it strikes me that the utilization of water, and the ocean in particular, has for us the greatest potential in economic and survival considerations when we talk about food and other factors that we simply can no longer afford not to expend research funds and pay more attention to the issue as it relates to the ocean. And I think that perhaps good times are coming in regard to this because through some minor breakthroughs I think there has been an increasing public awareness of the necessity for proper planning and utilization of the ocean resource to a degree that we have not done in the past, and in keeping it a parallel with our land interests. Lack of funding has, again, been one of the problems, but I think that most of the deleterious human trends that have negative impacts on the ocean are reversible, which they are not always in the land area.

I had a bill last year of great excitement to some people, called a bill to save the northern sardine. And most people knew little and cared less about that unfortunate animal at sea, but it was something that used to abide in our waters here by the millions and millions of tons. Our estimates in 1936 ran almost to 200 million tons of sardines. It was a major commercial fish that had food value, it had fertilizer value and so forth. And so this very year, I carried a bill which was finally passed into law protecting a fish that is now down to some estimated 20,000 tons in California waters, almost an immeasurable resource that we think can be saved by leaving it alone. It's not always that easy to bring one back. You won't believe the resistance that occurred to that little bill, but it's the type of thing we have to recognize. There are commercial and other interests to be served that are ligitimate that do not take into account the necessity, the public necessity, if you will, for doing something in a regulatory sense. In that case, I proposed to a handful of fishermen who were claiming they were going to go out of business that if that were to happen, it would be my position that it would be appropriate for the State of California to find a way financially to help them work out, over a short period of time, their reliance on a commercial fish that we wanted to protect, if it were absolutely going to kill their industry. In the final analysis, when I got through all the flack, I found out there were only two men fishing this in the state of California because they could not get the number of tons they were allowed to catch now. So that was not necessary. But once again, we come back to the public necessity for legislative funding of the type of programs we wish to undertake.

So I think that if we recognize some of the legal needs and translate that into legislation, in the supportive area and in the funding area, and we continue to massage the public so that it has a supportive attitude towards the increasing expenditures, which only can come from taxation, that we will, I think and assume, achieve the techical and management skills that are capable of solving these problems in the coastal zone both in the land aspect and in the water. If we can recognize the procedural and legal problems and the economic problems and solve those concurrently, because I think they are of equal import with the techical and managerial problems, we are way ahead of ourselves, I think, in the technical area, to a degree that we are overlooking some of the more philosophical and more intangible qualities of this issue, which I submit to you are equally important.

Those are my remarks formally, and I would only submit then that we will all be available for a short time for questions that any of you would care to address to us.

TECHNOLOGICAL AND MANAGEMENT STRATEGIES FOR INCREASING THE COASTAL CARRYING CAPACITY

Dr. John Craven
Coordinator of Marine Affairs
State of Hawaii

Thank you, Senator, for your introduction. I will not however, speak on management because it seems to me that one bar to the solution of coastal zone problems is management and regulations. Indeed there is a multitude in another session listening to talks about management. Over and above management is the lack of awareness, in my opinion, of the technological solutions which are available to us, and what these technological solutions could do to resolve the problem of increasing the carrying capacity of the coastal zone. I shall not in my talk review the total thinking process that has led to the "Hawaii Concept" for the coastal zone, but I shall discuss the techniques and concepts that have been derived from the studies that we have completed on new city design. I shall cite the basic conclusion of that study as the long term trend which we believe that mankind can and should use in building his new cities. The essence of the concept is an elemental approach. This approach assigns all the high density functions of mankind (the power plants, the industrial functions, even the high density living) to platforms called superstable platforms, which are deployed well out to sea. The actual distance (essentially three to four miles) is far enough so that the visual impact is sufficiently moderated.

These high density platforms are however, located close to the land mass. The coastal land mass is dedicated to the low density functions of society -- by this we mean such things as agricultural areas, low density type living, golf courses, universities, government cities and state houses, and other extremely low density functions. The two complexes are connected together by marine transportation systems. The marine transportation systems are designed for mass transit of people, for the movement of containers and goods, and the accomplishment of other logistical functions. The superstable platforms themselves are oriented in a 3-layered configuration in which the above water part is reserved for essentially nonautomotive pedestrian aspects of society. It is the place where people live. The water surface is employed for the movement of goods and services It is the transportation area. The area below the water is employed for industry, for nuclear power plants, for the heavy industrial functions of society, etc.

Philosophically, the concept is clear and explicit, but I hasten to make two points on the concept -- first that it is a low energy concept. Since the movement of goods and services and people on the surface of the water is, fron an energy standpoint, the most efficient way of moving goods and services. In addition, the organization of high density functions in a compact environment cuts down the total number of unbilical cords--

which again results in a low energy solution. Secondly, it is an environmental solution, since a careful examination of the ocean environment reveals that it is easier to blend with the ocean environment than with the land environment. And, there is a third point I would like to make about this concept, i.e. that it is not an ocean concept; it is a land concept. The motivation which engenders the concept is to move things off the land, so the land may be better enjoyed, and to preserve the coastal zone by moving high density functions away from the coastal zone and out to sea and moving low density functions away from the coastal zone area.

Now, if this concept is not to be a mere dream, it must meet two requirements -- it must be technologically feasible and it must be economically feasible. I would therefore present a few slides on both aspects.

First, one must have the marine transportation system. For such a system to be effective, it must extend to the very heart of the land. It must therefore use the canals and the waterways which exist in great unused abundance throughout almost all the major cities of the United States. You for example, have here in Los Angeles, great arroyos which are dry almost all year. If they were filled all year with just a little bit of water they could become major arteries of transport. What vehicles are available for these arroyos? Hover craft are available, the captured air bubble craft can operate in waters of several feet in depth. Another vehicle which is available is the Soviet Union type hydrofoil craft -- the Soviet Union hydrofoil craft as shown here, (there are several hundred operating on the canals of the Soviet Union) is one of their main means of passenger mass transit in the Soviet Union. There are two configurations of this particular craft -- one of the which operates in a draft of 3-1/2 feet and that is the deep draft configuration. And then there is one which operates in water depth of 1-1/2 feet in the shallow draft configuration. It may be said that such a craft will operate with nothing more than a teacup of water. Insofar as the available configurations in the United States, there are other types of canal boats that could be conceived of; the prime characteristics are speed capabilities of 20 to 30 knots, extreme quietness, and low pollution levels. These canals and waterways do in fact exist, although in neglected condition throughout all the major cities and are available immediately. Therefore, the right of ways which are needed to acquire these systems already exist.

When considering the open ocean, the chief technological requirement is a low motion spectrum. People will simply not travel in craft in which they would get seasick. It is mandatory that the craft have little motion. There are several craft that meet this characteristic. The one that we will have in Hawaii next fall is the Boeing Jet Foil. This is a hydrofoil whose characteristics are different than most hydrofoils in that the angle of attack of the foils are adjusted to match the wave profile. Thus the motion spectrum of this hydrofoil is extremely low even in a very heavy sea. In Hawaii, the oldest inhabitants talk about a most feared area of the ocean -- the Molokai Channel. It is rightfully considered to be among the most seasickness inducing waters of the world's oceans. Calculations for the Jet Foil indicate that in these waters the motion of the craft will be less than that of a DC-8 at altitude when the seat belt sign is off. A new craft which is now being tested by the U.S. Navy is the semi-submersible or SWATH craft (an acroynym meaning small waterplane area craft). This consits essentially of two submarine hulls which are below the water, thin struts which pass through the water surface, and a platform above. The advantage of this vehicle is that it rides with the submarine hulls surfaced in shallow water in the port and harbor areas.

Thus they can operate at very, very shallow draft when coming into port. When it is ballasted it operates in a submerged condition at sea. Most naval architects trained to regard water plane stability as sacred, shudder when they look at this craft because this craft is not stable of itself. That is, without a ballast control system, the movement of passengers to one side of the craft would result in a slow but inevitable tilt over to the side until all the passengers were close to the water line. To avoid this effect requires a ballast control system which operates in conjunction with the movement of loads around the craft. Such control systems are now routine state of the art. The response time is sufficiently slow that a failsafe back up system can be applied in time. And, in the ultimate case of full failure, the crest can come down off the submarine hulls and land on the main hull istelf. In this failure mode, the ship operates in a standard naval architectured mode. This means the ship will not sink but it might be terribly uncomfortable for the remainder of the ride.

There are a large number of other craft which are designed for movements of goods and containers. This talk has only shown the crest designed for passenger use. In Hawaii, we have in our capital improvement budget for next year an interisland ferry consisting of a SWATH type ship. The first one we will build will be an experimental one for the movement of people only, and then, if this is successful, the state intends to build interisland ferries of the roll-on/roll-off type in order to move cars from one island to another. There are a great many advantages to roll-on/roll-off types even in Los Angeles. As I drove down here from the airport this morning, I thought how nice it would have been if I could have avoided the traffic by rolling on a ferry at Los Angeles airport area, proceeding here at 45 knots and rolling off at the port area here. I would have avoided all the congestion of the highway and lost no time in the process.

If we are successful with marine transportation systems, we have the first element of a successful coastal zone technological solution. The second element has to do with the question of the building of superstable platforms at low cost. What do we mean by superstable platform? This is of course our own definition and by superstable platform, we mean one that has a vertical acceleration of less than .01 g in the maximum sea state that is expected. The reason we choose this figure is that such a platform will have a lower design factor than that required for earthquake loading, or, the platform will be more stable than a structure built on land. Therefore, the structural requirements and limitations on this platform will be less than that on land. (If such a concept spread, a lot of Southern California's most eminent engineers will be forced into retirement status).

The current state of the art for these platforms is exemplified by the oil industry's floating platforms, the semi-submersibles. These are essentially two kinds -- the vertical column semi-submersibles or the horizontal semi-submersible very much like the Mohole concept. There are however, two characteristics of the oil company platforms that are inappropriate for a superstable platform for use for urban society. The first of these characteristics is an excess of motion. That is very understandable because the oil companies platforms are designed only for the motion requirements for successful drilling. If you want to make it more stable than that, you've got to have a larger platform, more volume, and apparently more expense.

The second characteristic is that all of these oil company platforms to date essentially have been built out of steel. It is our view that steel does not lend itself to an efficient platform. The current characteristic cost of these platforms is

about $30 million for a platform. The mode of holding the platforms in place is important, they are now using dynamic positioning, that is they use continuously operating propulsors to hold the platform in position. In our own Hawaii design of semi- submersible platforms, we believe that dynamic positioning is useful not only for low-cost positioning, but also to meet city design requirements to move the platforms. That is, it is a requirement to move these platforms so the land gets a different view of the platform and the platforms get a different view of the land. If the platform has been inappropriately located the first time, they can be better located at relatively little cost, to follow the season or demographic changes in society.

The Hawaii design is essentially as follows: We have designed these platforms in modules of three vertical towers per module. In the particular configuration we have here that each of the towers is 240 feet high and 80 feet in diameter, which requires a depth in water of about 300 feet in which to operate. This makes it very good for the West Coast and not very good for the East Coast. You have ample water depths of 300 feet or deeper on the West Coast. A thin column goes into the water surface about 27 feet in diameter, then a platform deck above it with a capability of putting low rise structures as high as 10 stories on the structure above. The slide shows a cardboard model of one of these platforms. It demonstrates a little better how it is constructed. A 3-tiered deck is located above the water, each deck being about 2-1/2 acres in area, columns rise through the deck on which you could have buildings. The three low-rise apartments go down underneath the surface of the water. You will observe that there is a great deal of freedom here for ships and barges to come underneath the platform and discharge the goods vertically where they are needed. There is no horizontal movement of goods in the platform area itself, just vertical utilization. In the columns, down in the deepest part where there is cold water, is the place to utilize for your heavy machinery. This location meets several requirements -- the ballast requirement makes it an ideal location for industrial functions. In the upper portion of the columns, one can have ports and windows for viewing or even for some kind of men in the sea function through locks which are connected to the sea.

The question about the feasibility of building these --the feasibility has already been established. Most of you are familiar with EKOFISK oil storage tank. The EKOFISK oil storage tanks consist of nine columns, each of which is 80 meters high, and many of you will recognize that 80 meters is 240 feet, and it's a coincidence that that's exactly the same height as the columns in the Hawaii design. These are made of pre-stressed concrete. This is not, in fact, a floating platform in that its final configuration and as it rests on the bottom of the North Sea. However, it was built by the techniques that we recommend, that is, a slip form technique utilizing the crane and the slip form, a rather standard technique. It was also built in a cofferdam so that no shipyard was required for building purposes. When the structure was completed, the cofferdam was converted into a small boat harbor and park area for the people of Stavinger. The EKOFISK structure was then floated out to the site in the North Sea where it was sunk in place and used as an oil storage platform. From our standpoint, the chief characteristic of EKOFISK demonstrates that the technological feasibility of these platforms is present, and that also gives you some notion of the cost. The total cost of building this platform was as I understand it, $27 million -- a very low cost indeed for a platform of this size.

We, in Hawaii, did not have $27 million -- we had only $25,000, so we built a 1/20th scale model and we built it out of steel, not concrete, just because in the small model scale, the

steel worked better for our purposes. Here, you see one of the 10 modules that we did build. A picture of the 10 modules assembled on land shows them to be unattractive and ugly. They block the skyline, are very congested. Here are the same modules floating in the water and as you can see, the great bulk of the displacement is below the surface of the water. You'll see some students in the water disporting themselves. The students assembled the platform in the water demonstrating the ease with which the superstable platform is assembled in water. Remember, the superstable platform is easy to assemble because it doesn't move in response to the waves. It does move easily in response to drag forces. Therefore, the problem of mating some of these is a relatively simple one. Much simpler than the general mating of unstable platforms in the sea which is a very complex operation if the two modules are pitching and heaving. Finally, we have an architect's model to indicate that these offshore platforms will not be the unsightly things that we've come to associate with some of the floating platforms. There is shown architect's model composed of 27 of these offshore modules. There is a view from the free surface and a view from below, where the major part and the bulk of the modules are.

In summarizing, I would add a few more technical facts. We've had three independent cost studies done on these modules and all these studies indicate the the concrete module, the bare module itself, can be built somewhere between $4.5 and $5 million for the concrete structure. These three independent estimates, indicate that a functional platform for whatever function you want, which includes the power and the utility and the transportation can be provided at a capitalized cost of $45 a square foot of useable space. Such a cost makes it more than competitive with costs on land because it's very difficult to get high density buildings on land at $45 square foot even without the transporation, without the power and the sewage treatment plant capitalized in the total cost. Like any future cost estimate, there is uncertainty in the estimate. The estimates, however, were made by three independent parties who didn't talk to each other. If they are wrong, they are all equally wrong.

In summary, we see a growth pattern which can be developed consisting of low density on the land, essentially a forbidden zone right at the coastline itself, the forbidden ecologically sensitive edge open to the public domain. Modern high-speed mass marine transportation systems, smooth and comfortable, economic, low energy utilizing, are employed to connect with stable platforms on which there are power plants, industry, petrochemical plants and living spaces. We think that this is a solution for modern cities, but we haven't the foggiest notion of how to bring it about in our society.

THE COST BENEFIT CLASS STRUGGLE

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I am not going to talk about specific hardware, though I agree with Dr. Craven's comments concerning need to provide people with the kind of information they need to make choices. In fact, my overall thesis is to submit first, that in fact economic, systems analysis, sociological already contain techniques that we can use to give people the information they need to make choices. Secondly, one of my assumptions really is that the place to make those choices is ultimately in the political process. I don't think its the job of the economist, the physical scientist or the computer man to set values and make these choices. To the extent that our society is going to solve these problems short of a wrenching institutional change, it has to be done in the political process. I for one, see nothing wrong with that. However, that process has been operating, when it comes to coastal zone management, with I think a little less information than we are capable of providing.

I think before we get carried away with the techniques of providing information, information about the alternate choices that the body politic has in front of it, we need to frame what it is we are doing, in a little bit of an historical sense, if for no other reasons than to give us, the professionals, some humility and to give the public some awareness of what we can put over on them so they will watch us.

I'd like to do that by going back and suggesting, first of all, that what we are talking about here is increasing the allocation of our land resources. We are going to have to make decisions about how we properly use it. Well, properly to one group means something totally different than properly to another group. So in all of these cases, what we are going to have to do is make decisions about what land uses can there be on particular pieces of coastal areas. In doing this, we are continually in a battle that in fact has been fought since man first came to this earth. When he was in tribes man battled for the choice hunting ground or the most desirable places to pick berries. As soon as specialization came in, we began to develop classes. Today we have no classes in America. Now, I think that while, being a philosophical point, we have to get over it.

Any of us that work in this area of land management, work in providing information for land use decisions. We have in America today, reasonably homogeneous groups, and I suspect that most of us in this roon fall in one of them, based on education, occupation, income and half a dozen others, although those first three are much more important to most of us. We have values that differ from those of other groups.

Now in day-to-day activities of our firm, I recently overheard one of my interviewers addressing a group on a cost benefit study we were doing on open space. As she interviewed the individual in very much the same way you would push the usual open space program. What we were trying to find out was what are the critical factors that the community wanted to get from this project, so we could give them a relevant cost benefit analysis. He finally broke down after about an hour of prodding by a very clever interviewer and he said, "Well, you know before these young people came in here, I used to get in the newspaper every week. I haven't been in the newspaper now for 10 months." For this man, living in his environment, that's a legitimate factor. We see the same thing when builders talk about growth--they inevitably talk about the jobs that are going to be created.

Recently, we worked in one community that traditionally wanted progress, but now when the state was going to provide an active recreational park in their area, the community came out against the park. In their arguments was this very much middle (upper middle class, really)class, community concept that if we allow the state to build this park, we're going to have Winnebagos up and down the streets. The way that Winnebagos was said was clearly that this was a very undesirable thing. Retention of quiet had a value. I think we have space values and they're fighting for pieces of the coastal environment. BCDC is planning the same thing when we talk about pieces of the Bay in San Francisco.

Now, there's nothing new about this kind of struggle. But it is very important not only who wins, but in terms of our society, how the game is played. Now, initially, when we first began to develop these class interests, it was played essentially by physical force. The toughest knight was the one who developed a feudal jurisdiction which gave him the primary right to decide who gets what piece of land. That was a very destructive way to go about making these decisions. We spent so much of our time fighting for who gets what piece of the pie that we didn't have the time or energy to produce a very large pie.

So we began to evolve into a market society, we began to let the market make part of these decisions. Now initially, of course, the Kings monopolized this market, and it was the father of my science, Adam Smith, who essentially waved the banner for the middle class merchant group in which he was telling them, "the market will work better for everyone's benefit," particularly the group that he was speaking for. If we take away from the King the right to push this thing toward their direction by granting monopolies, making physical distribution and so on. Now we recognize that even here, there have been continual efforts to change the way the market allocates. We have tried to stop fraud, institutions, but this works obviously for the consumer classes less than for those who are perpetrating the frauds. We have the Sherman Anti-trust Act and various anit-monopoly laws. Even so, it was recognized that the market alone could not do an efficient job of allocating all our resources, in particular, our land use resources.

Now, frequently, we try to be objective and we wind up being probably no more objective than most people, but we do try and we wind up being damned by both sides. On the one hand, there are those who feel to let the developer build and make money is a sin. On the other hand, there are those who feel that development is good for development's sake and that private property rights, as has been shown, are inviolate. Well, as a matter of fact, if we can show anything, we show they are not inviolate. Why won't the market officially do the coastal job? Well, for at least four very good reasons.

First, the market does not put a price on the by-products of the services and goods that are produced. The jargon for this is externalities. For years we all drove our automobiles and thereby created a dumping ground for our air pollutants. Only we didn't buy it, because there was no price on it, we got it free. When I build a house that blocks your view, I simply buy the ground. I don't pay for the fact that one by-product of my building going up and getting the view is that your view may be blocked. In this mornings conversations, Joe Bodovitz gave another example talking about public access. As more and more units are put into Corona del Mar, the buildup of required accessability is strained but no individual developer pays for that. We're working on one county now where 8% of that county's roads takes 27% of their budget, and yet that 8% serves a very small percentage of the total population because its roads go up into the mountains where there are second home sites. So the market simply doesn't put any price on these externalities, or by-products that are produced. These by-products are the types of environmental damages that we are all increasingly concerned about.

Secondly, is the action by the people who put these land use policies in effect, provide some sort of services free--most noticeably parks, recreation and schools. Now as soon as the public provides a service free, the market can no longer work to allocate that. Now this policy has boomeranged, for example, in the case of beaches and parks. What we thought was important and should be provided at a low cost, we had the state provide. The result is that even when more and more people want a beach or park, the state can't outbid residential users, because they have no way of bidding for that park, since they don't pay for it except through the state. There are many other examples of where we have a service that is provided by the public and the market can't operate.

Let me break here for this one story I do want to tell. This report I've got in my hand is a study that was done by Gruen and Gruen with Sedley Cook. It was prepared for the Department of Navigation and Ocean Development on setting guidelines for coastal management decisions. As it turned out, the Department really did not want control and elected not to use this, and instead of the Department managing it the electorate voted in Proposition 20. In the public hearings, several of the people and the commissioners were saying, "now, who is the communist who said all these things?" The things they were referring to were some of the same things I'm telling you today. Even though I hadn't been asked to testify, I was asked to speak and I said, "Well, I'm one of those communists and I'd like to just give you the literature of some of the other communists that have been saying these same things for years." They include of course, people like Milton Freedman, who is not famous for espousing communistic views.

The third reason that the market never could be expected to make these allocations for the social benefit is simply that we are mortal. An operating society, hopefully, must be really proof enough, in itself. Society, as we know it, will be around for a lot longer than any of us sitting here, but when we make individual decisions, we recognize that we have a limited life span. Therefore, we tend to have a relatively high discount rate for our decisions. Society shouldn't have such a high discount rate. So for these reasons, the market by itself never could, nor can it today, make these decisions. And the political process has to get into it.

Now we have long recognized that there are economic tools that can be used to provide information about the choices that are before the body politic. Now, we first used these tools

really during the 30's in cost benefit analysis, which I think is still the word to use. It is also increasingly a land and systems analysis, economic computer technology, but we began to use them during the 30's when the things that were highly valued by the kind of professional classes that were studying the guide rules for cost benefit analysis were jobs in the period of depresion, and the goods and services that would be provided by the market as a result of whatever alternative was being filled.

So the first Corps of Engineers bluebook dealt primarily with primary economic benefit. How much electric power would be produced, costing how much, times the number of people who would use it. Secondary benefits, how many jobs were created, and the tendency by the way that cost benefit formulation was administered was to suggest that we should always build the dam.

Now, this was a period, of course, when most of us that were developing cost benefit methodology, did have enough income so that we could get to recreational areas. Whereas, most of America was not sufficiently affluent to get to what was available. So we were providing recreation and jobs for our price. Increasingly, though, Amercia became more affluent and we began to find Winnebagos and older cars using up our recreational space. Now we can see, and I think this is very desirable, but I think we ought to recognize the source, new cost benefit formulations. We can read in economic journals that when we talk about development of Mineral King, for example, we must consider option demand--preservation demand--that is not just the users but those who may want to see that it gets preserved, those that are non-users. It is very important, for example, to keep wilderness intact.

Dick Myers feels the same protection for the use of the water. Dick did an interesting study to find out who uses different kinds of recreational areas. He found that very close to the roads, were the kinds of people in occupational levels that are in the semi-skilled and unskilled range--heavy equipment operators, truckers, etc. As you went further up the mountainside you have less equipment and also began to get higher levels of education, income and occupation. And at the top of the mountain where there was very few of them, came mathemeticians, philosophers, senators and professionals.

Now I think that complies with the kind of cost benefit formulations we're now developing on things like Mineral King. I want to put this in not because I think cost benefit shouldn't be used, I think it must be. But, because I think we ought to recognize the way the cost benefit formula is developed can often bias or push the information in one way or the other. This means that we have to be very explicit, very honest about what we are doing and then proceed to use the tool.

The tool, basically talks about two kinds of measures. First of all, there is the measure of the primary economic good. I must say that the one bone that I might have to pick with Mickey Milane is that we do not have enough information. All to often, we have so much data that we can't see through it. I Think our problem is to know how to ask the right questions, to use the data we have and, of course, the computer has a role there.

What do we mean by primary economic benefit? We mean no more than what is the benefit of the goods and services that would be produced by each of the alternative land uses we have. The key concept here is one of opportunity cost. If we do not put it here, but put it somewhere else, will those who use that thing pay more and get less quality. This can be done very very simply. We merely need to categorize our land uses on the basis

of the kinds of resources they provide to those who give goods and services. Frequently, this means nothing more than finding out if it goes on a different kind of resource base, what are the increased capital costs. If this refinery goes inland, how much does it cost to run the piping in? If the nuclear power plant goes inland, how much will the cooling tower cost? There are discernible figures. Secondly, what are the extra operating costs of going somewhere else? Or, for a product differentiated site, what do we have to pay to make up for the kind of amenities we can get on the coastal zone?

Let me give one quick example of one of the things you learn. If you look at artichokes, what you find out is that artichokes today, or when we did this study, the grower got 14 cents per pound. He is paying for the land he uses, and it is relatively few acres in California that can grow artichokes, about $2,000 per acre. Now this is the relationship between the price he gets and what he pays for the land. Residential development is quickly chewing up this land--in fact, we found that most of the artichoke growers that we interviewed had already sold their land to developers and were waiting for the developers to build. If the developer takes that, he can pay $6,000 to $12,000 per acre. Once he puts his houses on it, it becomes an irreversible change. That is, to get those artichokes back, we would have to buy six houses at $30,000, or pay $180,000 an acre.

What will happen if we want to eat artichokes? We can grow them in greenhouses. Greenhouses cost the equivalent of about $150,000 per acre. That would mean, to those who buy artichokes, that the cheapest artichoke you could get is the one that the grower has to charge $1.50 per pound for. Now this kind of analysis is not hard to do.

One foot note, we do have to say who or what products are we talking about? We did one report for the California Department of Fish and Game looking at values of the marine resources, and it was very important to point out that you had one totally different value if you look at the fish as a recreational item. That is, if you look at the service as a fishing experience, and if you look at the fish as something you eat. These are two different values and they are serving two different constituencies. All I can say is that I think that we have a suggestion. We can do this kind of analysis. We can also estimate what are the externalities. Frequently we don't need 300 meetings with citizens groups to determine how they feel about the externalities. We can do a statistically proper sample and ask those who would be affected directly quite simple questions. Such as, "Would you pay X Y Z and so on not to have those derricks standing out in the channel? Now the citizens of Santa Barbara can answer those questions. They will give you some feel for what that particular externality is worth. Its not perfect, but I would agree that this kind of information is available, obtainable, and its much cheaper to go out and otain it in this manner than to have your 300 meetings. It is also more representative.

Fiscal analysis can be done the same way and presented to the body politic information about the services that would be gotten from alternative uses of land. The bad, the externalities that would be imposed by each of these units, and what the fiscal impact will be on their pocketbook. These are do-able things that are not terribly complicated and I think that with that kind of information, we can make better use of our coastal land within the existing institutional framework.

GROWTH AND THE USE OF THE COMPUTER IN COASTAL ZONE MANAGEMENT

Keynote Address
Michael P. Milane
President
Datatronic Systems Corporation
Computer Sciences and Environmental Technology Division

Environmental quality, coastal zone management, growth, and the use of the computer; are they really related to each other?

First, I want to take this opportunity to personally welcome you here this afternoon, and I also want to thank you for inviting me here to Newport Beach to speak at this national forum on "Coastal Zone Management and the Western States Future!" This issue has vital implications--not only for the Western States--but for our nation in general.

I would like to talk about growth in the coastal areas, the potential of the computer as a resource, and environmental quality; and to challenge you to see what you can do to apply your kind of professional expertise, to rouse the spirit and power of the computer, to the solution of our growth and coastal zone management problems.

While this is truly a "national" conference, the fact that it is being held here in Southern California provides a somewhat different perspective to our view of the growth issue than if we were meeting in either Dallas or Chicago. And this is good. It is important that we recognize the wide diversity of values and concerns that are involved. The one thing we should avoid are dogmatic, categorical, and computerized approaches to solving our coastal zone management problems. We are in a period of the evolution of values, and we should both respect and encourage a wide diversity of views. Different social and economic groups will inevitably have different perceptions of the costs and benefits of various kinds of coastal growth--or for that matter, the lack of it. Different coastal areas likewise differ in their perceptions of these questions. Again, this is as it should be. But, beware of insistent voices that tell us categorically what our values should be. Let us adhere firmly to our own values and never hesitate to speak up for them. But let us also be tolerant and understanding of the values of others. They just might be right!

Above all, we need the openness of communication on the coastal growth issue, such as you are providing here, for a free and honest exchange of information and technology. This conference can help set both the direction and the tone of such a national dialogue.

During the last four years this Nation has begun a broad, conscientious effort to clean up the environment. We have moved

swiftly to reduce air and water pollution, control pesticides, abate environmental noise, deal with our solid waste management problems, protect wildlife and regulate the development in the coastal areas. We have given strong leadership to international cooperation in some of these same areas. Most of these are relatively simple, preliminary tasks where the objective is not inherently controversial.

The subject of this conference, however, is an entirely different matter. For more than a century growth has been associated with prosperity, expanding opportunity and social progress. It has produced so many benefits, both apparent and real, that for a long time it was an unquestioned end in itself.

But throughout the western states--that attitude is fading fast. Many are beginning to ask whether we should continue to regard growth--growth of population, growth of technology, and growth of industry--as the primary measure of progress. Stated simply, is more necessarily better?

Of course, this is a question which has no useful answer unless we ask: "More of what?" This is just another way of suggesting that the question of growth in the coastal areas is not one of absolutes--are we for or against growth? The really meaningful questions are the kinds and the directions of growth, or, the rates of growth. This is probably one of the areas where the computer offers its greatest service as a tool for analysis.

To look at the answers to these questions involves a tremendous collection of data and information. For instance, population density by census tracts must be looked at for past periods using the ability of the computer to forecast population density and mobility into the future.

In the broad sense, concern over the growth issue is closely related to concern over the quality of life, and I am convinced that this issue is emerging as the issue for the rest of the 1970's. Our society is at a junction where traditional assumptionas are being tested by new aspirations, new national priorities, and new values. That is why we are here today in Newport Beach.

The fact is that growth issues are being hotly debated all across the country, not in the abstract, theoretical terms of the university, but in the realm of real life concerns--energy needs, housing, environmental protection, land use regulation, transportation systems, and so forth. It is in these terms the issue really comes to life. It seems to me that questions of growth and coastal zone management--both how much and what kind-can only be addressed practically within the context of a value system. Thus, the question of whether we should have more or less highways can only be addressed usefully in relation to the values we attach to mobility, environmental impact, traffic congestion, air pollution, etc. And the way we perceive and apply such values must usually be in the framework of actual choices between real alternatives.

Also, in the energy field, there is no useful way to address the question of whether to have more or less energy, except in terms of the positive and negative value impacts of the various choices. Our society has come to attach a steadily higher value to clean, healthy air. It has imposed strict controls on sulfur oxide emissions from fossil fuel power generation facilities. Obviously, such controls--and the underlying values--have important implications for coastal zone growth, in terms of power plant siting and investment patterns.

Our society is addressing coastal growth questions, both locally and nationally, in our homes and communities as well as in the Congress and Federal agencies. Transportation control plans proposed by the Environmental Protection Agency are a case in point. Growing land use regulation, both at the regional commission and State level, are another. Both reflect the new priorities and the new values which are rapidly evolving within the western states.

It is important, I think, to emphasize the evolutionary nature of these shifting national priorities. They are real, but there is still no national concensus on many of the coastal growth issues--both because there is still considerable uncertainty over what it is we really want, and because our newer values have not yet been fully tested in the crucible of choice and the courts. We have already entered the period of such testing in the 1970's.

For example, I think it fair to say that there is a national concensus in favor of clean air. There is really no argument over the overall objective of air quality. At the same time transportation control plans for urban areas are proposed to meet the primary ambient air quality standards by 1975. And if those plans call for drastic reductions in automobile driving, there may be a real howl. Plainly, the value of clean air has run head-on into the value of personal transportation freedom. It is also instructive to note that the howl tends to vary in intensity, in different parts of the country--once again attesting to the diversity of value perceptions.

I see the democratic, political process as a critical element in the way we deal with growth and coastal zone management. Societies values cannot be altered by decree but only through a complex, evolutionary process of social interaction. This fact underlines the critical importance of fully involving our citizens in the decision-making process of coastal resources use.

Once again, I would emphasize that what we are dealing with are choices, which should be based upon a careful systematic analysis of the data, costs, and benefits involved in the management of coastal resources. The economic cost of urban sprawl and other forms of poor development are usually very real.

In this connection, a growing phenomenon around the country is the local "no-growth" or "controlled-growth" ordinance which, through a variety of mechanisms, seeks to put a lid on further growth. As you know, such ordinances are coming under strong attack in the courts and the legal issues, I believe, are still to be resolved. The Coastal Zone Management Act of 1972 is a good example of this.

Looking at such laws, they represent a sort of absolute, all-or-nothing response to a complex management problem, involving the very kind of rigidity which we should avoid in dealing with social problems. What many communities have experienced is uncontrolled, undirected growth, without plan or purpose; a process in which permanent choices are made without community involvement. In the absence of a more rational process, it is a small wonder that many communities are shouting: "Stop!" This is one reason, in my opinion, that it is so important that we use the most sophisticated available technology and the computer in coastal zone management. It is essential that we develop rapidly at the State and local level, orderly and effective mechanisms for making rational choices in the use of coastal resources.

I was just asked by the press today whether I was for or against offshore oil development, deep water ports, and similar facilities in the coastal areas. My answer, of course, is that there are certain places where we should probably not undertake such developments, and we should never push them down the throats of communities which are opposed. At the same time, there are places where such developments can be undertaken, and in ways which will minimize the environmental impact and also provide substantial benefits to our society. It is a matter of careful analysis of costs and benefits, and of the trade-offs. Once again, it is basically a matter of making rational orderly choices.

Public opposition to such development is sometimes described as emotional and unreasoning. The fact is, I believe, that we have seldom presented the public with any rational process for participating in the choices involved. As in the cases of uncontrolled coastal growth, these kinds of development have just seemed to happen and the public has been confronted with decisions that have already been made. If we are to avoid emotional responses, then I think it is plain that we must develop institutions and processes that provide truly effective means for public participation and choice, and in-depth capabilities for the analysis of coastal development.

Power plant and refinery siting are other cases in point. Some feel that public participation in such matters can only lead to delay. However, these individuals tend to be the same ones who describe public response in such cases as emotional. We can't have it both ways. We need orderly processes for making choices, not confrontation. For these reasons we need power plant siting research to develop more comprehensive computer simulation models and analysis of their impacts.

Overall, we need to create a sense of public confidence in the ability of the private citizen to influence the process of decision making, and to bring about meaningful change within the framework of our institutions. The National Environmental Policy Act provides a major reform in this direction. The Act's provision for environmental impact statements is essentially a full disclosure requirement. To an extent unprecedented in our history, government plans are made available <u>in advance</u> for public examination and comment. Whatever inconvenience and discomfort this process may occasionally cause, is far outweighed, in my opinion, by the inherent value of public involvement in the decision-making. Environmental programs and concerns touch almost every facet of our life. They provide a major opportunity to build a new confidence in the process of government, and to bring a new vitality and a new sense of responsibility to our citizens--both individual and corporate. I might add that the impact statement requirement also applies to the determination of growth patterns. I am convinced that we must do a better job than we have in the past in preparing such statements.

As we daily face the increasing reality of our energy crisis, the interrelationships between energy and the environment are becoming very apparent. As we know, almost all forms of energy available to us at this time involve environmental costs of various kinds. Oil involves such costs at the point of production, transportation, and then at the point of use through emissions. Coal involves such costs particularly from the effects of strip mining and the emissions of sulfur oxides and particulates when converted into energy. Nuclear power involves both radiation andsafety concerns at various points in the cycle, from fuel production to waste disposal. This is hardly an exhaustive analysis, but enough to indicate that the choices are not clear and simple, but involve careful identification of the costs and benefits and of the trade-offs involved.

As with all of our environmental programs, the use of the latest in technology is essential to our success. In the long run, I am confident that new technology will give us clean, abundant energy relatively free of the environmental costs we now associate with it. Of course, I suspect that such an abundance of clean energy might well give rise to an unconstrained growth that could carry with it a new range of environmental and social costs. As we develop such new technologies, we should carefully assess their impacts and develop the institutions for dealing with them. The availability of relatively unlimited energy would create a strong imperative for comprehensive and effective regulation of coastal development.

In the shorter run, we cannot avoid entirely the environmantal costs of energy production and use--but we can minimize them. One of the important opportunities is to conserve energy. The President has called for a new national energy conservation effort. All of us, in government and in the private sector, should work to give effect to this policy. This is not a matter of curtailing growth. What is really involved is the cutting down on wasteful uses of energy so that it can be applied in more useful and creative ways.

Likewise, we must move aggressively to install the computer technologies and establish the institutions which will reduce the environmental costs of our current energy production and use--effective regulation of coastal developments, stack gas scrubbing technology, desulfurization of fuels, auto emission controls, and so forth. The costs of such pollution abatement are certainly not small.

The cost of U.S. environmental programs to meet control standards and alleviate environmental pollution, during the 1970-1980 period, will result in the expenditure of approximately $287.1 billion dollars in public and private funds. However, the value of the benefits to be derived far outweigh those costs and it is in our national interest to get on with this job as rapidly as possible.

As you know, I have been concerned that we do not permit our environmental priorities to halt coastal development. Environmental considerations are a part of our difficulties, but only a part. Other factors include: poor planning by both government and industry, oil import quotas, price regulation, gas curtailment, international considerations, and a failure to make adequate investments for research in new energy sources and technology. Hopefully, we are making major improvements in these areas. It will be unfortunate if we let our real energy needs distract us from effective action to meet our equally real environmental needs. The coastal management problems associated with energy production will not be made to go away by slowing down our commitment to their solution. They will only be solved as we make the investments, do the research, and install the technologies required.

We have all heard it suggested that coastal zone management will stop or slow down economic growth. Just the opposite is the case. It is large-scale pollution--not its control--that limits coastal growth. The American people will not and no longer will tolerate unrestrained coastal growth, and activities that adversely affect the public health and welfare. Thus, the truth of the matter is that the real anti-growth forces--however unwittingly--are those who oppose environmental progress.

This point has, I believe, profound implications for any consideration of the interrelationships between coastal growth and environmental quality. The sooner we minimize or eliminate adverse environmental effects, the sooner the western states can

direct its energies positively and more creatively.

There are a number of specific growth issues to which I would hope this conference will devote attention. Let me touch briefly on some of these.

We must develop better measurements of social progress and the quality of life than we now have. The much-discussed GNP was never designed for such a purpose and is grossly inadequate to the job.

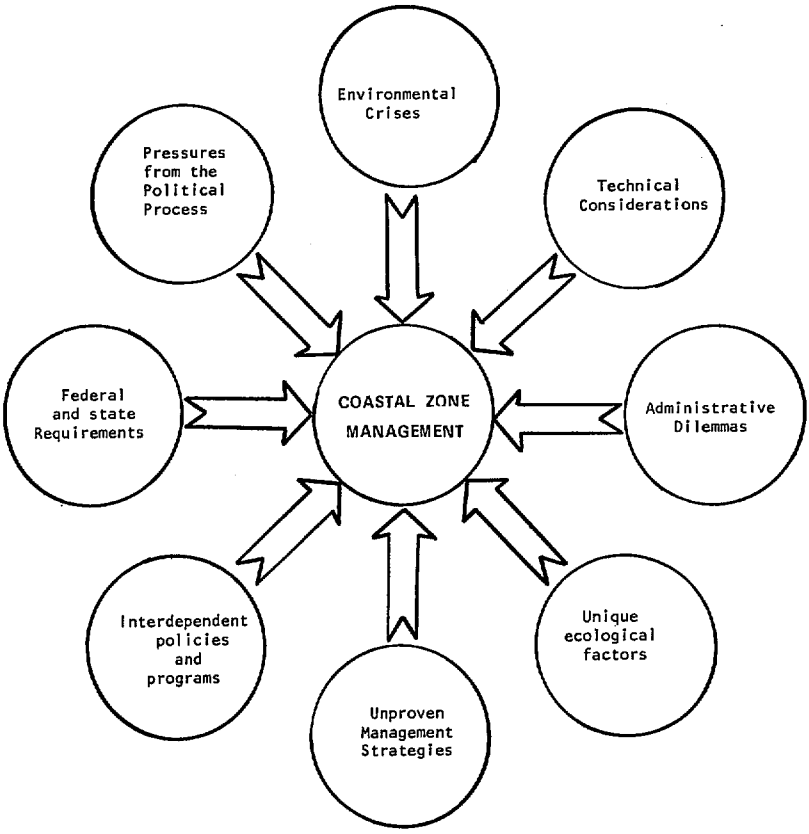
We need to do far more research on the economic aspects of coastal growth questions, including studies of the economic and other impacts of reduced rates of population growth or of a stable population.

We need to develop institutions, such as USC's Sea Grant Program, in both the public and private sectors to address coastal growth issues. In the Federal Government, we need a focal point for the identification and analysis of long-range trends and their implications for the nation and the quality of life.

We need to address the national implications of growth and coastal zone management issues, and open an active dialogue with other states and industry. Population trends, energy needs, agricultural production, and resource utilization must be examined in their totality. We should give some thought to the intense pressures that growing demand for coastal resources will place on the quality of life, and the stresses on our own environment that will thereby result. We cannot disassociate ourselves on coastal growth issues from the rest of the nation.

Finally, we need both individually and as a society to develop a clearer vision of what kind of world it is that we really want. In its absence, the hard choices may only lead to confusion. We need greater certainty as to the values we are using as goals for long-term use of our coastal resources.

I would like to conclude my remarks today with a request and a challenge that you devote your best efforts to coastal zone management; and employ the best available technology, including the computer, to the purpose of directing growth in the coastal areas to the ultimate service of the quality of life.



COASTAL ZONE MANAGEMENT AND THE WESTERN STATES FUTURE

SESSION II: COMMENTS-DISCUSSION
QUESTION AND ANSWERS

Session II - Question and Answer

Answer: By Senator Carpenter - My comment with regard to what I consider to be the best land management and use control device.. Well, let me go back. The best device for land control is none in a free, democratic society, all right? Well, we have ended that a long time ago.

* * * *

Question: How do you arrive at that?

Answer: By Senator Carpenter - Well, all right, in terms of pure freedom, and recognizing the constitutional right of ownership of property, there are no restrictions on the usability of your land and there's a certain attractiveness in a belief in that system.

* * * *

Question: If you had an infinite amount of land, I can see that.

Answer: By Senator Carpenter - I don't see that that is the issue. Because it doesn't make any difference the amount of land we are looking at unless you view the land mass of the United States as being owned in equal proportions to the amount of people in the U. S. today, because that is not the system.

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Question: But in terms of freedom of choice, it seems to me that the type of system with those constraints is ultimately, on the long term basis, going to further reduce choice because there will not be that much choice to be made. And since this is one of the things we believe in and one of the things the plan ought to do, provide the open space and the diversity....and a variety of things that different people have so that we as citizens truly do have a choice. By no constraints at all, I think that is the way to handle it.

Answer: By Senator Carpenter - I was not suggesting that we were going to go back to that system, because I firmly believe we are not. However, I would refer you, if you have not already done so, to some of the writings that pertain to the no-zoning areas of our country, which I think are increasing in support and there are those thinkers in the field who increasingly recognize perhaps some benefits to a change in our zoning procedures or in the existence of zoning as we know it. Houston, and other places which have a very workable system without zoning. So, if we recognize that, and I do at least, it is a starting point as to what degree government should impose itself on individual rights to utilize the land he ostensibly controls. And we can find some very good arguments, obviously, for one who believes in as much freedom as possible. I would find it very difficult

to live with my freedom if next door to my home in Newport Beach a rendering works were established by that fellow exercising his freedom. So we find the same kind of trade-off in terms of the ownership of property as we have found in all human endeavor in society that has to be considered. We have to stop when the policeman turns on his red light, even though we might not be speeding or what have you, because he has a lot of other responsibilities, and I want him out there protecting me against the people who want to violate my rights, etc. And on up the line to government intervention; so I think there is a differentiation.

I recognize also that there are some subjects that lend themselves most logically and fairly to the regional approach and analysis. We must make a differentiation between land use and control and planning as related to water and air. Because of the transient nature of those qualities, they cannot be dealt with in an isolated way, the way Los Angeles treats its air and then exports it through the natural forces that we have not yet controlled to Riverside and Orange County. This is something that I think demands a regional approach. The same is true of water. So there is a differentiation that I would have to make. I do not view land in the same way. Now some people say, "You people live down here in Newport Beach and you have some fine beaches, and I live in Pasadena, but I have as much right to plan your community as you do." And because I might be a user or what have you, I might have a little argument with him.

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Question: And I would say that most ecologists disagree that you can separate water and air in common with most systems from the land...

Answer: By Senator Carpenter - Well, there's at least one new federal agency that shares your view in terms of land utilization and its impact on air, for instance, a new regulation is now being promulgated for immediate introduction, creating values I won't even go into at this point. It is a matter of philosophy, I think there is a differentiation to make.

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Question: What I'm concerned about is the opportunity for a property owner to use his land. By placing the highest value you force high rise and high value of the property and what I'm suggesting is that in neither of your opinions is this a) desirable, and if so, b) how can we somehow offset this maximization goal in order to perhaps redeem land values?

Answer: By Mr. Gruen - We ecologists disagree fundamentally in the sense that philosophically..I think democracy is a good system and I want to see individual property rights not because I think its the best way of allocating our land use most appropriately. Now where would we be if we did use a price factor to allocate our land use. We do have a vast economy that can't operate without conglomeration, or without central cities. For example, without the people being able to get to each other you couldn't have a growth incentive. You have got to have some rationing of our land, and I think that by and large the market system which essentially drives up the price of the land by having competing bids for it obviously takes that land and puts it into the pockets of the property owners.

We have always known that it operates in some ways that are not socially desirable. What you are saying is that, you don't want Orange County to develop like Miami Beach. I think this is a legitimate function of government. You do have to have legislation and controls. As far as I'm concerened the problem we have today, and I don't think we disagree is that we have all waited too long to postulate and enforce these planning

regulations and controls. Let's take as an example in San Francisco, people buy buildings with the thought that they can build an 800 foot tower, and along comes the planning board and they say you can only build to 40 feet. Now, I think that 40 foot level on Fisherman's Wharf is a good thing for the people. But think of the cost of this retroactively, and I think you can see why we have an equity problem. The equity problem means that society as a whole in San Francisco and those who particularly use Fisherman's Wharf, I think should be required to buy and to pay for the equity problem. We are retroactively taking something of value away from him and I think we the public ought to pay him back. I think we ought to pay in areas where we have created an inequity, but by the same token you have to put on the controls or else we get a pattern of land use that is socially inequitable.

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Comment by Dr. Craven:

While I think this whole discussion of realtions of values must be generally broad, and the general notion that every alternative use relates to use of land and land alone.. this just isn't the case in this discussion alone, but isn't this the case of thinking about land management that is only coastal land.

Our society is so structured that doing something on the sea is not a practical commodity. You can't get a mortgage on something which is put out free in the open ocean, because you can't get a mortgage on anything that is not hooked on to a piece of land. We are not structured so that there is no way that society can finance some alternative solutions to its problems. The society has a sort of built in block that it must first solve its problems on land. I sat here and agreed with your economics, but the logic of taking a power plant off the coastal zone and moving it inland will not only be raising the cost of the power plant, but will cause environmental problems. The alternative is not to put the power plant on the coastal zone, where it does not belong but to put the power plant offshore which will turn out to be a lower cost.

Someone asked the question about nuclear power plants. Westinghouse and Tenneco did a recent study of offshore power plant siting and found them to be cheaper. A lower cost nuclear power plant can be built cheaper offshore, than you can put it on land. When you put the same plant out to sea, that's your coastal zone solution. When you go through all the environmental questions, when you go through it non-hysterically, and when you look at it very, very calmly, you discover that you get all sorts of environmental benefits by moving out into the ocean. You will get economic benefits from moving out into the ocean, you will get all sorts of social and sociological benefits from moving out into the ocean and you get all sorts of savings benefits from moving out. In short, you solve almost all your problems by moving out into the ocean. The mental philosophy is tied very much to the land use notion, such that the solution involves alternate land uses. This is the disturbing aspect of federal legislation coming up. Legislation which would substitute the land use act for the coastal zone act which would take the ocean completely out of the total economic and free choice structure of society. This is to me a very, very disturbing aspect of all of the kinds of studies that you are talking about.

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Comment by Dr. Gruen

Well don't be disturbed on my account, because as far as I'm concerned, land use does not exclude ocean use, I think that if you can, in fact, show that its truly most economical to go out offshore. Admittedly, we have rigidity in our system, but I think that this picture clearly shows the advantages of controlled land management. I think that one of the problems we may have is that $45 per sq. foot is frankly much more than any low density use would recover. Therefore, it is incumbent upon you, I believe, to show ecological benefits at least in California.

If you can show that the environmental benefits are greater by locating the power plants out at sea (and I don't know if they are or not, you know, I'm not a physical scientist). There I just can't believe that with the power crisis as it is, that the demand pressure in California to locate them somewhere inland would be determined to be the only alternative site.

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Question: If you can't lease the land out in the ocean, does that mean you have to create the land in the ocean?

Answer: By Dr. Craven - No, I don't have to create the land because I don't have to. If I were going to put a fractuating tower out in the ocean, I would build a tower in one of those pylon designs. I would be saving the land area that the fractuating tower now occupies and then if I want space to keep additional towers, I have the space between the towers. So when I'm talking $45 per sq. ft. I'm talking $45 a square foot not in terms of land area, but in terms of building area. The land is free.

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Question: I'm more optimistic than you are about the energy crisis and power necessity, because with the power crisis as it is, you don't have to get the banks to agree on a lending rate. The PUC in this state sets the rates so the safest way and the most economical way to build it elsewhere will prevail and the PUC will pay for it.

Answer: By Dr. Craven - Well, you haven't been fighting the battle of getting people to consider it.

Answer: By Dr. Gruen - You have to remember Dr. Craven that you are on what I call the leading edge of an idea. Very few of us probably have as much background and expertise in this as you with which to deal with your suggestion. I have difficulty when you talk about banks because I'd have little trouble borrowing on anything if I couldn't get a title report.

Answer; By Dr. Craven - That's exactly it, thats what I said earlier about raising the money to put it in the ocean.

Comment: By Dr. Gruen - Maybe 10 years from now we won't have the same attitude, but I think that's the problem we have to fight when we do something new.

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Question: If the statistics show that the underwater nuclear plant is the best way to build offshore, why haven't we been putting themm offshore and what is the holdup?

Answer: By Dr. Craven: - There are several holdups. The first is that the AEC is not developing the offshore civilian underwater reactor. I think you can put that down to politics,

because of the kind gentlement of government sitting over there on the military side. There's been a wall set up to protect the American public against any benefits of military technology. Underwater reactor technology has been prevented from moving from the military side to the civilian side. If you look at the AEC budget for reactor development over the pas decade, we discover that perhaps the smallest item in the AEC budget has been development of an offshore submerged reactor. Despite the public statements of support by Edward Teller and statements by the government that this is indeed the safest place to put a reactor.

If it sinks, it automatically does not go critical there's no way you can blow up a pressurized water reactor. And its absolutely the safest kind of reactor--if it sinks in the ocean there's just no way that the radiation is going to create a problem, its not going anywhere, its just going to sit there beautifully shielded by the ocean, that's well documented, and well known. Aut the power companies can't go into that because the technology has not been shared by the military with the civilian side. Adequate technology hasn't been developed on the civilian side. You can't automatically take the best solution and put it in the ocean even though you can get the public to do it.

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Question: I'd like to ask Dr. Craven. I was recently reviewing some material on the deposition of sewage wastes in the ocean presented by a gentleman from Hawaii. He pointed out in the federal ruling that they were going to be required to utilize essentially park size areas on the shoreline in Hawaii for the purpose of erecting secondary treatment plants with the sole purpose of reducing the BOD of the effluent, whereas BOD when deposited in the ocean waters off of Hawaii is no problem at all. I'd like your commentary on that.

Answer: By Dr. Craven - This issue came up in the San Francisco meeting of all the West Coast states held to look at this very problem. There is substantial evidence to show that the primary sewage in the ocean, placed in the right part of the ocean, is the most environmentally sound solution, particularly in Hawaii where we don't have any problem at all, and our fish are craving for the good taste of primary sewage. Secondary sewage goes in at the lower end of the trophic scale, resulting in obnoxious algae problems before it is converted up the line. So, the State of Hawaii has good documentary evidence, so good that our Sierra Club people are marching out with banners calling for primary sewage treatment in Hawaii, against secondary, as the basis on which we are actively seeking now to get legislation.

Now the curious thing, the real reason for the secondary sewage needs across the nation is political, namely, there is an economic benefit that accrues to a society that has coastal waters which will receive in quality, not only admit, but prefer primary sewage over secondary sewage. This is recognized of course in profits, with no desire to give an economic advantage to one part of the nation over another part of the nation. And so it was decided that all the nation would use the most expensive process whether required or not, in order to insure no economy, that is, noncompetitive.

This is the primary argument as to why you can't go to the much more intelligent, much more environmentally sound, much more rational way of dealing with sewage disposal which is to look at the quality of the receiving waters and to match your effluent to the quality of the receiving water, whatever that quality may be. In other words, you want to have zero discharge - you think of zero discharge as fresh water in the ocean. Fresh

water is the most polluting thing I can think of, to be put into the ocean. What you want to do is put in the ocean that water which most matches the ocean and that happens to be primary sewage.

Comments to above

Fresh water is not the most obnoxious waste you can put into the marine system. You'd have to put an awful lot of fresh water in.

Did you see what fresh water did to the Chesapeak Bay? It wiped out the whole fishery and the oysters.

I'm just telling you, it took it a lot more, and there are a lot more things, more toxic to marine organisms than fresh water. You have to have it in tremendous quantities. Now, I'm not disagreeing in concept..you're stepping over, maybe in your enthusiasm for the ocean system. I think this is one of the concerns for a nuclear power plant, while it may be safe where you have service materials, and if there is a problem, concerning waste, there is a problem with marine systems that is can become so spread out and so diffuse, very quickly, that essentially, the problem is irreversible. Whereas, on land, its more confined. And this is a concern. It can be handled, but I don't think we chould....the BOD I admit isn't much of a problem, but there are certain conservative materials that can if done on a large scale and can lead to long term problems.

Continued diologue on above

Dr. Craven: Materials like what?

Questioner: Like pesticides, etc., heavy metals, etc.

Dr. Craven: Oh, obviously when you talk about pesticides, we are talking about biological wastes, all right?

Questioner: Biological wastes I agree with you.

Dr. Craven: As far as we are concerned, it is the least damaging to the ocean (primary), the next most damaging is secondary, the next most damaging is tertiary, the most damaging of all is fresh water.

Questioner: No, I would not agree with that.

Dr. Craven: Okay, on that spectrum?

Questioner: On that spectrum, maybe, but I think that has very little meaning in terms of the types of waste we are putting in. Parts of it are very serious, including radioactive materials.

Dr. Craven: In Hawaii, we don't get pesticides, we don't get heavy metals. Oh yes, we do put in heavy metals - the volcanoes put in fantastic volumes of heavy metals, more than any other source.

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Question: I'd like to ask Dr. Gruen a question, you mentioned most contemporary forms of cost benefit which seems to have one objective.

Answer: By Dr. Gruen - I don't think you are aware of cost benefit versus cost effective. I think it depens on who you are reading. In the sense that you are using it I'd call it cost

effective. Incidently, we did do a study of ferries across the Bay, we suggested hydrofoils was obviously the winner, and the Golden Gate Bridge Authority put in a 26 knot conventional vehicle that will be obsolete...

Dr. Craven: Right why?

Dr. Gruen: Well the other agencies kind of wanted to make a note that it was aware of us, but it was economic, it was esentially the kind of leading edge thing that the Senator was talking about earlier. All I'm saying is that the primary, the secondary and the externalities have to be considered for each of those alternatives. Now if you call that cost effective, fine.

SHELF CURRENTS OFF SOUTHERN CALIFORNIA

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ABSTRACT

Currents over the continental shelf off Southern California are complicated resultants of a combination of components, including onshore extension of geostrophic flow, wind currents, tidal currents, and local non-steady flows due to irregular topography, runoff, low-salinity sewage and high temperature thermal outfalls, and other little-understood phenomena.

However, data from current surveys at several places between Pt. Dume and San Diego present a surprisingly consistent picture of the mean shelf currents in the Southern California Bight. Currents are strongest off headlands and weakest in embayments. They vary in depth in both speed and direction. Above the thermocline, they are dominated by wind currents; below the thermocline, tidal forces are dominant.

A study of four years of current data off the Palos Verdes Peninsula showed the mean currents oriented along a northwest-southeast axis parallel to the coast, with morthwest-setting currents predominating. The occurrence of black, H_2S-rich sediments, poorly-diversified benthic faunas, and possibly a higher incidence of anomalies in demersal fish also occurs to the northwest of the White's Point outfall system, strongly correlated with the predominant direction of sub-thermocline currents.

Limited measurements by Shepard and his associates have demonstrated that currents in submarine canyons are predominantly down-canyon, towards the offshore basins. Both mean and instantaneous down-canyon speeds generally exceed those of up-canyon currents.

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INTRODUCTION

Pollutants are introduced into an area such as the Southern California Bight through atmospheric fallout, flood runoff, by ships and through wastewater outfalls, and through contact with volumes of surrounding sea water. The initial interactions between wastewaters and receiving waters are physical. A contaminant or potential pollutant in a volume of water introduced into a specified volume of the ocean may mix with the receiving waters or be transported elsewhere. In the first case, diffusion, irregular movements of water through turbulent and molecular processes, generate a local exchange of the property without net transport; in the second case, advection, the property is

transported by moving water without effective mixing with the surrounding water. In nature, of course, both processes occur.

Those responsible for the controlled discharge of wastewaters into the sea are concerned with initial dilution and with subsequent advection of the resultant partially mixed waters to areas well beyond the point of initial entry.

Three principal types of currents can be identified: (1) those related to the distribution of mass, (2) those caused directly by the stress of the wind on the sea surface, and (3) tidal currents.

The first type called geostrophic currents, results from the lack of coincidence of isobaric surfaces (along which the pressure is constant) and level surfaces (along which no component of gravity acts). In the sea, isobaric surfaces slope relative to level surfaces in a direction opposite to surfaces of equal density. Water moves slowly down the sloping surface, and the resulting current is deflected by the earth's rotation (called the Coriolis force). The small deviations from a state of perfect static equilibrium (in which level and isobaric surfaces coincide) can be determined from the density at different depths. Density is computed at many depths from observed temperature, salinity, and pressure observations. These data are taken during hydrographic cruises or surveys in which many temperature and salinity observations are made at many locations at multiple depths.

These currents are fully developed only in water deeper than about 500m; however, considerably modified by bottom friction, their influence extends almost to the breaker zone.

The second type of current is due to wind stress on the sea surface. The wind moves the surface water, which is then subject to both friction and the Coriolis force. In very deep water the surface water moves at an angle of 45 degrees to the wind direction. This motion is transferred to the underlying layer, causing it to move, but at a lower speed. At the greatest depth in the layer affected by the process, the water is moving very slowly in a direction opposite to the surface current. This current profile is called the Ekman Spiral. The angle between the surface current and wind direction depends on latitude and interference from water piled up by the wind. The integrated effect over the entire layer under the influence of the wind is an average transport at right angles to the wind. A second effect is the redistribution of mass, which produces a geostrophic flow, the first type of current described.

Off southern California, the onset of strong, steady winds blowing in the late winter moves the surface water to the west and permits water to well up. This water brings up nutrients, which support heavy plankton blooms and cause the area to be one of high organic production. The resulting distribution of mass maintains a geostropnic current.

Tidal currents are produced when the tide rises and falls in the ocean as the result of the gravitational attraction between earth, moon and sun and the centrifugal force which balances the attractions. Although lunar and solar tides produce a rhythmic wave motion, irregular sea-bottom and shoreline topography causes many secondary effects. The observed tide is the resultant.

Of particular immportance in problems such as the disposal of wastewater in the ocean are the regions in which currents mingle. Convergences exist in areas where currents merge, and divergences occur where surface currents arise and diverge. In

coastal waters, which have a complex system of currents of a wide spectrum of dimensions and velocities, many such features, large and small, occur. Their importance in the distribution of pollutants is obvious, but detailed knowledge of such phenomena is unfortunately limited.

Another type of current, the turbidity current, is usually associated with submarine slopes. These currents are heavily-laden with suspended sediment, increasing the internal density over the surroundings, and confining the flow to the region of the sea floor. The direction of flow is downslope at speeds claimed to approach 50 miles per hour. They are important in submarine canyons and on submarine slopes.

Geostrophic currents may be dominant in the coean where depths are greater than 500 meters; however, in the nearshore waters overlying the continental shelf and upper continental slope, currents may be complex and highly variable, due to the restrictive effects of two boundaries--the sea floor and the shoreline. Resultant currents are more directly affected, and to a greater degree, by wind and tide forces, internal waves, boundary irregularities and low salinity waters from coastal rivers, storm drainage systems, and large sewage outfalls. Local water movements in close proximity to the shore are further complicated by wave, rip, and longshore currents.

SHELF CURRENTS IN THE SOUTHERN CALIFORNIA BIGHT

Introduction

There has been very little investigation of the currents on the mainland shelf, perhaps because of the complexity of the factors and forces that affect and shape these currents. Of the investigations that have been made, most have been conducted in conjunction with studies for the siting and design of marine wastewater outfalls. As a consequence, the data have been collected in localized areas, and for the most part, over short periods of time--1 to 2 years at the most. In a few areas, current measurements have been made in the vicinities of outfalls over longer periods. Figure 1 shows the areas in which current studies that are reviewed in this section have been made.

Most of the current study work conducted over the last 15 to 20 years has been done with drogues or drift cards, although a few studies have supplemented these data with measurements using current meters. It should be recognized that drogues, drift cards, and current meters produce different types of data. A current drogue presumably follows (ignoring the problems of wind drag or friction) a particular mass of water as it moves uner the various current-inducing forces. Drift cards provide an indication of the strength and general direction of onshore surface currents. To provide useful data, of course, the drift cards must reach the shore and be found. Current meters provide information on the strength and direction of the current at a given point over some period of time. All three types of information may be useful, but their differences should be recognized and the investigator must be reconciled to the fact that the data resulting from the the use of these different techniques are not always comparable.

The circulation of water over the entire shelf off southern California has been discussed by Stevenson (1963) in a paper oriented towards sewage disposal into the overlying waters. He has noted that the basic water movement over the shelf is to the southeast and along the coast. He also calls attention to a current flowing in a westerly direction from Ventura to Point Conception.

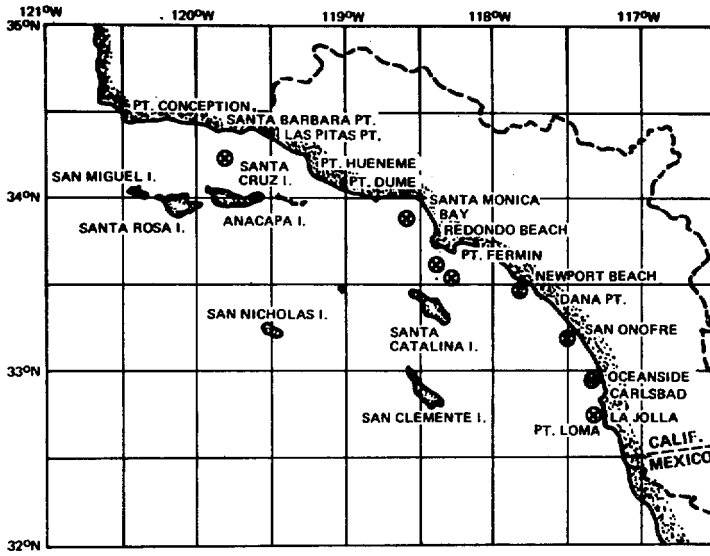

Figure 1. Locations of Recent Nearshore Current Surveys in the Southern California Bight

He advised that headlands are better locations for outfalls than embayments because currents are stronger in these areas. The White's Point and Pt. Loma outfalls fall into this category. He warned against location of ocean outfalls on coasts southeast of major headlands because of relatively calm water and little turbulence due to sheltering from prevailing winds and currents. The Orange County and Hyperion outfalls fall into this latter category.

The embayment with the least water motion is the shelf from Ventura to Santa Barbara, becuase of protection by the Channel Islands and the Santa Barbara headland. Small eddies are superimposed upon the weak flow towards the west referred to above. In 1963, Stevenson noted the presence of at least 8 small outfalls in the Santa Barbara-Ventura embayment and cautioned against any significant increase in waste discharge into that area.

From Newport Beach to La Jolla, the coastline forms a smooth arc. The coastal southeasterly flowing current, under the influence of the northwest winds, gradually spreads away from the shore. The current, therefore, has a progressively decreasing effect on the nearshore waters. Toward the south end of the shoreline are, eddies on the shore side of the current become more pronounced, and it may be their influence which aids in producing a nearshore counter-current in the vicinity of Oceanside. The counter-current flows to the northwest immediately adjacent to the shore and constantly impinges on the coastal boundry. This flow, along with the shoreward-moving wind drift, results in water motion which is almost continuously directed to the coast. Consequently, iff effluent is discharged into these waters, it must be recognized that under most conditions it will move toward shore.

Wave action is also considerable along this open coast, both from local wind waves and from the longer period swell. The waters are constantly agitated and the dissolved oxygen values are as high as in any waters along the coast. The area is, then, not ideal for the location of a submarine outfall, but the situation is ameliorated by considerable turbulent mixing which does not exist in protected locations. There were seven small outfalls along this portion of the coast in 1963. None have presented problems as yet, as long as they discharge treated sewage at present rates. If the discharge is significantly increased, undesirable consequences can be predicted.

Existing Data

Data from shelf current surveys are available for those sites shown in Figure 1. Information regarding these surveys is additionally summarized in Table 1. The author assembled and compiled most of the data discussed in this report while a member of the Southern California Coastal Water Research Project (SCCWRP) and wrote the sections on the subject in the report published in March 1973. While the support of SCCWRP is acknowledged, the opinions are those of the author only.

TABLE 1

CURRENT SURVEYS IN THE SOUTHERN CALIFORNIA BIGHT, 1935-72

AREA	TIME SPAN	MEASUREMENT INSTRUMENTATION OR TECHNIQUE	SOURCE
Santa Barbara Channel	1969,1971	surface drift cards	Kolpack, 1971
Santa Monica Bay	1955,1956	surface drift cards,drogues current meters	Stevenson, Tibby & Gorsline 1956
Palos Verdes (White Point)	1960-1964 1972	current meters	Parkhurst,Whitt & Gorsline; SCCWRP, 1973
San Pedro Channel	1935	current meters, current pole	Haight, 1939
Orange County	1964,1966 1967	drogues	SCCWRP, 1973
San Onofre	1964,1965	surface drogues, subsurface current meters	Marine Advisers 1965a,1965b
Oceanside	1971	bottom drifters; current meters(?)	R. Stone unpublished
Pt. Loma	1956,1957 1972	drogues, current meters, drogues	Gaul & Stewart 1960; SCCWRP, 1972

The most comprehensive set of data is that acquired for the Palos Verdes Peninsula area by the Los Angeles County Sanitation District (LACOSAN) water circulation for the vicinity of the (JWPCP) Joint Water Pollution Control Plan outfall area off White's Point. The most extensive time and depth coverage has been provided in these data, collected over a 4 year period from 1960 to 1964. Therefore, a detailed discussion of the results of SCCWRP analysis of these data, combined with the data taken jointly by SCCWRP and LACOSAN in 1972, is presented in the suceeding section.

COASTAL CURRENTS OFF PALOS VERDES PENINSULA

LACOSAN Surveys, 1960-1964

These data were taken from 1960 to 1964. The site was in the vicinity of present monitoring Station C-1, about 7.5 km west of the 90-inch diffuser and 7.5 km offshore from Palos Verdes Peninsula (inset., Figs. 2-4). Currents were measured with a Savonius rotor device at depths 2 ft. (0.6 m), 10 ft. (3 m), 25 ft. (7.6 m), 50 ft. (15.2 m), 100 ft. (30.5 m), 150 ft. (45.7 m) and 200 ft. (61 m) from a boat anchored bow-and-stern in water about 70 m deep.

Initially, current observations were taken at 30-minute intervals; later, the interval was extended to 1 hours. Weekly surveys of 24-hour duration were performed from 1 June 1960 through May 1961, except when high winds and swell prohibited operations. Subsequent data were taken mostly over periods of less than 10 hours. Data cover a wide range of tide phases, and all seasons for a 4-year periods; however, little data were obtained at wind speeds exceeding 25 knots (about 50m/sec) for the reasons stated above.

Because of the measurements system used, all measurements were subject to the effect of surface waves. A slight bias toward higher apparent speeds can be expected for the obervations above 15 m. However, the prevalence of low seas during the current surveys minimizes this error in speed, and the effect on direction measurements is considered to be very slight.

Direction

During the winter current measurement surveys (Figure 2), the prevailing winds were from the northeast, Almost half of the 130 observations of wind speed were zero during the winter operations. The currents from 1 to 25 m did not follow the measured winds, but showed a bimodal distribution of direction towards the northwest and the east-southeast. At 15 m, this bimodality still existed, but the current was predominantly towards the northwest. At 30.5 m, the bimodality remained, but the dominance of currents towards the northwest had increased. At 46 and 61 m, the predominant currents were setting in a general direction from northwest to west-southwest.

Again, the spring observations (Figure 3) were made when the winds were weak; thus the wind data may not be truly representative. The Prevalent direction was from the west-northwest, which is the mean direction generally quoted. Although there was a tendency for the currents at 1 m to follow the wind, the familiar bimodality reapppeared at 8 m and was quite pronounced at 15 m. The prevailing directions were east-southeast and west-northwest. While some semblance of bimodality in direction reamained at all of the lower depths, an easterly component persisted over that towards the west.

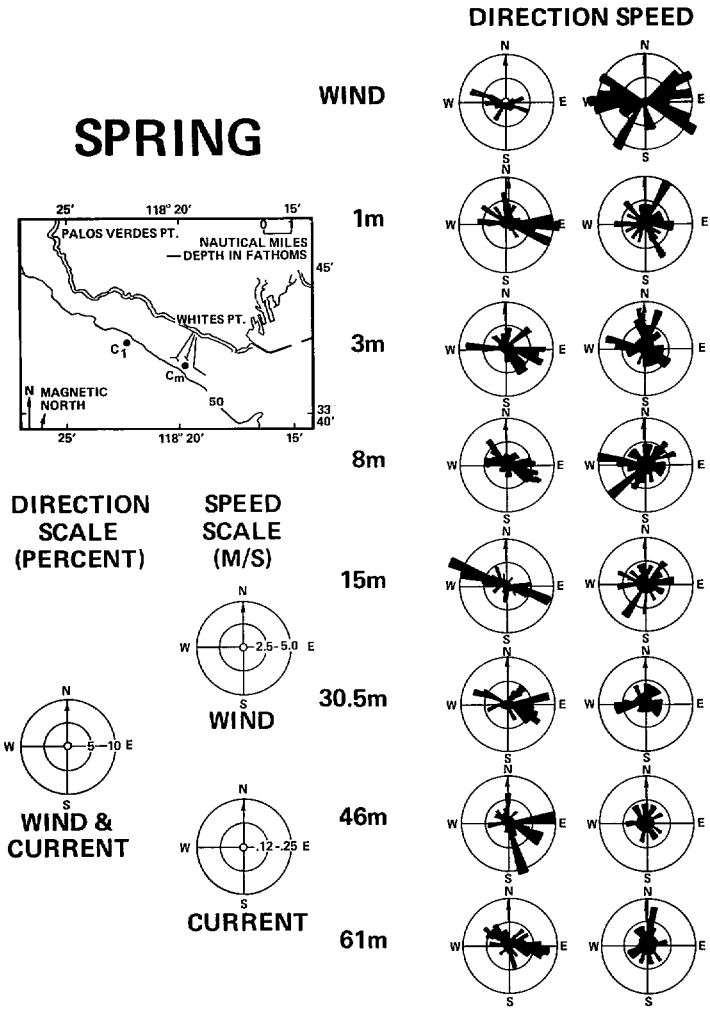

Figure 3. Summary of Wind and Current Directions and Strengths off Palos Verdes, Spring 1960-64.

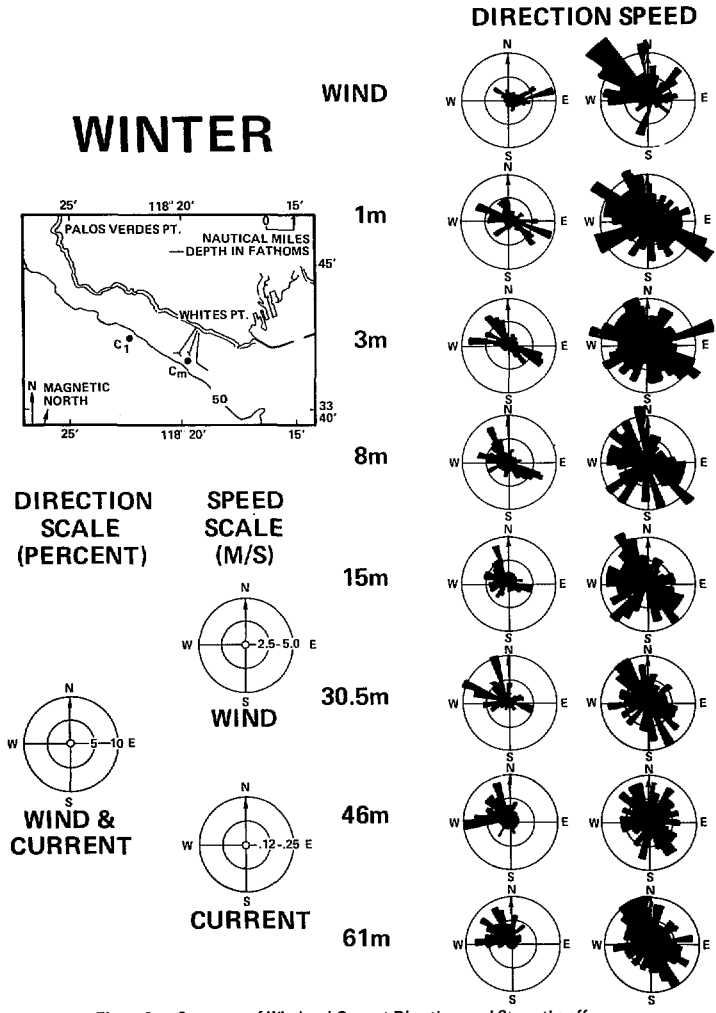

Figure 2. Summary of Wind and Current Directions and Strengths off Palos Verdes, Winter 1960-64.

Summer observations totaled 271, more than for any other season. Winds blew persistently from the west-northwest (Figure 4). The currents at 1 and 3 m were also directed from northeast to south-southeast. A tendency for currents to flow towards the northwest as well as east to south-southeast appeared at 15 m; the currents at 30.5, 46 and 61 m retained some bimodality, but the prevalent direction was towards the northwest.

Autumn data were similar to those taken during the summer, except that the shear below 15 m was weaker, and the predominance of currents toward the northwest below 46 m was weaker.

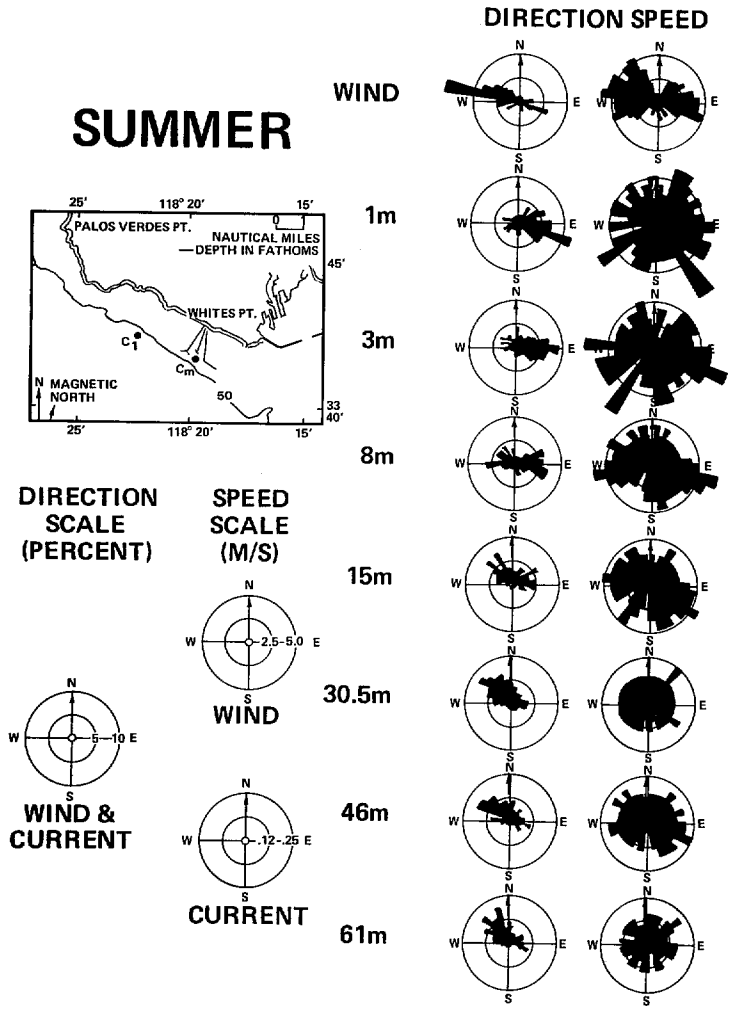

Figure 4. Summary of Wind and Current Directions and Strengths off Palos Verdes, Summer 1960-64.

Speed

Mean speed in each 10° sector is also shown in Figures 2 through 4. In addition, wind speed and current speed at each depth are given by season in Table 2. The mean winds were weak in all seasons, probably because of the understandable bias of the survey towards days of good weather. The tendency of onshore winds to increase in the summer is reflected in the persistence of winds blowing towards the east (Figure 4) and higher mean speeds. The mean winds observed in winter and spring are the most biased because these are generally the seasons of strongest storm winds.

Table 2

MEAN WIND AND CURRENT SPEEDS (M/SEC)

	Winter	Spring	Summer	Autumn
Wind	2.0	2.0	3.5	3.0
Current				
1 m	0.20	0.10	0.25	0.20
3 m	0.20	0.10	0.25	0.20
8 m	0.20	0.10	0.20	0.20
15 m	0.18	0.10	0.20	0.20
30.5 m	0.15	0.10	0.15	0.15
46 m	0.15	0.05	0.15	0.15
61 m	0.18	0.05	0.10	0.13

Weakest currents are recorded during the spring. This may be due to the maximum intensity of upwelling during the season. Increased vertical flow may suppress mean horizontal flow, although total flow may not change significantly from periods when horizontal flow predominates. The strongest currents at depths above 15 m were observed during the summer. Stronger winds during the surveys are believed to be the cause of this effect, which was most apparent near the surface at 1 and 3 m. Currents below 30 m showed the least seasonal change, except for the decrease during the spring.

A decrease of mean current speed with depth occurred in all seasons. It was most prominent during the summer when stability is highest due to density stratification; the decrease was very gradual and barely noticeable during the spring and winter when the water is poorly stratified and stability is low.

The highest mean speeds were generally associated with the predominant directions of current flow. Vector averages for all the data were also computed by season (Table 3). As the result of two opposing predominant directions of nearly equaly persistence and speeds, the net vector sum was very small. The vector average at each depth is an approximation of the mean seasonal

or annual transport at that level. The spring vector average showed very low speeds and little change in direction with depth. On the other hand, current shear was well developed during the summer and autumn, the seasons of highest stability. Mean current direction reversal occurred between 8 and 15 m during the summer and between 15 and 30.5 m during the autumn.

Table 3

MEAN WIND AND CURRENT VECTORS,
WHITES POINT, 1960-64

	Winter (N=130)	Spring (N=102)	Summer (N=271)	Autumn (N=213)	All Seasons (N=716)
WIND					
Speed (m/sec)	3	2	3.5	2	2
Direction (deg from)	290	230	270	240	260
CURRENT					
1 m					
Speed (m/sec)	0.05	0.05	0.1	0.05	0.05
Direction (deg toward)	300	040	090	040	070
3 m					
Speed (m/sec)	*	*	0.1	0.05	0.05
Direction (deg toward)	290	090	100	070	090
8 m					
Speed (m/sec)	0.05	*	0.05	0.05	0.05
Direction (deg toward)	290	080	090	040	060
15 m					
Speed (m/sec)	0.05	*	0.05	0.05	*
Direction (deg toward)	290	030	300	010	320
30.5 m					
Speed (m/sec)	0.05	*	0.05	0.05	0.05
Direction (deg toward)	300	060	290	280	290
46 m					
Speed (m/sec)	0.05	*	0.05	*	0.05
Direction (deg toward)	290	080	310	290	300
61 m					
Speed (m/sec)	0.05	*	0.05	*	0.05
Direction (deg toward)	290	100	310	300	300

* Speed less than 0.05 m/sec

SCCWRP-LACOSAN Surveys, 1972

The joint SCCWRP-Los Angeles County current data measurement program conducted in 1972 used a refined method of measurement that permits closer examination of currents measured continuously over periods of time ranging from a few hours to a few days. This method was used in the County's monthly monitoring cruises from February through September.

In the new procedure, pairs of Savonius rotor current meters were moored to a subsurface buoy at a station designated CM (see insert map, Figure 2) about halfway on a line between

the 90- and 120-inch diffusers off White's Point. One meter was situated in the upper part of the water column, above 23 m; the other was placed below the thermocline at a depth greater than 27 m. Data were averaged over 30-minute intervals. Results of the two surveys during March and April 1972 are shown in Figures 5 and 6. The data are shown as vector addition diagrams that is, vectors for each 1/2-hour average are joined. The current plat resembles a trajectory, and becomes one if currents over the surrounding area are representable by measurements at the mooring location.

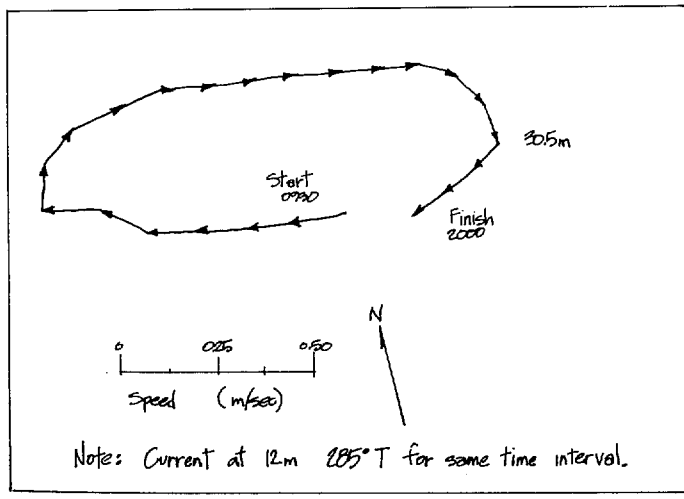

Figure 5. Current on 13 March 1972 at Station CM off Palos Verdes. Time between arrow points = 1/2 hour.

The measurements on 13 March showed a steady current at 12 m toward the west-northwest and a distinct rotary motion in the form of an ellipse, with the long axis roughly parallel to the coast at 30.5 m. The wind was light and variable, with speeds less than 2 m/sec from the east and northeast.

Two sets of data were taken during April, the first in support of a survey of phytoplankton and nutrient relationship study by University of Washington scientists on the R/V THOMAS G. THOMPSON and the second in support of the monthly monitoring cruise. Only results of the first survey are shown in Figure 6.

In the survey of 3-5 April, both current meters recorded a northerly flow, upon which changes to the east or west were periodically superimposed. In the absence of strong winds, these results are tentatively interpreted as showing evidence of a persistent residual flow upon which tidal currents are superimposed.

The relative wealth of data from the White's Point area adds greatly to a reasonable understanding of mean annual or seasonal flow. Such means may be misleading, however, if applied over shorter periods of time. Obviously much more work remains to be done, especially during periods of rough weather, but the prediction of currents on any given day or week will undoubtedly

remain only probablistic for many future years.

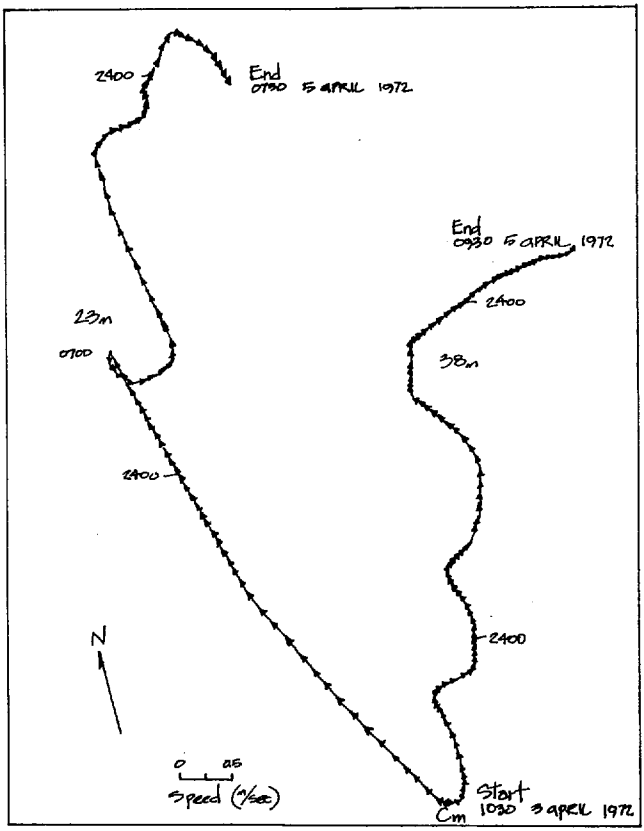

Figure 6. Current at Station CM off Palos Verdes on 3-5 April 1972. Time between arrow points = 1/2 hour.

Comparison with Other Areas

These results are similar to those found in an analysis of currents in the Orange County area. This is especially interesting in view of the fact that data were taken by different methods; that off the Palos Verdes Peninsula with Savonius rotor current meters, and that off Orange County with drogues. The preferred directions were again west-northwest and east-southeast. Above 8 m, the component most nearly parallel to the prevailing winds (towards the east-southeast) was somewhat more persistent; currents at 30.5 m and below showed a definite tendency to flow towards the northwest. At 15 m, intermediate conditions exist. This sampling location was apparently in a transition layer: possibly, it is at times in the wind-stirred layer and at other times is below this layer, depending on wind velocity and water stability. Currents at the deeper stations off Orange County had higher sp eds than at locations closer to shore in shoaler water.

Although the data obtained from individual current measuring surveys often appear to be inconsistent and difficult to understand, the total data from Point Dume to San Diego present a suprisingly consistent picture of the mean currents in the area. These data have been taken using drift cards, drift poles, and various types of drogues and current meters with a wide assortment of techniques; yet, there is consistency in the general picture they present.

Surface currents tend to follow the wind when it is blowing; otherwise, they appear to be dominated by the general patterns generated by mean winds and the offshore geostrophic circulation. Subsurface currents show a close relationship with the tides, except possibly when strong winds were blowing for more than a few hours and stability was low. It should be noted that much of the data that have been collected have, for obvious reasons, been taken during periods of relatively light winds. Consequently, many of the reported data are necessarily biased towards conditions of low wind velocity. During times of weak winds or weak tidal currents, residual currents apparently related to the offshore circulation system may dominate the flow at all depths on the shelf. In general, the strongest and most persistent currents are parallel to the coast. The greater prevalence of currents towards the east-southeast appears wherever more than a few measurements have been made; except off the Palos Verdes Peninsula. However, flow to the north-northwest is only 10 to 15 percent less persistent usually than currents in the east-southeast direction. It should also be noted that this flow reversal occurs quite frequently and is usually related to the diurnal or semidiurnal tide. Although the net advective transport along and across the shelf may consequently be quite small, the large variations of the current speed and direction in time and space act to greatly increase the rate of dispersion of materials over that which would result from ordinary turbulent diffusion in a steady mean flow. This shear-induced dispersion effectively acts to transport materials along and across the shelf.

In general, the surface currents have a greater velocity than those below, say, 15 to 20 m. The differences between surface and subsurface currents are most pronounced during summer, when the stability is the highest and stratification is most pronounced.

Currents and Pollutant Distribution

Several lines of evidence show that pollutant distribution in the Palos Verdes Peninsula is compatible with long-term characteristics of measured currents below the thermocline.

1. The distribution of heavy metals in the bottom sediments, exemplified by copper (Cu) in Figure 7 is elongated parallel to the coastline and the bottom contours. The elliptical contours of copper concentration in the sediments show a northwest-southeast orientation, asymmentrical about the outfall area, and elongated toward the northwest.

2. Species diversity among benthic polychaetes molluscs shows a similar distribution with an asymmetrical orientation of the region of low species diversity toward the northwest. Four different diversity indes - Gleason Richness, Shannon-Weaver, Scaled Shannon-Weaver, and Scaled Standard Deviation Diversity - all show low values for polychaete species off Palos Verdes asymmetrically distributed towards the northwest with respect to the outfall area. In addition, two species of polychaetes considered to be indicators of conditions of envirnmental stress, *Capitella capitata* and *Stauronereis rudolphi* dominate this area of low diversity index, and their distribution shows a very

similar orientation skewed to the northwest with respect to the outfall area, for example, (Figure 8).

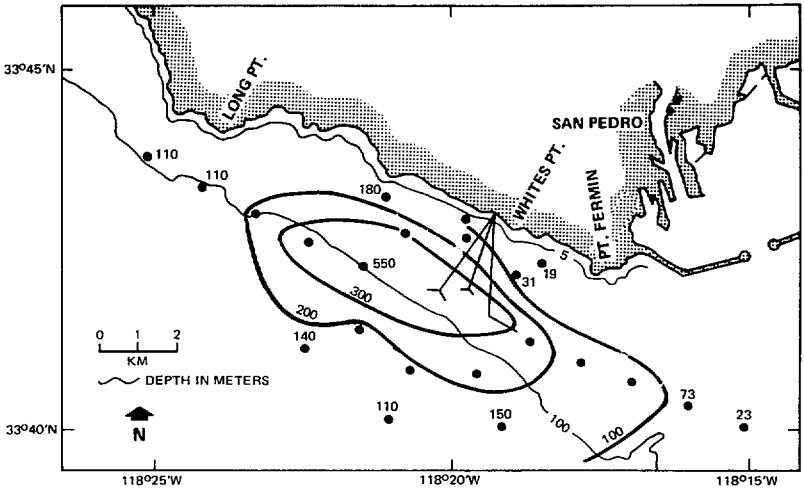

Figure 7. Copper Concentrations (mg/dry kg) in Surface Sediments Around the Whites Point Outfall System (Phleger Cores, May 1970).

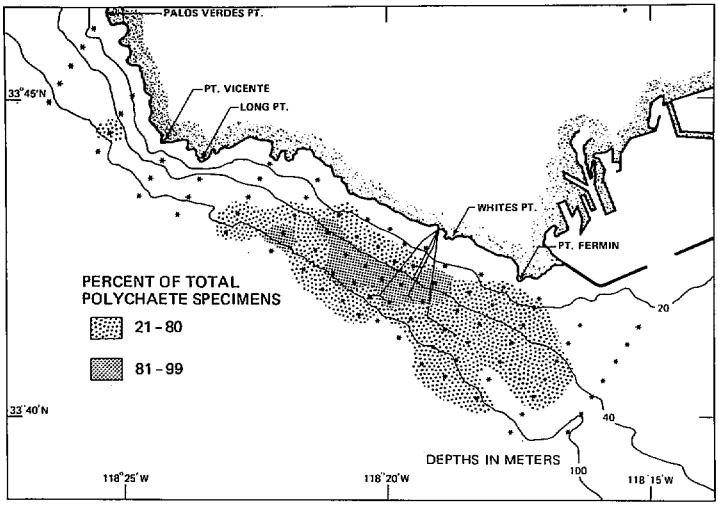

Figure 8. Relative Abundance of Two Species Within the Polychaete Communities Off Palos Verdes, July 1971.

3. A zone of sediment with a flack surface, commonly bearing a heavy odor of hydrogen sulphide exhibits a similar distribution with respect to the outfall system (Figure 9). This zone of black sediment corresponds very closely with the C. capitata and S. rudolphi zones.

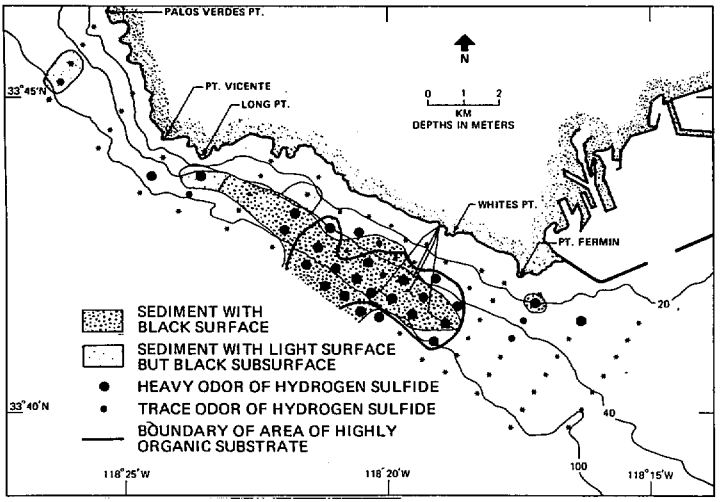

Figure 9. Results of Qualitative Analyses of Sediments Off Palos Verdes, July 1971. Organic Substrate, Hydrogen Sulfide, and Blackened Sediments

4. The occurrence of fin erosion in small dover sole exceeds 10 per cent in a zone off the Palos Verdes Peninsula, asymmetrically distributed about the outfall in a pattern overlapping those referred to above.

5. Ammonia concentration, clearly derived from wastewaters are highest downcurrent from the outfall system. Concentrations as high as 150 gat./L have been measured at distances up to 4 n. mi. from the diffusers consistently in or below the thermocline. High ammonia concentration is associated with a heavy concentration of particulate material and a low oxygen concentration in a turbid layer ranging from one to five meters thick. A more typical example is Figure 10, showing temperature, relative transparency, ammonia, oxygen, and coliform bacteria profiles at Station B8, southeast of the outfall system, or 23 February 1972. At the time the station was occupied, the subsurface current was southwest.

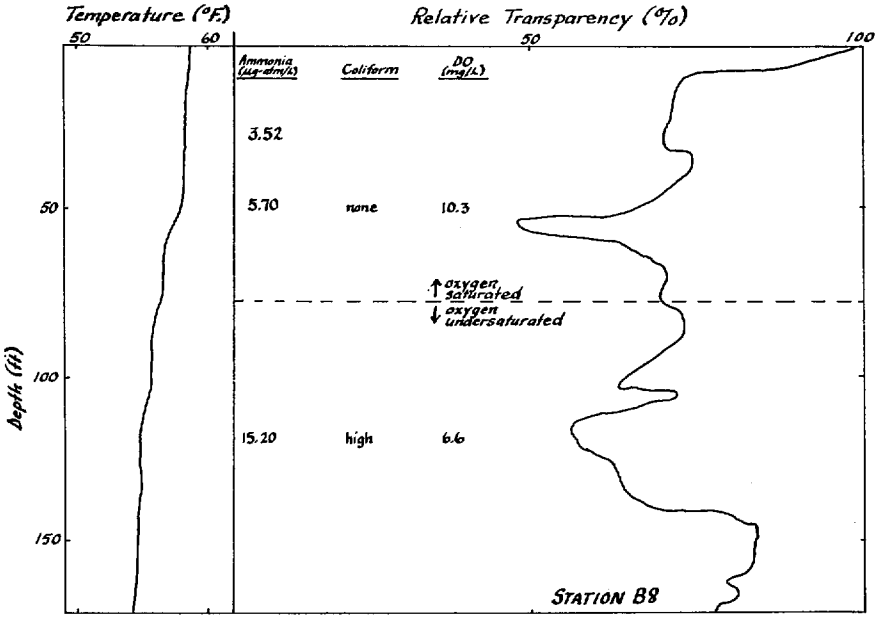

Figure 10. An example of the turbid layer pattern (transparency, temperature, and ammonia, dissolved oxygen, and coliform content) at a station approximately 1 mi. SW of the Whites Point outfalls, 23 February 1972.

CURRENTS IN SUBMARINE CANYONS

The shlef off California and Baja California is indented by many submarine canyons. Some, like the Redondo, and Scripps-La Jolla are quite large, extend within less than a kilometer of the shoreline, and discharge far offshore into basins or troughs many hundreds of meters deep. These features are natural "short cuts" for the transport of wastewaters across the shelf into deeper water; yet only one small canyon, Santa Monica, has been used for this purpose. The sludge-line for the Hyperion treatment plant discharges into the head of Santa Monica Submarine Canyon, about 7 nautical miles (11.3 km.) from the shoreline.

We are indebted to a marine geologist, Francis P. Shepard, for most of the pitifully few current measurements in these submarine features. Shepard and Revelle (1939) began with measurements in La Jolla Canyon almost 35 years ago; Shepard and Marshall resumed the program after a long lapse of time about 1968. In 41 or 45 sets of measurements, Shepard and Marshall have recorded higher velocities and longer periods of flow donw-canyon as compared to up-canyon. Net transport is dominantly down-canyone, a significant result from the viewpoint of waste discharge.

LITTORAL CURRENTS

Littoral currents are defined as those found in the coastal waters, immediately adjacent to the shoreline. They are responses to waves breaking on the shore and the backwater from those waves, as well as the topography in that restricted zone.

They are an effective factor in beach and nearshore sediment erosion, deposition, and transportation. Some of the old outfalls were near the seaward boundary of the zone affected by waves and littoral currents, but all the present larger and most of the smaller ocean outfalls are now located in deeper water farther offshore.

The momentum of a wave breaking at an angle with the beach has a component along the beach parallel to the direction of wave propagation. This generates longshore currents roughly parallel to the beach inside the breaker zone. These longshore currents ultimately converge, resulting in the seaward return of water through the breaker zone in the form of rip currents. An offshore movement roughly parallel to shore develops from the expanding head of the rip current. All these components described above constitute the nearshore circulation system.

A continuous interchange between offshore surface waters and the surf zone is maintained by the system. It is important in waste discharge because floatables such as grease, oil, and other materials which have surfaced from an ocean outfall are easily introduced into the surf zone by breaking waves. Piled up by the swash on the beach, they may not be picked up and returned through rip currents, and thus constitute unsightly and highly undesirable evidence of pollution.

Velocities in the littoral system may be very high when high waves are hurled against the shoreline. Rip currents with velocities exceeding 150 cm/sec (over 3 knots) and longshore currents exceeding 250 cm/sec (5 knots) have been measured.

SUMMARY AND CONCLUSIONS

Currents in the water off Southern California are principally due to geostrophic flow, wind stress on the sea surface, and tides. On the shelf complicated currents due to irregular topography, runoff, internal waves, large low salinity outfalls and other phenomena are superimposed. In the zone close to shore littoral currents are generated as the result of the breaking of waves against the shoreline.

On the shelf currents are strongest off headlands and promontories and weakest in embayments. A study of four years off the Palos Verdes Peninsula, site of the L. A. County Sanitation District outfall system, shows that currents vary in depth in both speed and direction. They are dominated by wind-driven currents above the thermocline; below the thermocline, the motion appears to be principally due to tidal forces and the currents are oriented along a northwest-southeast axis, parallel to the coast. The predominance of a resultant toward the northwest is reflected in the distribution of black, H_2S-rich sediments, poorly diversified bottom faunas dominated by species characteristic of stressed environments, and possible a higher incidence of disease among some demersal fish.

Currents in submarine canyons tend to flow down-canyon into offshore basins and troughs significantly more often and with higher speeds than those flowing up-canyon towards the shore. This suggests that they may be more attractive for waste disposal than has been previously suspected.

The data base for currents is pitifully small. Considerable effort should be expended towards improved knowledge of currents throughout the area.

Especially needed are:

1. Long continuous time series at stations spaced across the shelf and into the basins. These transects should

extend from headlands and through embayments.

2. Considerably more current measurements in submarine canyons.

3. A research program to identify the relative importance of predictable and measureable factors generating and affecting currents is desirable, so that a prediction model can be developed for forecasting.

4. A data bank for current and other oceanographic data should be established and maintained.

* * * * * *

SOME FEATURES OF THE CALIFORNIA COASTAL ATMOSPHERE

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Ocean Influence

At sea, the ocean exerts a dominating influence on the overlying atmosphere. This influence is exerted through the sea surface temperature which largely determines both the air temperature and its moisture content. Incoming radiation from the sun is at short wave lengths, and most of it penetrates the atmosphere and is absorbed in the upper layers of the ocean. Since the specific heat of sea water is several thousand times that of air, the incoming heat may be stored in the ocean and rationed off to the atmosphere over long periods of time (months). The most typical interchange between the air and the ocean on a global basis is heating from below.

Adiabatic Lapse Rates

Over most of the sea, the surface air temperature is near that of the sea surface and the relative humidity approximates 85%. Because there usually is heating from below the air usually rises. In the process of rising it expands and this results in a cooling of approximately 1°C per 100 meters of altitude up to the level where the air becomes saturated. At this level condensation of moisture begins. Condensation releases heat and although further lifting brings about further cooling, it occurs at a slower rate. These rates of cooling for dry and saturated air are called respectively the dry adiabatic and the moist adiabatic lapse rates. It is through these processes associated with ascending air that primary features of the vertical structure of the marine atmosphere are established.

Deviations from Adiabatic Lapse Rates

Changes in the type of marine atmosphere created by heating from below may be brought about in several ways. One is by the inflow of air from adjacent continental areas having different characteristics. Another is by large scale sinking or subsidence of the air mass, and a third by formation and movement of storm systems.

Along the California coast differences between the observed atmospheric features and the more common adiabatic marine atmosphere are largely related to the so-called Pacific anticyclone and its movements. The Pacific anticycone is an area of high atmospheric pressure some 1,000 or more miles in diameter usually centered between the mid-California coast and Hawaii. The winds flow clockwise around such an area in the northern hemisphere and this leads to northwesterly winds off much of the California

coast. These northwesterly winds exert a stress upon the sea surface which, in the presence of the earth's rotation, produces an offshore flow of warm surface water and leads to the exposure of cold water along much of the coastline.

Three Types of Southern California Coastal Weather

The Pacific anticyclone may vary in intensity and position and, as a result, the California coastal atmosphere may be considered to have three primary regimes. Two of these are related to vertical movements of the atmosphere (subsidence or sinking, and lifting). In subsidence or sinking there is warming and the air cannot remain saturated. It thus warms up at the dry adiabatic rate as it descends (1°C per 100 m) and the relative humidity falls rapidly as a consequence. In the southeasterly portion of the Pacific anticyclone the California coastline is often in an area of general subsidence which leads to such warming of the descending air and to the consequent establishment of an atmospheric inversion. It is this inversion which is associated with the typical summer stratus on the California coast. However, the most marked subsidence feature tends to occur in the fall months when the eastern portion of the Pacific anticyclone moves eastward over the coast and produces the strong offshore winds known in southern California as Santa Anas, see Figure 1. In the presence of these winds the air moves from mountain elevations of 4 to 5,000 feet down to the coast and thus the winds are associated with an adiabatic warming of 20 to 25°F. Thus the air arriving at the coast is much warmer than the sea and very dry. The atmospheric inversion is brough to the surface, the air is clear, and the visibility unusually good.

The second category of atmospheric characteristics occurs in relation to rising or lifting of the air mass. This occurs when the wind is onshore, Such winds bring moist cool air from the sea which is lifted and cooled as it moves up slope. These situations are most common in the spring and early summer and as category one type weather moves toward category two there are associated periods of dense fogs and low stratus. The third primary regime occurs when the Pacific anticyclone is moved aside or broken up by passing frontal systems. The changes which occur in the marine atmosphere at such times are more related to the large scale horizontal movements of air mass than to the local lifting and sinking process. Changes of this horizontal movement or frontal type of course are more common in mid-winter. A good reference on these three types of southern California coastal weather is "Point Mugu Forecasters Handbook, 1972."

In all three types of weather the influence of the local upwelled water and the sea breeze are superimposed. The sea breeze, due to the greater heat of land during the day, increases the onshore flow component during these hours and decreases it during the very early morning hours.

Fog As An Air Pollution Related Coastal Phenomena

As one example demonstrating the interaction of the various above factors on the marine atmosphere in this locality, the formation of coastal fog will be discussed. A more complete analysis is available in previous articles by the author (Leipper 1948, 1968).

In fog situations vertical air movement through the inversion layer is greatly restricted so that pollutants introduced at the surface tend to remain in the lower air layers. Thus fog forecasting becomes useful in understanding, predicting, and controlling atmospheric pollution.

It appears that an initial condition required for the development of a fog bank is the presence over the southern California coast of air which is extremely warm and dry from the near-surface and upward. Our data indicated that the most extreme heating occurs at the lower levels as the result of down-slope motion. This happens when the Pacific anticyclone pushes inland north of Los Angeles and the Santa Ana winds blow toward San Diego and Los Angeles from the east, warming adiabatically in the 4,000-ft descent from the mountains. In such situations there should be extremely good visibility and no fog or smog inland along the coast. The synoptic pattern which precedes sharp fog banks at San Diego and Los Angeles is of the type shown in Fig.1.

The fog situation begins to develop when the dry air, adiabatically warmed, becomes stationary over the sea. It soon becomes nearly saturated with moisture in a thin layer at the surface. The great overall stability holds the moisture near the surface. When the east winds die down and the normal northwesterly regime begins, fog is created in the thin surface layer at sea as the warm, nearly saturated air moves over the cold tongue of the surface water which is known to exist offshore. Thus, fog is created by cooling from below. However, once the white cloud is formed, so much incoming radiation is reflected from the top and so much heat is radiated by the cloud itself that observations show the fog layer cooling to a temperature lower than that of any ocean surface in the vicinity.

Once the fog is formed at sea and the fog layer becomes cooler than the ocean surface due to radiation, there is heating from below and cooling continues from the top of the fog layer. This creates a super-adiabatic layer. The mixing which occurs within this layer causes the fog layer to increase gradually in depth from day to day. When the normal sea breeze regime returns, the strongest onshore winds occur at the time of day when the sea breeze blows. Late afternoon is thus the most probable time when any new fog bank existing offshore would be blown towards shore.

On the first day that the shallow fog bank moves toward the coast, it is quite likely to break up at the coast. The heat of the land is sufficient to dissipate a shallow fog and the associated shallow inversion before it can travel far.

Figure 2 shows schematically a development of such a fog situation in southern California. In Figure 2-1 the winds blowing off the land carry warm air out to sea over cool and warm water areas. Influenced by the underlying sea, the very lowest air layers become nearly saturated at air temperatures near those of the water. In Figure 2-2 the east winds have stopped, the sea breezes have begun and some of the warmer moist air is cooled to fog formation when it moves back over the tongue of cool water. In Figure 2-3, in the later afternoon, the thin fog bank is carried towards shore by the returning sea breeze but is dissipated upward by the heat of the land when it reaches the coast. The inversion is broken and the moist layer is dispersed. In this situation moisture does not move inland. When the sea breeze stops that day, the fog bank retreats toward the sea, as in Figure 2-4.

As time goes on, the unstable fog layer (with a strong inversion above it) increases in thickness due to convection within it and is again carried towards shore with the afternoon sea breeze. Eventually the fog reaches a thickness such that is cannot be dissipated at the coast but may move inland. Figure 2-5, with the inversion unbroken, shows such a situation. At this stage, there may be enough heating from below to evaporate the fog particles but not enough to break the inversion.

With continued convection throughout the fog layer as days go by, the layer is thickened further and it eventually reaches a thickness beyond which there is insufficient cooling to create a full layer of fog. This thickness is apparently about 1,300 ft. at San Diego. At greater thicknesses there is stratus overhead, but a layer with no fog near the ground as shown schematically in Figure 2-6. Of course, the pollutants may remain in lowest levels of the marine layer even though the fog has not formed there.

This fog development sequence seems to take place frequently in winter. With the approach of summer, however, a fog situation may develop and move through various stages to the stage illustrated in Figure 2-6. Then, this stage may persist for several weeks or more at a time, giving the steady stratus overcast which is common along the west coast.

The time changes in the upper air temperatures are indicated for a typical fog period in Figure 3. The sounding for 23 September below 800 mb is the common nearly adiabatic temperature structure with the surface air temperature equal to the sea surface temperature. From 800 and 950 mb, 30 September through 2 October, the air warms steadily as winds blow with easterly components. At the same time the surface layer air temperatures decrease. Both changes strengthen the inversion and improve the odds that fog or stratus will occur. Heavy smog occurred in Pasadena on the last day of the sequence in Figure 3. The definition of indices useful in forecasting the development of fog situations such as reviewed here may be found in Leipper, 1948.

Summary

Air pollution along the California coast is controlled by the same atmospheric events as fog. The coastal air temperature structure may be considered as consisting of deviations from the common adiabatic lapse rates found over the open sea. The most important deviations are related to arrival of descending air from inland and to unusual cooling of the surface layers in fog. More data are needed to fully describe the interaction of all of the factors involved. However, some sequences of events useful in forecasting can be described.

* * * * * * * *

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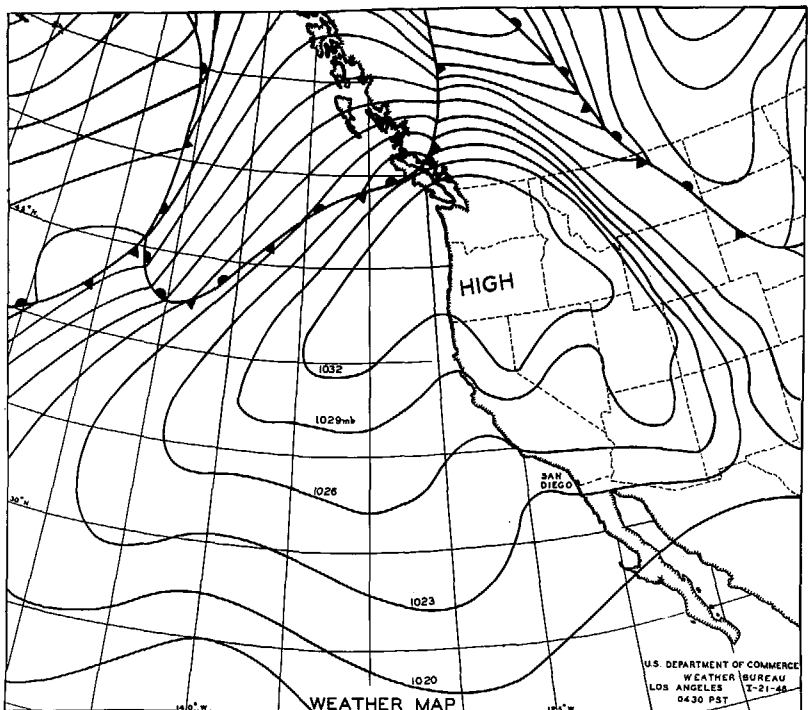

Figure 1. Weather map showing the type of synoptic situation which usually precedes winter fog in southern California.

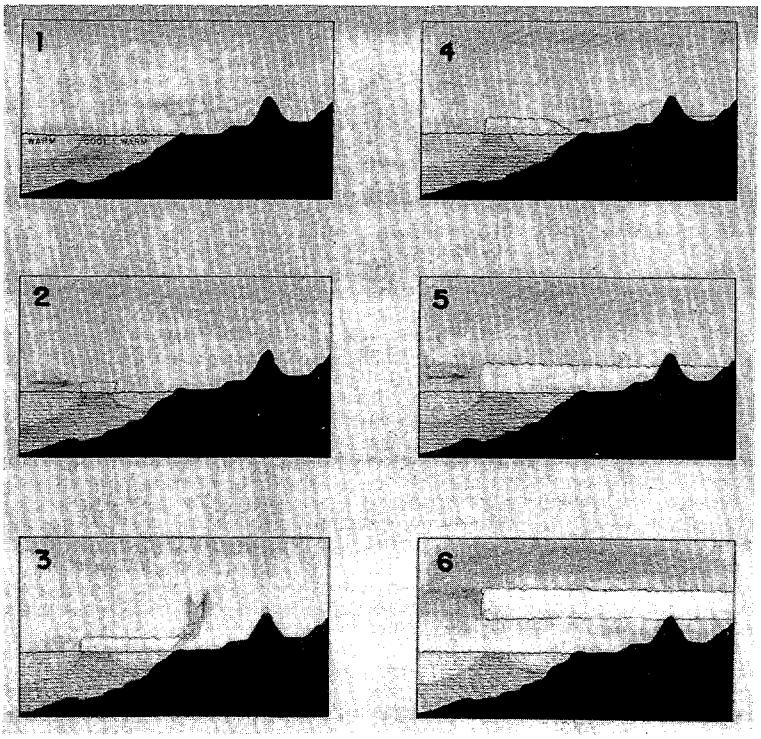

Figure 2. Six steps illustrating schematically the development of fog along the southern California coast.

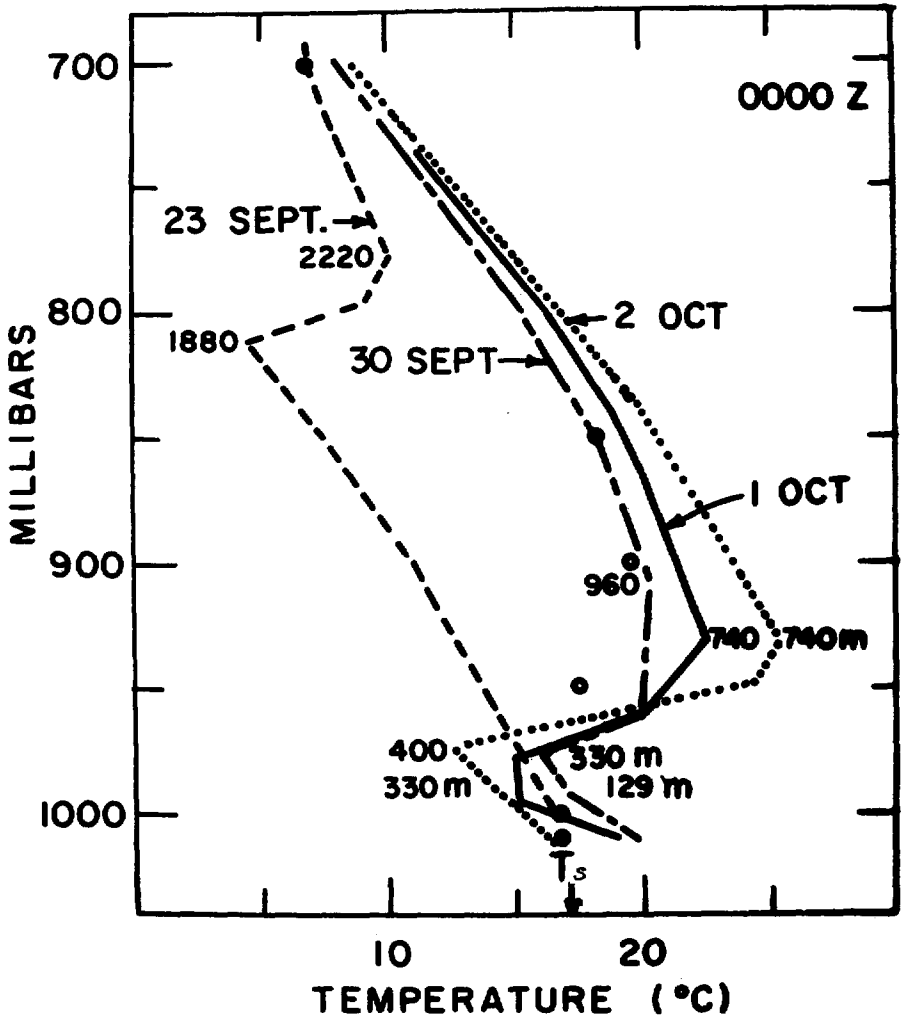

Figure 3. Comparison of atmospheric temperature structures on four selected days, Santa Monica, California. Open circles are 7-yr averages 1958-64. T_s is the sea surface temperature.

LEAD POLLUTION: AN ASSESSMENT FOR THE LOS ANGELES COASTAL ZONE

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Mr. Chairman, MTS members and guests!

Our first speaker of this Symposium Section, Dr. Carsola, has described the ocean currents along the California coast which carry and distribute pollutants that enter the ocean by precipitation or by runoff. Dr. Leipper, our second speaker, has discussed Southern California meteorological conditions that greatly influence the accumulation and dispersion of aerosols and gaseous pollutants.

This report deals specifically with a chemical pollutant, viz. lead aerosols, which is one of the major environmental hazards. In the next fifteen minutes, I shall discuss the source of lead aerosols in the Los Angeles basin and their passage through the air and water to final burial in the coastal sediments.

Source of Lead Aerosols

The principal source of lead pollutants in the environment is the burning of anti-knock lead alkyl additives in gasoline. Being an automotive-oriented megalopolis, the Los Angeles basin has a serious problem of lead pollution; its atmospheric lead contents often far surpass both limits set by the U.S. Environmental Protection Agency (2.0 $\mu g/M^3$) and the State of California (1.5 $\mu g/M^3$). To view the nation as an entity, in recent years some 280,000 tons of lead in the additives are combusted annually. In 1972, gasoline sales in California alone amounted to ten billion gallons. Assuming an average lead content of 2.1 grams per gallon and that 41% of California automobiles operate within the Los Angeles basin, the consumption of lead as additives totaled 8,600 tons annually. With an average of 75% of the lead additives in gasoline emitted as automotive exhaust, the annual output of lead emptied into Los Angeles ambient air is 6,450 tons.

Fate of Atmospheric Lead

What happens to the lead aerosols in the ambient air? According to Stokes' Law, the particle sizes of lead aerosols play an important role in their gravitational settling from the atmosphere.

For the Los Angeles basin, Huntzicker, Friedlander and Davidson (1) have estimated than an annual amount of 3,600 tons of lead aerosols, whose mean diameters are greater than several microns, are deposited along the vicinity of roadways. Lead aerosols of small particle size precipitate out as dustfalls onto the entire Los Angeles basin. By assigning a surface area of the Los Angeles basin as 4,430 km^2, it receives an annual lead fallout of 730 tons. The residence time for sub-micron size lead aerosols and lead alkyl vapour in the atmosphere is several days; thereby, some 2,000 tons of these leads are carried out of the Los Angeles basin by air currents and deposited elsewhere.

Portions of lead aerosols fall directly into the coastal ocean water. Using lead fallout data for various islands off Los Angeles obtained by Hidy, et al. (2) and Rabinowitz (3), Huntzicker, Friedlander and Davidson (1) calculated that some 70 tons of lead settle directly into the ocean between the Santa Catalina Island and the Los Angeles coastline which has an area of 4,400 km^2. Based on the lead content of rainwater (4), an estimated amount of 30 tons of lead aerosols are washed out annually from the atmosphere into the same coastal ocean during rainfall.

Input of Lead to Coastal Ocean

There are many ways for the lead pollutants to reach the coastal ocean. I have mentioned the direct lead aerosol fallout (70 tons per year) and rain washout (30 tons per year) for the Los Angeles coastal water.

Municipal sewage effluent discharges deliver a significant amount of lead to the Los Angeles coastal ocean. Huntzicker, Friedlander and Davidson (1) estimated that about 234 tons of lead per year were discharged from the Los Angeles City and County sewage treatment plants. However, the lead in sewage effluent is deposited in the immediate vicinity of the outfalls (5).

Rainfall over the land carries the fallout lead, which has been accumulating on the ground surface, as runoff into the ocean through storm drains. Chemical data for storm runoff are few and spotty. Based on data provided by Young (6) of the Southern California Coastal Water Research Project, Huntzicker, Friedlander and Davidson (1) computed that some 160 tons of lead per year are washed out from the Los Angeles basin during rainfall and discharged into the ocean as storm runoff, and additional ten tons of lead runoff during the non-rainy times.

Lead Pollutants in Coastal Sediments

The marine sediments provide chronological records of lead pollutants input to the coastal oceans. Since the sedimentation rates vary among various locations along the California coast, the fluxes of man-generated lead in the sediments are often more meaningful than the absolute concentrations.

Sediment cores from three oceanic basins (San Pedro, Santa Barbara and Santa Monica) near Los Angeles have been studied (5). These sediments are anoxic and thus relatively free from biological disturbance. A similar anoxic deposit in the Soledad Basin (25°14'N; 112°41'W) off the coast of Baja California was used as a control. A fifth core was taken off the Los Angeles County sewage outfall at Whites Point.

Figure 1 shows the lead values given both as concentration on 110°C dry weight basis and as the lead/aluminum ratios. The aluminum was used as a normalization factor that reasonably represents a measure of the detrital minerals that are assumed to have had a uniform input over the past century. In general, both the lead values and lead/aluminum ratios of these three ocean basins off the coast of Los Angeles give similar trends as a function of depth in the sediments. The exceptions are the surface sediments which contain high water and salt contents because these sediments are subject to less compaction than the deeper deposits.

The lead accumulation rates began to increase in the basins in the 1940's. The much higher sedimentation rate in the Santa Barbara Basin accounts for its lesser slope. The lead concentration in the Soledad Basin is essentially constant with depth and averaged to be 8.5 ppm.

Surface values of the anthropogenic lead fluxes were obtained by subtracting the pre-pollution concentration of lead accumulated per year from the value computed from an extrapolation of the lead curve to surface depth. The anthropogenic fluxes of lead for the Santa Monica, San Pedro, and Santa Barbara Basins are 0.9, 1.7, and 2.1 micrograms per centimeter square per year compared to natural fluxes of 0.24, 0.26, and 1.0 $ug/cm^2/yr$, respectively.

Heavy metals such as lead are removed from waters within several kilometers of the input site to the marine environment. The extremely high lead concentration (averaged 390 ppm) in the Whites Point sewage outfall sediments reflect the discharge of domestic and industrial waste. The radiometric ages of the Whites Point sediments were indistinguishable from top to bottom, indicating that the deposition probably took place within the last few years.

Acknowledgment

I wish to thank Dr. J. J. Huntzicker of the California Institute of Technology for providing the Los Angeles lead aerosol data.

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Suggestions for Further Reading

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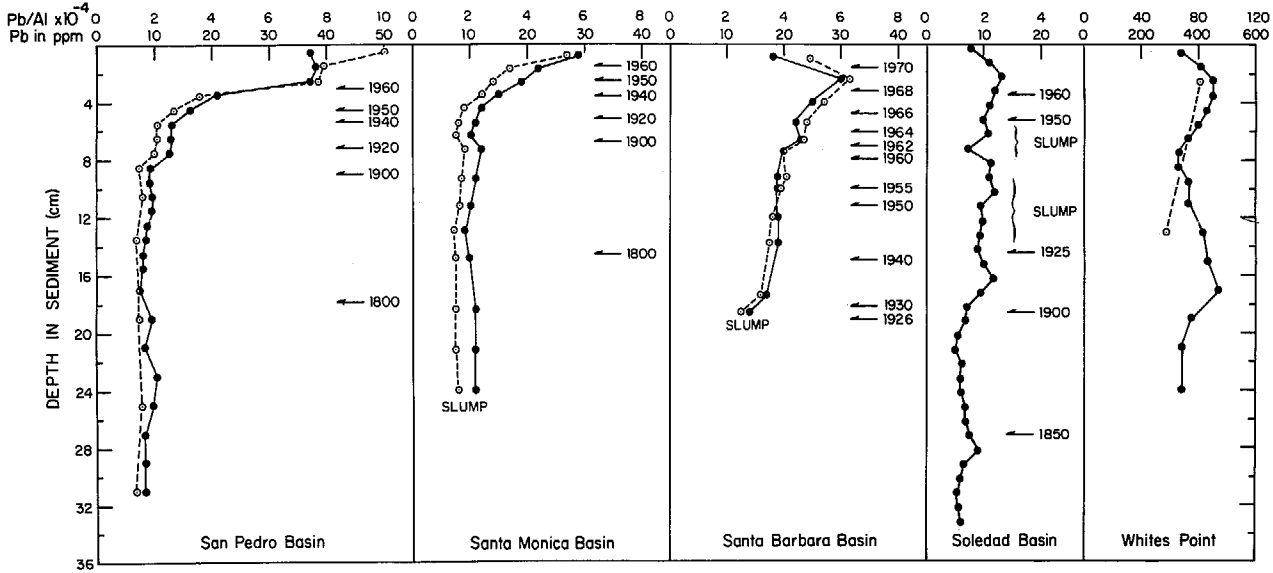

Figure 1. Lead concentrations in ppm (solid circles) and lead/aluminum ratios x 10^{-4} (open circles) from various sediments off Southern California coast.

CIVILIZATION AND THE COASTAL OCEAN

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There are a number of things we can talk about in terms of civilization along the coastal zone. We can look at it in terms of history and we can also look at it in terms of effect. I think that one of the major problems now in the coastal zone in terms of the focal point or complex, is the result of tremendous population, static population and also a concentration of people in a particular area.

The present system for dealing with these problems appear to be an adversary system where it affects the entire recreational, economical and policitcal portions of our coutry. Many of the problems related to specific areas of high concentration are common to say New York and the southern California area. What I'd like to do now is to look at some slides of a sewage affluent coming out primarely in the Santa Monica area and then look a little bit at solid waste dumps that were observed off the coast.

The reason for looking at sewage affluent is that there are a number of sources for contaminants or pollutants in the environment. One, as previous speakers have shown, from the atmosphere, are proponents coming in from the auto exhaust. We can have material coming in from sewage affluent and there can also be runoff from streams and agricultural applications. In the southern California area of Los Angeles, there are approximately 850 million gallons per day (MGD) of sewage that are dumped in the coastal waters.

One area I'd like to look at in particular is the Hyperian outfall in Santa Monica Bay and that outfall dumps 235 MGD of primary sewage, 100 MGD of secondary sewage and another additional 5 MGD of sludge.

Slide 1 is a general physigraph diagram of southern California border land. The continental areas are outlined in brown and the coastal islands are marked here. The northern channel island is marked.

Slide 2 shows locations of Santa Monica Bay. There is sewer affluent coming out here. There is a diffuser going out to the north and another to the south. Another line goes out to the upper end of the Santa Monica submarine canyon which discharges primarely sludge. There are a couple of short lines going in the nearshore area that are only used periodically for short periods of time.

Slide 3 measuring the distribution or diffusion of sewage in the offshore waters has been a very difficult task. A number of years ago it was related to dye diffusion studies and one of the problems has been with instrumentation to measure material on a real time basis within a water column. We've been using a transmisometer which has a light source at one end which travels to the other end and folds back for a one meter light path measuring at 470 microns. It has a 10 conductor cable and the percent transmission is transmitted through the cable to the deck for recording. It can also record temperatures and we also use an STD to measure salinity from which we get the density of the water.

Slide 4 is a plot of some work we did (Bob Brown and Marine Resources and USC) several years ago. To demonstrate,the green line represents percent transmission per meter, a high value represents very clear water and a low value represents turbid water. A value of zero is equivalent to about 6 mm of particular material per liter of water. Ninety eight percent would be proven to be extremely clear water. The pink line is density, a combination of temperature and salinity of water. Here we have the salinity outlined in yellow and we can see that at a depth of about 30 meters there is a tremendous fluctuation going on. Influx of fresh water coming out of the effluent pipe and a certain amount of mixing. One thing we don't have plotted on here is temperature, yet temperature is a very significant factor in controlling the distribution of particulate material within the water column. A temperature difference of about one tenth of a degree C is sufficient to hold up the suspended material on the top of it.

Slide 5. One study which we conducted in November of 1972 was to look at the distribution of the sewage coming out of the long diffuser here. There is an outfall at the north and one at the south. We ran a series of stations in a circular pattern around the outfall and just for purposes of orientation there is a circle here, a second circle and then a third here.

On the next series of slides I'd like to unfold circular patterns and show you distribution of turbulent material within the water column.

Slide 6 - If we look first of all at the inner circle in terms of direction this is out toward the west and this to the north. Each succeeding slide will be orientated the same way. We have a lobe at a depth of about 30 meters, of very turbid material. This is material that has come out of the northern "Y" of the diffuser. We get low values of transmission which means it is high turbidity and then there is a secondary lobe at the southern end of the diffuser.

Slide 7 - I'd like to point out that in this slide there is a lobe of clear water coming in from the west. This is the second circle now computing the same sort of pattern. We have again a higher turbidity at the north diffuser and then a lower turbidity at the southern "Y" of the diffuser. Some of this material is going down toward the west but there is also alot of clear water coming in here.

Slide 8 - we have a much larger pattern in the third circle out and we can see very clearly that we clear water and we believe this represents clear water that is coming up the Santa Monica canyon. I think I can take exception to one of Mr. Carsola's statements about dumping material in submarine canyons. I'm not convinced that the material is going down the canyon and in the Santa Monica canyon, I beleive the material may be going towards the northeast maybe ending somewhere around Malibu or off the slope in that area. In Redondo canyon the current

meter measurement by Shepard (we have been doing work there for the last couple of years) shows that movement is down, but there is a tremendous pumping action that is going on both up and down the canyon. We don't know exactly what is going on. Let's say sewage is dumped when the currents are going up canyon, there is a possibility that the material could be moved up.

Slide 9 - To give you a little bit different perspective I ran another survey, the first survey took approximately 13 hours to conduct and this one took an additional 12 hours. So all of the information presented on these slides were obtained roughly in a period of 24 hours. We are concentrating here on the southern part of the diffuser, the "Y" coming out here, and for orientating we have plotted values of turbidity going say from one up to five. But everything on the left hand side here will be on the left hand side of the next slide and everything over here on the right side of the next slide. All are orientated in terms of the sewer outfall. We can see two down movements. One is a movement up in here going from the southeast toward the northwest and we get a secondary movement going from the northwest down towards the southeast. So this turbid plume staying submerged and the diffuser was designed to do that. We have not seen sewage coming up and breaking through the surface during our surveys in the last three years. We have on the order of about 1500 stations out there for turbidity and we see this general direction. Now the bottom current measurements in the area indicate a velocity of about 3 to 5 centimeters per second towards the south. If it explans the movement of material towards the southeast, however, it does not explain movement of material towards the northwest or rather the northeast and there is a possibility that that is affected by the movement of material by water coming up the Santa Monica Canyon.

Slide 10 - This is a cross section of the years of turbidity or just to give you another outlook on it. The turbid lobes around the outfall area is a circular plot. We have also plotted the layer thickness of the turbid zone. The patterns that emerge out of here is kind of complex, alot of different lines. We tried to color this first of all to show the maximum turbidity. Look at the yellow, it represents a value of 40 which is the area of highest turbidity and they are lying in this direction going toward the northwest and the southeast and then extends out to areas here that are better than 20 to 30 %. The layer thickness also corresponds to this, in other words, the layer is a thin or closer to slope source and then the layers are getting much thicker going away from the source, but both of the lines in that direction, in other words northwest and southeast.

Slide 11 - This is a summarized report that was presented in Japan by Bob Brown and myself. Looking at the information that was accumulated, the survey that Bob Stevenson was involved in in Santa Monica Bay, 1955-56, this is the envolpe of value which they obtained prior to the pipe being out in that area. There is the suggestion that there is movement coming out of the canyon, that the sewage effluent being pumped out in there has affected the water movement slightly and the influx of material coming up the canyon may not have been present at the time prior to the construction, subsequently it was altered.

Slide 12 - I would just like to show a couple of photographs of solid waste material that was photographed in three dives in the Deep Star the summer of 1972. This is a photograph of some radio active material that was dumped. At this other side there was another 12 million barreles of oil mud dumped in 1966-70, and another additional 12,000 gallons of material was dumped in 1971. This dump site was selected on the basis of the information I was showing you where there is almost

no oxygen. Consequently there is no benthic forms to be affected there and other observations indicated almost no life. Our problem is we don't know what the affect is, if there is diffusion or the water column or if the material is transported out. It comes back to one of the things I pointed out, that we have done a fair amount of work offshore but there is still a tremendous amount of information necessary in order to define what the material is and to define its affect on marine organisms.

Slide 13 - In this slide we are looking at a solid waste dumping site of garbage, primarely from the foreign vessels off the south end of Catalina. In that area the currents are relatively strong. The bottom fauna is rather prolific, and we have a cardboard box. There are a lot of ophiurods crawling around the bottom, the bottom is very well stirred up. At about a depth of 2300 ft. the ground currents are relatively strong, one can see movement of fine grain material, you can see the alignment of the organisms with the current.

Slide 14 - Just an example of the material dumped down there. We saw no high concentrations of material in any one particular spot. The theory being that the material was not dumped in the primary target area or the currents scattered the material out and down.

Slide 15 - That is another kind of material that has been dumped down there.

Slide 16 - In the area primarely between Avalon and Newport these are the kinds of waste.

I would like to comment on some of these problems in this area and this is where I'm going to put my foot in my mouth because it seems to me that the problems we have coming along, are proliferating and are becoming more complex all the time. I think this is in direct relationship to the trend in population; and it is getting down to the point now where individuals or very small groups cannot make decisions on a local area without consideration of the effects on the very large population mass.

One solution that has been proposed for this is to get into coastal zone management. I've been thinking about this for some time and have come to the conclusion that the best use of the term coastal zone management is sort of a buzz word, because I can't figure out what people are trying to manage, unless they are trying to manage the people. It seems to me that the management is being advanced through legislation. The legislation is coming about without an understanding of the basis of pollution and the problems of the coastal area. In order to understand this, one usually needs scientific information and the needs to organize it, relating to some form, either a standing format or certainly be able to get it into a data bank and then be able to manipulate it. One of the ways of doing this is to formulate another model, model is another buzz word, but models can be very simple or they can be very complex. Certainly we should start looking at available information and use that information to direct our efforts in time and priority and be able to see the relationships between the physical instead of going out there and the biological things.

At the present time I really don't see that we are doing this. I think there have been a number of hangups and my impression is that people are sort of acting like a flock of chickens, throw out a grain and everyone is running around grabbing for the nearest kernel.

INFERENCES ON OCEAN ENVIRONMENTAL CHANGE IN THE SOUTHERN CALIFORNIA BIGHT

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ABSTRACT

Scientific investigations of ocean conditions prior to 1930 in the Southern California Bight were limited. Consequently, the search for data comparative to today's conditions is hampered by the dearth of information indicative of water quality and the character of the marine biota present in earlier years prior to the onset of major urban-industrial activity in the Los Angeles Basin and development of ocean outfall systems discharging primary-treated sewage wastewater. Previously unpublished commercial catch data for albacore tuna (Thunnus alalunga) in the Santa Catalina Channel and off Newport Beach and elsewhere inside the Channel Islands during the 1920's are presented as one more index of oceanic, "blue-water" conditions that once prevailed off southern California.

. . . . . .

In the past few years, a great deal of public discussion has occurred over the state of ocean conditions today, and how they compare with conditions in earlier times. In March of this year, a comprehensive three year study of the Southern California Bight concluded that"..there is no evidence to document that present (sewage) wastewater disposal practices have had any substantial adverse or irreversible effects on the general ecological characteristics or environmental quality of the Bight.. .." (SCCWRP, 1973).

On the other hand, Fay, 1973 presented substantial biological evidence to support his views that nearshore conditions had indeed deteriorated substantially. In virtually all instances evidence of ocean conditions prior to the 1940's is scattered and largely circumstantial; worse still, research quality data prior to 1930 are extremely scarce.

Today, I will offer one more bit of evidence relative to nearshore water conditions in the summer of 1920. The area under discussion will encompass the waters from Santa Monica Bay south to Santa Catalina Island, and thence southeastward to the shore off Oceanside.

The Pacific Coast albacore tuna fishery had its beginnings in Southern California when A.P. Halfbill experimented with canning of a small sample of fish in his Long Beach cannery in the summer of 1916. His test market of the "chicken of the sea" proved remarkably successful, and by 1920, a major fishery had

grown for albacore to meet the consumer demand. In 1920 an estimated 300 small boats fished the Southern California Bight by day from ports ranging from San Pedro and San Diego harbors. This paper summarizes a 9 day period from July 22 to 30, 1920, in which 234 tons of albacore were taken as close as 5 miles from the beach off Newport, San Juan (Capistrano) Beach, Oceanside and inside Catalina channel.[1]

Slide 1 - July 22, 1920. Approximately 25 boats working inside the catalina channel and spread over a 35 mile reach took 27 tons of albacore. The season had started on July 12 to the southwest of Catalina Island.

Slide 2 - July 23, 1920. More boats worked to the south end of Catalina and to within 6 miles of Laguna Beach. 14 tons reported.

Slide 3 - July 24, 1920. About 30 boats returned to the southeast corner of Catalina Island. 22 tons reported.

Slide 4 - July 25, 1920. Same fleet extended east to within 10 miles of San Juan. 15 tons reported.

Slide 5 - July 26, 1920. Fish appeared to scatter and boats operated as close as 10 miles S of Point Fermin and 6 miles S of Newport. 15 tons reported.

Slide 6 - July 27, 1920. Some boats found fish S and E of Santa Barbara Island, but the majority fished in major area to within 5 miles of the beach from Newport to 10 miles S of San Juan. Best day yet, 33 tons reported.

Slide 7 - July 28, 1920. A major fishery had developed from about 5 miles off Newport; a large concentration occurred about 4 miles off San Juan, but fish were found close to beach to within 6 miles of Oceanside and about 10 miles off Del Mar, just N of Pine Hill (now called Torrey Pines Bluff). Catch today, about 28 tons.

Slide 8 - July 29, 1920. Region of fishery had expanded considerably to between Catalina Island and Santa Barbara, to the NE tip of San Clemente and inshore from 6 miles off Newport to about 10 miles off Oceanside. Catch today, 42 tons.

Slide 9 - July 30, 1920. Fish schools had scattered, and boats ranged from W of Santa Barbara Island E to Oceanside and up to Newport. Catch today, 37 tons.

From these data, it can be concluded that the appearance of albacore tuna so close to the beach was more than just happenstance. In fact, this fishery continued to operate in the same general area through late August. Further, albacore tuna moved northward to an area 5 miles S of Point Dume and were found scattered between Anacapa, Santa Cruz and San Nicholas Islands well into September. The last recorded catch was taken September 27, 1920. The season total was between 8,500 to 9,000 tons.

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1 - These data are part of some unpublished holdings in the library of Dr. W. F. Thompson, who died in early 1966. The junior assistant working under Dr. Thompson at the time, and who also acheived experience later as a fishery oceanographer was Oscar Elton Sette who died last year. These plots were made personally by Elton Sette. These slide are color photos of the originals.

From what we know now about albacore tuna, ocean conditions for such a persistent nearshore fishery in 1920 (and also 1921, 1922) were probably as follows: water temperature ranged from 62-68 degrees F., with optimum at 64°F; water transparency - secchi disc depths greater than 15 meters; baitfish present, probably anchovy and Pacific sardine (the fishermen reported using salted anchovy bait).

Clemens and Craig (1965) stated that most albacore avoid the cold, green water associated with islands and continental land masses, preferring the blue waters. Murphy (1959), in a study of the effects of water clarity on albacore catches, observed that ".....albacore are probably sight feeders." They have large and presumably efficient eyes, and thus vision in the nearshore zone would be expected to be related to turbidity, which is in turn related to the amount of particular matter in the water.

Pansline (1971), in a study of the Oregon coast albacore tuna fishery in 1969, observed that water color and sea surface temperature were prime determinants of albacore distribution and availability. Over a three month interval, 66% of the fish were taken in "blue water," whereas only 27% were taken in "blue-green," and 7% in "green" water, respectively. The latter observations were predominant in the Columbia River Plume, which is a complex fingerlike region of mixing of the river runoff with Pacific ocean waters.

One can conclude, then,that the ocean waters off Southern California were indeed clear enough for nearly a three month stay of albacore in 1920, and a gain in 1921. One can conclude also, that in those years, man's impact on the nearshore zone was not yet evident. Harbor dredging was just beginning; ocean sewage wastewater outfalls were not yet engineered; and streams tributary to the Los Angeles Coastal Plain were just being regulated by dams and impoundments. Agriculture was well developed and erosional deposition in the nearshore zone could have been substantial, beginning with the record flood year in 1916. Nevertheless the cumulative impact of man on the ocean waters was insufficient to deter the prolonged visitation of albacore so close to the beach.

In the past 30 years, we have no such equivalent record of tuna abundance. In the 1962 season, which set all albacore tuna sport fishing records, albacore tuna came within 20 miles of Point Loma, but remained well outside the Catalina Island - San Pedro Channel.

What has happened in the 50 year interim? Sea temperatures have fluctuated according to the intensity of the upwelling season each year, but have remained optimal for albacore at least two to three months of each year. Water transparency has dropped substantially--but the comparative data are few to document this assertation. Emery (1960 pg. 100) reported a secchi depth survey of over 1200 stations aboard E.W. Scripps in June 1938, in which the majority of the Southern California Eddy had readings greater than 15 meters. Fragmentary observations are available for recent times, but it can be said generally that such measurements are unattainable in Santa Monica Bay, off Palos Verdes, off the Catalina Island east side, and the San Pedro Channel.

I maintain that the continual, cumulative additon of primary treated sewage wastewater effluents are significant contributors to these subtle changes. The natural upwelling and enrichment process, which occurs on a seasonal basis commencing with the onset of the persistent northwesterly wind regime from March through September of each year, is now receiving signifi-

cant additon of nutrients via the nearly one-million acre feet of sewage wastewater discharged annually from the Hyperion, White Point, Santa Ana and Point Loma outfalls, not counting the Santa Barbara and Port Hueneme outfalls as well.

These discharges also carry thousands of tons of flocculent settleable organic solids into the nearshore zone each year which are only partially degraded in the sewage treatment process. These materials are being dispersed at intermediate depths within the Santa Monica Bay, Palos Verdes offshore zone, and off Newport Beach in turbid layers that have been suspected of merging at times (Brown, personal communication). The ecological impact of such widespread submerged wastewater fields is poorly described and even more poorly understood. One can assume, however, that the triple combination of seasonal natural upwelling and enrichment, continual sewage nutrient enrichment and continual addition of settleable organic fine solids from sewage wastewater must contribute significantly to the reduction in water transparency now being observed in the Southern California Bight.

As long as man continues this course, and as long as he persists in using the Southern California Bight as his septic tank for increasingly large urban-industrial communities, we will witness the gradual but inexorable exodus of pelagic marine organisms that depend upon the clear, deep blue sea for their existence. The albacore tuna could be brought back close to Southern California shores if man so chooses to select other means of waste disposal, and to reverse the processes he has set in motion.

NOTE: T.Chow's inflection points on lead concentration in S. California Bight sediments after about 1920: "concentrations rise sharply."

FUTURE OPTION OF COASTAL ENERGY

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Long Beach

Coastal energy options are grouped in three sets: 1) water food; 2) ore-fuel; and 3) electricity-land. Under group number one, Figure 1, fresh water from towed icebergs, aluminum plate transpiration systems, and reverse osmosis fiberglass pipes is considered together with 3 D mariculture, algae-water hyacinth blooms in sewerage outfall lagoons, and artifical nutrient upwelling.

Under group number 2, Figure 2, sodium chloride from solar evaporation, magnesium and bromine from brines, vanadium and nickel from marine animal farms, and copper, zinc, and silver from rift brines are considered with hydrogen from seawater biophotolysis, magnesium hyride from brines and seawater electrolysis, methane from algal fermentation, and petroleum products from beneath coastal ice.

Under group 3, Figure 3, electricity from (a) vapor turbines involving Claude heat exchange systems, (b) low-head turbines run by surface or density currents, (c) von Arx electrode systems, (d) solar panels, (e) floating nuclear reactors, (f) reactors emplaced in salt domes, (g) geothermal heat, (h) wind turbines, (i) tidal turbines, and (j) wave turbines is considered with land-producing mechanisms such as direct pumping of seawater into subsurface strata by wave or tide machines (possibly augmented by pumice tow-and-dump techniques). Wave or tidal energy could also power local maintenance dredging operations.

Hydrogen may become the fuel of the future. There is a good deal of literature published on the development of hydrogen. Other sources of fuel, such as methane, can be readily produced from algal fermentation. Lime calcium carbonate gases can be derived from calcium oxide and magnesium, found in bitterns. Calcium oxide can be used to extract magnesium from magnesium chloride. Oklahoma State University researchers have found that magnesium hydride decomposes at low temperatures and is safe to handle. Hydrogen can therefore be handled as magnesium hydride. Concentrated vanadium present in salt can be produced by adding manganese.

Research on low head turbines has been conducted by Alan Pascal of the United States Manufacturing and Engineering Company in San Diego. Figure 4 demonstrates the simple boundry layer effect with the bladeless turbine.

The French have not talked much about their research progress in tidal wave energy. It has not been too successful. It

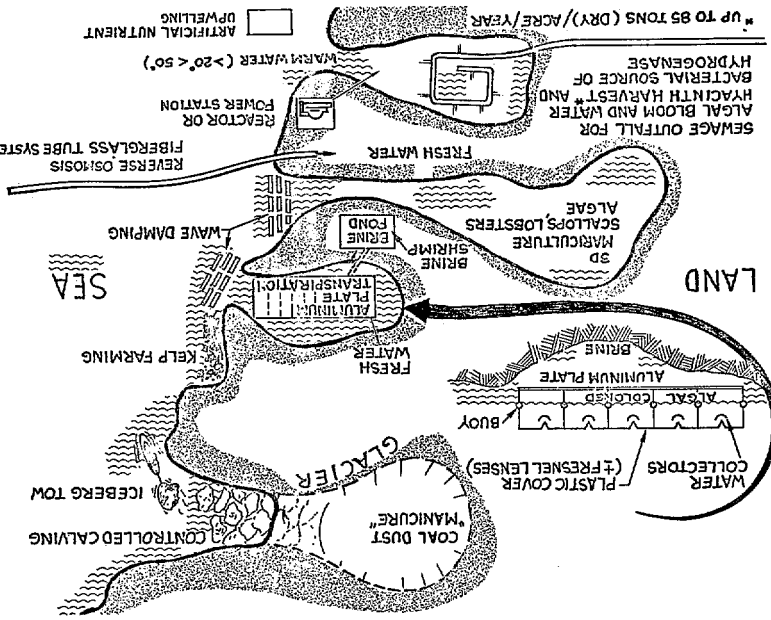


FIGURE 1

FOOD - WATER

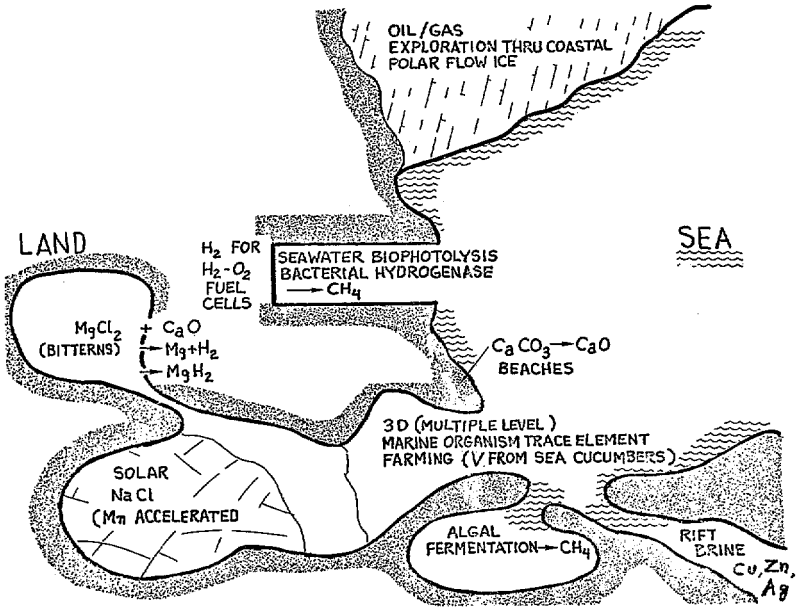


FIGURE 2

ORE - FUEL

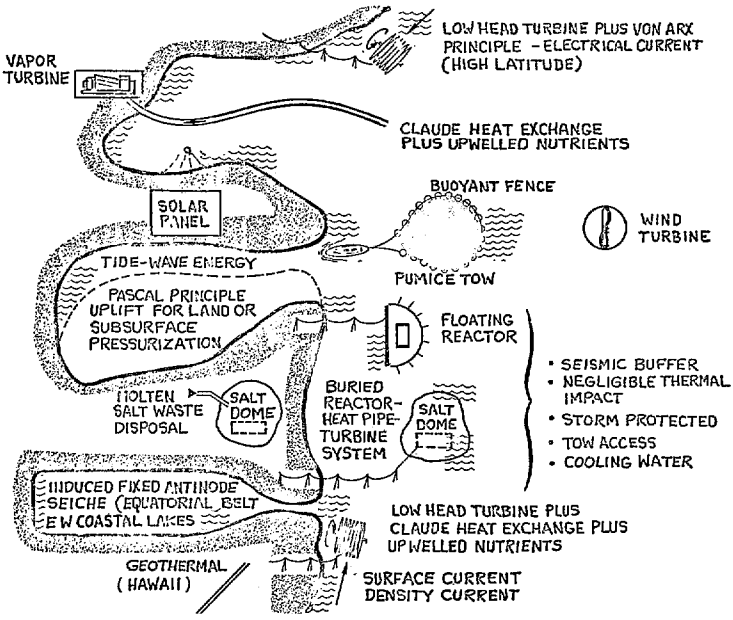


FIGURE 3

ELECTRICITY - LAND

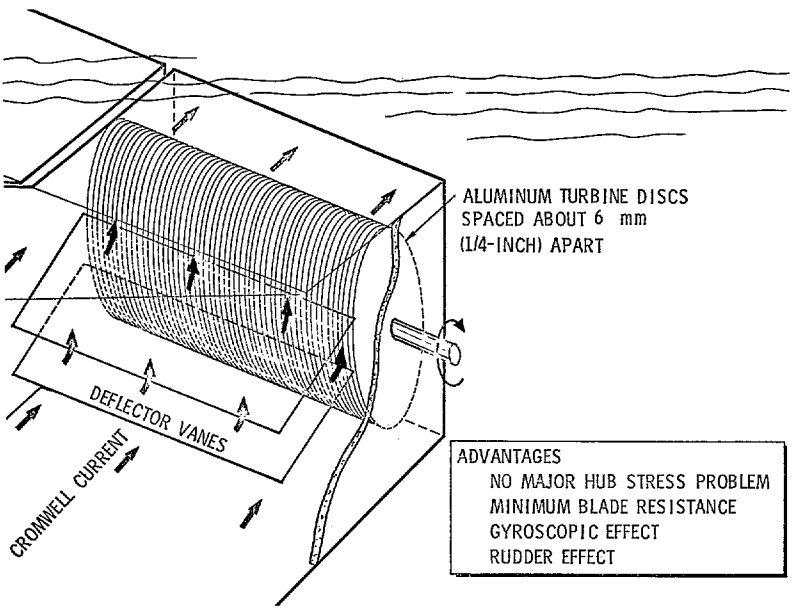


FIGURE 4

BLADELESS TURBINE CONFIGURATION
USING BOUNDARY LAYER FORCES

would be possible to pump water undergound using Pascals' principle and incremental tidal and wave energy sources. The chloridated heat exchange technique is another method of driving a turbine.

On the subject of solar energy, I'm reminded of a recent article in the Los Angeles Times related to a historical event of 214 B.C. An experiment reproduced the action of Archimedes, who destroyed the Roman fleet nearshore by focusing sunlight. He commanded that his soldiers focus sunlight from their swords and shields on the boats offshore. In the experiment, a rowboat was ignited 160 feet offshore in two seconds by having dockmen hold simulated shield reflectors and directing the sunlight on the test boat. Solar energy is a very powerful source of energy and much research is needed. Wind turbines also offer a potential and Arronomus is currently doing research along that line.

A floating nuclear reactor is being planned. It will need to be protected from climatic damage and secure from a military threat. Salt domes provide, in my opinion, a preferred alternate site for nuclear reactors. Wave energy studies by J. M. Coleman have shown the availability of 1.3 kilowatts. Wave energies on the west coast of South America and in Brazil result from very large waves.

Southern California wave action warrants additional study as does that of the remainder of the west coast of North America. I'm always looking for coincidences for energy. I want to call your attention to the coincidence of very, very high waves. Enormous wave action is found in the area of the Archipielago de los Chonos, Chile where we also find very, very strong current velocities of 4 knots. I don't have much faith in current energy, but when you have a coincidence such as these two, it might be worth looking into--these coincidences could prove to be most valuable.

As far as wind energy is concerned, again Arronamus of MIT is doing some interesting work. He proposes 300' of high towers with blade diameter of something like 70 meters - an enormous windmill. WIND POWER can theoretically yield 19% of year 2,000's annual kilowatts. Coastal for instances assuming 60 meter diameter wind turbines:

	KWH x 10^9
- Offshore Eastern seaboard along 100 meter depth contour, Ambrose shipping channel south to Charleston, S.C.	283
- Offshore Texas Gulf Coast along 100 meter depth contour from Mexican border eastward	190
- Offshore Aleutian Chain along 100 meter depth contour	402

Source: 1972 NSF/NASA Solar Energy Panel

Energy resources of the Artic are hardly known. Along the Aleutian Chain there is a coincidence of tidal energy and wind energy. This is something that deserves some kind of investigation and to see if any similar coincidences exist in other areas on the earth.

Two aspects of low-head turbines involving density currents and confined surface currents in the coastal area are important. The bladeless turbine provides a sample of the boundary layer effect concept. It is possible that we have an insufficient number of prime currents, but the Gulf Stream provides for considerable R and D. The bladeless turbine is simply a disc that boundary layer forces make it turn. It is an old idea. There is no major hub stress and other things useful in the extraction of energy from the various surface currents and density currents.

As far as the combination of circumstances, again, you have currents which can turn conventional Kaplan type or Prossel type blade turbines. This is, of course, Claudet's old idea. I'm pointing out combinations of circumstances and applications. A surface current that could run a generator, raise cold water which would be nutrient rich, create an artifical fishing area, and could also run a vapor turbine.

One area already receiving considerable inspection from Arronomus is the Gulf Stream off Florida where it is relatively shallow, 100 fathoms deep. This could be used to tap, again, a 200 centimeter per second current velocity right off the coast 70 miles from Miami, an area where energy is needed to support the growing population. In the Strait of Gibralter, at the entrance of the Meditterean, the density current of the bottom goes out at 200 centimeters per second, again at about 4 knots. There is a shallow, 45 fathom, point where it might be possible to install low-head turbines.

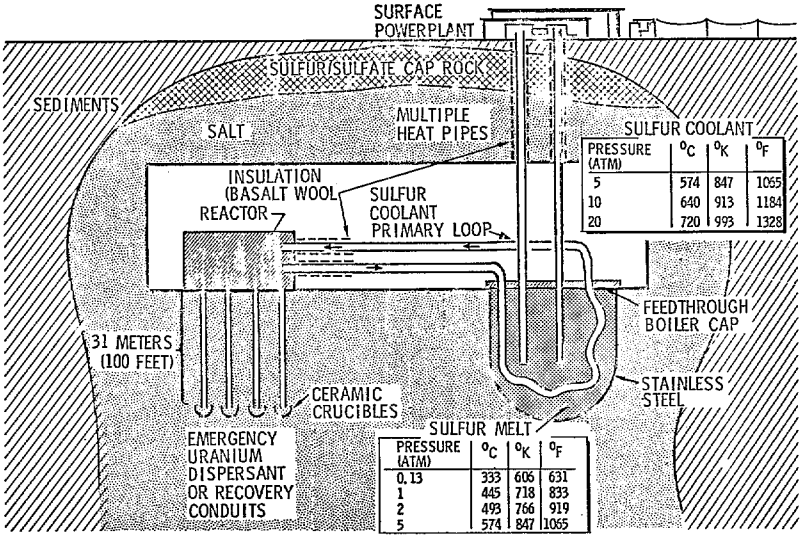
The floating reactor is real. Floating reactors must avoid the shock effect. I am disturbed about its vulnerablility.

One of my favorite subjects is reactors in salt domes. Because, I think, salt domes are nature's shock absorbers; they are relatively safe, they are elastic and you can maintain a positive or negative pressure and they are very, very deep; in other words, they come to the surface or near the surface and extend down a great depth. My concept is to use heat pipes, which is usually boiling, evaporation-type cycle.
The concept of putting a reactor down here and having it extract the heat from the top without having any communications with the hydrological cycle is extremely intriguing. Off the shelf configurations (Figures 5 and 6) would be some kind of working fluid, you cannot get up to the temperatures with conventional reactors to melt salt, yet. You could use heat pipes to extract the energy and I think this is a way to help the siting problem because you are removing your reactor from the hydrological end of the meteorological cycle. Any runaway reactor, even a guillotine break, would not be disastrous because of the salt dome. In case of an accident, nuclear material would simply melt down through thousands of feet of salt (salt melts at 800° C). Salt domes have been mined and rooms as large as parking lots for trucks exist.

The new high temperature gas reactors, like the one at Ft. St. Brian north of Denver, are already using liquid helium as a coolant with temperatures at just about the temperature to melt salt. I don't think we have to be worried about the reactors in salt and again using heat pipes to extract the energy, completely isolates the reactors from the surface.

There are numerous salt dome areas in the coastal areas, Typically, near the Artic Circle and in the Gulf of Mexico. I want to conclude by saying there are possibly two major energy centers in the coastal area. This salt dome, for example, is near New Orleans and the salt dome is within 500' of the surface and the salt depth goes down to 12-14,000'. The domes are enormously thick masses of salt, so one energy center might be the Gulf Coast, and the other might be the Artic Circle. In Russia there are salt zones near Norvich. I don't mind the Russians having the benefit of salt zones in the Artic, but I think we want to be a little bit in prospective and try to look for sources of energy in our own Artic area and so here is a very important slide, I think, showing salt zones in the Canadian Artic. You can see it is also definitely the oil province, and the possiblity of using reactors in salt domes to maintain long range energy needs is very important.

I want to conclude by saying there are lots of options and there are a lot of wonderful ideas published in the various literature. For polluntion free energy sources, see Figure 7. There are lots of programs going on, I just hope that we have enough support to see these through in time.



PRESSURE (ATM)	°C	°K	°F
5	574	847	1065
10	640	913	1184
20	720	993	1328

PRESSURE (ATM)	°C	°K	°F
0.13	333	606	631
1	445	718	833
2	493	766	919
5	574	847	1065

FIGURE 6

SALT DOME REACTOR SITING
OFF-THE SHELF CONFIGURATION

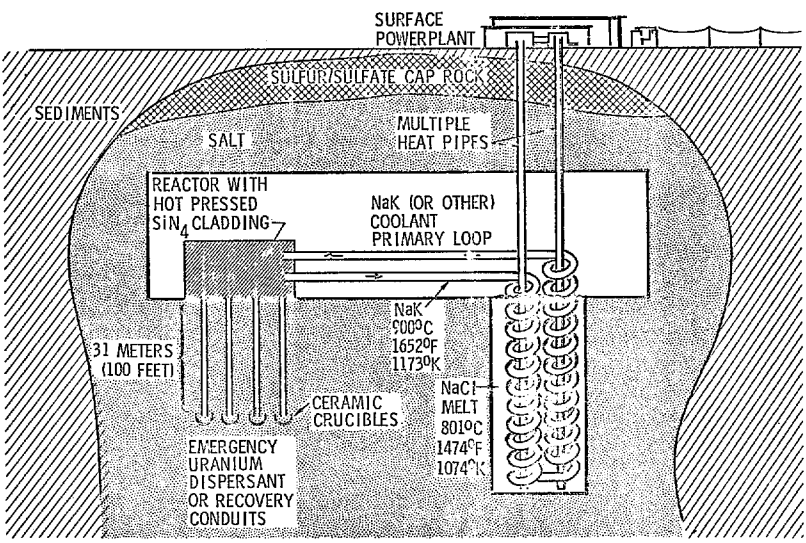


FIGURE 7

SALT DOME REACTOR SITING
MODIFIED CONFIGURATION

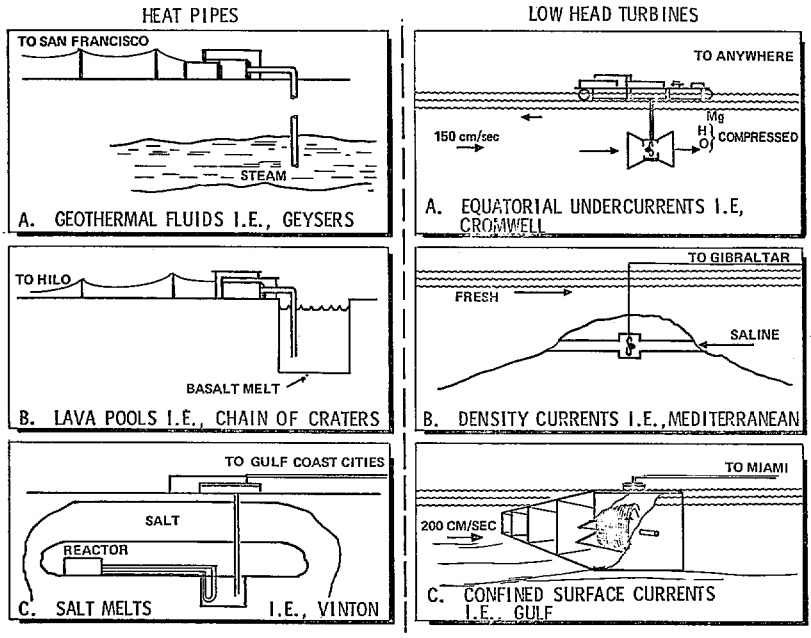


FIGURE 7

POLLUTION FREE ENERGY SOURCES

AUTOMATED OCEAN MONITORING SYSTEMS

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INTRODUCTION

Automated systems for monitoring the ocean are maturing through efforts by academies, Federal and local governments, and industry. There are many examples of both success and failure in systems deployed for ocean data acquisition, but the technology is available and it works when the budget and schedule permit meticulous execution. The automated systems have the advantages of eliminating the labor intensive costs of manned stations, and they do not suffer in quality of observation from tediousness of the job, long hours, or heavy weather. Most of the early work in automated monitoring was directed toward measurements in the deep ocean. Monitoring the Coastal Zone has gained attention as the pollution of coastal waters has reached alarming levels in recent years.

For those of us involved in design and deployment of automated systems, the selection of suitable instruments for measuring parameters of interest in the Coastal Zone has proven to be more difficult than for open ocean measurement requirements. Because the parameters are more specialized, the fouling environment much richer, and the human activity greater, long term accuracy and reliability are consequently inhibited. Biological parameters are the most difficult, and representative current measurements are as difficult near shore as in the open ocean. Dissolved oxygen is still a problem parameter if accuracy and reliability for long time series are required. However, most parameters of interest in Coastal Zone Management can be monitored.

Automated ocean monitoring systems have generally taken the form of instrumented moored buoys, both large and small, surface and subsurface, telemetering and internal recording. My report covers the large, surface, telemetering buoys designed for high capability data acquisition with long endurance on station.

DATA BUOY STATUS

Data buoys have matured during over 20 years of development, deployment and refinement. In the 1950's, several kinds of special purpose buoys for scientific research were developed by academic institutions. In the 1960's, agencies of the Federal government undertook the engineering development of a general purpose buoy and conducted analyses of buoy employment for operational and scientific data acquisition. A working committee of distinguished scientists guided the concept and development at General Dynamics of what they christened "the Monster Buoy". Sponsored by the Office of Naval Research, the Monster Buoy has been improved through critical evaluation and refinement by many quarters of the nations environmental community, including NOAA Data Buoy Office, Naval Oceanographic Office, Naval Oceanographic

Instrumentation Center, academic institutions and the National Science Foundation. Now, in the 1970's, the data buoy enjoys the status of a qualified data acquisition system for classical meteorological and oceanographic parameters. That status has been achieved because the development/refinement cycle recognized and satisfied the requirements for effective data acquisition:

1. Representativeness of the Data
2. Quality Control of the Data
3. Data Validation

The Representativeness requirement concerns the ability of the sensing system to measure the environment in a meaningful way for the intended use of the data. It first involves information theory relative to the required sampling frequencies to avoid aliasing of the data in describing natural variability. Second, transducers must be selected that will faithfully measure the environmental values, uncorrupted by the sensor housing, sensor installation, or buoy motion. Once taken, the data sample must be accurately reproduced through the mechanical and/or electronic sequence that conditions and formats the signal into useful data. While the question of representativeness has been addressed by academic, government and industrial organizations, the most thorough analyses have been conducted by the NOAA Data Buoy Office. Through the work of Withee and Clem* at NDBO and others in government, academia and industry, error analysis of the buoy data acquisition system has authoritatively established the meaningfulness of data from properly designed data buoy systems.

The second requirement, Quality Control of the data, depends upon the excellence of the hardware and software which transforms the environmental measurement into a data report. To satisfy this demanding hardware requirement, the sensors were selected from the best units available from the nation's experienced instrument industry, providing accurate, reliable measurements at the buoy and formatted for machine/machine transmission. Automatic checks of radio transmission-induced errors are made with every data message. Ashore, comprehensive computer programs handle data editing functions and prepare reports, eliminating human intervention and error potential. (Human monitoring can be applied as deemed desirable in the view of the data user, however.)

The third requirement, Data Validation, concerns the traceability of the data to a certified standard. Such traceability assures that a data acquisition network is producing uniformly valuable data without unknowns or eccentricities in individual reporting stations. There is then no need for approximations or arbitrary interpretations in the primary use of the data, and secondary users of the data can have confidence in their conclusions when treating such data. Data Validation begins, as do the first two requirements, with selection of accurate, reliable transducers. It continues through the execution of calibration procedures relating the buoy sensor to a known, certified national standard. Validation is a continuing concern until the sensor is returned from the ocean station and subjected to post-station-calibration check to certify that the measurement was within specified tolerances throughout the deployment. For data buoys, calibration procedures have been meticulously prepared and methodically implemented and the results documented.

THE XERB-1 POLLUTION MONITORING SYSTEM

Applying Monster Buoy technology to water quality monitoring was undertaken by General Dynamics as a part of the NOAA Data Buoy Office program. The platform used was a 40 ft diameter discus hull Monster buoy designated XERB-1 (Experimental Environmental Reporting Buoy) moored off Cape Hatteras East of Norfolk, Virginia.

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*Determination of Total Observational Error in Environmental Data from Ocean Measurement Platforms, G. W. Withee and L. M. Clem

The primary function of XERB-1 is to monitor meteorological parameters for use in weather forecasting. To accomplish its task, it was already equipped with a small digital computer which could be reprogrammed to control the operation of the pollution sensing system when it was installed at sea, and an HF telemetry system for transferring data to the shore station at Miami, Florida. Also, because the buoy was already equipped with two engine-generator sets, there were no restrictions on the power required by the pollution sensing system.

The water quality parameters to be measured by the system were conductivity and temperature to derive salinity, hydrogen potential (pH), and dissolved oxygen (DO). Two approaches were initially considered for bringing the sensors in contact with the water sample to be measured. One approach involved an automatically deployed sensor arm which would extend the sensors into the seawater under the buoy for measurement, and then retract them into an anti-fouling solution which would purge the sensors but not contaminate the electrodes or subsequent samples. This approach presented several mechanical design problems: possible interference of one sensor with another, or a distribution of sensors such that a small sample volume could not be used. It had the advantage that disturbance of the chemical balance of the seawater measurand would be minimal.

The second water sampling approach considered employs a sampling pump and associated sample tubing for pumping water on board the buoy. The sensor transducers are mounted in series with the sample tubing, and the sample tubing is reverse-flush purged with an anti-fouling solution. The pumping approach presented a possible problem of upsetting the chemical balance of the measurand due to outgassing of oxygen which would change the DO concentration, outgassing of CO_2 which would change the pH level, and possible temperature changes due to pump heat and agitation. This approach did not involve significant mechanical design problems however, and allowed a common volume to be sampled.

The approach selected as the most suitable for incorporation into the buoy was the pumping system. A slow pump speed and short sample-tubing run were selected to minimize measurand outgassing and temperature changes.

SENSORS

The sensor types selected for use in the system were an inductively coupled conductivity sensor, a platinum wire thermometer for temperature, a glass electrode for pH, and a thallium electrode for dissolved oxygen. Selection of the conductivity and temperature sensors was based on in-house background experience, while selection of the DO and pH sensors was based on an extensive survey of sensor suppliers.

Sensor suppliers indicated that two basic types of sensors were available for measuring dissolved oxygen (DO): the thallium electrode sensor and the polarographic sensor. All but one sensor supplier indicated that their DO sensors would not survive unattended in an ocean environment. Life expectancies claimed ranged from hours to 2 weeks. One sensor supplier claimed the successful deployment of thallium-electrode DO sensors in raw sewage for an unattended period of 6 months. It was believed that the raw sewage, although different, was an equally hostile environment as seawater. The thallium-electrode sensor selected for testing to determine its suitability employs a reference electrode identical to the active sensor electrode. The reference electrode is co-located with the active electrode in, but isolated from, the measurand. This method is used to cancel out the temperature dependent errors. The testing program indicated that the sensor lacked the stability required and, consequently, a DO sensor was not included in the deployed system. A more recent evaluation reported by Pijanowski[1] of the National Oceanographic Instrumentation Center indicates that a suitable DO sensor may now be available.

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[1]References and illustrations appear at end of paper.

SAMPLE PUMPING SYSTEM

The sensing system aboard XERB-1 pumps the water sample aboard from a point 1 meter below the bottom of the buoy. Taking the water from this depth prevents damaging or clogging of the intake by material floating on the surface, and also prevents ingestion of water that has been supersaturated by air as it is forced down under the buoy by the bow wave. As a further precaution, the intake is equipped with a coarse mesh screen. Pumping is accomplished by a small pump selected to prevent "bruising" the water sample and changing the composition before passing through the sensors. Various types of pumps were considered. The flexible impeller type was judged to be the best choice when heating, agitation, pulsation, and pressure differentials were considered. The pH, temperature, and conductivity sensors are inserted in series in the plumbing system (Figure 1). Provisions have been made for inclusion of a dissolved oxygen sensor at a later date. After passing through the sensors, the water exits overboard at an elevation selected to present a head at the sensor location similar to that at the depth at which the inlet is located.

Although the need for an anti-fouling purge was not well established, since the sensing system is located in a dark buoy compartment free of sunlight necessary for many types of marine growth, it was decided to incorporate a purge system into the pumping system as a precautionary measure to assure success.

Since the system is always filled with fluid, the problem of formation of air bubbles caused by the incoming sample water mixing with air in the system is avoided. If present, these can be very troublesome because they may become lodged at the sensors and cause false measurements. When the dissolved oxygen sensor is included, such mixing would also affect oxygen dissolved in the sample as seen by the sensor. Gases dissolved in the seawater can also come out of solution and form bubbles if the sample is mechanically "bruised." For this reason, a pump with flexible rubber impellers was used and great care was taken to eliminate sudden diameter changes or other discontinuities which might be sources of sudden pressure changes in the plumbing system.

SYSTEM OPERATION

Upon command from the digital computer, the pollution-sensing-system controller turns on the power to the sensors. Two minutes later, the intake pump starts and runs for 2-1/2 minutes (10 system volumes) to rinse the system with fresh sample water and to allow the sensors to stabilize. Near the end of this period, the computer automatically reads the sensor signals and stores the data in computer memory. Once this has been accomplished, the controller reverses the intake pump and starts the purge pump for 1/4 minute (1 system volume). During this period, a solution of 10% alcohol and 90% water is drawn from storage tanks and is then passed through the sensor system plumbing and out the sample intake to flush out the seawater. This solution is left in the system (in contact with the sensors) until the next data collection period. The solution sweeps out organisms which may have entered with the seawater, and prevents buildup of growth between sampling periods.

Upon interrogation, the data in the computer memory is transferred in digital form through the XERB-1 Telemetry System to the shore station located at the U.S. Coast Guard Radio Station at Miami, Florida. Scale factors are applied ashore before data is distributed to users.

TESTING PROGRAM

Since the system required long term unattended automatic operation, an extensive testing program was conducted before deploying the pollution monitoring system aboard the buoy at sea. The purpose of the tests was to establish:

a. The effect of pumping water through the system on sensor system accuracy.

b. The long term stability of sensor calibrations.

c. The time required for sensor readings to stabilize when operated in cyclic mode.

d. The reliability of the pumping and control system.

e. Effectiveness of the purging system in preventing a buildup of marine growth.

TEST RESULTS

The system was found to be insensitive to seawater sample pumping rates over a wide range. Pumping rate change from 1.25 to 4.0 gallons per minute produced no change in sensor output. Testing established that the use of a 10% alcohol purge solution does not affect the accuracy or stability of the sensing system.

During the Phase I tests, the DO sensor exhibited large temperature dependent errors due to a difference in the thermal properties of the active and reference electrodes. In addition, the calibration drifted rather severely due to formation of a thin thallium-hydroxide layer on the active thallium electrodes. These instabilities resulted in the DO sensor being omitted from Phase II testing and from the system deployed aboard the buoy.

Warm-up time for the temperature and conductivity sensors was less than 10 seconds, and that for the pH sensor was approximately 2 minutes. Stabilization time after the pump has been turned on was approximately 1 minute. When sensor power and pump power were turned on simultaneously, the stabilization time for the overall system was less than 2.5 minutes.

The cyclic tests both in the laboratory and at Scripps Institution of Oceanography established the stability of the pH sensor calibrations obtained in the laboratory. The differences between the calibrated sensor measurements and the values derived from the seawater samples drawn while at Scripps Institution of Oceanography are shown in Figure 2 using the laboratory determinations as the base. These data indicate that the system may be expected to read pH well within ±0.1 pH unit.

PERFORMANCE AT SEA

The pollution sensor was installed on XERB-1 during a visit to the buoy in early August of 1971. The buoy was on station off Norfolk, Virginia at a location 36.5°N and 73.5°W, near the edge of the Gulf Stream. During the installation, the pH sensor developed a leaky seal which required repair ashore. Consequently, the system was initially activated using the conductivity and temperature sensors. The pH sensor was included in the operational system during a visit to the buoy in September of 1971.

The system was initially operated with samples taken hourly to study short term variations in the measurements. Figure 3 (a weekly plot from telemetry data of the hourly measurements) illustrates the variations observed. The abrupt mid-week change in the measurements may possibly have been caused by a path deviation of the Gulf Stream.

On 20 August, the sampling rate was reduced to once every 6 hours by a telemetry command from shore. At this time, sufficient initial short term data had been accumulated and the slower sampling rate was used to conserve the purge solution stored in tanks aboard the buoy. Data taken during the week in which the sampling rate was changed is shown in Figure 4 and illustrates the difference of information content at the two sampling rates. Figure 5 is typical of the data records obtained after the pH sensor was installed. The system was operated routinely in this mode until the end of February 1972, when the 300 gallons of purge solution had been expended. At this time, the system was returned to the hourly sampling interval and operated without purging.

The system continued to operate routinely until 19 April 1972, when the pH measurements became suddenly erratic. Since that time, the remaining measurements have continued to be stable and the pumping system continues to operate reliably. The buoy was retrieved from station in early June 1972. At that time, the sensors were carefully examined to determine whether any fouling had occurred. Preliminary indications were that it may be satisfactory to operate without purging the sensing system in future deployments.

ACKNOWLEDGEMENTS

Much of the work described in this paper was sponsored by the National Data Buoy Center, Bay St. Louis, Mississippi under Contract DOT-CG 02,319-A. Mr. Robert F. Devereux made a major contribution to the system philosophy and the initial design.

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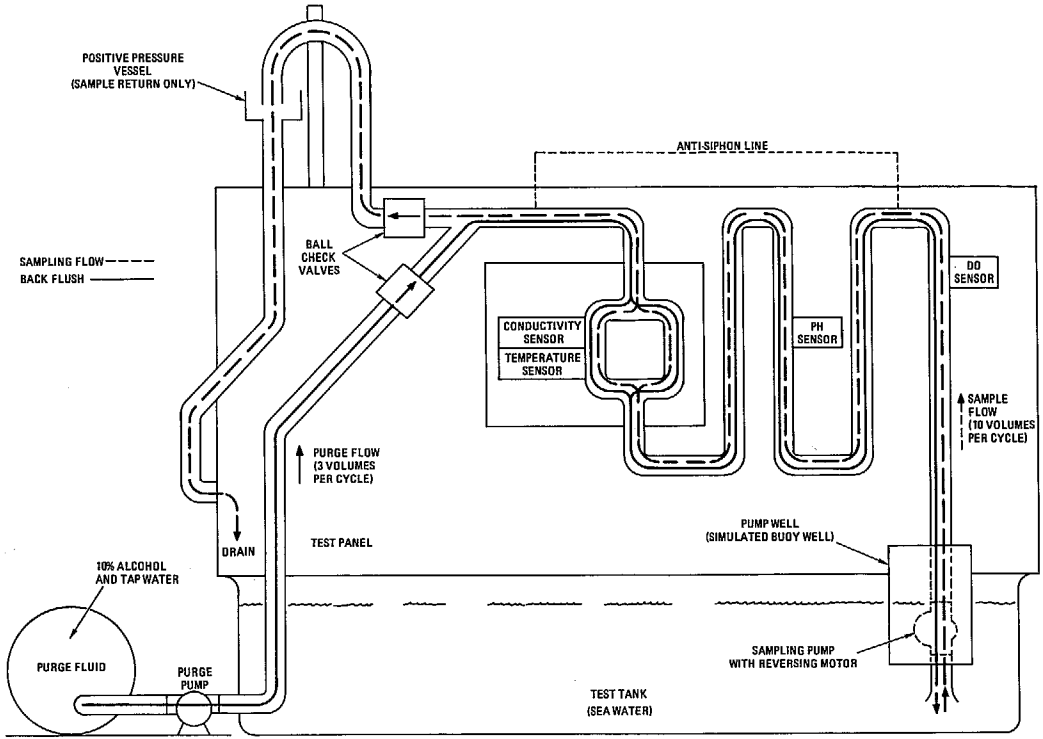
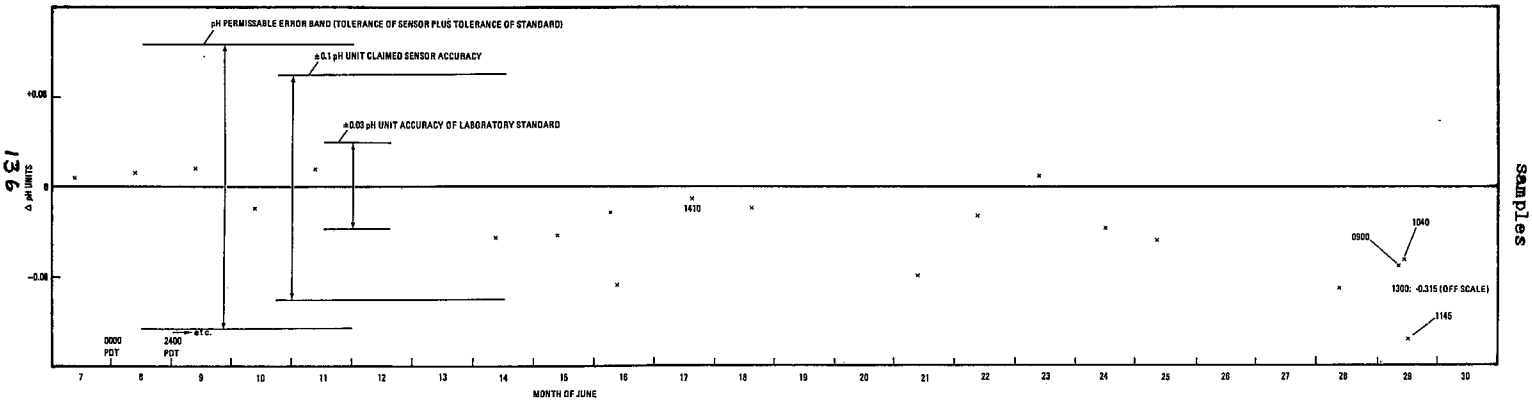


FIGURE 1 POLLUTION SENSING SYSTEM



Samples

FIGURE 2

PLOT OF SALINITY AND PH ERRORS
REFERENCED TO LABORATORY ANALYSIS
(data starts Month 7)

DATA FOR WEEK STARTING 13 AUGUST 1971

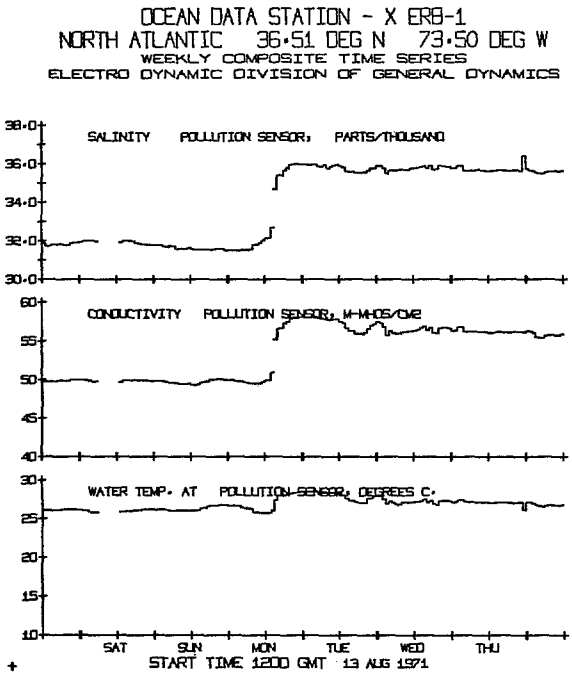


Figure 3

DATA FOR WEEK STARTING 20 AUGUST 1971

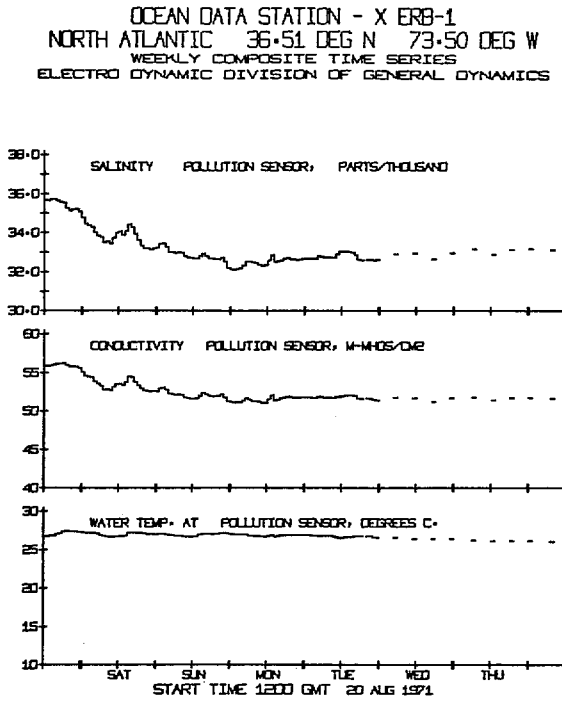


Figure 4

DATA FOR WEEK STARTING 17 SEPTEMBER 1971

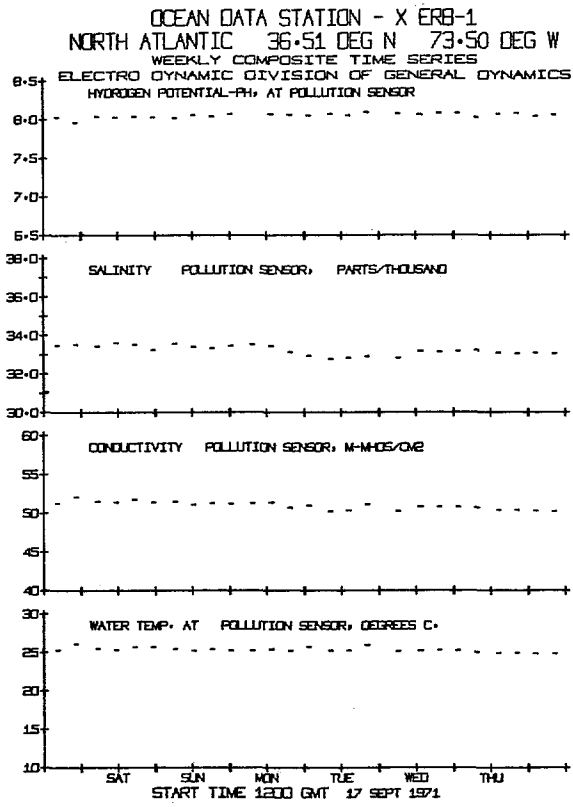


Figure 5

INFORMATION REQUIREMENTS OF THE CALIFORNIA COASTAL ZONE COMMISSION

J. D. Frautschy
Scripps Institutuion of Oceanograhpy

What are the data needs of coastal zone planning and management? In California's case the needs are almost so broad as to be undefinable. First of all, the California Coastal Zone Commission is charged with preparing a multi-element plan for the coastal zone consisting, at least, of the following components:

A. A precise, comprehensive definition of public interest in the coastal zone.

B. Ecological planning principles and assumptions to be used in determining the suitability and extent of allowable development.

C. A component which includes the following elements:

1. A land use element.
2. A transportation element.
3. A conservation element for the preservation and management of the scenic and other natural resources of the coastal zone.
4. A public access element for maximum visual and physical use and enjoyment of the coastal zone by the public.
5. A recreation element.
6. A public services and facilities element for the general location, scale, and provision in the least environmentally destructive manner of public services and facilities in the coastal zone. This element shall include a power plant site study.
7. An ocean mineral and living resources element.
8. A population element for the establishment of maximum desirable population densities.
9. An educational or scientific use element.

D. Reservations of land or water in the coastal zone for certain uses, or the prohibition of certain uses in specific areas.

E. Recommendations for the government policies and powers required to implement the coastal zone plan including the organization and authority of the governmental agency or agencies which should assume permanent responsibility for its implementation.

In general, one can say that the data needs are for data which will assist in answering all questions which arise in the

broad planning areas as listed, as well as specific data essential to intelligently control development during the planning period, which is another charge of the commission.

To get down to brass tacks, let's see what one needs to know to act properly in assessing the permit application of San Diego Gas and Electric Company and the Southern California Edison Company to construct two systems, each of 1140 megawatt electrical output, powered by light water nuclear reactors on a site at San Onofre, California. It is proposed that ocean water be used to assimilate waste heat.

Specific issues to be assessed are:

1. Is there a need for generating capacity?

2. Should it be on the coast? and if so, is this a suitable site on the coast?

   a. does it interfere with or preempt an area otherwise useable for public recreation?
   b. does it interfere with scenic vistas?
   c. is it an irreversible commitment of coastal resources?

3. Using cooling water from the ocean, as is proposed, does it have an adverse effect on living ocean resources and aesthetics? and finally

4. Is the development proposed safe, insofar as seismicity of the site and engineering design are concerned?

Fortunately there is federal preemption of the final issue of safety and the Commission is precluded from considering that point although it is <u>the</u> issue in the public mind.

To assess the issue of point 1, the need for the generating capacity, the answer can only be an overwhelming <u>yes</u>. When one considers the present almost total dependence on fossil fuel generating plants and the small finite reserves of acceptable fossil fuels it is clearly in the public interest to construct this plant which is not dependent on fossil fuel, and as rapidly as possible. Thus the normal projections of power useage need not be computed.

The remaining issues are tougher, mostly because of our lack of solid information, although there are numerous expressed hypotheses and apprehensions bearing on specific problem areas.

There are, of course, economic considerations for siting power generating facilities on the coast. Concentrations of population exist on the coast and the load centers are there. Because of this, transmission losses are held to a minimum. The capital cost of constructing a plant with open circuit ocean cooling is usually considerably less than that of a plant utilizing cooling towers or cooling ponds. The capability of a plant with open circuit cooling is generally at least 2% greater and since one does not need to maintain cooling towers or purchase cooling water the operating costs are lower.

The cost and availability of fresh water for cooling can be an important consideration. San Onofre units 2 and 3 would require about 50,000 acre ft. of water per year were the units to be dependent on fresh water with tower cooling. Since in this part of the world water equates to power in the overall scheme of things, the net electrical yield of the plant is thus further reduced.

On paper, salt water towers might be attractive. However, there is very little experience with salt water towers and only limited experience with towers in the 100 megawatt capacity range in England and perhaps elsewhere. The option of salt water tower use on a large scale is not very attractive environmentally, at least until more is known about the ability to control salt drift, climatic effects and problems associated with concentrated blow-down brine disposal. It will be seen that a great deal of data, most of which is now non-existent, is necessary to evaluate specific alternatives to open circuit cooling options for comparison purposes with plants of this size. Certainly considering fuel efficiency only, the coastal open circuit cooling plant is the most attractive.

Passing to the question, "is this a suitable site on the coast," one finds himself dealing with matters both factual and subjective. Seismicity of the proposed sites and population distributions become important when one is dealing with nuclear plants. San Onofre appears to be marginally adequate on these counts. Other high public value utilization of the site is another consideration. Measured on this basis, and with present public values, San Onofre would be unacceptable since the site contains beautifully sculptured sandstone cliffs and barrancas which would be lost in the site prepartion process. Also it is bounded on two sides by state beach parks. The only redeeming feature of the site on this score is that is is immediately adjacent to existing nuclear unit one.

An additional negative aspect is that some view of the ocean from Interstate 5 would be lost because of construction of a berm to screen switch gear and distribution lines from view.

Certainly loss of the sandstone cliffs is an irreversible commitment of coastal resources. Other aspects of the proposed construction constitute reversible commitments if one considers a time span of the order of thirty years or more. The staff analyst of the Commission has equated destruction of the cliffs to "burning down our cathedral for firewood." At least the "ashes" of the sandstone cliffs would have value in replenishing our vanishing beach sand and this must be considered in the overall balance of the proposal.

The place where good solid data is needed and where it is unavailable is with respect to the effect of plant operation on the ocean environment.

Here there are a number of questions. What will be the extent and nature (vertical and horizontal) of the thermal field and how will it vary in time and space? The principle concern here is for the well being of nearby kelp beds which have economic value themselves and which also play an important role in the support of other living things. Kelp has a limited tolerance for heat. During the warm water years of 1955-1958, the kelp beds of southern California declined markedly.

A considerable amount of data exists on the thermal field associated with unit one, but the degree of confidence that can be attained in extending that experience to the much larger units two and three is uncertain. Modelling has been done, but again the validity of the models is unknown. The existing thermal field is generated by a plant with a capacity of 450 MW (e) as contrasted with the two proposed units at 1140 MW(e) each. The combined pumping rates of the three plants would be about 1.95 million gallons per minute with the water heated 20°F. above intake temperature. The thermal field geometry will be affected by winds, currents, waves, and details of the ambient density structure existing in the surrounding area at any given time.

Another area of concern has to do with the consequences of entrainment of planktonic organisms. The probable mortality of entrained organisms is virtually unknown, based on the mortality projections made by various investigators. The estimates vary from about 12% to nearly 100%. Here solid data is really lacking In reviewing monitoring data taken since unit one went into operation in 1968, Professor James Enright of Scripps found that there is a major concentration of zooplankton in the vicinity of the intake discharge. He ascribes this concentration to a collecting of plankton from other areas since primary phytoplankton productivity does not track with the zooplankton increases. His belief is that the mortality of entrained copepods and other large forms is high, probably of the order of 70% or more. Further, my impression is that he believes that much of the mortality is caused by mechanical damage associated with the organisms impinging on pump impellers and conduit walls. However, impoverishment of plankton in nearby ocean areas has not been noted to my knowledge, and the California Department of Fish and Game reports the biota of the area to be "lush and diverse." His speculation as to the role of mechanical damage in the mortality of zooplankton raises an interesting question in my mind. Are ship propellers responsible for comparable plankton kills? The dimension of the action of a tanker propeller is comparable and the velocities are higher. If San Onofre expansion is to be prohibited on the basis of plankton kills, should we determine whether or not tanker propellers are killing large numbers of plankton and tie them up if they are? My personal attitude towards things like bacteria and plankton is that if there are enough of them to successfully support other living things, I care little about their health and happiness. I guess I lack planktonic empathy. Unfortunately the question remains, will there be enough of them left in the vicinity to do the job? In the case of unit one, I think that the indirect evidence is that there are. Unfortunately, little is known about the effects of elevated temperture on viability and growth rates of plankton In higher forms the general effect is to accelerate growth, often by a factor of three or more.

Still another plankton and larva problem might be caused by operation of units two and three. This one is an artifact of EPA-required regulations adopted by the state. These regulations require that heated discharges be diffused through the vertical water column to the extent that the surface isotherm 4°F above surface ambient shall not extend more than 1000 ft from the point of discharge more than 50% of the tidal cycle. Further, the plus 4 degree isotherm is not permitted to touch the shoreline or any substrate. The engineering design response to this requirement is to discharge heated water well offshore in a considerable depth of water through multipart diffusors. To obtain separation between intake and discharge, the intake is located inshore. The net effect of operation is to draw in relatively warm inshore water, together with endemic inshore planktonic larvae and subject these forms to a long, hot transit through the extended discharge line where they are subjected to a sharp thermal gradient when released into the cold, deep, alien offshore environment. This is the best way that I know of to insure plankton mortality. Further, the heat is diffused into the body of the ocean where it becomes a near-conservative property. To my way of thinking this is running the system backwards. Take water at a low temperature at depth offshore, run it through the condensor and discharge close inshore. The merits of this arrangement are that the discharge water is perhaps about 6°F (assuming the same ΔT in the condensor). The transit path of organisms in the heated water is minimal, and water released inshore would rapidly radiate heat to the atmosphere and space. Inshore organisms are generally tolerant of moderate temperature change. Beside these benefits, California bathing beaches could stand a little warming!

Fish are also vulnerable to entrainment. The San Onofre expansion program calls for installation of equipment to divert fish from the intake stream and return them to the ocean. A system of this kind, to ny knowledge, has not previously been used in connection with a power plant. Its designers anticipate that is should be 90% effective. If this is the case the fish kill should not exceed 100 tons per year, 40% of which would be anchovies. I do not consider this to be a serious environmental problem.

On the basis of the negative and unknown environment effects of units two and three, most of which I have covered, the staff of the Commission has recommended denial of the permit. Staff further suggests that the requirements of the Coastal Conservation Act could be met if a site east of Interstate 5 were acquired, if more efficient high temperature gas reactors were substituted for the light water reactors, if intake water were taken from depth, and if a comprehensive monitoring program were maintained.

On the surface this appears to be a reasonable compromise and would save the scenic cliffs. Environmentally there may be serious flaws, however. The proposed site east of the freeway would need to be graded down to near sea level. This is necessary to avoid supersaturation of gases caused by pump cavitation. Supersaturation could be lethal to entrained organisms. Further, the discharge lines would be greatly lengthened, thus resulting in added transit time for organisms in the hot effluent and greater mortality.

While I appreciate the cliffs, I am uncomfortable in voting on the permit with information presently available as a commissioner. Some facts that I need before I vote include:

1. Can a site east of I-5 be made available for units two and three promptly?

2. Can this site be graded down to an elevation no more than 50 ft. above sea level?

3. Is EPA willing to revise its thermal discharge requirements immediately to permit construction of a system rational for this site?

4. If a non-coastal site is the only alternative, what time delays would be involved in getting a plant into operation?

5. Where would the fresh water come from to cool a non-coastal plant?

Until I have this additional information I would prefer not to vote on this issue.

In the present energy situation, one which I view as being critical for at least 25 years, I believe that it would be irresponsible to deny the permit with the assessment of possible damage to the marine environment as it stands now, unless construction on an alternate site is possible with little deferral of the planned operating date.

San Onofre is now intimately related to Southern California's health and economy and in turn the success of our environmental programs. A large numer of unemployed and disgruntled citizens could care less about the cliffs at San Onofre or the fate of plankton in the area and would surely make their position known to the legislators who will be considering the coastline plan for adoption in 1976. I am sure that what we are

doing now in processing permits will be viewed by the public as a sample of the coastline management to follow. Although the charge of the law is simplistic and specific, I believe that it is the duty of the Commission to interpret the spirit of the act toward the end of achieving a net environmental improvement in the coastal zone and of having a viable coastal management law after 1976.

In general, environmental issues dealing with living resources appear to me to be much more difficult to resolve intelligently than those that involve the physical environment.

One must recognize that man's presence in increasing numbers is the basic problem. His population is forcing and accelerating the natural selection process regardless of what he may do to attempt to ameliorate the situation. The only very useful thing that he can do to improve the environment for other living things in the long run is to limit his own population. Thus the environmentalist objective of improving human health and longevity is in reality in contradiction to protecting other living things.

For myself this is a laudable objective and one that I subscribe to, selfish though it may be. I think that we clearly should attempt to maintain viable populations of endangered species as a hedge against the day when changing activities of man could again permit these species to assume a role in the natural plan.

What I am saying is that we can't go back; irresistable forces are at work and even if man were to abandon his technology and return to an agrarian or hunting life the situation would be no better. We can't avoid an adverse impact on other forms of life; what we can do is to try to manage our populations and affairs to try to avoid catastrophic change. This will require much more knowledge and self-restraint than we now exhibit.

In matters dealing with environmental health problems, it is amazing how many doctors come forward with profound professional advice. Unfortunately the podiatrist appears most apt to give advice on brain surgery. The public and sometimes the Commission fails to evaluate the source of the advice, thus being led into unwise decisions. When you as marine scientists have special knowledge on matters before the Commission, I hope that you will share your expertise with us.

URBAN MARINE RECREATION: BOAT OWNERSHIP TRENDS IN THE LOS ANGELES REGION

Phillip J. Symonds
Research Associate, Center for Urban Affairs
University of Southern California

Perhaps a more descriptive title for this talk would be "some useful information obtainable from an analysis of the department of Motor Vehicle's master registration file."

But first I would like to place this project within the context of a set of endeavors undertaken by the Coastal Zone Management Group at the Center for Urban Affairs at the University of Southern California research group which has had a considerable amount of financial support from the Sea Grant Agency under NOAA. The Group has done some studies at U.S.C. over the last couple of years, and at Washington State before that. The work has been concerned with studing aspects of coastal zone management structures from the following theoretical -if not philosophical-viewpoint which has been nicely expressed by Peter Harrison who worked on the Puget Sound Study in Washington State:

> "The coastline represents the interface between two highly different systems of property rights. On the one hand the rights to land ownership may be bought, sold, bartered, or exchanged in a quasi-market situation. The water body on the other hand more nearly represents a common property system, the ownership of which is vested in the public-at-large even though possibly controlled by institutional intervention." (1)

At U.S.C. an initial study by Mitchell Moss and Robert Warren of the managment structure of Marina Del Rey was continued and greatly expanded by my associate and colleague Marsha Rood. In a forthcoming paper "Management and Policy Development in Marine Del Rey," she notes that:

> (The) controversy over control of coastal zone resources in California centers on the basic question of whether regulatory powers over these resources should be retained by local bodies or be transferred to state or regional levels of authority. Since the majority of California coastal cities have responded to economic priorities in allocating their coastal resources, many environmental groups have supported the creation of these higher-level coastal management authorities...oriented to the conservation and preservation of the coast. As a case study of coastal resource management at the local level, (her paper) explores Los Angeles County's management and policy decisions concerning the development of Marina Del Rey, the largest small-craft harbor in the world. (The)

study also considers the possible effects the state and regional California coastal zone commissions could have on the Marina's future development.

She concludes that:

> (An) administrative structure originally designed to develop and administer a revenue-producing harbor operation has been faced with an increasingly complicated set of policy questions concerning the conflicts between boaters and the private operators of anchorages, the use of the facility by the general public, rental and taxation policies relating to commercial lessees who have made multi-million dollar investments, and finally the future development at the Marina. If Marina Del Rey is to become a model for other recreational harbors in Los Angeles County and elsewhere, the administrative channels through which all affected and interested citizens can raise issues concerning the Marina.....become central considerations. (2)

Within this context, then, it has been useful to concern ourselves with the relationship between those who benefit from the use of coastal resource and the governmental management system responsible for coastal allocation policy. For instance, strong interurban and interregional recreational patterns would imply that these bodies might not represent their recreational constituencies. Consequently, it is important in the analysis of coastal zone policy to investigate the demand for recreational uses and to estimate the extent to which non coastal resources could be substituted for marine-based resources.

Unfortunately, the demand for outdoor recreation, often provided at no cost to the individual, is usually difficult to assess. In particular, boating, a popular outdoor activity, while it requires the use of goods generally provided in the private market at fairly high prices, also requires public recreational services provided at low costs. Changes in prices of the use of harbors, boat ramps and slips, or gasoline may affect the level of demand for such facilities. Clearly it is an important public policy question to assess the distribution of benefits resulting from the allocation of coastal resources to recreational boating.

Especially in the Los Angeles region, boating has become a major urban recreational activity. Moreover, much of the boating activity is carried on at the coastal edge of the metropolis. Along the southern coast of California from Ventura to Oceanside, thirteen small-craft harbors provide wet-storage for about fourteen per cent of the region's registered or Coast-Guard documented vessels. On the other hand, since most of the boats are dry-stored and trailerable, urban boat owners may use a variety of coastal or inland recreational locations near, or at some distance from, the urban area. Day and weekend trips are time-constrained so that intensive boat use reaches about three hundred miles, thereby defining a not inconsiderable region of influence. Metropolitan Los Angeles, with its 188,000 boaters places demands not only on local recreational sites but also on sites as far away as Lake Tahoe, the Colorado River, and the coast of Baja California.

There is little information about the distribution of access to recreation sites among different classes of boaters living in a large metropolitan area. The metropolis of Los Angeles spreads over an area measuring one hundred miles by seventy miles; time and distance travel costs may preclude important segments of the boating population from using certain facilities regularly. Moveover, the facilities at a given

location may be designed--or be constrained by available natural resources-to be useable only by boaters with adequate equipment. As an example, relatively few recreational boats are designed or equipped for safe ocean use; others are too large to be moved to inland sites.

Now I would like to tell you about how we have been obtaining some information about spatial distribution of boat ownership in relationship to access to marine and inland recreational opportunities.

The development of third-generation computers has allowed the storage of motor-vehicle registration information so that it may be accessed rapidly by police and other law-enforcement agencies. Edited versions of motor vehicle registration lists have been made available to commercial interests and have been found to be useful in determining market areas for vehicle retailers. Little use has been put to the lists in the analysis of public policy decisions. In this study it is shown that the lists constitute a useful set of public information; the study is concerned with the exploration of the use of the State of California Boat Registration Master File in defining characteristics of recreational boat ownership.

. . . . . .

The remainder of the presentation was concerned with discussing a series of photographic slides of maps of boat ownership levels within Los Angeles-Orange County metropolitan area. Each map displayed the level of boat ownership within zip code base maps copyrighted by Thomas Bros Maps. Because the slides were produced under coypright waiver it is not possible to display the maps in the conference report. Accordingly it is possible to give only a brief summary of the concluding remarks; the maps and other analysis are to be presented in a forthcoming document. (3).

. . . . . .

To attempt to motivate more graphically the usefulness of the spatial distributions, the first slide to be shown indicated the geographical distribution of users of the boat ramp at Marina Del Rey. It was clear that about sixty per cent of those who used this facility lived within about four miles of the Marina, the rest living about ten miles away in the San Fernando Valley. In order to estimate effectively the range of influence or market area of the Marina and thus obtain an idea of the distribution of benefits of the facility, it is necessary to determine what proportion of boaters from each subarea of the city traveled to the boat ramp. The calculation of the proportion is possible only of maps of urban boat ownership are available at a fairly disaggregated level. It is also of interest to have some idea of the family income levels within each section of the city. The second slide indicated family income levels obtained from the recent 1970 Census of population and housing.

The rest of the slides displayed levels of boat ownership within each zip code area of the metropolitan area. The following distributions were shown: all boats, trailerable power boats (less than 20 feet in legth), moored boats (defined as all boats longer than 20 feet), sail boats and jet boats. Finally maps showing the distribution of legal ownership for power boats and sail boats indicated that the use of credit in purchasing pleasure craft seems to have the same spatial distribution as the level of ownership.

Some clear trends could be hypothesised by inspection of the maps. It was seen that power trailer boats comprise 80 per

cent of the stock of all boats so the distribution of residences of owners of this class of boat determined the distribution of all boat classes added together. It was seen that there were usually high levels of ownership of power trailer boats in moderate income areas as well as high income sections of the metropolis. For all classes of boats there was a very low level of ownership in the low income central city areas of Los Angeles. On the other hand, ownership of moored boats and sail boats is concentrated sharply along the coastline, with high peaks near the major recreational harbors (Marina Del Rey and Newport Beach) and the upper income coastal places (e.g. Palos Verdes Peninsula) Jet boats, which have a power trailer design and make up a small percentage of the fleet were seen to have a high concentration in the moderate income, non-coastal city of Norwalk.

To conclude, these findings were placed within the context of the current threat of gas rationing. It was suggested, without rigorous statistical testing, that both family income level and distance to available recreation sites were important factors in determining the level of boat ownership. In particular because of the distribution of available recreation opportunities in the Los Angeles region, 80 per cent of all boat owners have trailerable power boats. Most of these boaters have moderate income. It was suggested that if gas were rationed or if the price of gasoline became very high, that many boat owners would lose their opportunity to enjoy their recreational investment. On the other hand even if fuel prices remain at the present level and if fuel remains plentiful, a significant portion of the population of the urban area will remain unable to purchase the equipment necessary if they are to have access to the benefits of public recreational boating facilities.

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AN INDUSTRY VIEW OF FUTURE TRENDS IN MARINE RECREATION

Mr. Paul Albrecht
President
Southern California Marine Asssociation

I feel somewhat in the minority being asked to speak at such a distinguished gathering of speakers and guests.

My position here today is that of President of the Southern California Marine Association. Our association was formed in 1956 by a handful of concerned business men, all of whom were active, in what was then, a very small marine industry here in Southern California. When our association was formed it consisted of approximately 45 companies and represented approximately 150 members.

Today we are somewhat larger. We represent 398 firms who employ over 45,000 people directly involved in recreational boating here in Southern California. We are presently the largest AREA marine trade association in the country.

The purpose of SCMA is simple.....to promote boating and the boating industry in Southern California.

We actively maintain committees in the fields of legislation, education and information pertaining to recreational boating.

We work closely with local, regional and national marine organizations who are also involved in recreational boating.

We provide a comprehensive year round FULLY STAFFED boating information center for the public and the industry with FREE information on all aspects of boating. Our boating information center this past season answered over 1500 requests for boating information of all kinds.

We are pleased that you have asked up to participate. So now, we shall attempt to give you our view of our future.

Let us divide our outlook into two areas.

FIRST, THE IMMEDIATE FUTURE:

1. Looking back over the past 6 months, our industry was in the midst of an economic boom.

2. The 1973 model year produced over 4 billion dollars in sales at the retail level.

3. Over 200,000 people across the country were employed by companies solely in the marine recreational industry.

4. Beginning in late October and early November the boat business made a noticeable turn downward. HOW MUCH? Approximately 15 to 20% AFTER A SEASONAL ADJUSTMENT.

5. REASON: OBVIOUS. The UNCERTAINTY of the fuel situation in the United States today.

6. May of the distributors of small power boats will be drastically affected. Their sales are to smaller "Mom and Pop" retailers who, because of their lack of basic knowledge and know how, have not properly planned for such a slowdown. This slowdown, coming at a time of the year when new merchandise had been placed in stock for sale, and is now not moving, will surely cause many to fall.

7. As these smaller dealers go out of business, the market place then becomes glutted by distressed merchandise, causing an even greater strain on those dealers which are left in business.

8. THE SHORT TERM OUTLOOK, THEREFORE..... very poor.....with a loss of many marginal dealers.

SHORT TERM OUTLOOK FOR THOSE WHO REMAIN:

BAD.....BUT TOLERABLE.

1. The GOOD business men in the marine business who remain will be hurt, but will find ways to cut back the overhead and maintain a reasonable safe position while waiting for the market to return to a more normal position.

2. These retailers will find ways to promote the product and make it more attractive for the buyer. More buyers will then return to recreational boating.

3. The SHORT TERM will be rough, but as with any industry..... when the going gets tough, the tough get going.

WHAT ABOUT THE MANUFACTURERS:

THEY FACE SOME REAL TOUGH GOING FOR THE SHORT TERM.

1. They will have fewer dealers to sell to.

2. Those dealers left will DEMAND AND GET better deals or they won't buy.

3. Shortages of raw materials and higher costs of those materials will make it difficult to bring to the market place a good sellable product at a price at which it will sell.

4. The market place will already be full of boats - motors and trailers that because of the uncertainty of fuel, will not be moving.

SO WHAT HAPPENS:

1. Some manufacturers will fail, and the source of goods that the retail dealer and general public will have to choose from, will lessen.

2. Competition will decrease.

3. Prices will once again become stable - but at a more competitive level. This will draw even more people into recreational boating.

4. And so the weeding out process is once again taking place in our industry.

Not a particularly pretty picture but one which we have seen and lived with many times before.

NOW - LET'S LOOK AT THE LONG RANGE:

When uncertainty becomes certainty.

When the smaller retailers regain the confidence they had only one year ago.

When manufacturers re-align theselves to the new market place.

Business will once again return to the normal pattern of healthy, slow, upward growth.

HERE IN SOUTHERN CALIFORNIA:

In Southern California.....probably more than anywhere in the United States.....recreation is not just something to do.....it's a part of our way of life.

It's as basic to our needs as food and shelter.

As we look at recreational opportunities here in Southern California, we focus our attention on the mountains - the deserts - and certainly the most important of all - the ocean and its shoreline.

It is because of the ocean's great potential for recreational development that we in the marine recreation business predict a very bright future for our industry.

We believe that we have all of the basic ingredients for healthy upward growth ---the natural resources----the population to engage in participatory recreation---and the economic factors which make it possible for vast numbers of the population to engage themselves in our activity---recreational boating.

It does not take a genius to realize that in order to become involved, one must first own a boat - any kind of a boat-large or small - power or sail - a boat kept in the water at a marina or on a trailer at home.

We have a great need in the marine industry here in Southern California to make sure that the vast recreational possibilities of our ocean are continually developed for the maximum number of people wishing to participate.

The Southern California Marine Association is particularly pleased to see plans for future development of marinas and other water oriented areas within the state.

We believe that careful planning of future marinas should include adequate facilities for the trailer boaters as well as the larger berthed vessels. The importance of this is more clearly emphasized when you realize that 84% of the total registered boats in California are of this type.

Plans should be made to provide more areas where Southern Californians can store their trailerable boats AT or VERY CLOSE

to marinas and launching ramp sites. This would enable the apartment and condominium dweller to also share in recreational boating. This factor, we believe, is becoming increasinly important as the price of available land increases, causing builders and contractors to move away from single family homes towards condominiums and family apartments.

By careful planning by all agencies involved with the future of our coast, planning that which takes into account the many various factors which affect each new development, we can all have a more useable and more beautiful coastline.... one which many more Californians can more fully enjoy and use..... one which will better serve those people who have choosen boating as their recreational activity.

The Southern California Marine Association hopes to participate by contributing to future planning.

In closing let me say that our industry is now in the shadow of uncertainty. Uncertainty over the country's present concern for the conservation of its fuel.

We are more than willing to do our part.....however, we do not expect anyone to take away OUR RIGHT to continue to operate and to serve the public's desire for our form of recreation.

The marine industry is now suffering from a bad case of acid indigestion.....more commonly known as gas pains.

Let us all keep in mind, however, there is a vast difference between gas pains and terminal cancer. The marine industry of Southern California will continue to be a strong force in our ever expanding recreational market.

POTENTIALS AND PROBLEMS IN MARINE RECREATION

George W. Webber
Deputy Regional Director, Pacific Southwest Region
Bureau of Outdoor Recreation

The theme of the conference covers the future. Yet, also, we have been told that the program emphasis is on the practical, and not the abstract. Realistically, one can hardly be very practical while conjecturing on the course of future trends and events. None of us can speak very authoritatively on what hasn't happened. Therefore, the first part of my talk will stress the practical, namely; What my small agency and some others have been doing over the past decade along the California coast. Later on I'll hazard a few guesses on the impulses that will be dictating directions in marine recreation in the early future. To go beyond the early future (say the next five to ten years) essentially would be idle and probably foolhardy.

The Bureau of Outdoor Recreation, in cooperation with the California Department of Parks and Recreation and other echelons of government, has laid considerable emphasis on coastline affairs. This has been undertaken through; (1) the 50-50 cost sharing relationships of the Land and Water Conservation Fund, (2) in the disposal of Federal surplus property for recreation purposes, and (3) in large acquisitions of new Federal property.

Lets discuss the projects under the Land and Water Conservation Fund first. Coastline acquisition and development projects occupy the top line in California recreation priorities, and the State is in the pivotal position of deciding the direction of these monies. Since 1966, out of a total of some 300 funded projects, 52 have been marine oriented, i.e. coastal land acquisition, fishing piers, beaches, marshes, estuarine locations etc. In other words, about one-sixth of the projects are marine oriented. Over 6,300 acres have been acquired.

Marine oriented acquisition projects for recreation have received over $17,167,000 from the Fund. Development projects have received over $3,311,000. This totals out at a Federal cost-sharing of over $20,478,000 for marine projects. Of course, an equal amount, since 1966, was expended by the state or by local governments in the cost-sharing. All the 300 projects in California have received about $62,000,000 out of the Fund. Hence, while only about one-sixth of the total number of California's projects could be considered marine in nature, they represent approximately one-third of the cost of all projects. The grand total expenditure then, since 1966, has been about $41,000,000 under the Land and Water Conservation Fund along the coastline of California, one-half being Federal money and one-half State or local money. Incidentally, all but a half-dozen of these 52 projects are located along the southern half of the

coastline. Moreover, it should be stressed that other public and private expenditures have made, independent of the Land and Water Conservation Fund during the same years.

Since the passage in 1970 of the revised Surplus Property Act, our Bureau has transferred 33 parcels of former Federal property in California to State or local jurisdiction, nine of these involved acreages associated with marine environments. The fair market value of these nine former Federal properties total over $6,554,000 and they include some 512 acres of coastal land. Certain of these parcels have rather substantial fair market values, such as the former Border Field at over $2,377,000 and the Naval Training Center and Marine Recruit Depot at $2,500,000, both in San Diego County. Also, of course, 5.5 miles of Camp Pendleton beaches have been leased to the California Department of Parks and Recreation at essentially zero cost.

In the category of new and sizeable acquisition of Federal property at or about marine locations, the results are impressive. I do have certain slight hesitations in dwelling on these accomplishments, however, because of their concentration in southern California marine locations. The chagrin (possibly verging on jealousy) of this audience, however, hopefully will be tempered by its intense dedication to marine affairs. In any event, the State as a whole should benefit by establishment of the Point Reyes National Seashore, $57,500,000; the Golden Gate National Recreation Area, $61,600,000; South San Francisco Bay National Wildlife Refuge, $9,000,000; and the Redwood National Park, $92,000,000. These are authorized dollar totals. The ultimate expenditure will be in greater or lesser amounts.

To recapitulate, we find that since 1966, the Federal investment alone along the coastline areas in California totals over $247 million. Also, through cost-sharing, we have positively identified another $20 million spent by other governmental echelons. Before leaving the Federal area, I should add that the Bureau of Land Management has a very active acquisition and land-exchange program in the King Range along the coast between Eureka and Fort Bragg. Federal lands here will be increased from 31,000 to 46,000 acres, concentrated along 25 miles of coastline.

Beyond this, of course, State, county and local governmental entities and private concerns and foundations have spent additional sums in purchasing, developing and managing coastline acreages. The California Coastline Preservation and Recreation Plan of 1971 by the Department of Parks and Recreation, tells us that 408 miles of California's coast were publicly owned at that time: 145 miles Federal; 200 miles State; 34 miles county; and 29 miles municipal. Of these 408 miles, a total of 137 are publicly owned in the northern third of the State, 108 miles in the central, and 163 in the southern. Without judging the merits, it's necessary to note that perhaps two-thirds of the Federal mileage is closed to public use.

While the most extensive public coastline mileage is found along the southern California coast, the ratio of usable space per person is obviously lowest in this area. I've used too many numbers already, suffice it to say that the California Comprehensive Ocean Area Plan (circa 1970) by the Department of Navagation and Ocean Development estimated 127,000,000 recreation days were spent at the State's shoreline in 1970 and that 177,000,000 recreation days are anticipated by 1980.

In confronting the subject of potentials in marine recreation, one feels as if he should simply develop a taste for classical music or take up Mah-Jongg. So much as been documented by so many people regarding coastal recreation needs and

opportunities that every utterance becomes a redundancy. Excellent material exists on types of recreation areas and locations which are required here in California. I've cited a couple of reports, but there are many others. California's Coastline Preservation and Recreation Plan makes one particularly simple but (to me) very sage recommendation, however, namely, that "Structures and activities along the shoreline must be limited to those dependent upon the coastline." It goes further also and states, "Those meeting this requirement should be located and constructed to minimize their impact on the shoreline's natural and recreational resources."

One could go even further and suggest that existing facilities and activities interfering with essential coastal uses should be removed. If we will be experiencing growth in marine recreation comparable to other activities, this removal procedure will be commonplace and very expensive. Recently, as some of you may know, we cost-shared with the City of Long Beach in acquiring 0.32 of a seaside acre. There were several buildings on the site containing nine apartments. This one-third of an acre cost $282,000. The buildings have been destroyed. Presumably expenses will be incurred in restoring the site. Based on this rather extreme case, however, we may be envisioning million dollar an acre costs, in some instances, for acquiring land. No wonder legal briefs are being prepared on behalf of establishing public commons or establishing public access right along the shores.

As the King Ranges, the Redwood Parks, and the Point Reyes are brought into existence along the somewhat more remote reachs of coastline, this eases the long-term strain for recreation acreages for the State as a whole. But for the shorter-term future, this is of comparatively little benefit to the southern Californian, especially the crowded inner city resident with small amounts of disposable income.

One could argue for acquisition of large swatches of coastline in the south, similar to the northern acquisitions. Where are they, however, unless one contemplates acquisition of shore fringes already developed? Camp Pendleton and the Channel Island are exceptions to the congestion.

Our Bureau issues a monthly bulletin listing legislative proposals in the Congress. In the November issue, there were 191 proposals for new National Recreation Areas, National Parks, National Lakeshores, National Seashores, National Riverways, Wild and Scenic Rivers, Parkways, Scenic Roads, National Wilderness, etc., or additions to areas. In all, 20 pages of goodies. Many of these of course, never will be acted upon. But, others will be added and the potential for expenditures must total in the billions.

The point I'm trying to make here is that correction of inadequacies for coastal recreation will be very costly and very competitive with demands for other investments for outdoor recreation, to say nothing of demands for other types of legitimate needs.

Some time ago I gave a talk in Tucson in which I discussed what I believed were the underlying impulses or engines that were driving this outdoor recreation machine. One of these was the conservation movement in its old time sense, i.e. the preservation of unique or special areas (the Yellowstones and Yosemites). Creation of the Redwood National Park falls in this category and it's coastal, but there won't be many more of these except possibly in Alaska. There just aren't many of these sensational type areas left.

The second impulse behind the outdoor recreation movement I described as sociological. There seemed to be a growing recognition following such events as the Watts riots that maybe recreational outlets were more than merely desirable. Perhaps they were essential. The recognition of this concept resulted in inner city emphasis and special attention to rather sizeable Federal acquisition programs, such as the Gateway National Recreation Area in New York City and the Golden Gate National Recreation Area in San Francisco.

My own notion is that this sociological impulse will continue to be quite viable, perhaps even looming greater in the future involving not just disadvantaged areas, but metropolitan areas generally. There seems to be reason to believe, however, that for the near future, at least, the funding for coastal areas will not involve large Federal outlays. More likely the setting aside of additional public zones along the coast will emanate from land-use planning decisions, with cost-sharing among the several governmental echelons. The so-called "new" Federalism seems to call for this. It's quite interesting, this matter of funding. If you read Federal reports, you find quite frequently that the state is described as the pivotal point for decisions on matters involving a multitude of things, including recreation. Quite often, however, state reports describe the local governmental entity as having primary responsibilities.

The third motivation to outdoor recreation investments is rather new, but promises to continue to move us forward. This is the interest in the environment. The movement still has much drive despite ongoing conflicts with the resurgence of demands to meet energy needs. Some would place this impulse as concomitant with the old conservation ethic. I don't believe it is. Environmental attention often focuses on the commonplace, this mudflat, that shoreline, this deep fresh marsh, etc. In fact, it is these two latter concepts--the sociological and the environmental that appear to be the dominant forces presently and bode to be in the future.

Finally, in looking at the future, we have to confront the gyrations that may be engendered by our latest crisis, which is energy, of course. This fourth item, if perpetuated, and if profound, will be of great influence. On first examination one might be forced to conclude that outdoor recreation may be moved into the back seat again. It appears this may well be true, at least for the short run, particularly with respect to hinterland acquisitions and developments. Conceivably, however, the direct opposite prospect may emerge for coastal locations. After all, its less consuming of energy for the Los Angeles resident to visit Redondo Beach than to tour Yosemite, unless he is a devotee of power boating. At this writing one cannot be very optimistic on the continued high levels of use of recreation vehicles and other energy consuming avocations.

In summary we are confronting: (1) already developed shorelines in many instances, (2) high recreation demand for coastal recreation areas, (3) high demand for coastline locations on the part of other public and private interests, (4) a mixture of ecologically fragile and ecologically tough areas, (5) high costs for acquisitions, (6) diffused responsibility for action on the part of many governmental entities, (7) changing laws and rules on coastline development, and (8) a general shortage of funds for moving forward. In other words, the complexities of human efforts on shoreside areas is seething with activity and interest. It rivals the many complications one encounters when trying to understand by biological complications of estuarine environments.

Where, then, lies the answer to accommodating the public interest? Of course, no one knows for certain. It would appear however, that coastline improvements will come about from a variety of actions, as follows: (1) probably coastal spending for recreation will continue to be emphasized over other areas in the State, (2) doubtless we will continue to see some progress being made in the use of zoning improvements, (3) new ideas for expanding private investments serving the recreating public will be forthcoming, (4) acquisition of travel corridors for the public to gain entrance will continue, (5) new laws establishing beaches as public commons will be aired and discussed (if not passed), (6) a further intensity in coastal planning is foreseeable at all levels, and (7) the level of public interest in what transpires along the coast will continue at a high level.

This belief in a continuation of high interest is supported by the percentage increases in volume of participation for selected comparable activities on summer vacations during the period 1965-1972. A national survey was conducted for our Bureau in 1972 and it revealed the following percentage increases in participation for this period: camping in developed campgrounds, 213 percent; picnicking, 208 percent; swimming, 125 percent; water skiing, 100 percent; sailing 96 percent; and sightseeing, 71 percent.

Certain activities common to the seashore were not included in the sampling, but given the level of interest and the inherent complexities and contradictions in managing coastal areas, it appears to us that lively prospects are ahead.

One futuristic aspect I neglected earlier to touch upon is the possibility of increased layering of uses along coastal areas. That is; various uses piggy-backing on one another, seasonal scheduling of uses, even daily scheduling, and/or joint uses of property.

Finally, and of course I could be wrong, but I believe improvements in coastal recreation more likely and more often will result from institutional changes in laws, governmental practices, and perhaps even customs, than in simple and single-purpose acquisition of large lineal acreages. Others, who have been speaking here, or will be speaking, are better fitted than I to discuss these aspects.

MARINE RECREATION AND THE PLANNING PROCESS: PLANNING ANYONE?

By
Francis Dean
Eckbo, Dean, Austin & Williams
Newport Beach, California

I was prepared this morning to deliver a highly organized talk on marine recreation, its needs, new innovations such as hang gliders, soaring, underwater parks and the educational enjoyment of experiences such as whale watching, marinelands, interpretative centers dealing with shoreline, estuaries and marine life exploration. These all in addition to the natural magnetism that the ocean holds for all of us for boating, and swimming, fishing, or just watching. Then--BANG!--we had another bombshell--the energy crisis. I therefore decided to take the opportunity to focus on some of the difficulties encountered in the planning process which must be resolved if planning is to have a significant role.

However, we seem to respond rather well to crises these days so it would not be out of character to assume the energy crunch to be just another impact and build it in to the process. However, the energy crisis in a society based upon growth and expansion can have serious ramifications upon our economic system, but may portend the beginning of understanding of finite natural resources, much more so than the environmental issue. Even some forms of the existing and projected marine recreation activities may well be a moot point.

It used to be easy--if you wanted to build a marina, a housing project, a recreation facility--no haste--get your permit and begin. Recreation was vested in a boat, or perhaps your kick was fishing or surfing. Or you might be a sun bather and access to the beach was through the no trespassing sign, down the face of a cliff hand over hand, spilling the lemonade and finally coming to rest next to an oil pumper or railroad track. You could walk the tidal pools, learning how sea urchins coped with oil globs. In one way or another, these recreational activities will be impacted upon by recent decisions and others upcoming.

It started in Santa Barbara--they spilled the beans about an oil spill and we were all in the soup. Everything would have been OK if the oil companies had just cleaned up the mess. But we had to go through a continuing agonizing reappraisal attempting to determine the culprit who turned out to be a portion of the industrial complex to whom we owe our growth and expansion. And now that that has been determined where do we go from here? The energy crisis will now allow more drilling to go on and with no better planning than before. Since then we have had the requirements of EPA, CEQ, and ARB along with the Coastal Commission and now the Clean Water Program and a State Land Use Policy

pending in Sacramento.

You say--yeah, what happened? Well, I know now what I wouldn't have believed ten years ago. The public is serious, outraged and fed up and now reponding the best way it knows how in a democratic society. It is the largest special interest group with which this legislature has ever had to cope. Perhaps the greatest contribution by the public has been the impact on time honored traditions in the political field and on the staid and solid institutions of governmental practice. Accountability for one's actions is now the standing order of the day and there is no room for rationalization, ignorance or incompetance. In fact, if the public had a long term track record in terms of self-expresion relative to land use, it might have psyched out the energy shortage earlier and used that as a defense against the missuse of land and finite resources.

There are, of course, serious gaps, problems, and many non solutions in the legislation that has been forthcoming. But how else do you start except on an issue level in a society that is crisis oriented. However, crises inherently produce short term solutions on their way to the next crisis. If the State or the country or the world for that matter ever needed long term goals and programs with monitoring capability and adaptibility to new information, it is now. But we will have more crises, shortages and struggles relative to coastal lands, agricultural lands, open space, recreation lands, natural resources and man's needs and the capability of our environment to adapt to those needs. No one would disagree with the premise of an improved quality of life, but how does one achieve such a high moral purpose in this society and prevent it from becoming an impaired quality of life. First of all, awareness on the part of the citizen hopefully resulting in dedicated leadership through the representatives.

Crisis has proven to be the least desirable method of achievement. One of the hazards of a crisis is that there is always someone to exploit it, vis-a-vis the Alaskan pipeline which will only begin to supply us with a relative low volume of oil in 8 to 10 years and who know the full price?

But what are the alternatives? The energy crisis rather than being a permanent negative impact may be a long term positive impact by causing a renaissance in intellectual pursuits and stretching mankind beyond his assumed limits. A word of caution, however, we may very well respond to the crisis and sacrifice some of the environmental gains, but to over-react could cause irreparable harm.

It has been our good fortune to be involved in many projects of late where we have been applying an approach that allows all issues and factors to be involved in the planning process including the public advisory groups of users, observers or concerned individuals. For the purpose of explanation, the factors or issues are grouped into three general categories:

1. Pysical and biological characteristics of the zone are combined and referred to as the pysical environment.
2. Attitudinal and demographic characteristics of the society that occupies, uses, relies upon that environment.
3. Political, economic, legal and cultural framework which defines how the society regulates and orders its activities within that environment.

A reasonable means of weaving these interrelationships into the decision making process is fundamental to establishing and maintaining an optimum dynamic and symbiotic balance among all factors.

The conflict between conservation and development is a clear example of the established system's inability to accomplish this goal. The internecine attitude of the two forces can only be adjudicated through the understanding that each depends on the other.

Two factors compound the conflict. First, the existing political, legal, and economic frameworks involved in a socially oriented vacuum which assumed the coast environment unlimited, indestructable and unchanging, and therefore immaterial. Second, through attitudinal change, the physical environment becomes a social issue. Now we have a political, legal, and economic framework unable to reconcile new attitudinal changes in a society that has achieved a degree of awareness of the inescapable relevance of the environment.

Therefore, it is now necessary to develop a unique effort to create a responsive new governmental framework to cope with this new awareness.

It must recognize the inexorable, continuous nature of the physical-biological systems which form the environment and the equally ingrained, traditional cultural and economic systems which have become the warp and woof of our society. It is the incompatibility of the two, when juxataposed, that define the problem, and it must be a modification of both to a harmonious end that will solve it.

Information and knowledge concerning the interrelationships of environmental or social factors is inadequate for any final determination of the organization of either. Since both are essentially continuums of change, it is highly unlikely that such information or knowledge will ever be more than temporarily adequate even under the best of circumstances and certainly never complete.

Any procedure for making decisions must therefore be capable of:

1. Bringing to bear the available information and knowledge at the time the decision is to be made;
2. Estimating the ramifications of alternate decisions;
3. Creating and recording new information and knowledge by monitoring the results of the decisions made.

The social political, and economic forces which help to determine the physical configuration of the landscape are as complex as the processes of the land. The diverse interests of the private sector are the most significant force which governs land ownership and use in our system. Government bodies have been established to serve the purpose of insuring that the private interests of one individual do not conflict with or destroy the opportunities and interests of the total community. In terms of long-range planning the role of the government would appear to be that of protector of the land.

However, it is apparent from the problems and conflicts which have been outlined that county and city governments are presently ill prepared for this role. Present methods of long-range planning and regulating land use have been unable to forsee and protect communities from the direct costs which result from the conflicts between private interest goals and the capacity of natural systems to absorb the resultant impacts.

It is assumed that the planning process prescribed by the Coastal Commission is heading in this direction attempting to analyze, evaluate and establish criteria in determining land use, marine recreation, intensity of development, etc.

The Coastal Commission in dealing with recreation must examine all other uses as they might relate to recreation.

PROCESS

1. Gathering of all data relative to the natural and physical political, economic, and social forces;
2. Analysis and determination of the interrelationships of all natural phenomenon and physical needs along the coastal areas;
3. Evaluation of all of the above and establishment of alternative approaches for review or public hearings;
4. Selection of alternatives from input through review;
5. Preparation of final policy and review.

In summary, it is clearly evident that some planning processes and land use controls are inadequate to deal with the conflicts arising from the imposition of abstractly conceived design criteria of various development types upon a highly dynamic landscape such as the coastal area. The coastal zone is being subjected to an ever increasing burden of additional and unnecessary costs and degradation through the lack of adequate measures to protect the environment. An essential component of sound planning whether it be in the establishment of policy, master planning, or in the review of specific planning applications, is the availability of critical information on natural resources against which the consequences of alternative proposals can be rationally assessed. A continuing public review process is necessary in order to solicit input as well as to help define public value and build public support.

I have a half a dozen or so slides take along the coast that I think may demonstrate some of the things I have been talking about, relative to inadequacy of information, exploitation of the landscape, and other factors in design and planning.

Slide 1 - This is where we all started open, uncluttered landscape along the coast. If we all understood the need for it's use, the quality of the space and the absolute continuity of natural processes we would not be in the mess we are today.

Slide 2 - This is in Southern France near Nice, some of the impacts that are occurring in Southern France are as critical as are those happening along our coast or Miami Beach. The walls of apartment structure along the beach front are beginning to appear almost as dams backing up the watershed. But the unique thing about this picture is the historical relationship of land and the development in the foothills - the houses fit the hills because of the acceptance of the natural forms.

Slide 3 - Here is a shot from Hawaii, different in scale, from what we were talking about along the Southern California reaches but I think this demonstrates our emotional affair with the ocean. Everyone would like to live along a beach like this. We always think in these terms then we are forced to go down to Santa Monica or Redondo Beach area and wonder what went wrong.

Slide 4 - The same similar types of land form as the slide just before but lack of understanding of what the land had to offer, and I can't think of anyone coming down to this beach to get a view of the ocean and live in one of these condominiums. Erosion itself will wipe out the houses in time. Fantastic, we have a beach that is minimal in quality and size at best and we destroy the very essence of the beach by impacting on it with houses. Only a few people can enjoy this public resource.

Slide 5 -The reason I threw this in is that this is what is normally found just prior to urbanization. This is a pretty handsome piece of land regardless of the fact that we have sewer outfalls, a channelized stream, a freeway and a railroad. Here we are at least trying to save some of this even though the natural environment has been impacted upon. But it is still viable as open space. But you can see the future now, this is just above San Clemente, the development will be close in, the agricultural lands will be gone, the stream will be further flood controlled, there will be houses all along the beach front unless we determine some process that relates land to need. As I said in my talk there is no question about the balance necessary between development along the coast and the preservation of unique areas resulting in what we call conservation. We should be preserving unique areas. But we must begin to understand that when the pressure of need is involved on a resource like the coast line, we must develop a process whereby the natural physical functions along the coast can be modified to accept man and his functions in a graceful, all encompassing comprehensive planning program.

Slide 6 - This is kind of typical of what happens. This is a storm drain outfall. It is interesting how people adjust to situations like these. People actually end up parking and camping adjacent to this outfall and apparently enjoying a recreation experience on the beach.

Slide 7 - This is an estuary partially impacted upon by oil, streets and highways, etc. But it's still functioning as an estuary, if only we could have obtained this land soon enough, we could allow the oil companies to continue here, and even allow other types of development but it would

have been with an understanding of what this marine estuarine life is all about. The significant relationship between marine life, the estuary and the coastal land and human needs could have been planned in a total organized development program.

Slide 8 - This is Santa Monica - not bad for many years ago in which even then there was evidence of preservation and understanding of the land form. Not the best but at least an effort. You look for anything when you are down to zero.

Slide 9 - Somewhere between San Clemente and Laguna, the projection of land almost completely lost to us. We would have to pay dearly to get it back.

Slide 10 - But this similar projection on the island of Oahu is what it could have been. A real observation point to view the ocean, here you have an 180 degree view both up and down the coast.

Slide 11 - Here we come into an area where foothills meet the ocean. We chop off the top of the hill sloping to the coast and build houses in this rigid format to get as many houses per acre as possible. It's very hard to get excited about the coastline when you approach a desecrated site such as this.

Slide 12 - More of the same.

Slide 13 - I put this in because I think that Marina Del Rey has solved some very difficult problem in this area but obviously not enough. What annoys me about Marina Del Rey is not the fact they have opened up the estuary and allowed the boats in, what annoys me is that even when we get into housing boats, we have to line them up like a parking lot thus losing the whole impact of water. Great imaginative uses could have been made with that water but economics calls for us to put these things in a row like a flat land subdivision.

Slide 14 - This is what we are all looking for in use of the beach.

Slide 15 - Not only do we build houses on the beach and invade the beach but here we locate them at 45 degrees to take excess advantage of the view for 180 degrees. This is an atrocious development.

Slide 16 - On Balboa Island everyone gets near the water but doesn't know where it is. They pay dearly for a piece of land on this island. The whole marine environment of Newport Beach is houses and water but only if you buy a boat can you see the water.

Slide 17 - More of the same.

Slide 18 - We seem to take advantage of the coastline for almost anything. I understand the next two increments of the San Onefre plan have been turned down by the State Coastal Commission. I guess we are going to have a hassle on our hands between the AEC and the State Commission. I know we need energy, I know this isn't the place to put but I don't know what the tradeoffs are. We need a very comprehensive plan to understand what should be done.

Slide 19 - I think one can imagine what the first settlers to the Los Angeles basin must have thought as they viewed this magnificient stretch of beach from Santa Monica to Palos Verdes. We have turned it into nothing more than a sand strip, the whole relationship between that land and the water

have been lost forever. When we built Marina Del Rey we lost the understanding of the impact between estuary water and the coastal land and the marine extension into the channel.

Slide 20 - This is up near Malibu. It would seem to me that despite any other planning program, the fact that the land of the Santa Monica mountains is shifting would preclude this kind of cutting and filling for this kind of development. The land is certainly a desirable piece of land but shouldn't it be an area preserved because of potential hazards.

Slide 21 - I think there are people who understand the sensitivity about the relationship between land and water and trying to do something with it. This is a good example of that relationship in the Venice area.

Slide 24 - If we could all have a view such as this in Southern France the response that a picture like this engenders, we would all be very careful how we managed our coastline. The california coastline in it's own unique way could be planned in a similar way.

SESSION IV: COMMENTS-DISCUSSION
QUESTION & ANSWERS

COMMENTY BY: Bemi DeBus, American Cetacean Society and MTS/LARS Councilor.

As an addendum to this morning's Series IV sessions, I would like to append the following:

It appears to me that in all the talk we have heard about the marine environment, land and people problems legal and otherwise, the planning for future use and the like, one factor (minor admittedly, except to those involved) has been completely overlooked. We should like to call your attention to the view from the water. From off the beach, as enjoyed by hundreds of thousands of marine mammals. They too have a vested interest in water quality, in environmental impact questions, in the life-styles practiced on the western coast and certainly in the western states' future. Long live the whales!

(EDITOR'S NOTE: the following words come from the March 1974 "The Whalewatcher" newsletter of the American Cetacean Society of which Bemi is editor)

"Mr. Isadore Barrett, Deputy Director of the Southwest Fisheries Center at La Jolla, California, as a figure to be remembered, and against which to compare future catches, that, at the present, it is estimated that 3-1/2 dolphin died for every tuna-ton taken.

Under terms of the Marine Mammals Protection Act of 1972, not only are means to be found to reduce dolphin mortality in the tunafish nets, but also a program of gathering information about these marine mammals was to be instituted. We will be happy to see the final results of this section of the program when it is finally made available, and we will look forward to welcoming Mr. Barrett again.

IT MIGHT BE APPROPRIATE at this point to show that there are other indications of increased efforts at information-gathering along this line. The Coastal Zone Commissions, formed under Proposition 20, are also to come up with suggestions for the future, as well as trying to handle the real estate problems of the present. In a Final Draft Copy, dated February 11, 1974 under Coastal Zone Plan Element: Marine Environment (Page IV-9) there is this statement: Many institutions currently utilizing marine organisms from the water of California are engaged in a broad spectrum of biomedical research programs ranging from the use of bacteria to degrade oil spills, to the use of marine mammals in underseas warfare programs. This broad application of the biological resource of these waters generally receives attention in esoteric professional circles, yet it must be recognized as a very significant use of the resource and one which must be permitted in future management programs for this coastline. (Ed's note--the "amen" is universal)."

Questions - Paul Albrecht

Q. Phil Simons made the report about the legal ownership of boats - the fact that so many boat owners project their middle-high income, are not the legal owners, they take out loans. Do you foresee an increased shortage in the boat loan market for the short term, and an increase in the interest rates?

A. No, I do not. I was anticipating another question from you. No - I, this week - pardon, last week, the latter part of the week, I had a meeting with the head people in recreational finance for the Bank of America. It might be interesting for all of you to know that, in the past six or eight months at a time when interest rates were just going out of sight, we held the same identical interest rate of boat paper and boat financing that we have had for the past two years. We didn't even raise it a 1/4 of a percent. The reason is that most of the dealers, as I've referred to as Mom and Pop dealers, are small businessmen and they fall into a different interest rate catagory than do larger borrowers. Their interest rate has not been affected. and it's the selling rate of the Marine retailer that determines the interest rate. As you probably all know, the Marine retailer generally makes 1% or 1 - 1/2% or 2% in some cases on marine financing.

Q. How does the energy crisis affect sailboats?

A. Well, I have to admit something to you. I'm a dyed-in-the-wool power boater, and you know how that goes. We power boaters and sailboaters have our thing going and I really don't know, except from my own personal experience. I can tell you that we're located in the Long Beach Marina shipyard in the Long Beach Marina - one of the finer marinas on this coast, I might add. I have noticed a slow-down of walk-in traffic in my place of business. I'm a power boater. I have not noticed this same slow-down in the sailboat people next door. Now, this really doesn't indicate anything. It could be that he is advertising more or he has a special deal or something. I don't think you're going to see a drastic switch from power boaters to sailboaters because of the energy crisis. I think that's what you're getting at. I don't think you're going to see that, because once a power boater, always a power boater.

Q. Again, the Southern California Marine Association Boat Show, which is the largest one in Southern California, just completed about two weeks ago - from that boat show which started three days after the energy situation, were there any trends that were seen from that boat show, as far as people coming through, on-the-floor sales or anything that related to the energy situation or other trends in marine recreation?

A. Yes, there were. This is our third boat show in the new facility. By the new facility, for you people who are out of town, I mean the L. A. Convention Center. We are the oldest and largest boat show in this area. We have been putting on that boat show for several years at the old Pan Pacific Auditorium out in Hollywood, and three years ago we changed. When we changed from the Pan Pacific to the new facility, our attendance increased 26%. Now, this could be economics - it could be the facility. We tend to think it was a little of both. The second year was up another 15%, so we ended up about 40% over what we were doing at the old Pan Pacific. The show that just ended closed down about 10% under last year. Now, last year there were other factors that affect the boat show business. If it rains, it's great for us because people can't go boating. They don't know what to do with themselves - they come to the boat show. You might not think about that but, if you put it through your head, you'll see it makes a lot of good sense. If we have a rainy week end - two rainy week ends - we love it. That's what happened two years ago. This show this year was down a little bit. I don't think there was a correlation with the energy thing and the attendance. The sales, by the way, were up very much. I did about a quarter of a million dollars in tentative orders.

Q. What of your development of the rotary engine and the 4-cycle engine to replace the 2-cycle engine?

A. Well, the rotary engine, of course, is an outboard at this time. The outboard model is the one that you're talking about, and I left the outboard business several years ago to get into big boats; I'm not really up on that field. I don't have as much expertise as I should have on it. I can tell you this, it surely is raising havoc in the racing circles because they have outlawed it now. There's nothing to compete with it, so I would imagine that they're having very good success with the rotary engine. I imagine that we're going to see a commercially built and marketed outboard engine of the Wankle type very soon. The turbine engine, by the way, in the big boats has not worked at all.

Q. Is your indication of brisk sales out of the show - is that in the large power boat, diesel fuel?

A. Yes. I'm in the large power boat business. The products that we sell are $20,000 and up. Most of them are in the $100,000 catagory. There was also good indication in the smaller boats that sales were up. I talked with a manufacturer's representative for the intermediate range - the run-abouts. He had had the best sales in this past show that he has ever had in any of our SMA Shows, and he's one of our ex-directors. He has been in a lot of shows and he is a good showman. I think it really gets back to the established dealers, those who are not going to run scared - who are not being panicked by the present talk on radio and television. As I said before, the dealers who are not going to let themselves be panicked in this situation are going to be around, and we really look forward to a very good Spring, not as good as it has been, but there'll be a lot of product sold and I don't think that the boating business is going to dry up and blow away.

Q. Is there a bigger problem concerning availability of diesel fuel as opposed to gasoline?

A. Well, when we talk about fuel; you know, I knew that you guys were going to get me into this fuel thing. When we talk about fuel, let me relate to you, if I may. I'm extremely concerned. My whole life, you know, comes right out of the end of one of those hoses you see at the gas pump. So, I had my finger right on it and I'll report to you what happened in the Long Beach Marina, which I'm very closely associated with. Mr. Ken Lockman, who runs the Union Oil Dock in the Long Beach Marina, is a very good friend of mine. I went over and had a cup of coffee with him right after the boat show, and we talked about the energy situation. I said, "Ken, how are things going?" because, obviously, no fuel and he's out of business. He said "Paul, I've had the best November we've ever had." He said, "My God, everybody came in here and filled their boats up". He said. "there are more boats in this Long Beach Marina with more fuel in them than there's ever been." He said," I'm out of fuel right now". I said, "is that going to last", and he said, "no, as a matter of fact, tomorrow they're bringing in a full load. You can check with me". I wanted to get my boat filled up. I did check with him, and I did fill up my boat.

At this moment, when I'm talking to you, I can honestly tell you there is more fuel sitting in the Long Beach Marina than there has ever been at any time, ever. Because all the people ran over and filled their boats up, and they have the fuel in the docks, I don't know what the hell people are going to do with all the fuel they've got.

Q. What are most of the boats being sold today being manufactured of?

A. The answer to that is Fiberglass, but probably I'm guessing, 90% maybe.

Q. The second part of your question was, is there going to be a shortage in this basic raw material? Is that right?

A. I will tell you only what I know about it, and I won't tell you that this is fact; but there have been some shortages in the basic raw material. The raw materials being resin. You see, a Fiberglass boat is made of two parts. It is made of Fiberglass, which is a cloth material, and resin. The resins are what we've experienced a shortage in. The reason, we believe, is very simple. There has been a price fixing on the price of resins at 12-1/2 to 13-1/2 cents a pound. At the same time that this went on, foreign buyers have come into the market place and are buying resins at 25¢ a pound. Now, I ask you in all honesty, if you were the manufacturer of resin, where you would sell? You would obviously sell where you could get the most money for it. This has caused a temporary shortage. In our case personally, of our own manufacturer which is Uniflite Fiberglass Boats and built in Bellingham, Washington, there is no shortage whatsoever of basic raw materials. This is because of two reasons: Number 1, we are a very large producer of Fiberglass for the United States government. Number 2, we use a special resin which is made by Hooker Chemical, and it has an additive called "Hetron". It is a fire-retardant resin, and I dare say that you folks sitting out here are going to see the day very soon when all Fiberglass boats will be made of fire-retardant resins, by law. We have been paying the premium price all along and we have no shortage at this time.

Q. Isn't there a shortage of Styrene Monitors?

A. Yes, Styrene, Styrene Monitors are some of the products which are now short.

Q. I understand they are selling a lot of Styrene overseas while we have quite a shortage of it here in U.S.

A. That's correct. The price, you see - the law of supply and demand rules here and, as I said before , if you were a manufacturer of this basic product - you cannot condemn these people for trying to get the best possible price that they can get for it. Now, when the government releases or relaxes their fixing of certain prices and the prices float upward, there will no longer be a shortage.

Q. Has your organization made any prediction as to shortages in available berth slots in Southern California?

A. This is a major problem. It's my major problem. Now keep in mind I am in the boat business. If I don't have a place to put a boat, I can't sell that boat. So, it is my major problem. We have not done any statistical analysis of the berth situation because we know, quite frankly, that there just aren't enough. And, I would think that you gentlemen here, who are very closely associated with the facilities and marinas and things like that, could do the boating public a great service by increasing the available amount of slips.

Q. I agree with you. I'm with the Corps of Engineers. I'm directly involved in studying the expansion for oceanside marinas and small craft harbors. Our studies show right now that by 1980 we will be short 1,500 berths for boaters, and by the year 2,000 we will be short 8,000 berths. I was just wondering if your organization had done any work other than what the federal government and the state government have done.

A. No. We relied quite heavily on your figures and they sound correct to me. There's a beautiful area there to be developed. We'd surely like to see it developed.

Questions after Francis Dean's slide presentation

Do you know of any examples of real citizen's input and the follow through during implementation?

I have one beautiful example right here in Orange County that I can only refer to in generalities. We did a little concept study of the Santa Ana River as it passes through Orange County about 2 years ago. All I can say about that plan is that it was completed and sent to the Board of Supervisors and accepted by the Board, through the good efforts of a 100 man committee composed of real citizens who owned land in the area, used the land and were concerned with the ultimate plan. There were some council representatives, environmentalists as well as the committee. The process here was very sensitive because the river runs through several communities in addition to the county unincorporated areas. Several federal and state agencies were involved as well as many county districts such as flood control and water districts. All had to have input into this plan and it was this committee, and I'll say it was a successful committee operation because of the leadership and a carefully planned, organized program, that made it possible to be accepted by the planning commission and the county board of supervisors. The other program I am aware of was the Bay Area Conservation District Plan in San Francisco. It also had great community support and one reason BCDC is operating today is through the same kind of efforts. Community committees are dependent upon organization and upon its leadership.
QUESTION - We have heard about the 10,000 acres at Irvine, really asking what should we do with it. Isn't this a golden opportunity to make a coastal park or something?
ANSWER - You are absolutely right. Everyone in that community should have knowledge of what is going on and provide Irvine with their input. There are many factors relative to that particular piece of land. Many issues have arisen since the first concept was completed for instance, the freeway was stopped which made a tremendous impact on how to handle the traffic through that section of land. I think Irvine would be absolutely delighted to know what the public is thinking and gaining their input. They are not sure what they want and they are not sure what the public wants. Irvine needs someone to tell them what they would like to see and I believe Irvine will listen. Irvine projects, I believe, are cut above the normal types of development and we are really beginning to see improvement by developers and responsiveness to the public interest.
QUESTION - I've heard a great deal of planning about boating and boating related things and other types of development. I represent the surfer - what will happen to him?

ANSWER- Let's take the surfer, if it hadn't been for an extreme effort by various groups along this coastline for preservation of some of the natural wildlife we would have lost much more of it than we have lost today. It is only by virtue of these groups getting involved that have made it possible to allocate many areas for the preservation of wildlife. I think the same for surfers and surfing. If you think of surfing as a recreation activity, that doesn't use energy, a healthful sport enjoyed by great numbers of people, then there must be a place reserved for this activity. But only if the surfers get involved and speak for themselves. You must all be involved - let your wishes be know. How it fits and relates to other activities is the job of the planners - but you must monitor them and participate with them.

QUESTION - Your comment suggests a balance between the public use and the private use. It seems to me that the emphasis here, however, has been toward the public use and I'm concerned as an individual property owner, as I think each of us in the room who owns individual property should be, and the pendulum at the present time seems to be swinging in terms of public use and conservation and yet what about the property rights as guaranteed by the constitution and the numbers of things which are happening today to pre-empt property rights or by inverse condemnation, or to tie up property, or to put it into moritorium what about those considerations.

ANSWER - I'm not a lawyer but I think the public's value, and public attitude and it's interpretation through legislation is what becomes law. You have an absolute right to get just compensation for that land if it is so choosen to be put into public use but I think it is part of the planning process to determine and to make recommendations in the change of land use from private to public use. He will make these recommendations in the best interest of the total public but it can only be acceptable as a result of the democratic processes. The private land owner must make his position clear and it must be part of the process. We are moving back on the public's value of its resources. Yes, society is changing its val ues relative to the environmental resources. As a result, the use of private land for public use is a major issue. After 200 years of telling a man he can go out and buy and own a piece of land American society has begun to change its sense of values and saying wait a minute, you can no longer do with your land as you please because of it's impact on the public. I cannot make judgements I can only plan in the best interest of the public try to develop a balance of conservation and development. We are all several different types of public, we own land, we also drive to and appreciate the national forest, we work at our place of business, we detest a sewer outfall, we look at the tanks and the drilling going on in the bay and we detest this, we use parks and schools. Who are we - what are our interests - can we be one public at one time and wear a different hat at another. How are we going to make decisions? We will have conflicts under the best of circumstances but we can only resolve these with true citizen participation. Some of the decisions will be made in the courts.

ENERGY: THE MAD DANCE OF DEMAND

L. Edwin Coate
Deputy Regional Administrator, Region X
Environmental Protection Agency

In mid-november, a Newsweek magazine article said that the American society--the most affluent and the most intricate economic mechanism ever know--began to adjust to the new balance of the energy equation.

What is this new energy equation? What forces have dictated it? What can we do about it--now and in the future?

These are questions that we find we have to answer, and we find that we cannot procrastinate; we have alarming problems now, this year, and even more alarming problems to face through the next several years.

What I sould like to explore with you today are some of the reasons we have these alarming problems, and rather than try to give you any pat answers, try to point out some of the alternatives that are available to us.

What is the "new energy equation?" Stated simply, it is a gap--a gap between the available supply of energy and the present demand for energy. I'd like to imagine, if you will, two lines on a graph. One is supply of energy and one is our demand for energy. The lines start low on the graph around 1900 and slope gently upward together until the late 1930's when the upswing starts. The rate of climb increases rapidly through the 1940's, even more rapidly through the 1950's and surges upward through the 1960's. At the beginning of the decade marked by 1970 the two lines start to separate--in 1973, the lines are clearly separated. The demand line has continued up at its same rate, but the supply line has fallen below--there is our energy gap.

Our natural tendency is to look with alarm at the sagging supply curve and start looking very closely at that curve to see why it has fallen off. So intrigued do we become with looking at that supply curve, and looking for culprits that are weighing on the curve, we forget entirely to look at the bright, glittering, whirling mote that drives the demand curve up and up.

Let's forget for a moment, as we all do at first, about that demand line and continue our search for culprits on the supply curve.

By now, we are all familiar with the culprits, they are the mid-east war--the lack of modern refining capabilities in our country, the exports of raw materials to other world countries, environmental concerns that delay development of new energy sources and production.

Since we are here at this conference to talk about environmental concerns, let me for a moment explore the "energy culprits" in those concerns.

I beleive there are four major areas where environmental concerns have been labelled energy culprits--that is, energy supply culprits. The first has been the problems in approving and building the trans-Alaska oil pipeline. The second is in the area of recovering new energy sources, the third concerns new power plant sitings and the fourth is the new auto emission control requirements.

I submit that placing the blame for our current energy supplies on these factors are red herrings--old, tired red herrings at that. The herrings take on two basic forms--one is an irresponsible attitude and the other is simply misplaced blame.

The first, irresponsibility, I call a "Let-the-Bastards-Freeze-In-the-Dark" syndrome--words from the now famous bumper stickers produced in our 49th state when delays in the Alaska pipeline became apparent.

This attitude has been taken with a greater or lesser degree of sophistication very widely throughout the power-production industries--Alaskan's simply said it the most plainly. Faced with new environmental concerns, many power producers figured if they simply sat back and did nothing, we would feel the pinch. They did, and we have.

Many resource gatherers have done the same--and I think we can agree that this attitude is basically irresponsible, both on the power production side and the environmental concern side.

The second red herring is misplaced blame, on careful examination, we can dismiss the arguments about auto emission controls being a major factor in gasoline shortages. Emission controls are the result of a demand--a fundamental demand for clean air to breathe--and at the very worst, can cause a 13% fuel penalty. Automatic transmissions and air conditioners on the other hand are a demand and can cause a combined fuel penalty of about 25%. Which is the greater penalty, and which is the more basic need to base our demand upon?

EPA administrator Russell Train, in response to a suggestion by General Motors president Edward Cole that a first step in conserving gasoline could be to remove pollution controls from autos, called the suggestion "a shocking example of wrong priorities." Shocking indeed, but a very convenient vehicle to mislay blame--a very convenient red herring.

Most of the other supply curve culprits fall apart under examination just as a red herring does when it has been dragged to long. Newsweek points out for instance, that"the energy crisis was shaping up long before the Arabs decided to use their oil as a policitical weapon, and it will be around long after the current tensions subside."

After chasing each of the red herrings being drug across the supply curve then, and coming up with empty answers, we find that we have been sleuthing the wrong curve all the time.

We have to turn, then, and examine the demand curve. Let's get out our magnifying glass and look carefully at the bright mote driving the demand curve skyward. As we bring the mote into focus, what we might see is a whirling dancer, gyrating in an ever-changing costume and riding a car that changes its style fluidly as it moves along.

The dancer is a magnetic figure and draws us into the bright, pulsating scene lit by 70 quadrillion British thermal units--all the energy we are using today in America. The stage is warmed by heaters, cooled by air conditioners; the scence is kept alive from below by rivers of oil and gasoline, giant blocks of coal (very little of which we see because the dance is too fascinating); the dance somehow promises light and glory and comfort and warmth in ever growing abundance.

We, however, have the advantage of being too involved in our interest in the back trail of the dance to be drawn in, and because that interest keeps us--at the last minute--away from joining the dance, we can see the fatal flaw. The dancer is mad and has no control over his own dance. He is supported and directed by casts of millions who are forced to keep the dancer dancing because of their own inability to let the dance stop.

This, then is our energy demand curve, It is a mad dance that started as a stately minuette and has grown into something we only hope we can control.

Using our advantage of historical perspective, let us for a moment leave the dance and walk back along its trail--back down America's energy demand curve--to see where we have come. The energy line is not only America's lifeline but has even more basic connotations. Energy is the essential commonality among all living things. From the fueling of the minature furnaces that power living cells to the dynamos of industrial empires, we advance and survive because of energy. What better place have we to examine what we are?

To make the trip, let's make ourselves small enough to walk down the line. First, we have to walk back along the supply curve to about 1970 where we can jump the energy gap.

Standing on the demand curve, on the empty path of the dance, we find a burned-out milestone at our feet that says 68.8 quadrillion British termal units. A quick glance over our shoulder back up the curve shows us a new milestone just beginning to pulse and glow in anticipation of the dance in 1990. We can just make out the figures--135 quadrillion British Termal Units.

The path of the dance of 1970 is broad, but hushed. It is littered with remnants of the dance. We find a pile of 1969 clothing styles, with smaller lines leading away from it like spiderwebs; energy that was used to grow the cotton, grow the trees and mine the coal; energy used to make the cotton into thread, the coal and trees into synthetic fibers. Energy used to weave the fibers into the cloth--each step had its energy use and left its own wastes--all lines radiating away from each step in the process.

On close examination, we find that the entire energy curve is made up of these radiating, interwoven fibers from each step in each process. But the end results, like last year's clothes, were only a flash in the bright dance as it passed through 1970.

Walking on down the curve, we come across a bit of nostalgia in 1967. It is a chromed, finned, glass and metal behemoth that we remember as the ultimate in driving luxury. It had a high-compression engine that could run an air conditioner, automatic transmission, power windows, power brakes, power steering, and still do 120 miles per hour on the open road.

But while we are gazing with a certain fondness on the hulk of what was, our eyes start to burn a little, and we can't quite hold back a cough. The air around the car has been left

dirty--and the energy and resource use lines radiating away from the old, rusting car are so strong that they feel like pavement; about 125,000 square miles of pavement to be exact. The paths are littered with synthetic rubber production, glass production, steel and iron production; coal for the furnaces--oil and gas to run the finished product--and all the sub-energy lines left their wastes.

The path is now, or course, supported directly by the energy supply curve. Ghost power plants and even some nuclear reactors stand as mute testimony to the pillars that supported the dance as it whirled madly by. We notice, however, that these too left their marks with hot water changing the natural balances of the shorelines, and radiation wastes that no one knows what to do with--wastes that follow the dance like a remora rides the shark and grow on the scraps of our energy production.

Our path is still sharply downhill, and we notice with some surprise that around 1950 the energy curve is arching over our heads. We can turn and retrace our steps and find that our dance of demand arched upward quickly to meet the available supply.

We realize with some wonder that the roles are reversed. Supply here is the villian--when the supply arched over our demands, the mad dance leapt quickly to fill the reverse energy gap. We even had to invent some demands which we quickly assimilated into our needs so skillfully that we couldn't tell the difference.

On our walk down the energy demand curve through the years the same pattern is repeated again and again, a shortage just before World War II and an overabundance right after. Low demand until the huge dams created the super supply--the dance leapt to meet it. Finally, we might reach the very beginning of our industrial revolution in America. Where would it be? In 1880? 1890? 1900?

Wherever it was, we can turn back and see on the soaring curve the tiny, tinsel figure of the dance demand still going on in the distance of 1973.

Now if we look down at our feet, standing there at the beginnings of the society we are today, we will find that the path of demand shows clearly our basic needs: water, food and protection from the natural elements. It is difficult to relate these basic needs to the terribly complex, bio-social structure our society has become today, but they are the beginnings.

Other threads are woven in--legal protection in a society of man,sociological needs, technological threads that are soon to leap to prominence.

The thread that I am most concerned with here today was barely visible at the beginnings of the industrial revolution--the thread of demand for clean air, clean water and a clean land

That small demand curve has been with us throughout the history of civilization as we know it. The ancient Greeks recognized three basic elements as necessary for the survival of everything in their world--air, fire, water. To those three basic elements, let me add one more--land.

Now turn again and look at our demand and supply curves soaring away from our feet. We have used the air, water and land to create our fire--our energy--and we have in turn used that energy to fit the land, air and water to suit our ever-

growing demands.

All four elements are basic to our survival, for to remove any one of the four would cause a collapse of life as we know it--no matter how complex and intricate an embroidery we have made of those four basic threads.

In this time then, in 1973, can it be valid to say that the ever-expanding demand thread to protect our air, water and land is at odds with our energy needs? Can one possibly work against the other when each is tied so inextricably to each of the others?

Or do we perhaps tend to think and talk in terms of the mad dance of demand? Are we confusing the glitter and excitment of the dance with the realities we are faced with? Do we have, as administrator Train said, "a shocking case of wrong priorities?"

It is true that many pollution controlling mechanisms create more energy demand. For instance, primary treatment for removal of biological oxygen demanding wastes from sewage takes about 420 kilowatt hours per million gallons of sewage. Secondary treatment takes about 725 kilowatt hours, and tertiary takes about 2500 kilowatt hours per million gallons of sewage treated.

Recirculating cooling water in a coal-fired electric power plant creates a 5 to 7% generating penalty--cooling water treatment creates a one to three percent penalty.

I only wish I could buy life insurance at such rates.

That is what we are doing--buying life insurance for our land, air and water: and in turn, buying life insurance for that commodity the ancients called fire--our life-giving energy.

I use the term "life-giving" very deliberately. We have built the most staggeringly complex bio-social system ever known to man. But it is still just that--a bio-social system. We have built our social, economic, and legal environment of man in America. We have created, in effect, a synthetic ecology. In this synthetic ecology, just as in a biological ecology, if a link of the chain is destroyed it will in turn destroy other links. We have the advantage over a natural ecology, however, in that since we created this national ecology, we can make our own adjustments in the chains and links.

However, we tend to forget that we have built this synthetic ecology on the foundation of our natural ecology--we want to believe that the mad dance of demand can go on and on simply by its own inertia, even when we know it cannot. The roots of the foundation are to deep and will pull the dance back. Today, in 1973, we can feel the pull because the dance has tried to soar away.

Where do we go from her then? Do we stop the dance in its tracks? Of course not--that is neither a realistic nor desirable step even if we could do it. It would be catastrophic.

Since, however, we created the ecology of America, the nation, we can change it at will. The first steps are being taken. We our lowering our thermostats, we will not buy gas on Sunday, heating oil deliveries are being cut back.

These first steps will probably not last too long, but they have two distinct values. The first is obvious--these first steps will take us through this winter, and the next, and possibly even the next. The second value can't really be measured,

but it is perhaps the most important. It is the value of awareness--we are becoming very pointedly aware of our energy problems.

The basic problems still remain with us though. Even in the field of pollution control we are turning to the very technologies that gave us pollution to clean up pollution. We are not really taking advantage of the fact that we have created our own ecology, and can change it.

What we will have to do in the long term is re-examine our priorities--our system of values. We have to initiate and pay for broad research into energy efficient systems of all kinds. We will have to look for transportation alternatives, make changes in rate structures of electricity sales, change depletion allowance laws, encourage recycling of energy-intensive products--the list can go on and on.

An EPA report finished this July as part of EPA's socio-economic environmental studies series lists three basic government strategy options for resolving the energy crisis. They are:

1. Take no action (leaving a gap between supply and demand).
2. Reduce demand by:
   A. modifying energy-wasteful government policies.
   B. Internalizing environmental costs to users, and
   C. Assisting the market-place on a selective basis.
3. Increase supply be relaxing environmental constraints and by government funding of research and development.

The report lists the first option as simply undesireable--impossible really. The third option is dismissed because on examination of long-term costs, the social and natural structure cannot bear the load.

The results of this 115-page study are summed up when it says: "The basic conclusion is that relatively large fractions of total energy consumption are being used, not because the energy is essential or desirable in itself, but because the energy is slightly cheaper than available energy-saving alternatives. There is no reason to fear that (a National return to greater efficiency in energy use) will cause major dislocations in the economy."

The report chooses option 2. Reduce demand. Translating from the language of economists, the report says that the mad dancer will expire if allowed to go on at his present whirling course. It goes on to say that if the pressure of the multitudes is lifted from the dancer, he can regain his sanity and perform for us an even more beautiful dance--and the earth can come dancing with him.

NUCLEAR POWER PLANT SITING

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The study I am going to discuss today is one that we conducted at Holmes & Narver several months ago for the State of California Resources Agency entitled: "California Power Plant Siting Study." The study objectives are:

- analyze the situation in California -
- determine candidate site characteristics -
- develop plant concepts -
- develop concept evaluation formalism -
- compare concept acceptability by evaluation factors -

The basic assumptions, evaluations, and conclusions are summarized below:

Assumed:
- continuing growth in demand (1991) -
- base line 1,100 Mw(e), LWR technology -
- once-through cooling (coastal, offshore) -
- minimal environmental impact -

Evaluated:
- conceptual plant arrangements and locations -
- relative acceptability of each concept -

Concluded:
- more acceptable concepts -
- follow-on effort required -

Projected power demands for California by the State Public Utilities Commission (March, 1972) are shown in Table 1, together with an assumed portion supplied by nuclear power plants during the next 20 years.

TABLE 1

Power FOrcasts - Annual Peak Loads
(California Public Utilities Commission)

	10^3 MW (e)		
	1972	1982	1991
SF/Sacto	11.3	20.0	37.8
LA/San Diego	15.3	29.7	56.1
Others	0.5	0.9	1.6
Total	27.1	50.6	95.5
% Nuclear		19	35

Allocation of these increased power requirements to the two major loss areas (Los Angeles/ San Diego and San Francisco/ Sacramento) indicates that a minimum of ten new 1100 MW (e) nuclear plants would be required to serve these areas by 1982 with another 20 plants added in the following decade.

It is recognized that final determination of the most desirable location for these sites can only be made after completion of more detailed studies of each candidate plant-site concept. However, the following three general areas can be identified for obvious reasons:

- Coastal - condenser cooling water and load center proximity
- Offshore- Same as above plus some degree of seismic protection
- Inland - much land area available that is not also demanded for competitive uses. Also farther away from coastal faults.

The coastal plant-site concepts can be above ground, underground, or on a floating platform (Offshore Power Systems Co,), in a lagoon; whereas the offshore plants can be floating, undersea, or constructed on an island. Seventeen candidate concepts (including one inland) were identified and evaluated in this study and tabularized below; six of these are shown in figures 1 through 6 (at end of paper).

Concept No.	Description	
1	aboveground	coastal
2	"	inland
3	"	hillside
4	"	low profile
5	"	floating,lagoon
6	underground	massive igneous rock
7	"	massive sedimentry rock
8	"	unconsolidated materials beach
9	"	non-massive poorly cemented materials
10	"	massive rock, faulted
11	offshore	floating, shallow
12	"	floating, deep
13	"	seabed
14	"	undersea
15	"	artifical island
16	"	natural island
17	"	tuned sphere

Early in the study it was decided to derive numerical values for each concept based on pertinent evaluation factors in order to delineate the relative acceptability of each when compared with the other sixteen. Four evaluation factor groups were selected (Table 2) and each was assigned a weight which was obtained by averaging the judgment values of a panel with regard to the contribution that factor should make in deriving the relative acceptability of each concept. In order to more closely examine the significance of environmental impact and feasibility, subfactors were identified for each of these factors and also assigned weighted values to indicate their relative contribution to the magnitude of the factor weight (Table 3). The risk factor was chosen to either credit or penalize each concept according to their relative degree of resistance to various threat scenarios which might occur during the lifetime of the plant. As a minimum, all concepts were considered to be equally safe and licensable according to established standards. Furthermore, it was recognized that some plants would have

different design requirements, structures, engineering safeguards, etc. to be licensable. Therefore, major events (both natural and manmade) were postulated, which would subject the plant structures and safeguards to conditions beyond the design limits, and acceptability values according to the resultant consequences were derived for each concept over a severity range for each event.

TABLE 2
Evaluation Factor Groups

COST
- Capital costs and interest during construction.
- Operation and maintenance costs.
- Taxes, insurance, depreciation, and interim equipment replacement.

ENVIRONMENTAL IMPACT
- Compatibility with existing and planned adjacent land use.
- Ability to return the site to its natural state at plant retirement.
- Visual image.
- Operations impact on physical and biological environment.
- Multiple use of reject heat and facilities.
- Multiple use of site property.

FEASIBILITY
- State of the art.
- Existence of potential sites.

RISK
- Plant exposure.
- Safety.

* * * * * * * * * * * * * *

TABLE 3
Evaluation Factors Weighting

Evaluation Factor		Weight Value
Cost		0.287
Environmental Impact		0.301
land use	0.050	
land restoration	0.033	
visual image	0.055	
physical effects	0.075	
construction impact	0.015	
multiple uses-heat,plant	0.033	
multiple uses-site	0.040	
Feasibility		0.272
technology	0.119	
potential sites	0.153	
Risk		0.140

A formalism was developed for evaluating the concepts as shown below.

OBJECTIVE:
develop relative acceptability values for each concept and display graphically.

METHODOLOGY:
Identify evaluation factors and subfactors.
Assign relative acceptability weights to factors.
Quantify Factors.
Derive concept acceptability values.

First, the relative importance of each factor and subfactor was assessed by concept. Then a measure of merit was established by which a quantitative value could be assigned to each siting concept for each subfactor. In some cases, such as construction

cost or potential cost of damage from hazards, the measure is more definitive than for feasibility, which is measured in terms of the state of the art acheived, or for environmental impact measured in terms of multiple uses of the site. In the latter cases, concepts are given a relative rating by assigning absolute values.

After an evaluation factor is measured for each siting concept, the values can be normalized against that of the best rated concept, considering only that subfactor. The result is that all measures are eventually reduced to absolute numbers. These absolute values are multiplied by the weighted value of the subfactor. When added together for each siting concept, they result in a measure of over-all acceptability from which a judgment can be made as to the preferred concepts.

The relative acceptability values of all four factor groups can be summed and displayed in a number of ways to indicate the most favorable concepts. Factor accessibility values can be shown in a profile graph for each concept (sum of the products of weighted value and relative rating of each factor and/or subfactor), and also shown in a plot of all concepts indicating relative acceptability relationships (as shown on Figure 7). In the case of the latter plot, an "overall acceptability" value derived for each concept from the profile graph is reduced by the acceptability value of one factor (or subfactor) and then plotted against the acceptability value of the isolated factor. It is seen in these plots that increasing acceptability is denoted by increasing values along both axes; therefore, the more favorable zones of acceptability will consistently appear in the upper right hand quadrant of each plot. Furthermore, the more favorable concepts with respect to the factor shown on the abscissa (cost in this case) will appear on the right side of the distribution.

Profile graphs for two concepts and acceptability plots for two factors are shown in Figures 8 through 11.

A first look at ranking by overall acceptability (total of all four factors) places all five aboveground concepts, i.e., inland, lagoon, hillside, low profile, and coastal plants, at the top of the group (in that order), with the underground plant in poorly cemented sedimentry rock in sixth place, the most favorable underground concept (shown in Table 4).

TABLE 4
Over-All Acceptability

Concept	Acceptability Value
Aboveground-inland	0.779
Aboveground-floating,lagoon	0.761
Aboveground-hillside	0.756
Aboveground-low-profile	0.674
Aboveground-coastal	0.657
Offshore-floating deep	0.649
Underground-nonmassive,poorly cemented materials	0.642
Offshore-artifical island	0.637
Offshore-floating shallow	0.636
Offshore-tuned sphere	0.617
Underground-massive sedimentary rock	0.603
Offshore-natural island	0.581
Offshore-undersea	0.549
Underground-massive igneous rock	0.540
Underground-unconsolidated materials, beach	0.522
Offshore-seabed	0.502
Underground-massive rock, faulted	0.494

The reasons for this spread can be traced to the basic assumptions of factor and subfactor weight and relative applicability values which led to derivation of relative acceptability values for each concept. However, when the concept acceptability-factor acceptability plots are displayed for all 17 candidate plant-site concepts, the platform mounted plant in a selected lagoon (coastal, inland bay, or lake) consistently appears in the most favorable acceptability zone. It is particularly attractive from a risk aspect due to a degree of seismic isolation (horizontal accelerations).

Therefore, in selecting a nuclear power plants-site combinations to provide a portion of the power demanded in California during the next 20 years, the floating platform-lagoon concept and the inland plants should be more thoroughly evaluated to fully exploit their potential advantages. The following conclusions are presented for further consideration.

MOST ACCEPTABLE CONCEPTS:
- land based - inland, coastal/hillside
- ocean based - coastal/lagoon, floating deep.

FOLLOW-ON EFFORT REQUIRED:
- deepwater plant protection systems.
- deepwater transmission system.
- coastal topography study (lagoon/hillside).
- seismic intensity zone maps.
- favorable water supply regions (inland).
- develop detailed, in-depth data for "most acceptable" concepts.
- floating platform plant supply to west coast.
- platform motion system demonstration tests.

* * * * * * * *

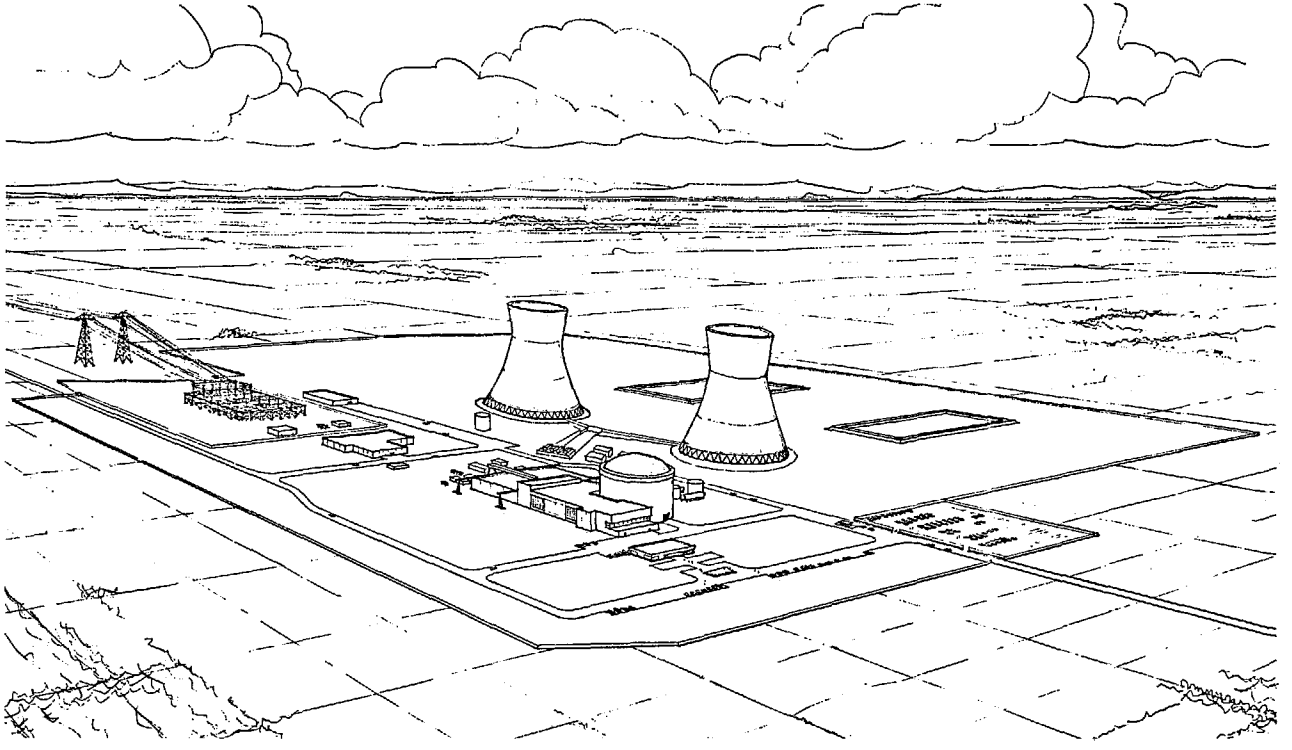


FIGURE 1 ABOVEGROUND - INLAND

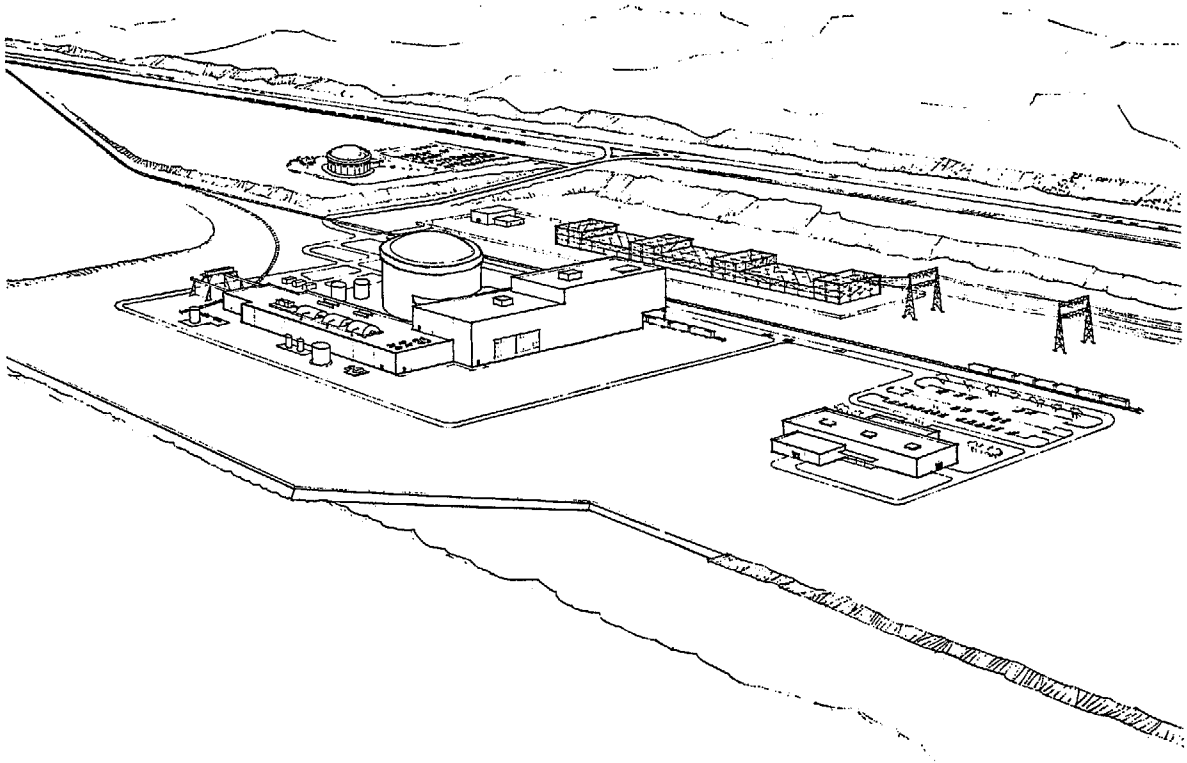


FIGURE 2 ABOVEGROUND - COASTAL

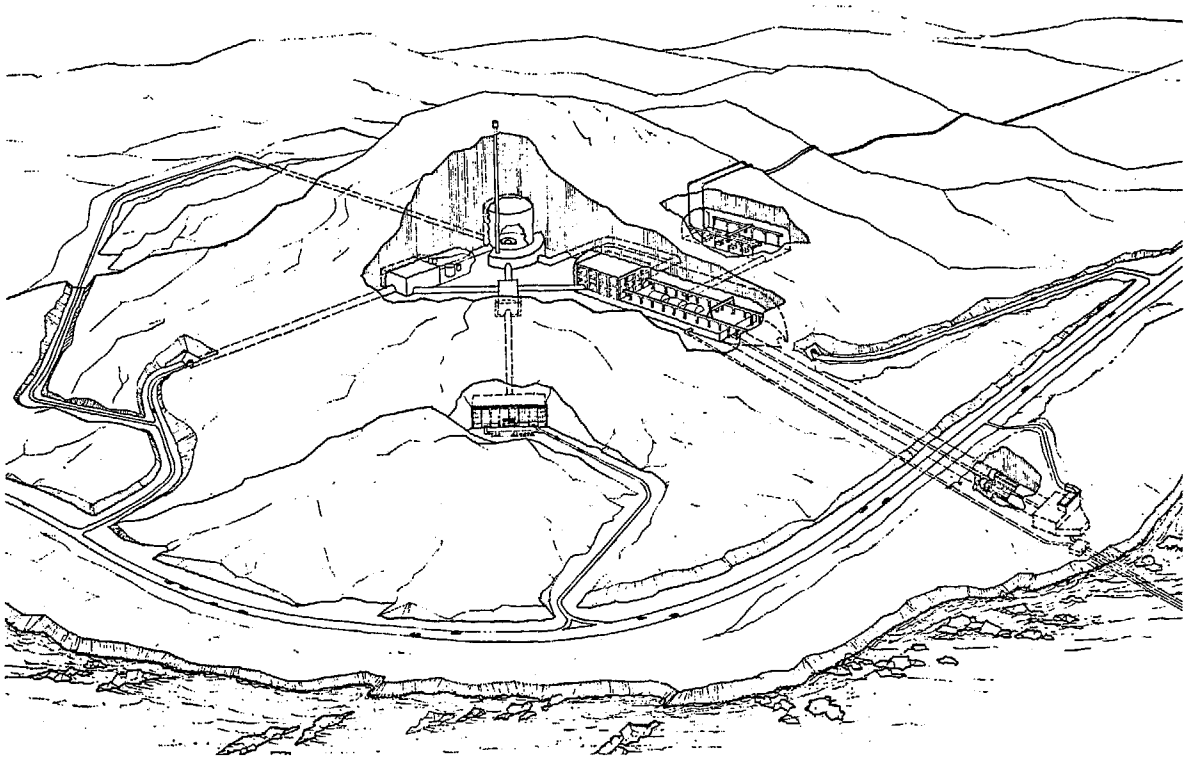


FIGURE 3 UNDERGROUND - MASSIVE IGNEOUS ROCK

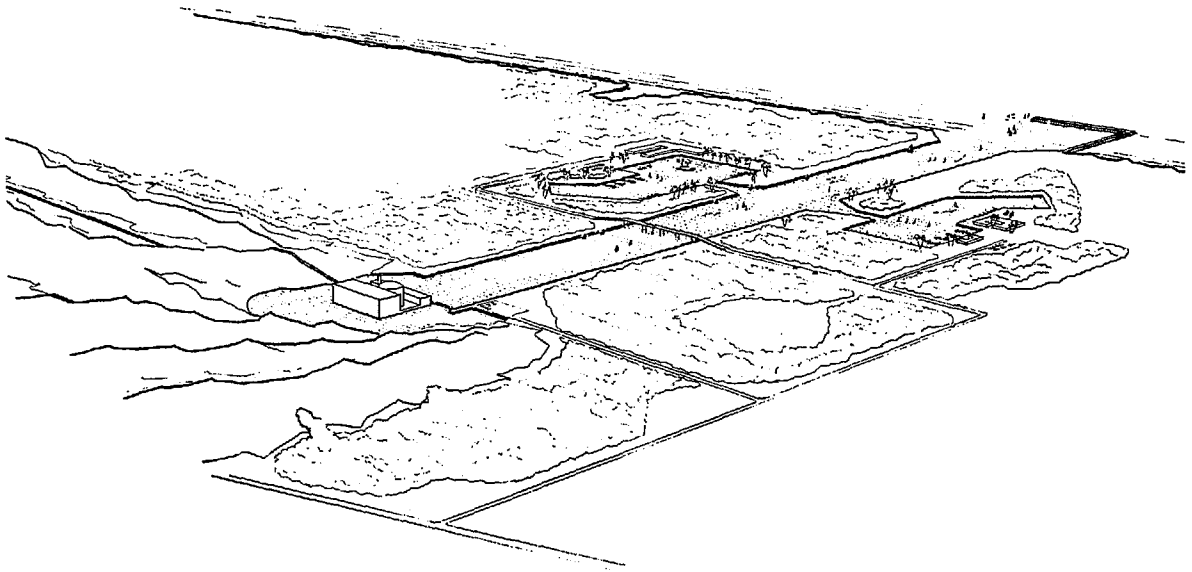


FIGURE 4 ABOVEGROUND - FLOATING LAGOON

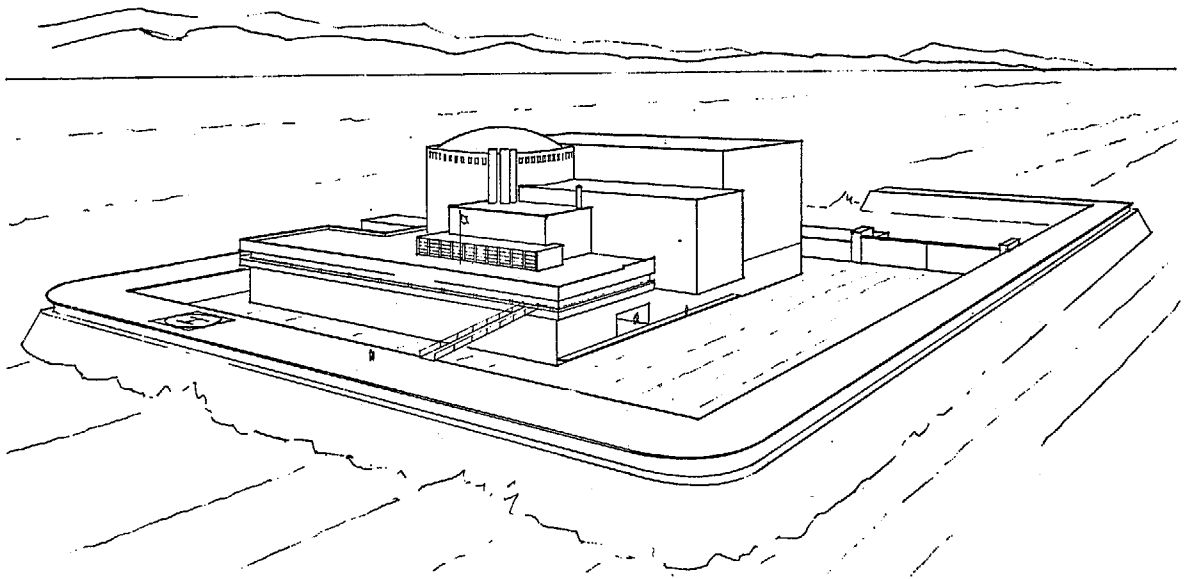


FIGURE 5 OFFSHORE - FLOATING SHALLOW

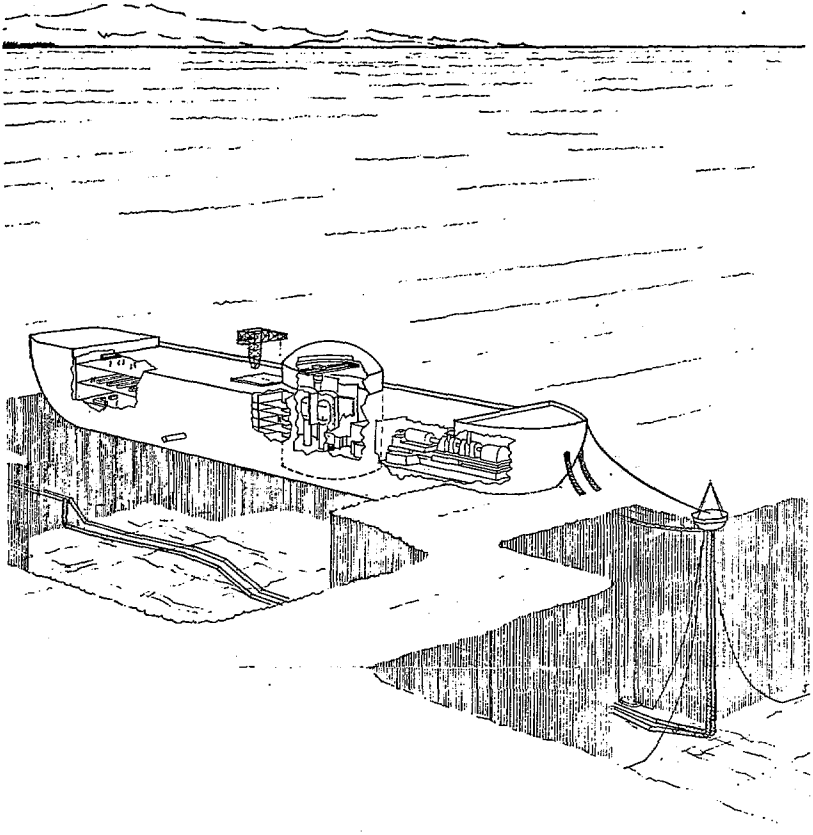
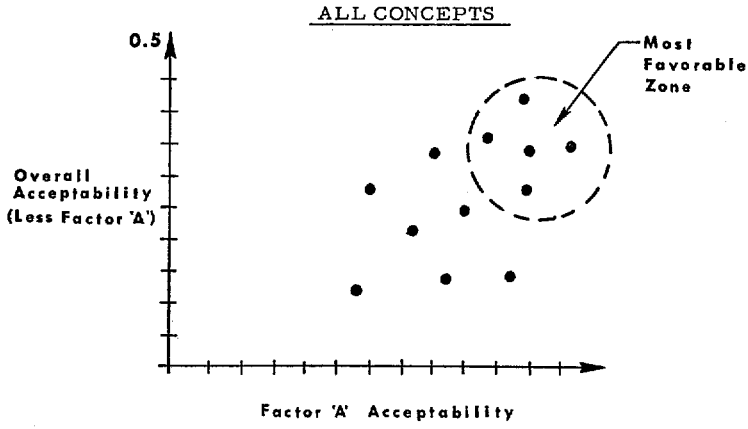


FIGURE 6

OFFSHORE - FLOATING DEEP



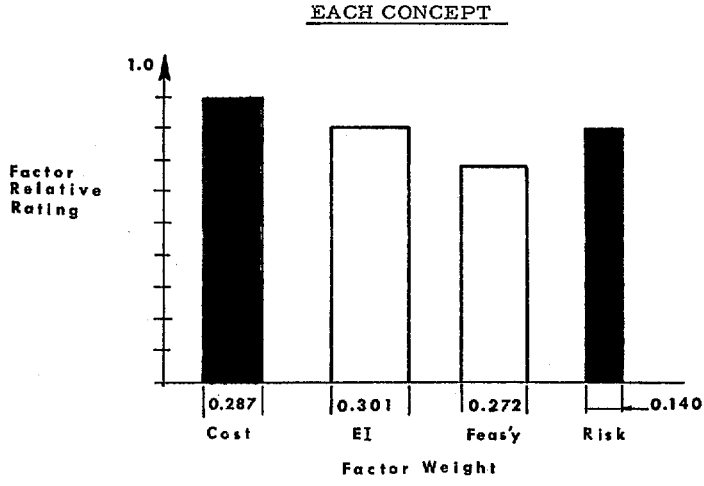


FIGURE 7

ACCEPTABILITY DISPLAYS

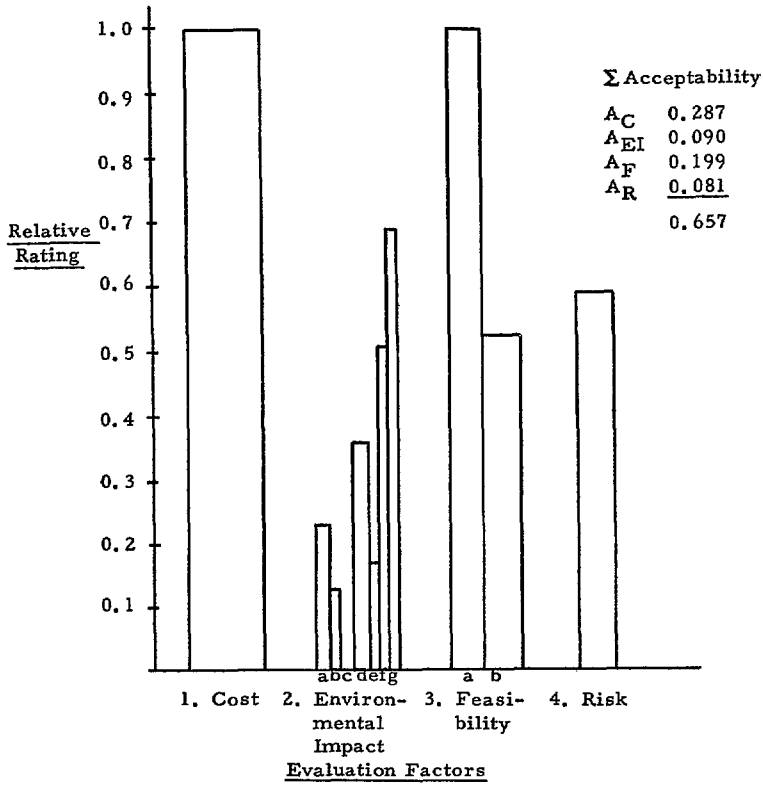


FIGURE 8

ACCEPTABILITY-ABOVE GROUND COASTAL

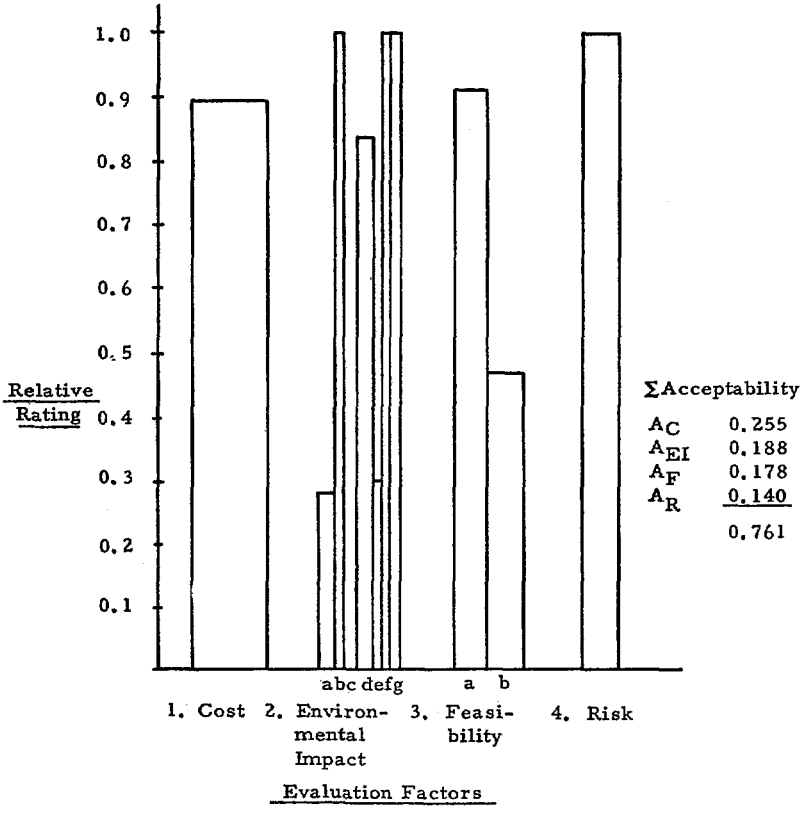


FIGURE 9

ACCEPTABILITY-ABOVE GROUND FLOATING LAGOON

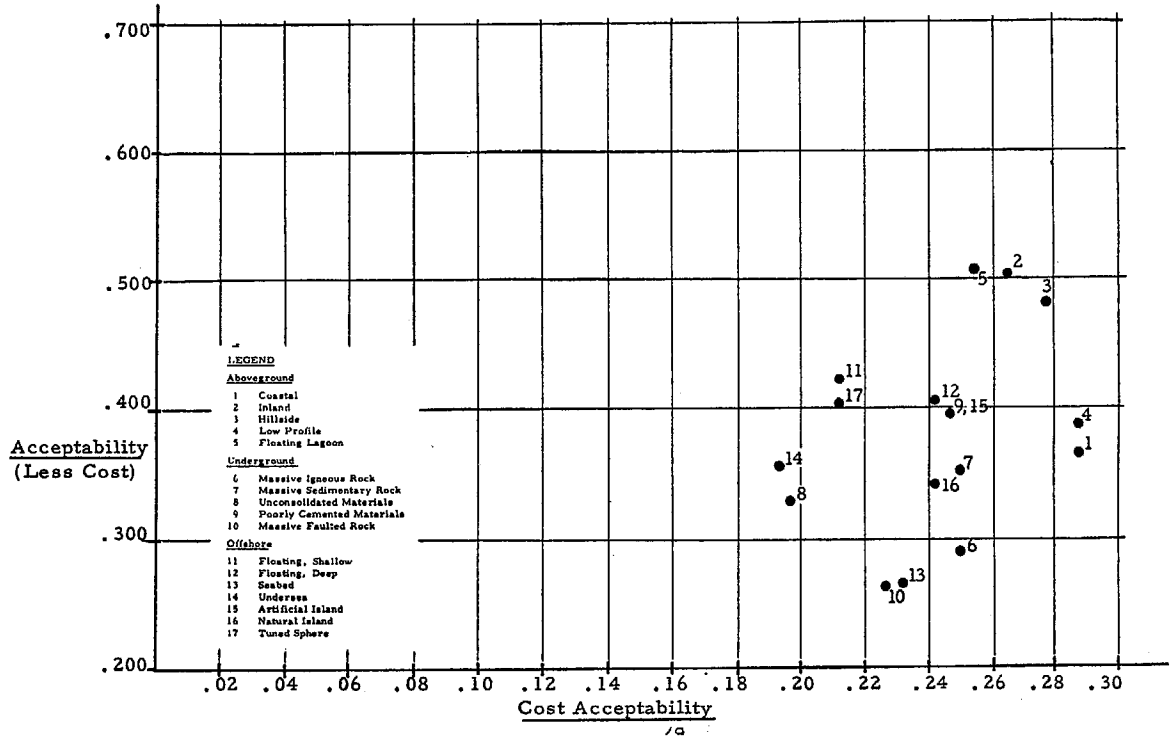


FIGURE 10 COST EVALUATION

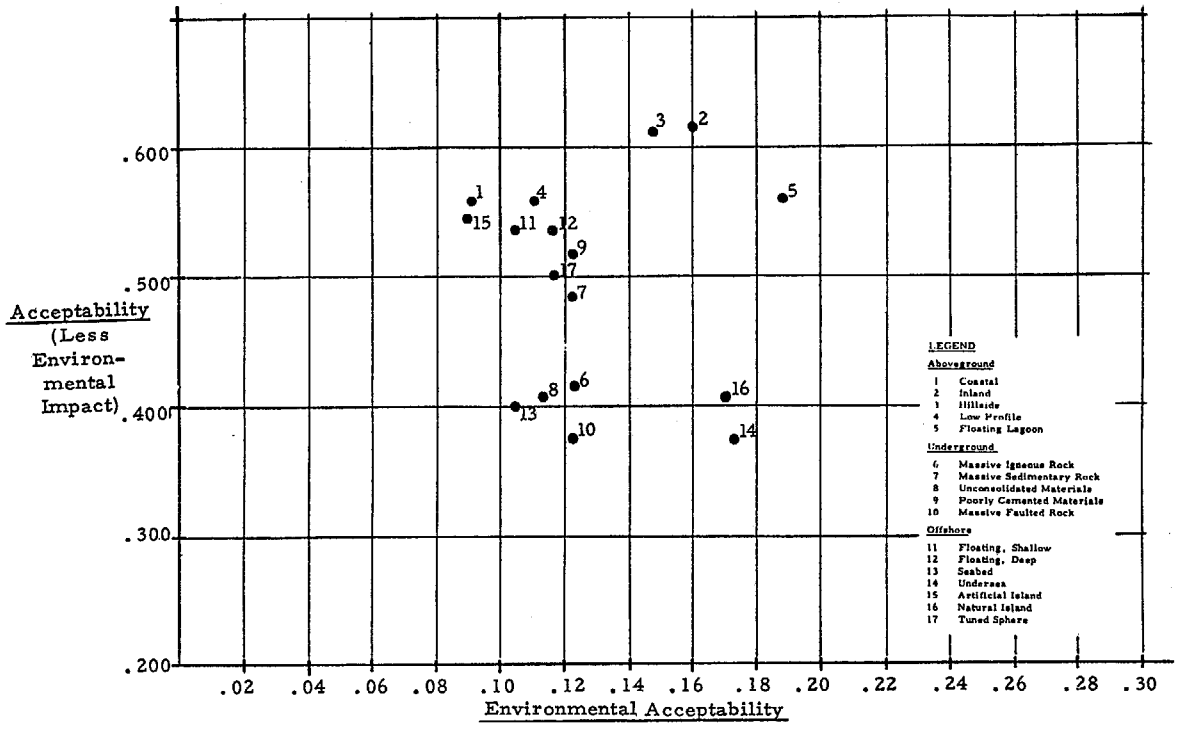


FIGURE 11 ENVIRONMENTAL IMPACT EVALUATION

COASTAL ZONE MANAGEMENT IN CALIFORNIA: THREE FACTORS INFLUENCING FUTURE DIRECTION

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ABSTRACT

The future direction of coastal zone management in California is contingent on numerous factors that are difficult to predict. Three factors that are particularly pertinent to the direction of coastal management are examined. The factors are: assessing the cumulative impacts of coastal development, the effect of land use designations on the value of coastal property, and coastal governance.

Distinction is made between assessing impact on an incremental basis and on a cumulative basis. If impacts are assessed on an incremental basis, the assessment will fail to comprehend the threshold point where many apparently insignificant impacts will reach a cumulative level that will result in the irreversable degradation of a coastal system.

If the California Coastal Zone Conservation Plan of 1976 designates priority uses for specific geographic areas, the relative differences between coastal property values may change radically. Depending on the land use designations, certain property owners may reap windfall increases in property value while others may suffer wipeout losses. Means of equalizing the windfalls and wipeouts in land values are discussed.

Six factors that will influence the coastal governance are identified and briefly examined. New organizational arrangements that will follow termination of the present coastal commission system are discussed.

INTRODUCTION

Yesterday, coastal zone management was characterized as shooting at a moving target. I feel the objective of this conference should not only be "getting to know the target better," but also to predict its movement. There is obviously great uncertainty in knowing how coastal zone management will be affected by the interaction of future trends and events. The executive director of the state coastal commission recommends that Future Shock be read by anyone seriously interested in coastal zone management. How many people a year ago would have believed that this year we may be rationing gasoline?

The original objective of the speech and the paper was to identify and briefly discuss the trends and events that may influence California coastal zone management in the next five years. Exploration of the topic led to the conclusion that the objective selected was overly ambitious for presentation in a conference proceedings paper. Adequate analysis of future trends and events that may shape California coastal management could run to book length proportions. To narrow the topic down to manageable size, I have focused on only three factors: assessing the cumulative impacts of coastal development, effects of land use designations on the value of coastal property, and coastal

governance. The selection of these three factors and the manner of presentation are intended to give greater visibility to a number of problems, not now widely recognized, that will eventually have to be considered by coastal zone management programs.

The paper is organized into three sections. Cumulative impact is discussed in the first section, followed by "dealing with windfalls and wipeouts" in section two, and coastal governance in section three.

FROM INCREMENTAL TO CUMULATIVE IMPACT ASSESSMENT

Due to the requirements of the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA), environmental impact assessment is a well known and frequently conducted practice in California. Impact statements circulate around the state like a paper blizzard. An underlying premise of both the U.S. Coastal Zone Management Act and the California Coastal Zone Conservation Act is that the future allocation of coastal lands and resources will be based on assessing the environmental (and, to some extent, the socioeconomic) impacts that a coastal use (such as residential development) may generate.

There are numerous problems associated with impact assessment, including information gaps, weak administrative structure, and lack of operable methodology. (For a full survey of impact assessment problems, see Sorensen, 1972; Dickert, February, 1974.) The particular problem I wish to touch upon in this paper is the present failure to assess the cumulative impact that many individual projects may have on a coastal system (coastal systems include both environmental processes, such as watershed and infrastructural processes, such as highways).

Impact assessment is largely an incremental exercise as it is currently practiced either by the units of governments when preparing impact statements or by the Coastal Commissions when reviewing a proposed project. Project review is an incremental exercise in the sense that the assessment is usually focused on analyzing the added increment of impact that may be generated by a proposed project (such as a housing development adding 600 more vehicle trips to a coastal highway's traffic load). The cumulative impact on the coastal highway system's traffic capacity by permitting past and future housing projects with similar traffic generation, is usually not considered, or if considered, given inadequate analysis. Because impact assessment is conducted as an incremental exercise, the assessment will usually fail to comprehend the threshold point where many apparently insignificant environmental condition changes will reach a cumulative level that will result in the irreversable degradation of a coastal system (or, to say it more simply, we do not know our capabilities until we have exceeded them). For example, a housing development of 25 units on ten acres may not cause a significant change in the sediment load entering an estuary. However, if all property owners were permitted to construct similar density housing on all lands in the watershed lands with similar site characteristics (as might be the property owners' right under equal protection principles of the law), 10,000 units might be built. The sediment load resulting from the construction of 10,000 units could far exceed the thresholds of estuary water quality and circulation necessary to maintain oyster production, productive waterfowl habitats, navigation channels, and fish nursery areas.* The obvious problem lies in determining how much housing (and consequent sedimentation) is allowable without exceeding desired thresholds of estuary water quality and circulation.

The plan and ordinances developed for the Lake Tahoe Basin appear to provide the only example where cumulative impact assessment has served as the basis for region-wide land use regulation(Tahoe, 1972). Land use designations were determined by rating all lands within the Lake Tahoe drainage basin

*It should be noted that impact assessment is complicated by the consideration of measures that may be used to mitigate the erosion and sediment impacts, e.g., settling ponds, check dams, recontouring.

according to potential runoff, erosion and sedimentation that could occur as a result of potential development activities (particularly impervious surfacing). The ratings were set so that the total runoff-erosion sediment from all lands draining into the basin will not exceed the eutrophication threshold (thereby turning the lake color from crystal blue to murky blue-green) (Pepper, 1972).

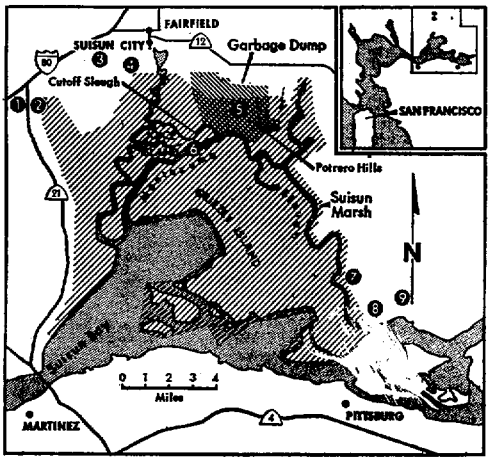
A current example of assessing cumulative impact is provided by the various projects proposing to locate on or around Suisun Marsh (San Francisco Chronicle, January 26, 1974). The marsh covers over 84,000 acres at the head waters of San Francisco Bay. It is highly valued as a habitat for waterfowl migrating along the Pacific flyway, a nursery area for sport fish, a habitat for wildlife, and a vast expanse of open space within the rapidly urbanizing Bay Area. At the present time proposals for industrial parks, a brewery, sewage treatment plant, a regional garbage dump, garbage barging, a steel plant, and a nuclear power plant encircle Suisun Marsh (see Figure 1). The major concern is that the cumulative impact resulting from all these proposals could exceed the thresholds necessary to maintain waterfowl, fish, and wildlife populations as well as permanently degrade the open space amenity of the area.

FIGURE ONE

The Proposed Developments

Opponents of a proposed regional garbage dump within Suisun Marsh fear that it will lead to widespread encroachment on the wildlife haven. Projected for development are (1) Cordelia industrial village (2) Area zoned for industry and manufacturing (3) Anheuser Busch brewery (4) Fairfield-Suisun sewage treatment plant (5) Envirosol, Inc's regional garbage dump (6) Envirosol's barging operations on Montezuma Slough (7) Steel plant site (8) Zoned for manufacturing and (9) Pacific Gas and Electric Co. nuclear power plant site.

Courtesy of the San Francisco Chronicle



It is evident that many of the major problems that have lead us to the imperative need for coastal zone management, derive from our past failure to recognize that the coast is composed of a number of environmental and infrastructural systems that are interacting among one another (this conclusion is shared by a number of studies in coastal zone management: Ketchum, 1972; California, 1972; Smith, 1970; University of Texas, 1973).

The following list illustrates the relation between coastal systems and types of impact that can exert a cumulative stress on the system.

Estuary watershed:
- Ground water or stream pollution, estuary water quality, and effects on biota.
- Ground or stream water flows, estuary and wetlands salinity, and effects on biota.
- Stream sediment loads, estuary sedimentation, and effects on biota.
- Stream sediment loads and deposition of beach materials on estuary or open coast shore.

Estuary circulation system:
- Direct discharge of wastewater into estuary from all sources, estuary water quality and effects on biota.

Ocean basins:
Direct discharge of wastewater, oil, solid waste from all sources, quality of ocean waters and sediments, and effects on biota.
Estuary pollution, quality of ocean waters and sediments, and effects on biota.

Littoral circulation cells:
Control of coastal erosion and erosion-accretion dynamics within littoral circulation cells.

Air basins:
Atmospheric emissions from all sources, ambient air quality, effects on biota and human health.

Populations of sport and commercial species:
Degradation of coastal streams and size of anadromous fish populations.
Degradation of estuarine habitats and size of waterfowl, wildlife and fish populations.
Harvesting of commercial or sport species and maintenance of a sustained yield population.

Infrastructure:
Land use within sewage services district and capacity of sewage system.
Land use within water services district and capacity of water supply system.
Land use within highway service area and highway congestion.

The coastal highways (Routes 1 and 101) and their associated service areas appear to be the system that will have the most influence on the future of California coastal zone management. If the public continues to oppose the construction of new coastal highways or enlargement of existing coastal highways, highway traffic capacity will very likely become the cumulative impact threshold (limiting factor) for coastal development. For each highway section and associated service area the margin of additional traffic loading could be established (margin represents the difference between existing traffic levels at peak loading times and design capacity). Coastal development (particularly residential and tourist commercial development) would be evaluated on the basis of the traffic volume generated relative to other potential developments within the highway's service area.

There are a number of reasons why cumulative impacts have not been assessed. The two most notable reasons are data gaps and the lack of methods to predict cumulative impact. Both these problems should diminish over the next few years. Acts requiring the preparation of impact statements, the Coastal Zone Management Act, local governments' addition of conservation and open space elements to their general plans, improvements in the remote sensing and mapping of earth resources, and the eventual passage of a National Land Use Policy Act should all serve to stimulate the collection of environmental and socioeconomic data applicable to the assessment of cumulative impacts.

One particularly promising improvement in the data base for impact assessment is the development of region wide data banks. The bank is composed of maps and other spatially defined data information that exist within a coastal region. Ideally, maps and spatially defined data would be computerized on a grid or point reference system to enable storage and retrieval according to geographic coordinates. Our research program has developed a prototype of such a data bank for the north coast of Santa Cruz County (Pepper, 1973). The demonstration area covers 14 miles of coast and extends inland from one to three miles. The maps (presently including: elevation, vegetation, land use, drainage, infrastructure, and ownership) are computer automated on 1.4 acre grid cells (approximately 10,000 cells in the study area).

The data bank should enable us to estimate a number of cumulative impacts. For instance, assume a housing development is proposed within our study area. The development proposes to build on 0 - 10% slopes at an average density of three units per acre. The cumulative impact question is:

"What trend is this proposal initiating or reinforcing?" What would be the total number of housing units which might be constructed if all the privately held lands on the northern Santa Cruz coast, between 0 - 10% slope, were allowed to build at 1/3 acre density. The data bank can answer this question. For illustration of this hypothetical case, assume the data bank projects 10,000 housing units. The 10,000 figure would lead to further assessment of cumulative impact. To what extent would the coastal highway have to be improved to accommodate the traffic generated by 10,000 housing units? To what extent will sewage services have to be built or expanded?*

Resolving the other major problem of cumulative impact assessment, predictive methods, largely depends on monitoring the effects of those projects that are permitted.

> One of the remarkable aspects of natural resource management is that immense stocks of money and time are expended upon preparation of plans while pitifully small amounts are spent on finding what actually happened after the plans were adopted. (White, 1972)

To substantially improve the capability to predict the environmental and socioeconomic effects, monitoring and analysis of projects hould be conducted during construction and after completion. Information derived from the monitoring programs should provide better bases for analagous comparison techniques, improve the statistical basis for empirical models, and test the validity of theoretical models.

Consideration of cumulative impact can ultimately lead to the question of population growth limits for a geographic area. A number of local jurisdictions (notably East Marin County, City of Petaluma, City of Santa Barbara) are in the process of grappling with the problem of setting population growth limits. It appears that as communities become more concerned about deteriorating environmental qualities and overburdening of public services, more considerations will be given to phasing population growth or setting growth ceilings. This phenomenon will probably be even more apparent in coastal communities, since the environmental qualities of the coast are often the prime attraction for residential location. Coastal residents often seek to protect the environmental amenities that attract them to the coast from being degraded by future inmigration of new residents seeking the same amenities. This exclusion tendency is known as the first-in rule, paraphrased by quips like, "I've got my toehold in heaven, so close the gate."

Growth limits can be based on the capability of an environmental system to tolerate cumulative impact or the capacity of public service systems to handle cumulative demands. However, as Petaluma is presently finding out, setting population growth limits raises a number of difficult issues. Three problems are evident.

On January 17, 1974, U.S. District Judge Lloyd Burke (San Francisco District Court) ruled against Petaluma's growth control program on the grounds that it "violates the Constitutional right to travel and enter any jurisdiction temporarily or on a permanent basis" (San Francisco Sunday Examiner and Chronicle, January 27, 1974). Newspaper accounts indicate the decision will be appealed. Since the Constitutional right to migrate has State and national implications, it is expected that this precedent-setting case will eventually reach the Supreme Court.

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*The capability to estimate the impact of various development trends allows the portrayal of alternative futures. The alternative futures approach involves the presentation of various development and conservation options that a coastal community could adopt as a planning program (such as preservation oriented plan or a development oriented plan). Each option presented is described in terms of socioeconomic and environmental impacts. Public review and comment on the impacts described should assist the selection and specification of the future coastal planning program. Examples of the alternative futures approach are Maine, 1972 and Dickert, 1972.

Growth limits can create displacement problems. One jurisdiction's growth limits may have significant displacement effects in other jurisdictions. Development may be displaced to areas where environmental and social conditions create greater net adverse impacts than would have occurred if the development had been allowed to locate in the growth control jurisdiction.

The third problem posed by growth limits is a community's denial to accept its fair share of social responsibility. One argument against the Petaluma program reasoned that growth limits, if adopted by many suburban communities, would have the effect of trapping middle and low income groups in the central city. "It would make suburbs into even worse white enclaves." To what extent will a community's parochial interests seek to use growth limits as a means to exclude land uses of regional, state, or national interest (such as low income housing, transportation facilities and essential industries)?

DEALING WITH WINDFALLS AND WIPEOUTS

Let us assume for the moment that in 1976 the California Coastal Zone Conservation Plan designates priority uses within specific geographic areas (as specified in Guidelines of the U.S. Coastal Zone Management Act). For example, ranching is designated to be the priority use for all grassland terraces in Mendocino County that are between U.S. Route 1 and the coastline, and visible from the highway. The designation of priority use will largely be based on the assessment of environmental and socioeconomic impact generated by the different types of coastal use on different types of coastal environments (wetlands, terraces, etc.). Continuing the Mendocino terrace example, residential development on grassland terraces may not have been designated as the priority use because of the adverse changes in coastal scenery as viewed from Route 1.

It is evident that designation of priority uses for geographic areas will have a differential effect on the value of coastal property. One property owner may be restricted to ranching while the land use designation of his neighbor's property may allow construction of a residential subdivision. The property owner restricted to ranching may realize little or no profit from his land (possibly incurring a substantial loss, since the price paid for the land was based on speculation that the subdivision would be permitted). However, the neighboring property owner who is allowed to build a subdivision may reap a profit (particularly if relatively few lands within the region are designated with a residential subdivision priority use). The change in land values produced by a new set of land use designations (such as specified by the coastal plan) has been described as the windfall and wipeout phenomenon (Hagman, 1973). The real crunch in coastal zone planning will come when the coastal property owners and investors that have been "wiped out" by the new land use designations realize the extent of their losses in land value and potential profits. A clear example of how this crunch may occur is provided by the experience of the Lake Tahoe Regional Plan. At the present time the dollar total of claims on property value loss and inverse condemnation filed by property owners and investors against the Tahoe Regional Planning Agency exceeds 160 million dollars.*

Even if the assumption** is made that most of the land use designations resulting in wipeout situations are upheld by the courts as a legitimate exercise of police power, the concept of equal treatment (equity) of property owners will still be a burning issue. For political and social reasons (although not so much legal), means may be sought to distribute the benefits and losses arising from the land use designation among the affected owners

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*Personal communication with Michael Heyman, legal consultant to the Lake Tahoe Regional Planning Agency.

**This may be a gross assumption since the land use designations must be nondiscriminatory, supported by rationally developed information, and demonstrate net social gain. For further discussions of how these legal principles affect land use regulation see Heyman, 1972 and Bosselman, 1973.

of coastal property. At least four different means of distribution deserve consideration.

Perhaps the most direct approach is to tax the windfall property owners on the value added to their property by the land use designation. The value added tax could be applied two ways: tax only, or tax and compensation. Lands allowed to develop could be taxed so as to reduce their value to the value of lands with development restriction. Lands with value added could be taxed and the revenues derived from the tax distributed among owners of development restricted property as partial compensation for profits lost by the land use designations. A tax only approach appears to be far easier to administer than a tax and compensation system.

A second means of achieving equity among property owners is by compensable regulations. Compensable regulations would require the passage of state enabling legislation authorizing the coastal management agency to impose compensable regulations on all private land designated by the coastal plan to be held in open space uses. Following the adoption of such regulations, a special appraisal would determine the market value of lands prior to and unaffected by the imposition of the coastal land use designations. This value would constitute the property owner's guarantee. Upon sale on the open market of any land subject to compensable regulations, if the price fell below the owner's guarantee, the coastal management agency would pay the seller the difference between the guarantee and the price received. (For a further discussion of compensable regulation, see Krasnowiecki, 1963.)

A third means of distribution would be the establishment of density transfer zones along the coast. The zone boundaries would be based on similarity of environmental and socioeconomic conditions or political jurisdiction limits. Within each zone all property owners would be given approximately the same development density (such as one dwelling unit per acre). If one property owner desires a higher density (such as four dwelling units per acre), he must purchase the additional density from other property owners within the zone. The land owner who sells the density rights receives a proportional reduction in the maximum density permissable on his land (such as a reduction to one dwelling unit per four acres). This approach appears most applicable to preservation of landmarks and residential development of rural areas (for further discussion of density transfer zones see Costonis, 1973).

The creation of a coastal land bank presents a fourth means to achieve equity among coastal property owners. The coastal zone management agency (or an institution working in conjunction with the coastal zone management agency) through controlling the supply of coastal land, would control the rate, density, and direction of development. Land banking would involve both outright (fee simple) purchase of land and the purchase of easements. The property acquired by the land bank could be sold or leased to investors who would then use the land in a manner consistent with the priority use designations of the coastal plan. The revenues derived from sale or lease of lands could be used to acquire additional property. The English have used the land bank concept to acquire and manage greenbelt lands around London (Hagman, 1971). A regional land bank was one component of a Bay Area Conservation and Development Agency proposed by AB 1057 (Knox) during the 1971 session of the California Legislature.

A variant of the coastal land bank approach would be the establishment of a coastal development authority. The coastal development authority would have power to both acquire and develop coastal lands and resources. The New York Urban Development Corporation is a working prototype of the concept (primary activity is the construction of low income housing). It is assumed that the coastal development authority would not be in competition with private enterprise, but confine its activities to projects with high economic risks (such as mariculture) or projects with marginal profits and broad social benefits (such as recreational housing for low income groups). A study on developing the resources of the coast of Maine recommended the formation of a Land Development Authority (Maine State Planning Office, 1971).

The land bank and coastal development authority approaches obviously

require the management agency to take an active role in the governance of the coastal zone. Such an active role goes against the grain of the common assumption that coastal zone management will be a reactive process, mainly involved in the review of proposed projects and not involved in the initiation of projects.

Before leaving the topic of windfalls and wipeouts, one additional point is noteworthy. The information requirements necessary to support the land use designations may be substantially reduced if means can be established to distribute the benefits and losses arising from the coastal land use designations. If the implementation of land use designations relies only on police powers, there will be numerous court cases on the grounds of inverse condemnation. Litigation will mean that the court will scrutinize the impact assessment information and findings used to make the land use designations. Obviously, the information must be of high enough quality to persuasively argue why many millions of dollars worth of private development should not be permitted. However, establishing means for distributing the benefits and losses arising from the land use designation should have two effects on information support requirements. First, there should be far less litigation since property owners feel they have been fairly treated. Fewer court cases mean less testing of the adequacy of the impact assessment information used to make the coastal land use designation. Secondly, in the situations that are litigated, the courts may look favorably on the land use designation since the property owners were treated equally, even though the information used for making the land use designations was inconclusive and could stand further substantiation.

There are high time and dollar costs involved in acquiring data and developing impact assessment information for designation of land use. To what extent can these costs be reduced by developing means of distributing the benefits and losses arising from land use designation?

COASTAL GOVERNANCE

California's coastal management system of state and regional commissions is scheduled to terminate on January 1, 1977.* Predicting the organizational arrangement for coastal zone management after 1976 is contingent on a number of factors, including:

- the regional and state coastal commissions' success in resolving the issues and gaining political support during their 1973-1976 tenure;
- the nature of the coastal zone management plan recommended by the coastal commissions in 1976;
- implementation and funding of the Coastal Zone Management Act;
- creation of state and regional land use agencies;
- new state-wide functional planning programs (such as energy, ports, power plant siting);
- crises (environmental catastrophies and energy supply/demand) and economic prosperity.

There are evidently other relevent factors which could be listed, but at least the six identified serve to indicate the complexity and number of variables involved in predicting a future direction of coastal governance. Each

*As proposed by AB 2321 of the 1973-74 session. This bill is not expected to encounter opposition. The current termination date set by the initiative is the 91st day after the final adjournment of the 1976 regular session of the Legislature.

of the factors listed has enough complexity to warrant its own report-length analysis.* Since I wish to keep this paper on the level of an overview perspective, I shall only touch upon the six factors.

Success in Resolving the Issues and Gaining Political Support

What will the coastal commissions' three and three-quarter year track record be like in December 1976? Statistics will be tossed about, such as: number of projects denied, approved, and still pending; dollars of investment and number of jobs lost by all projects denied; dollars of tax revenues lost or gained by net changes in property values.

Equity questions will be raised. Which socioeconomic groups, which interest groups received the benefits and which bore the costs of the coastal commissions' regulations?** During the campaign on Proposition 20, interest groups for economic development of the coast (real estate, construction trades, petroleum industry, tourist commercial developers, port developers) repeatedly raised the issue that the act would produce socially regressive effects. I note, after hearing Mr. Peevey's presentation on "Balancing Equities in the Coastal Zone," that the same arguments are still being posed. Proponents for economic development of the coast may raise concerns for social equity as a smokescreen to conceal their real motivations of self-interest. Whether the motivation to raise social equity questions is genuine or only a political strategy, the posing of such questions is a very real and effective means of arguing against a future coastal management authority that would be strongly pro-environment. (For a further discussion of social equity and coastal planning, see Dickert, 1974).

The acid test of equity is the recognition by individuals, special interest organizations, and socioeconomic groups of how they have been affected by the coastal commissions over the years and how they may be affected by the management program recommended by the coastal commissions. To what extent will individuals, organizations, and socioeconomic groups supporting or opposing the coastal management program proposed in 1976 be able to influence the Legislature, the governor's office, and the public? (Influence on the public will be necessary in the event the proposed management program is not passed by the Legislature or signed by the governor, and the initiative process is again instituted).

Questions of cost effectiveness will be posed in 1976. What has California received for its seven plus million dollar investment in coastal zone management*** (plus whatever additional dollar costs may be tacked on by opposition groups). To what extent have the issues that led to the passage of Proposition 20 been resolved by the coastal commissions over the three and three-quarter year period? If these issues are still not resolved, will the coastal management program proposed in 1976 lay out an effective means for resolution?

*As proposed by AB 2321 of the 1973-74 session. This bill is not expected to encounter opposition. The current termination date set by the initiative is the 91st day after the final adjournment of the 1976 regular session of the Legislature.

**Equity can be distinguished from social equity in that the former refers to both interest groups (e.g. labor, oil, conservation) and socioeconomic groups (e.g., upper income whites, low income blacks), whereas the latter refers only to socioeconomic groups.

***Estimate based on: five million appropriated by the initiative from the Bagley Conservation Fund, $750,000 in appropriations to reimburse legal costs incurred by the Attorney General's office over a three year period. Depending on the size and timing of grants from the Coastal Zone Management Act, additional state funds may be sought to cover an anticipated deficit. A 1.6 million application for a supplemental appropriation has been submitted to the California Legislature (SB1656, 1973-74 session). Cost estimates based on personal communication with Dan Gomes of the State Coastal Commission.

The 1976 Coastal Zone Management Plan

The type of organizational arrangement that emerges in 1977 will obviously depend on whether the coastal zone management plan proposed by the Commission in 1976 is passed into law by either the legislative or initiative process. If the management plan is passed into law, the organizational arrangement for implementation will be contingent on the nature of the plan itself.

The influence that the nature of the plan has upon the design of organizational arrangement for implementation hinges on the degree of prestatement in the plan. To what degree will the plan lay out explicit policies and measurable standards for evaluating the type and density of uses that will be allowed to locate and operate within the coastal zone? To what degree will the coastal plan designate priority uses for specific geographic areas within the coastal zone (as specified by CZMA)? The more prestatement in the plan, the less discretionary latitude the implementing agency will have in its decision making. It appears that reducing the discretionary latitude of the coastal management authority by increasing the degree of prestatement in the plan would reduce both the total number of proposed projects and the deliberation time spent on each project that is proposed. The reasoning is that a plan with strong prestatement would eliminate outright many potential coastal projects (on the grounds of incompatibility with the plan). Strong prestatement would focus the project review to those considerations not specifically addressed by adopted policies.

The staff size, budget, and discretionary powers of the organizational arrangement proposed in 1976 will depend on the extent to which the plan is a strong prestatement of explicit policies, measurable standards, and designated land uses.

Coastal Zone Management Act

After a year and a half delay, the federal Coastal Zone Management Act (CZMA) has finally been funded and California hopes to receive approximately $700,000 for fiscal 1973-74. Under the law the state may receive up to three annual grants for developing a management program (or $2,100,000 if the $700,000 figure holds for three years . CZMA also provides for grants to administer the coastal zone management program once it has been developed (the potential size of grants for administration are unknown since total funds for the program have not been appropriated).

CZMA's program development grants are particularly important to California since the current planning program has been severely limited by the diversion of funds to meet the high costs incurred by the commission's review of proposed projects. The CZMA grants should allow considerable development of the information base necessary to support the Coastal Zone Conservation Plan of 1976. To a great extent the success of the coastal plan will depend on having the environmental and socioeconomic information to pose, test, substantiate and implement the policies recommended by the plan. Without the CZMA funds, it may prove difficult to develop a strong and well supported coastal plan that can be implemented in 1977 by the successor to the coastal commissions.

Land Use and Functional Planning Programs

There is still reason to believe that passage of a National Land Use Policy Act (NLUPA) will be signed into law during this session of Congress. The law should give considerable impetus to the creation of a state-wide land use planning program. Support for the creation of region and state-wide land use control agencies may come from a new administration in Sacramento. The current administration has been a strong believer in home rule control of land use. Election of a new administration this fall should improve the chances of passing legislation establishing regional and state-wide land use control agencies. Economic development interests may lobby for state-wide land use control (Mr. Peevey hinted at this position in his presentation). It appears that the potential proliferation of regional land use control agencies in California (a trend already set in motion by BCDC, Lake Tahoe Regional

Planning Agency, and the California Coastal Zone Commission) is a matter of concern to the business and labor community. The apparent cause for alarm is the difficulty state-wide interest groups may have in effectively dealing with numerous regional land use authorities. Centralization of land use control in one state agency enables interest groups to concentrate their efforts at a point in the governance system ("one stop shopping").

In the long run it does not appear unreasonable to expect that the coastal zone management authority will become one component of a state-wide land use control agency. The political interaction now occurring between the San Francisco Bay Conservation and Development Commission (BCDC) and a Bay Area Regional Planning Agency (as proposed by Assembly Bill 2040 of the 1973-74 legislative session) may serve as a precedent for any future combination of a coastal zone management authority with a state-wide land use agency. AB 2040 does not propose to integrate BCDC with the Bay Area Regional Planning Authority. Supporters of BCDC argue that combination with a newly created regional planning agency may weaken and set back the successful program now managing San Francisco Bay. They pose the question: Why not let the Bay Area Regional Planning Agency get on its feet and demonstrate that it can resolve regional environmental issues as well as BCDC before considering a combination of the two agencies? The same argument may be posed when consideration is given to combining a newly formed state land use agency with an existing coastal zone management authority. The argument assumes that the coastal zone authority will be operating a reasonably successful management program. If this is not the case, there may be wide spread desire for terminating the coastal zone management authority in hopes that a state-wide land use control agency may offer a better management program for both the coast and the entire State.

One of the stronger arguments against the coastal zone management program in California should be responded to by a state-wide land use planning program. Opponents of the present coastal commission approach argue that the present regulatory activities have the effect of displacing uses (such as housing developments, industries, power plants) that seek coastal locations to an inland site. The net adverse impact (socioeconomic as well as environmental) generated by the use displaced to an inland site may be greater than the net adverse impact if the use had been allowed to locate in the coastal zone. A state or region-wide land use planning authority should examine the benefit/cost of coastal zone location versus the benefit/cost of alternative inland locations. It is evident that confrontation may occur on those occasions when a state or region-wide land use authority recommends a coastal site for a proposed project based on inland and coastal comparison of net adverse impacts, and the coastal management authority concludes that the proposed project should not be located in the coastal zone.

The debate over inland versus coastal zone location may be further complicated by the creation of new state-wide functional planning programs. Last year the Governor vetoed a bill (SB 283) to create a state power plant siting commission. Given the hysteria of the energy crisis, it is a distinct possibility that federal or state legislation will be enacted to vest authority for power plant siting (as well as siting of other energy related facilities such as offshore ports and oil development) in one agency. It is likely that the federal and/or state agency, if created, would have the power to override the decisions of both the coastal zone management authority and the state or region-wide land use authority.

Crisis and Prosperity

The energy crisis has served to underscore the fact that we are a society that rarely takes innovative action without prior provocation by events of crisis proportion. The great Santa Barbara oil spill of 1969 may have been the single most important factor contributing to the passage of Proposition 20. A catastrophy arising from a nuclear power plant malfunction may turn the controversy surrounding coastal location of nuclear power plants into a moot point. A recession in California's economy and consequent high unemployment may require revision of environmental protection policies and result in larger representation of the business and labor community within

the organizational arrangement that manages the coastal zone.

CONCLUSION

The extent to which cumulative impact assessment, equity among property owners and trends in coastal governance influence the direction of coastal zone management remains to be seen. Coastal zone management is shooting at a moving target. It is evident that the three factors only partially explain the nature and movement of the target, since other variables such as new technology, energy demand, and international relations will also have to be considered.

Collectively the three factors do serve to illustrate that coastal zone management is both a complex and evolving process. A report written during the infancy period of the coastal zone management movement summed up the situation in one sentence.

> Given the constantly changing physical, biological, and economic systems, the changes in values and technology over time and the imperfect state of knowledge concerning the full range of cause and effects and the relations between those who benefit and those who lose from given patterns of resource use require that planning for resource use be established as a continuing process.
> (Wise, 1969)

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BALANCING EQUITIES IN THE COASTAL ZONE

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Thank you Mr. Chairman. I want to speak to you a bit today about the subject in the program, which is Balancing Equities in the Coastal Zone. This is a difficult question to grapple with. The previous speaker made some references to it, in fact, I think he could have spoken two hours on it if left to his own devices and the chairman had not rung the gong.

It seems to me that the question of balancing equities really translates into how to be fair. The coastal commission, the six regional commissions and the state commission in California attempt to wrestle with the question of balancing equities on a daily basis -- or at least should be doing so. I say in principle because that still gives us a lot of room for differences of opinion.

In the case of the coast here in California, balancing equities comes down to discussing a number of issues -- a couple of which were touched on already. One of them, the issue of private property rights vs. public needs, revolves around the takings clause of the U. S. Constitution and there was a lengthy discussion of this in one of the morning sessions.

Another one of the questions one comes up with in talking about balancing equities is, who is to have coastal access -- is it to be all of the people, or a relative few? This was one of the causes for Proposition 20 in the first place. The concern of the many people who did not own coastal property themselves was that the coast would be walled off from public access. A case in point was the Sea Ranch development on the Sonoma County coast. Regarding the Marin County coast, which was mentioned here earlier, Marin County has pursued what can only be characterized fairly as a no growth posture - in the western part of the county. The Board of Supervisors, which controls the unincorporated areas of the county last year declared by resolution that the western one-third of Marin County was an agricultural preserve and then proceeded to zone it to what is called A-60, that is one home per 60 acres, as a means of reducing population pressures and obviously never having to deal with social problems or population density. And most of western Marin today is zoned for A-60.

Mention was made that Petaluma in Sonoma county has pursued in the last year and a half a policy of limiting new residential construction to 500 units a year. The difference between the Petaluma situation in my view and the Ramapo situation in New York, is that in Ramapo the city council --- the government --- said and was sustained in the courts, that you

can limit residential development to a prescribed number of houses over a period of time as long as it is tied in, in effect, to availability of public services such as sewage, water, and what have you.

Petaluma has pursued a different course. What makes Petaluma unique is that its limitation on housing construction is not tied directly to the provision for public services. And for that reason, some groups, basically developers, are in the federal courts today trying to get the Petaluma plan thrown out on the basis that it is a violation of constitutional guarantees of freedom of movement of people.

Now another one of the 'balance of equity' questions is of course the vested developmental rights issue which is being litigated as a result of the Proposition 20 success. In the Supreme Court, 4-3 decision, a couple of months ago in a case called See-the-Sea in San Diego County it was judged that someone has vested developmental rights if substantial, lawful construction had been done prior to February 1, 1973.

The Coastal commissions in California operate under a statute that, the only fair way to describe it, is tough. I think the Chairman of the regional commission here would agree. It's a tough statute -- it was a tough initiative. The intent basically, I think it's also fair to say, of those who sponsored it, and secured its enactment by the people of California, was not to balance all the equities, not to balance social and economic factors with environmental factors, but rather to put environmental factors first. This, of course, makes things difficult for those who think there should be parity between social, economic and environmental concerns. It makes it particularly difficult for even the coastal commissions themselves and for the commissioners who try in varying degrees, and with varying degrees of success, looking in part toward 1976 and a report to the state legislature on the plan, to try to balance some of these considerations.

Last month the state commission decided, and this was a social decision including social values, and they labeled it as such, that they were expressing, at least tentatively, a preference for land uses on the coast that will allow the most people to use the coastal zone. This was in a case for a recreational vehicle campground at Malibu which was appealed to the State Coastal Commission. They approved it.

Likewise, the same state commission last month denied a permit for an over 600 unit apartment and condominium development in Santa Monica, sponsored by the Redevelopment Agency of Santa Monica on the grounds that it would force older people, the elderly, many of them low income who were long time residents of this part of the south coast area where the air is clear, to have to get up and move out in favor of a more affluent group.

So, despite some of the things in Proposition 20, I think it's fair to say that there was an attempt to try to balance equities by both the regional and state commissions in a way perhaps, that goes beyond or at least is not explicitly stated in great detail in Proposition 20.

Another one of the problems in trying to balance equities in the Coastal zone is that there is a problem with the loss of value or reduction in value of unimproved properties with the passage of Proposition 20, vacant lots and so forth where developmental opportunities have been diminished by the passage of Proposition 20 versus the appreciation, rapid appreciation in many cases, of the existing developed land. Now this has

led a friend of mine, who happens to be a lobbyist in Sacramento and is relatively affluent, to say that "Gee, I might have been wrong in opposing Proposition 20 in '72, because since its passage, the value of my home in Sea Ranch has more than doubled." And this is one of those interesting consequences.

A couple of other points in trying to balance equities that need to be stated is that they really overlook the question of job needs. When Proposition 20 was on the ballot last year, one of the major opponents of it was organized labor in California, not all of it but most of it, and largely within organized labor, the building trades unions. The building trades unions said they opposed it because whatever else may be desirable in terms of Proposition 20, one consequence would mean job losses for their members. And you could see that clearly when matters come before regional or state commissions such as the San Onofre addition to the Southern California Edison facility which would provide 7,500 man-years of construction labor.

Also, the final overall point on trying to balance equities, is of course, the competing needs of a general society, which I want to speak a little bit more of in a moment, for energy, which means power plant siting, refinery expansion in a period where we are in an energy crunch, for the construction of deep water ports, obviously for the preservaton of fishing, and so forth, versus the need to preserve what is an irreplacable resource here in California.

I can give you two examples of how difficult these issues become in a very specific way. Turning first to the property rights issue -- the private property rights versus public needs issue --- I'll use on example in Marin county. A fellow by the name of Herbert Angress had for four years tried within the county to get approval of a condominium development of some 70 units on the shore of Tomales Bay. He finally secured approval of the county planning commission, and the county Board of Supervisors. His proposal was environmentally sound by the standards of 1971 and the summer of '72, and it was in accordance with the county's general plan and in accordance with the plan for the Point Reyes National Seashore which called for some recreational facilities for people to stay overnight to make use of the seashore.

By the time he had gotten all the necessary permits, but had never done any construction, along came the qualification of Proposition 20 for the ballot in early summer '72. He could not borrow money until this matter was resolved one way or another and in November '72 we know what the outcome was in terms of voter preference. Mr. Angess then went to the regional coastal commission and asked for a claim of exemption, he was denied. He asked for a permit, he was denied. Now he is practically bankrupt. It is obviously a tough equity question.

Another example, this one in Sonoma County, was the Schreffler case. This was an individual who was retired, who owned some property near Bodega Bay, in Sonoma County. He had lived in Santa Rosa. He sold his Santa Rosa home and he and his wife planned to build their dream retirement cottage near Bodega Bay.

It just so happened that the construction of that house would interfere with the line of sight from Highway 1 to the ocean, so the regional coastal commission denied him a permit to build. That is it technically provided him with a permit to build provided the state did not purchase the land within one year. This action was affirmed by the state coastal commission. So now the man is waiting to find out whether the land

is going to be purchased by the state. He's now in court. He has suffered great personal hardship although the public weal may very well have been served.

Obviously in both these cases the equity question was made more difficult because to date we have not provided the mechanism for the purchase of land or some other things, density rights, and so forth.

The third case I'd like to discuss as an example of the difficulty of balancing equities is here in southern California. This is not the private rights versus public rights question so much as it is the general welfare of the people versus environmental needs in the Coastal zone. What I'm talking about is the proposed San Onofre power plant addition that Southern California Edison and San Diego Gas and Electric Company wish to build. This is a 1.3 billion dollar addition to the nuclear facility that was shown to you on slides earlier this afternoon. The San Diego regional coastal commission approved the application by a vote of 9 to 1. Those of you who saw the L.A. TIMES yesterday know that this has been appealed by a number of groups including those who are concerned about radiation safety and other factors, to the state coastal commission. The staff of the state coastal commission has recommended denial of the permit to build the addition to the nuclear facility at San Onofre. This matter will be decided tomorrow by the coastal commission meeting right down the street here.

The San Onofre question is particularly difficult because, among other things 1) we are in the midst of an energy shortage, 2) the staff recommendation goes to the question of the environmental impact on the bluffs whose picture you saw. Actually there are some 17 or 18 miles of such bluffs. There is no doubt that the building of an addition to the power plant will cut into those bluffs. However, how do you balance that against the general society's needs?

I would like to read to you as an example of the reasoning of the commission staff, a couple of paragraphs from its recommendations regarding San Onofre. They say, "The proposed expansion of the San Onofre nuclear power plant would destroy more than one-half mile of coastal bluffs and canyons that, although little known to the public, have a beauty and grandeur deserving of protection. Motorists speeding by San Onofre on Interstate 5 may not know the bluffs even exist, but the San Onofre expansion would level them (52 acres of bluffs would be taken, about 2.5 million cubic yards of material would be trucked to 125-acre dump site adjacent to the freeway.)

From the beach below, however, these are the towering bluffs carved and patterned by wind and water, 'the sound of the surf,' and the silent twisting canyons. This combination provides an experience virtually unique along the Southern California coast. And, just as nobody would propose to carve a power plant into Yosemite's Half Dome, the staff does not believe that anyone should destroy the bluffs and canyons of San Onofre. Our society is not yet so poor that we must chop down our cathedrals for firewood.

That's the staff recommendation. It gives you a bit of a feeling for how strongly environmental concerns are being taken by the staff. Now the staff proposal, is that instead of being denied, Southern California Edison and San Diego Gas 7 Electric move the power plants to the other side of the Interstate 5 freeway. In other words, move it a half a mile or so the other side. This may sound reasonable at first, but it took an act of Congress to get the land for the present San Onofre power plant. To do re-engineering and get agency approvals and all

the other needed things could take three or four more years during a period of time when we are already deficient in energy.

In fact, as the staff does point out, the applicant contends that any delay would cause more reliance on fossil fuels. We know that they are of great concern, in terms of air pollution.

Personally, my own view is, in the case of San Onofre the staff did not adequately balance equities and needs. While there is a desire and need for us to preserve as much of the California coastline as possible, when you have competing demands, and in this case, very serious competing demands, the general welfare must come first.

Well, let me conclude by saying that equity questions are obviously though to handle. For example, the battle over gas rationing vs. increasing gas prices, which contributed to the firing only yesterday of Governor Love just five months after he resigned as Governor of Colorado. Or the limitless debate we have in this country over tax reform. And what is a fair tax system?

Equity questions are made even more difficult in terms of the coastal zone when there is no money for compensation of those whose property is diminished or taken.

My own personal view is that in the end what you have to come down to is an acceptance that single purpose planning, whether it's done in terms of coastal preservation or it's done as EPA has done under the Clean Air Act with the one standard being clean air, is not adequate. A better balancing of equities is necessary.

That better balance can only come through an approach such as state land use planning that's overall and multipurpose. That says the policy of the state is to consider equally social, economic, environmental considerations. That sets out areas of critical state concern, that sets out areas of statewide significance and that defines "key facilities." I think this is where we are headed; that it's proper; and I think it will happen sooner than the three to four years the previous speaker indicated. I see a developing consensus for it. Thank you.

Question: Are you going to use the same attitude towards preservation and conservation of the environment when there's only 15 miles of these lands left, then 10 miles, 5 miles, 2 miles and 1 mile?

Peevey: Are you talking about the San Onofre situation?

Question: Yes.

Peevey: I think your question is a red herring. You know you're talking about 52 acres when there are 18 miles of bluffs, and we're in an energy shortage situation, we've already done all the plans, and everything else for that site. It would mean cutting out a little bit of the bluffs, equal to, or a little bit bigger than what was shown. I don't take the view that this means that you then take the next piece of beach and then the next piece of beach and so on. I think the first speaker this afternoon indicated that on any kind of relative point scale, the best place to put a nuclear power plant was inland. It was done in Rancho Seco up in the San Joaquin Valley. But we're not at that point at San Onofre. We're at the here and now -- the decision has to be made at this moment and I don't think that suggesting that if you take 52 acres

of bluffs now means that you are in support of taking another 52 acres tomorrow and the next day, and the next day and the next. But you have a very immediate situation.

One of the Other Panelists: May I say something? That's a good question but, I don't know if there's anybody here from the Sierra Club -- (laughter) -- I asked that question first. Larry Moss is not actively opposing the San Onofre Two and Three additions. That doesn't mean he's for it, if I can speak for him (I will anyway because he isn't here). He appeared before a group of us last Spring in a course at UCLA on this subject and we asked the question. He said, no, he's not against it. He said that he'd appear at AEC hearings to talk about their concern for the thermal effluent and the monitoring systems and the safeguards to make sure that everything is done right but as long as, and this is kind of the context that he put it, as long as you've already screwed up the site anyway with one plant, you might as well put two more in the same place. Because once you get the plant licensed, the area licensed, it's very difficult to go elsewhere. Also once you get transmission lines in there, you've got to get a corridor built first, so unless you do go inland which is a different ballgame, because its a different design -- and on this, Dr. Bright can confirm this, but once they change this, or change the location or type of plant, they may have to go through all the other appeals again. All the other roads to the licensing. But, this is the part that occurred to me when you asked the question was that this isn't going to take all of the coast. This is one instance and it is probably one of the last few places on the coast that there'll ever be a plant like this.

Peevey: I think the basic point I'm trying to make is that you have to have a mechanism to balance these equities and you can't have it on a single purpose planning basis because that agency is going to consider its best interest, whether it be fish and game or the coast or whatever. And you have to have a mechanism that balances all these things. Sometimes you're right and sometimes you're wrong... Yes?

Question: Larry Moss isn't here. His statement was made, by the way, prior to the adoption of the California Coastal Zone Conservation Act and while he was also in his individual capacity. I would just like to add that that was before the adoption of the section of the act that points out that any irreversible -- that the commission may not approve any irreversible commitment of coastal resources. Some us feel that trucking 52 acres of bluff to Japanese Mesa constitutes somewhat of an irreversible commitment.

Peevey: I won't argue that it isn't going to do some damage to the bluffs -- there's no doubt about it. That's the question of balancing equities, you know, which one has to come first in this kind of question. People lay awake nights trying to decide. And I'm sure there'll be a lot of anguish by the coastal commissioners who have to vote on this, before they vote, tomorrow and afterwards too. (Laughter)

Question: Just one more statement ... do you or any of these other fellows live within twenty miles of San Onofre?

Peevey: No, but the President of the United States does on occasion.

LOCAL LAND USE:
MANAGEMENT CONCEPTS AND PROPLEMS

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The blind forces of urbanization, flowing along lines of least resistance, have not shown an aptitude for creating an urban and industrial environment that will be stable, self-sustaining and self-renewing. Rather, as congestion expands and the rate of expansion increases, the environment has undergone tragic defacement. Also substantial dollars have been expended on unsuccessful remedies for congestion and expansion, such as more transportation corridors for cars and more distant sources of potable water; yet, these efforts have all too often merely increased the economic burden and also promoted the "more of the same" blight and disorder. This frustration is aptly summed up in an early Environmental Impact Statement printed in TRUE magazine, 1959, namely: The "impact is critical, but not unassailable, potentially negative, but not unconquerable as long as we address ourselves squarely to its full implications, and proceed resolutely on a program of mitigation and amelioration of negative influences."

Armed with evidence of this confusion environmentalists have pressed hard for blanket prohibitions, moratoria, where all changes are precluded except to carry out "desirable" restoration. Yet, such prohibitions are not a viable solution. They would be just as destructive because of direct disturbance of economic stability, general cultural customs and governmental management protection procedures.

If we are to emerge from this dilemma with reasonable success, it is obvious that the thrust must be centered around a "common sense" balance between: use and disuse, conservation and exploitation and need and desire. Such a thrust is not new, and there is already indication that we are working toward such a "common goal" approach at several levels. Unfortunately, much of our activity is still "wheel spinning" because we have not been able to separate our process of identification of problems from vested interests and customs of the past. With this as a backdrop, lets turn our attention now to management concepts and problems.

First, considering management concepts, the issues are complex and the means of adjustment expensive in terms of time, talent and dollars. Here, we shall only consider three (3) concepts: ethical changes, land as a resource and a commodity, and a cross-matching scheme.

An ethic is a self-imposed limitation on the freedom of action aimed at survival. Technology tells us what we can do while our ethic tells us what we may not do. This is a far-

reaching issue, and the variations of "environmental concern" point up the difficulties of determining eithical attitudes. Earl Cook, in his article on "Ecoethics and Environmental Politics" identifies three (3) major ethical positions in todays environmental controversies: First, the Development Ethic, which states that good comes from the management and mastery of nature; second, the Preservation Ethic, which forbids alteration by man of natural areas deemed to have special aesthetic, recreational, scientific, therapeutic or ecologic values; and third, the Equilibrium Ethic, which requires all to work to achieve a relatively stable equilibrium between man's needs and his environment.

It seems essential that we must at the very least move toward an equilibrium ethic if we are to prevail and enjoy a degree of ecological stability. Thus good viable, management will only emerge when we are all more capable of straddling the fence between total development and total preservation, with a strong view toward measuring alternative uses versus overall goals and policies.

Second, what about land? does it have value? and will it become scarce in the years to come? At the present, our view of land use is centered still around the Real Estate mode of "regulate land use to maximize land values." Yet, the value of land is beginning to change, for example, mudflats associated with estuaries were once characterized as "useless" but today they are thought to have "value." Also, land is beginning to be viewed using interrelatedness rather than on a lt by lot basis. Further, scarcity of land is highlighted by increasing limitations put on land use by local governments. Thus, to some, land is a commodity, there to be sold, while to others it is soley a resource, to be preserved. However, it is essential that land be treated as both a resource and a commodity. Conservationists who view land only as a resource are ignoring the social and economic impact that would parallel restrictions on the right to buy and sell land. Yet, also, the land speculators who view land only as a commodity are ignoring the problem of our finite supply of land. As self-evident as the idea of land as a resource and a commodity may be, it is clear that the evolution of management concepts to achieve a change in the market place will not be easy or quick. This is a futuristic concept which warrants much of our time and conern.

Third, a suggestion as to how we may approach the problem of land use management so as to gather viable data or information, that is, a system of comparison or cross-matching. Although the comparisons can be variously packaged, there seem to be four (4) essential ones:

1. Environmental Sensitivity vs. State of the Art - this will point out areas where improvement is needed and also help to establish priorities.

2. Cultural Environment vs State of the Art - this will aid in determining why we are where we are, and serve as a basis for evolving mechanisms to resolve the problems.

3. Planned Future Changes vs. Envirnomental Sensitivity - this will serve as a base for identifying future environmental impact.

4. Planned Future Changes vs. Socio-Economic Base - this will allow a determination of the realistic aspect of current general planning or where development "roll back" may be most appropriate.

These comparisons or cross-matchings are achievable, and if put into operation would provide needed data from which to evolve viable decisions. The success of such an approach would dictate, of course, that many present governmental procedures and jurisdictions be violated.

So much for a "scratching of the surface" regarding management concepts. Now, let us consider for a brief period the present problems--actually the bag of problems is bulging, so much so that is would be presumptive to attempt to cover all aspects at this time. Accordingly, I will restrict myself to four (4) issues: Property Rights, Shifting of the Burden of Proof to Developers, Vested Interests, and Communication.

Property rights, the right of an individual to dispose of the land he owns AND the right to use his land, are at the very crux of the issue of land use. Since the 17th Century these two aspects of property rights have been gradually eroded. The loss of an owner's "absolute right" to dispose of his land was aptly described by Walter Lippmann in 1963:

> "Private property is, in fact, the creation of the laws of the land----it is a primitive, naive and false view of private property to urge that it is not subject to the laws which express the national purpose and the national conscience....."

Now, what about the "absolute right" to use your land! Precedents are numerous, but I will only review three key concepts.

First, the use of singular police power to acquire <u>or</u> change the use of property. This was established in 1915, the <u>Hadacheck Case</u>, where the U. S. Supreme Court stated--"there must be progress, and if in its march private interests are in the way, they must yield to the good of the community."

Second, as exemplified by the <u>Euclid Case</u>, 1926, the court ruled that land-use regulation was constitutionally valid, and thus approved comprehensive zoning regulations.

Third, the concept that the "management" of property rights is subject always to "reasonableness." This embraces four (4) principles:

a. Does the regulation relate to a proper legislative goal?
b. Regulations must not unfairly discriminate against similarly situated property owners.
c. Consideration should be given to the impact of a regulation on the market value of the property.
d. "Just compensation" should be provided by spreading to the public the costs of acquiring public benefits.

It is clear with even this brief account, that property rights are not static, that the issues are not always clear; yet somehow the ethic of equilibrium must prevail--coupled with a means of incentive to insure appropriate land use and just compensation. Always at the heart of the matter should be reasonableness-remembering that what is reasonable to one is unjust to another. Until this issue is managed effectively, land use management will not achieve maturity.

Until recently the initiative for change has been vested with the developer and the burden of proof of environmental degradation was left for others to consider, and usually too late. The trend is clear that the burden of proof is shifting to the developer. The flury around the character, quality and use of EIS's clearly demonstrates this point as does the

increasing number of class action suits based on such issues as esthetic deterioration of the environment. The importance of this shift of burden is enormous. It demonstrates the public's unwillingness to let experts in the government continue to make environmental decisions, as well as a degree of impatience with existing mechanisms for resolution of problems. However, this is not to imply that the development eithic lacks a conscience. There is increasing evidence: 1) that developers in general recognize the need for new mechanisms which will allow an evaluation of physical, economic and social costs and benefits before development; and 2) that the final decision should be made on a best-alternative basis. This is a new approach by developers and it must be encouraged by local, state and federal incentives.

Vested interests are not new, but near total exposure to public review is new. Perhaps we can see this easiest by considering two general statements which are presently very common: First, can a group of appointed officals have power to rule on decisions evolved by duly elected officials? Note that the concern here is not for the substance of a particular issue, but rather a matter of vested control. Second, can regional governmental bodies determine the destiny of any given city? Note, this is not an analysis of the pro's and con's of the worth of a regional government, but rather a matter of vested interest. Also crucial here is the number of governmental regulatory bodies, many with overlapping boundaries and oftimes conflicting and confusing regulations.

Obviously this issue is clouded by past precedents and the "cry at the trough today"--but unless we can evolve some land use management concepts which are pervasive, the issue will be mute in the distant future. The burden is totally vested in a need for change in governmental procedures--at all levels. Since law tens to be a bailiff for the ruling power of the moment, it will not solve this problem, even though it is called on with increasing frequency to regulate conflicting constituencies.

Communication is a perpetual problem. Yet, re land use, it is compounded becase the two extremes, proponents of development and preservation ethics, are not attempting to communicate and even if they did, neither side would listen with clear objectivity. Oh hes, they do on occasion listen to each other, but usually through a judge during a trial; and the judge is most often lacking in the needed background, to say nothing of time, to be an effective interpreter. If this lack of what may be called "lateral communication" continues it can only result in more severe problems with a concomitant reduction in the rate of achievement of needed changes. Accordingly, if we wan viable land use concepts in the immediate future, we must increase effective communication. We need more groups and organizations which can provide "reasonable" and "appropriate" griss for the decision mill. An excellent example of this approach was begun in the San Francisco area by a group called EIC (Environmental Information Clearinghouse). EIC's goals were directly to my point, namely:

1. To serve as a central service for environmental information.
2. To establish a communication link between groups concerned with environmental issues.
3. To provide a mechanism to bring businessment and environmentalists together on projects of mutual interest.

Although EIC was a public venture, there is no reason why local and regional governments can not now so enjoin themselves.

In conclusion, where are we today, re land use. We are on the cutting edge of a new adventure. This chapter of American History will be as a hinge of fate. We can more forward with an ethic of equilibrium which provides adequate balance between natural things, man-made things, economics, social need and governmental concerns. But we must also remember to avoid the bureaucratic trap that regulation is desirable in itself, and strive for a mode of operation that affords a planning process which measures alternative uses versus overall goals and policies.

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SUPERPORT ECONOMICS: THE NEED FOR DEEPWATER PORTS ON THE WEST COAST

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In my remarks, the term superport will be used in a very narrow sense. More specifically, I will be referring to deepwater port facilities (DWP) for transfer of crude petroleum. These DWP facilities may be private or public terminals and are not necessarily complete ports. On economics, I will be using the term in its broadest sense. Galbraith simply defines economic efficiency as "getting the most for the least". Both qualifications are important in addressing the West Coast need for DWP facilities.

In beginning, it may be apropos to describe our current situation, nationally and for the West Coast. At present, no U.S. harbor can accomodate a fully loaded tanker greater than 200,000 dwt. The world tanker fleet already numbers more than 300 ships too large to enter any U.S. port. Most U.S. ports have channel depths between 35 to 45 feet. The maximum channel capacities on the West Coast are at Long Beach and Puget Sound where 150,000 dwt, tankers can be accommodated.

The Corps probably perceived this situation at an earlier stage than others. In the late sixties, the Corps initiated a number of port studies, culminating in our latest effort - Deepwater Port Studies for the North Atlantic, Gulf and West Coast. Listed below are several of the published studies:

a. Foreign Deep Water Port Developments, A Selective Overview of Economics, Engineering and Environmental Factors, by A.D. Little, Inc., 1970.

b. U.S. Deepwater Port Study, by R.A. Nathan Associates, Inc., 1972.

c. Japan: A Survey of Ports, Deepwater Terminals and Vessels, by Walter Yep, South Pacific Division, 1973.

d. North Atlantic Deepwater Port Facilities Study, North Atlantic Division, 1973.

e. Gulf Deepwater Port Facilities Study, Lower Mississippi Valley Division, June 1973.

f. West Coast Deepwater Port Facilities Study, by South Pacific Division and North Pacific Division, June 1973.

The West Coast Deepwater Port Facilities Study was in response to a resolution of the Committee on Public Works of the U.S. House of Representatives. This resolution was adopted on 12 October 1972 and was sponsored by Congressman Glenn Anderson and Don Clausen. The study commenced in January 1973 when funds were made available and was completed in June 1973.

The objectives of the study were (1) determine the need for DWP facilities along the West Coast; (2) if the need exist, evaluate the advantages and disadvantages of the most likely locations and the most appropriate facilities.

To accomplish our study objectives, the scope of the study was divided into six interrelated elements. These were:

1. Petroleum Consumption and Supply

2. Refinery Capacity, Location and Impact

3. Transportation Economics

4. Engineering

5. Environment

6. Public Participation

The study was based on three conditions: (1) the "without" deepwater condition which considered the utilization of existing navigation channels to handle projected petroleum volumes; (2) the "with" deepwater port condition which considered the utilization of DWP facilities to handle projected petroleum volumes; and finally, (3) all DWP facilities would be on a common use basis. Also, our study analyzed more than 50 alternative schemes for vessel movements of crude petroleum whether from the North Slope or Middle East.

The findings of our study resulted in no Corps recommendation for construction of DWP facilities. This was not the intent of our study. Highlights of the study findings were:

(a) The need for DWP facilities is a comparative need and not an absolute need.

(b) After considering more than 21 potential sites, the most likely sites are Ferndale, Anacortes, Port Angeles, Central San Francisco Bay, offshore Golden Gate, offshore Point Fermin, Los Angeles Harbor or Long Beach Harbor.

(c) Transportation savings with DWP facilities could range from $100 million to $300 million annually.

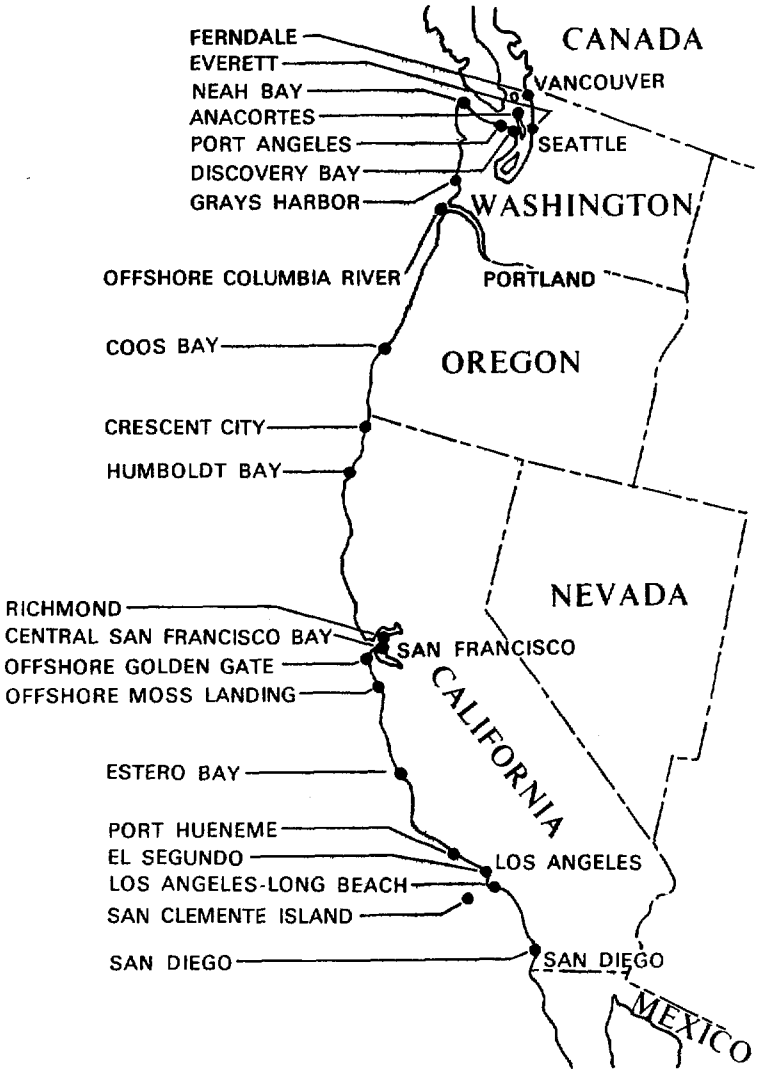
(d) Using a smaller number of large ships or supertankers would reduce congestion in shipping lanes and decrease the probability of oil spills.

The completion of the Corps West Coast DWP study provided a reference document for some policy considerations. One response to our study was a policy position by the Resources Agency of the State of California. The Resources Agency acknowlecges the "....need for a deepwater port somewhere on the West Coast." It is interesting to note that the stated DWP need is used in a singular context, implying no more than one DWP. Our findings indicated that up to three DWP facilities could be economically feasible along the West Coast.

In terms of a Federal policy, there is no precedent for Federal development of DWP facilities. DWP facilities, if constructed, should be financed and built by non-Federal interests. Federal authority will probably focus only on the licensing and permitting aspects of DWP development.

*Mr. Yep was one of the principal study managers for the West Coast Deepwater Port Facilities Study. The views presented here are not necessarily those of the Corps.

POTENTIAL DEEPWATER PORT SITES
WEST COAST



Editors Note

EDITORS NOTE: This material was extracted by the editor from the U. S. Army Corps of Engineers report "West Coast Deepwater Port Facilities Study" dated June 1973, to add a few interesting facts. Because it is out of context, this material may not now represent the views of the Corps of Engineers.

During the 1940's the standard tankers was a ship of 16,000 deadweight ton capacity, which drew 30 feet of water. In the 1950's the largest tanker in the world was 30,000 dwt, drawing more than 50 feet. By 1968, the largest vessel afloat was a 325,000 dwt tanker. In early 1973, a 477,000 dwt tanker was launched, and currently a 706,000 dwt tanker is on order and a one-million-ton behemoth is being designed.

Tankers require significantly deeper drafts as their deadweight tonnage increases. For example, a loaded 100,000 ton tanker draws about 47 feet, and a vessel carrying 300,000 tons requires 73 feet. The coming 500,000 ton ship will need about 90 feet of draft and the draft requirements of a million ton ship would be approximately 110 feet.

The deepest ports in the nation are in Puget Sound and at Long Beach. Existing port facilities in Puget Sound can handle up to 150,000 dwt. Channel depths in Long Beach Harbor can serve vessels up to 130,000 dwt. More and More large tankers are joining the world fleet. At the beginning of 1973 there were over 300 tankers of 150,000 dwt or larger in operation and over 400 or more on order for construction.

The reason for the larger size is economy. It costs less per barrel of oil to move petroleum in a large ship. As an example, where it might cost about $10 a ton to move oil from the Persian Gulf to California in a 50,000 dwt tanker, it might only be $5 a ton in a 200,000 dwt tanker. Eventually, the cost differential curve flattens out, but as tankers get bigger even a small saving in transportation cost per ton becomes a large saving on the total cargo. The use of supercarriers for the delivery of crude petroleum imports to the west coast would result in considerable cost savings per ton.

Deep=Draft Ports Considered: At the outset of the study, 22 potentially suitable deepwater port sites on the west coast were identified for review (as shown on Mr. Yep's figure). The study eliminated a number of sites from detailed consideration for a variety of reasons.

Assuming construction of the Alaska pipeline to Valdez, the study identifies three alternatives which would have the greatest potential economic value and cause the least change to existing conditions.

1) - Three deepwater ports. One deepwater port would be located in each of the Puget Sound, San Francisco Bay and Los Angeles/Long Beach areas.
2) - Two deepwater ports. One deepwater port would be in the San Francisco Bay area and one in Los Angles/Long Beach areas. Puget Sound would continue to receive crude oil at its existing ship terminals and through the trans-mountain pipeline from Canada.
3) - A single deepwater port. Deepwater port facilities would be provided at either San Francisco Bay or Los Angeles/Long Beach for tankers up to 475,000 dwt, with transhipment by sea in smaller vessels to other ports.

REGULATION, TAKING AND PLANNING IN THE CALIFORNIA COASTAL ZONE

by Lindell L. Marsh

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I. Introduction

A. The Problem - Urbanization.

The increasing urbanization of the California coastal zone[1] has placed an unprecedented strain on our present system of land-use planning and regulation. Communities have been destroyed by their merger into expanding megalopoli. The pollution of the ocean environment has increased. Sludge accumulates offshore population centers such as New York and Los Angeles. Air pollution is increasing. Population and structural density is increasing while open-space lands for agriculture, outdoor recreation and wildlife are disappearing. While many of the problems associated with urbanization are commonly experienced throughout the United States, their impact is particularly acute in the coastal zone because of its high population density,[2] the relatively complex and sensitive nature of the environment and the extensive overlapping and fragmentation of government regulatory schemes.[3]

B. Governmental Response.

Government agencies and concerned groups at all levels have reacted by conducting extensive studies of governmental policies and programs relating to the problems arising from urbanization and its impingement on the natural environment,[4] and by seeking to refashion and expand existing regulatory tools and schemes and to develop new schemes where the existing schemes are inadequate.

New regulatory schemes with respect to air and water quality and noise have been established on the Federal level.[5] There is a trend among coastal states, generally to effect new regulatory schemes with respect to wetlands, other coastal areas and the problems of urbanization.[5a] In California regional regulatory schemes with respect to water quality and land-use within San Francisco Bay,[6] the coastal zone and the Lake Tahoe Area[8] have been developed.[9] Legislation has also been enacted to promote the conservation of open-space lands.[10] Several communities have also moved to develop regulatory schemes to limit or control population and structural density.[11] Legislation has been enacted and court decisions rendered preserving and enhancing public interests and rights in coastal areas, including rights of access and use and the preservation and enhancement of wildlife resources.[12] Far-reaching State and Federal land use legislation is now being considered.[13]

This article will discuss (i) the limits of non-compensatory land-use regulation; (ii) recent innovations in various land-use regulatory schemes in California; and (iii) considerations with respect to the further revision of such regulatory schemes in order to make them more efficient and equitable in dealing with the problems attendant to urbanization in the California Coastal Zone.

II. The Limits of Non-Compensatory Land-Use Regulation.

A. Introduction.

Many of the recent innovations in land-use regulation raise questions which go to the basic principles upon which the system of land-use in this country and its regulation is based. One of these principles, which is found in the Fifth Amendment of the United States Constitution (and applied to the states by the Fourteenth Amendment)[14] and many state constitutions[15] is that private property may not be taken for public use without the payment of just compensation. Commonly, it is argued that a particular regulatory scheme or tool fashioned to deal with the problem of urbanization has passed beyond the limit of permissible regulation and violates these constitutional prohibitions, constituting a "taking" for which compensation must be paid.

In order to understand this distinction between constitutionally permitted non-compensatory regulation and prohibited takings, it is important to understand the historic concepts of property and regulation in United States jurisprudence.

The existing system of land-use regulation and the principles upon which it is based have their roots in England. The historic English regulatory scheme which consisted of a combination of the feudal system of multi-tiered land tenures with incidental services and obligations and the relatively unrestricted authority of the Crown and Parliament, provided a relatively adequate solution to the land-use problems of an agrarian economy with minor but growing trade centers. This English precedent was substantially affected when transmitted to the colonies by the vast abundance of land within the colonies and the desire to promote their settlement and development, together with a desire to cast off the feudal system as well as the "foreign" centralized authority. The result was an increase in the assumed magnitude of the interests and rights of the private individual as "owner" of lands and a corresponding decrease in the assumed "rights and interests" of the public in such lands. Further, the authority which was retained by government with respect to land-use was delegated to the lowest levels.

Concurrently with the decline of "public rights and interests" in property, the Federal and state governments undertook major programs to divest themselves of lands in which they held title in order to provide revenues and to encourage settlement and development (and to compensate veterans).[16] In California, this divestiture of lands was exacerbated by the confirmation in private ownership of large tracts of coastal lands comprising Mexican and Spanish ranchos pursuant to the Treaty of Guadalupe Hidalgo which concluded the war between the United States and Mexico in 1848.[17]

While the confirmation of the ownership of ranchos generally excluded tide and submerged and swamp and overflowed lands, either by restrictive court decisions[18] or by the practices of the surveyors employed to establish the rancho boundaries,[19] the Federal and State governments proceeded to dispose of such lands with widespread sales.[20] The "State Lands Commission estimates that there are approximately 80,000 acres (125 square miles) of patented tidelands within the state of Califor-

nia."[21] Had it not been for restrictive court decisions with respect to these conveyances,[22] it is predictable that, for example, a substantial portion of San Francisco Bay would now be filled and appropriated to private use.

The practical result of these two trends was to increase the lands in private ownership, particularly in the coastal zone, and to decrease the amount of government regulation which was exercised over these lands. It has only been recently with the urbanization of the country generally, and in particular the coastal zone, that regulatory schemes have begun to impinge significantly on the assumed domain of private property, thereby raising the question of the limits of non-compensatory regulation.

A number of recent articles have reflected a growing concern with respect to this question generally, and as it relates to land-use within the coastal zone.[24]

B. The "Taking" Concept.

(1) The Requirement of "Just Compensation".

The strengthening and emphasis of the concept of "private property" within the United States discussed above is reflected in the final version of the Fifth Amendment as incorporated into the Constitution. Prior to the Revolution and the drafting of the Constitution, the only limitations with respect to a "taking" pursuant to governmental authority under English law were procedural in nature; that is, a taking could not occur except in accordance with laws established by Parliament. The payment of "just compensation" was not an incident of such a taking and was added to United States jurisprudence by the Constitution and prior state constitutional provisions. Compensation, therefore, under English law was a legislative prerogative and not a matter of right. The harshness of the legislative act or any mitigation of its effect on the private owner of land was left to the discretion of Parliament.[24a] Without the "just compensation" provision in the Constitution, the private owner of land subjected to a "taking" by the Federal government would be, in similar fashion, left to the compensation, if any, provided by legislative prerogative and to the protection afforded by other provisions of the Constitution (such as the procedural "due process" and "equal protection of the laws" requirements).

For a substantial period following the ratification of the Constitution, the conceptual underpinnings of this particular clause were largely irrelevant. Land was plentiful and governmental restrictions on land-use were comparatively few. Governmental takings consisted primarily of the acquisition of the title to or possession of lands for public facilities such as roads and government buildings. It was only when governmental schemes to restrict and regulate land-use began to significantly increase that serious problems relating to the distinction between "regulation" and "taking" became significant. Accordingly, until shortly after 1900 a compensable taking would occur only where government took title to, or at least possession of, lands in private ownership. The "taking" clause was interpreted to define property in a physical sense as land, not as a bundle of rights and interests. Government regulation which was negative in nature generally did not fall into the category of a taking. For example, where land by contract was limited to use as a cemetary, a city was permitted to prohibit the erection of a cemetary because of the "evil vapors" that would result.[25] The covering of creeks could be prohibited for sanitary reasons.[26] The removal of stones, sand and gravel from certain lands could be prohibited.[27] The establishment of harbor lines was permitted, beyond which structures were prohibited.[28] The prohibition of the production of liquor was held to be a permissible exercise of

the police power by the United States Supreme Court even though it resulted in the closing of a brewery.[29] However, the Supreme Court stopped short of allowing the damming of water which resulted in the inundation of privately-owned lands.[30] This, the Court reasoned, constituted a physical "taking."[31]

In 1922 during the period when a concept of "real property" as a bundle of rights and interests was being developed (to better reflect the manner in which real property interests were being fractionalized) and at a time when regulation was on the increase,[32] Justice Holmes wrote the historic decision in the case of Pennsylvania Coal Company v. Mahon.[33] In that case, Holmes found that a "taking" had occurred where the state had enacted legislation to prohibit mining in certain areas, arguing that a physical invasion of the property was not necessary and that a restriction on use would be sufficient. It is significant that this change in the law, which flowed in large part from the view of real property as a bundle of rights and interests, should rest on a case which involved the fractionalization of interests in the land. In Mahon, the surface of the land had been sold with a reservation of the right to mine coal. Holmes argued that even if the restriction on mining was for public health purposes, the effect with respect to the real property interests consisting of the mineral rights and interests, would be the same as if the physical possession and use of the land had been taken. Accordingly, Holmes postulated that it is not a question of whether a physical taking had occurred, but, rather, whether regulation has gone "too far."

The Mahon decision in defining "property" as a bundle or rights and interests, rather than land for purposes of the Fifth Amendment, was part of an attempt to reconcile the regulatory power of government with the rights and interests of the private landowner into a single comprehensive scheme, or bundle of rights and interests, whereby adjustments could be made in the "rules of the game," but subject to certain equitable limitations. This approach is analogous to the relationship of the concepts of jus publicum and jus privatum with respect to tide and submerged lands; that is, the recognition of public as well as private property rights and interests existing concurrently in the same lands.[34] The problem is, that while Holmes unified the concepts of land-use regulation and public rights and interests in land, he failed to define the limits of existing public rights and interests, suggesting, instead, that in each case the "question depends upon the particular facts."[35]

From the time of the Mahon decision and the decision in Village of Euclid v. Ambler Realty Co.,[36] which upheld a comprehensive zoning scheme as being an exercise of one of those unasserted but inherent rights of the sovereign, until relatively recently, little has been done to further define the limits of such unasserted rights and interests which when asserted would not constitute a "taking." There is general concurrence that this issue "is still at a point of development where it is more readily amendable to ad hoc pragmatic analysis than to conceptionally symmetrical generalization."[37] In large part, this lack of concern may be attributable to the lack of government interest in the area of land-use regulation except to promote and encourage the development of land (except in certain exceptional cases such as tide and submerged and even then with questionable effectiveness). The use of land was virtually unregulated except by local zoning schemes which have proven to be inadequate to deal with the problems of urbanization.[38]

With the recent and growing concern of governmental agencies on all levels to curb the excesses of urbanization, there has been a recognition of the need for a further definition of the limits of these unasserted rights and interests of the

public in privately-owned lands, either by establishing principles for the application of the Holmesian concept which would permit an accepted and understood line between public rights (including the right to regulate) and private rights to be established or by throwing out the Holmesian concept and returning to the earlier line of cases which found a taking only when the title to or possession of land in a physical sense was taken for public use, thereby permitting the limits of governmental regulatory authority to be established by the due process and equal protection clauses of the Constitution.

Under either approach, the actual taking of property in a physical sense would constitute a taking for which compensation is required, although some minor questions would exist as to the circumstances which would constitute a "physical taking". Under either approach, regulations to clearly prevent an external harm from occurring would generally not constitute a compensable taking, although the definition of external harm would be open to discussion. Further, the limitations with respect to the denial of equal protection and the due process clauses would still be applicable assuming that the objectives are within the constitutional bounds of government authority and the ways and means adopted bear a rational relationship to those objectives. The development of other issues becomes significant only if the Holmesian concept is followed. These issues include, among others, the following: what constitutes a public use; to what extent may the lands be diminished in value as a result of the regulation; whether the regulation is appropriate or suitable to the lands involved; and to what extent will the courts balance the detriment suffered against the benefits received. These issues together with other considerations are discussed in greater detail below.

(2) Public Use.

It is clear that where property, in the physical sense, is taken to be used for a public use, such as a road or a post office, a taking has occurred. This is the case even where the public use has been assured by only a negative restriction, such as in the case of open-space. In this regard where the courts have found the purpose to be the provision of land for a public use they have held that a compensable "taking" has occurred.[40]

(3) Prevention of External Harm.

The prevention of external harm resulting from the use regulated is a widely accepted basis for determining that the particular regulation in question does not constitute a taking. This criterion is derived from the nuisance concept; that is, the accepted principle that one may not use his land in an unreasonable manner so as to unreasonably interfere with the use of the lands of others. In accord with this principle, the City of Manhattan Beach, California, was permitted to refuse to zone beach lands for residential uses on the basis that, among others, the construction of housing on pilings might create police problems. (e.g., problems connected with the use of areas under the residences for immoral purposes).[41] The United States Supreme Court upheld the destruction of cedar trees bearing cedar rust in order to protect nearby apple trees as a non-compensable taking[42] The destruction of houses to prevent the spread of conflagration has been condoned.[43] Gravel mining and brickyards have been excluded by governmental regulation on the basis of potential external harm.[44] The extent of this criteria, in large part, depends on the willingness of the courts to recognize the harmful nature of a particular activity. In this regard, recently, courts have exhibited a willingness to expand this criterion to include the concept of the "internalization" of costs; that is, requiring that the land owner to pay all of the costs (in-

cluding those to the community) resulting from the use of this land.[45]

This distinction is not always clear. Accordingly, the more that the regulation appears to provide for public benefits, that is, for uses which are generally beneficial to the public rather than to prevent harm from a particular use of the particular property, the more likely it is that a court will find that a compensable taking has occurred. In this regard, Professor Freund of Harvard, in 1904, drew the distinction between eminent domain and the police power, stating,

> "It may be said that the state takes property by eminent domain because it is useful. . . . From this results the difference between the power of eminent domain and the police power, that the former recognizes a right to compensation while the latter on principle does not."[46]

With respect to the changing nature of the harm to be prevented, Holmes in Euclid[47] acknowledged the ability of the legislative body to change the scope of its regulations to meet new and changing conditions. This problem is particularly acute in the case of coastal wetlands. Where regulations prohibit such filling, can it be said that the purpose is primarily the prevention of harm or the promotion of a public benefit? The case has been made that fisheries are dependent on coastal wetland habitats and would predictably be damaged by their filling. There is also an increasing acceptance of the importance of wildlife to man generally, although perhaps not in an immediate commercial sense. The acceptance by the court of the importance of the regulatory objective as one which is harm-preventing is often determinative. In turn, the significance given to a regulatory objective by the court is dependent upon its acceptance by the society at large. For example, the California Supreme Court recently exhibited its willingness to reverse established law in order to promote the public right of beach-access because of, in part, of the demonstrated public interest,[47a] and to expand the accepted purposes of the public trust in tidelands based on changing public concerns.[47b]

The harm prevention concept involves the recognition of a duty on the part of the landowner to restrict the use of his land in order to prevent harm from resulting to others. Using the Holmesian concept, the extent of this duty may be redefined from time to time on the basis of equitable considerations.

Some writers have gone so far as to suggest that in defining this duty the inter-relatedness of land should be taken into consideration; that is, the law should reflect the fact that one parcel of land may be used in connection with another parcel or in connection with another activity, such as for drainage, to provide a view, or as nurseries or breeding grounds for commercial fishery. Thus, in changing the character of his land the owner would be under a duty to recognize the dependence of others on the use of his land. Accordingly, where a regulatory scheme prevents or ameliorates the burden which would otherwise be placed on another or another's land (by preventing the development of a wetlands area for example), no compensable taking would result.[48]

Recently, the Wisconsin Supreme Court[49] suggested a further extension of this approach by holding that the owner of certain lands which were in their natural state had no inherent right to change the topography of those lands. Care should be taken, however, not to interpret the case too broadly in that the

lands involved involved were adjacent to a lake and the court emphasized their special character in this regard.[50]

This approach would be particularly relevant to the natural undeveloped portions of the California coast -- the estuarine areas of Southern California, the offshore islands, the rugged northern coast and other unique areas such as San Francisco Bay. There are, however, a number of limitations to this concept which should be considered.

First, implicit in the original government sales of certain types of lands with respect to which this concept might be applicable or which were Mexican or Spanish rancho lands confirmed in private ownership by the Federal government pursuant to the Treaty of Guadalupe Hidalgo,[51] was the implied, and in some cases, express understanding that the lands could be developed and used. In these cases, it would appear unfair for the government or others to now contend that a restriction on the use of the land existed at the time of the conveyance contrary to such express or implied understanding.

In this regard the California experience with respect to the sale of its tide and submerged lands is relevant. During the last half of the 19th century and immediately following 1900, the State of Californa and its agents sold many acres of the tide and submerged lands of the state into private ownership.[52] The legislation under which these patents were issued expressly contemplated that the lands would be reclaimed for agricultural purposes.[53] The California Supreme Court decision of 1913 in People v. California Fish Co.,[54] has been interpreted to state that such conveyances of tide and submerged lands, at most, passed only the naked fee title to the lands subject to the public trust for commerce, navigation and fishery.[55] The concept of the public trust, however, which has its roots in Roman law, was clearly part of the jurisprudence of the United States and California at the time of the conveyances, and, therefore, it can be argued that the restrictions in use under the law could be anticipated. On the other hand, while this distinction between tide and submerged lands and other lands is major, the courts appear particularly willing to override previously established judicial precedent to promote and provide for public rights with respect to lands of particular public concern, such as beach and coastal lands.[56]

Nevertheless, to the extent that lands were sold and conveyed or confirmed into private ownership with the express or implied understanding that they could or would be developed, it clearly appears that a change in the rules of the game would be occurring if this approach were to be applied and in the final analysis it is irrelevant whether the change is articulated as an assertion of previously unasserted but existing public rights or as the expansion of existing regulatory authority. The question simply put is who should bear the burden of such change, the private owner or the public. Where the lands have been previously conveyed or confirmed into private ownership with full knowledge by the governmental agency of their character, it would appear appropriate that the burden should primarily be borne by the public. This, of course, does not in any way depreciate the importance or need for a program to protect wetlands or to provide for the amelioration of the adverse impact of urbanization. In this regard, it should be clearly acknowledged that there are simply not sufficient funds available to acquire all of the valuable wetlands or other significant natural areas immediately. However, this problem should be squarely faced and a program should be developed which will recognize both the principle that compensation should be provided (perhaps in forms other than a monetary consideration) and the principle that the destruction of wetlands and other sensitive natural areas cannot be permitted.

Incidentally, to the extent that subsequent purchasers acquire these sensitive areas with the understanding that they may not be able to develop them, it can be anticipated that the courts will be more amenable to more restrictive regulations and will be less likely to find that a compensable "taking" has occurred.[57]

Where the character of lands does not indicate a special relationship to other lands or interests, there is even less justification to find that restrictive regulations will not constitute a taking, as for example, where the particular lands constitute a mere undeveloped remnant of lands which have otherwise been developed or where the proposed development or use is in accordance with a previously understood arrangement or plan for the area and where the development will only now result in an adverse effect on other lands because of circumstances which have arisen since the arrangement or understanding was arrived at. For example, the development might consist of the last phase of a planned project, as to which there is a question raised by the then existing homeowners as to whether the last phase should be developed or held as open-space. Assuming that there are no other factors present, it would appear fair for the public or the particular homeowners which will be benefited by such a change to bear the burden. With respect to the California Coastal Zone, this approach would be applicable to historically established land-use development arrangements (not including recent up-zoning however) with respect to Malibu or Palos Verdes where the owners of already developed lands are attempting to restrict further development of undeveloped lands even though development was originally contemplated under a plan pursuant to which their own lands were developed.

As suggested above this is not to deny that the original development plan may have been inappropriate or provided for the over-urbanization of an area when taking into consideration its natural beauty or value for open space purposes. It is to suggest, however, that a change in the rules has taken place and should be acknowledged. Further, the burden may be borne in many different ways, not only by the payment of money. The development of such alternative mechanisms for the provision of compensation in these situations is one of the most challenging problems which coastal zone planners and attorneys face today.[58]

(4) The Appropriateness of the Regulatory Scheme to the Land.

Courts will consider whether the scheme of uses contemplated is appropriate or adapted to the particular land taking into consideration the present or prospective use of other lands within the agencies jurisdiction, the region and beyond.[59]

If land requested is in fact unusable for the purposes permitted, a taking may have occurred.[60]

The courts will also consider the scheme of uses in light of other public policies and considerations. In this regard, some planners have suggested that local agencies should explore zoning and other regulatory schemes to curb undesired urbanization, including restrictions based on lot size, lot coverage by structures, height,[61] structural bulk, number of rooms, floor area, and parking spaces per unit; however, courts are becoming increasingly suspect of these restrictions as being exclusionary; that is, as being schemes to exclude additional residents from migrating into the area.[62]

The courts have historically articulated this suspicion primarily with respect to the exclusion of racial minority groups and the poor.[63] More recently, however, the courts have articulated a more generalized concern that local regulatory schemes

should be in accord with the "general welfare" of areas outside of the local jurisdiction (thus establishing the "general welfare" provision as a limitation as well as a grant of authority). For example, although the court in Steel Hill Development Inc. v. Town of Sanborton[64] upheld 6-acre large lot zoning on the basis that basic value judgments should be left to legislative determination, it indicated that

> "[W]e are faced with 'a local legislative determination that the general welfare will be promoted by exclusion of an unwanted use from a non-metropolitan community [which exclusion] is not likely to conflict with a regional need for local space for that use.'"[65]

In California, the courts have upheld the regulatory scheme of the Town of Los Altos Hills which eliminated virtually all commercial uses of property from the city on the basis that the general welfare of the "community or region" will not suffer and suggesting that such uses are adequately provided outside of the city.[66]

Further, courts have begun to articulate a requirement that zoning and other similar regulatory schemes must be "balanced;"[67] that is, a city may not include only uses, such as industry, which will increase its tax base and expect other cities to assume the accompanying burden of providing residences for the employees of that industry.[68]

Courts have, however, upheld regulatory schemes providing for phased development, provided that it meets the general tests set forth above.[68a]

(5) Diminution of Value.

The diminution in the value of the lands regulated is an often discussed factor. Generally, other than in instances where the only economic use for which the particular lands are suited would constitute a nuisance, a court will find that a taking has occurred when the owner has been deprived of substantially all of the value of his lands.[69]

Further, when assessing the constitutionality of a zoning or similar regulatory scheme, the courts will also take into consideration the economic effect of the zoning restrictions on the landowner, even though the restrictions may not deny the owner of all economic use of his property.[70] In particular, the actual investment return of the landowner may be considered.[71] The diminution of value test appears, however, to be only one element of the balancing test discussed below.[72]

In determining value, however, it is extremely important to note that some recent decisions suggest that there may be no assumed right of developability with respect to certain types of land.[73]

(6) The Balancing Test.

Courts and writers have often articulated a balancing test which is employed in the determination of whether a particular regulatory scheme is confiscatory which consists of balancing the burden upon the private landowner against the benefit provided to the society.[74] Thus, where the individual's house is blown up ("taken") in order to prevent the spread of a conflagration, it is constitutionally condoned.[75] Some writers have suggested that even in the case of great acknowledged public need, other than nuisance type cases, any taking of private prop-

erty should be compensated.[76]

The balancing test, in this regard, recognizes that each member of society should be willing to bear a burden in order to receive the the advantages of the association. Accordingly, it would seem appropriate that the individual should be willing to bear a burden without compensation which may vary in magnitude depending upon the public need or the benefit which he will indirectly receive as a member of the public.[77] In this regard, the Supreme Court in Euclid[78] upheld a comprehensive zoning scheme which restricted land generally and in turn benefited the group of landowners affected as a group. The courts acknowledge that the balance does not have to be effected in each instance, but rather may be reflected in the effect of an entire program or scheme.[79]

As a regulatory scheme becomes more complex and the balancing of burdens and benefits involves values for which there is no readily common denominator, the courts are more willing to find that the scheme is the result of a political process whereby such values are reconciled and less susceptible to judicial review,[80] except in cases where the objective is improper or the provisions clearly do not bear a rationale relationship to such objectives.[81]

III. Regulatory Innovation in the California Coastal Zone To Combat Increasing Urbanization.

As described generally above, governmental agencies on all levels have taken steps to combat the increasing urbanization of the California coastal zone. Cities, in some cases with the urging of the State, have attempted to limit an increase in their population and structural densities; more stringent restrictions have been placed on the development of shoreline areas and wetlands; and programs to increase public access to the shoreline have proliferated. While it is difficult to describe a process which has been and is now the subject of rapid change, the following examples of regulatory innovation in the California Coastal Zone will provide some insights.

A. Restrictions on Population and Structural Density and the Protection and Enhancement of Open Space.

The regulatory schemes which deal most directly with the root causes of the urbanization problem are those which restrict population and structural density and protect or enhance open-space.

(1) Population and Structural Density.

While some local governmental agencies, such as the City of Palo Alto, have simply attempted to limit population and structural density by revising the permissible zoning downward, others such as the cities of Irvine, Petaluma, Livermore, Milpitas[81a], Pleasanton[81b] and San Jose have attempted to establish schemes providing for the phasing of or limitation on development in accordance with the provision of public services.[81c]

By initiative, the City of Livermore sought to limit the issuance of residential building permits until certain public facilities (educational, sewage treatment and water) were adequate to provide for the additional residences. This ordinance was held invalid, because it failed to provide a positive program for the provision of such facilities and was not adopted in accordance with the procedure mandated by State enabling act.[81d]

In April, 1973, San Jose by initiative prohibited zone changes for residential development for two years in areas where

schools were overcrowded based upon an adopted schedule unless the developer of the particular land had made arrangements to provide a "satisfactory temporary alternative to permanent school construction." The validity of this scheme is now being tested in the Courts.[81e]

The City of Irvine has adopted a residential development permit scheme which requires that a developer obtain a permit before developing new subdivisions within the City. The permit will be issued only upon the finding by the Planning Commission that certain public facilities (utilities, sewer facilities, water, drainage, police protection, fire protection, park and recreation facilities, roads and other local transportation) are adequate to provide services to the new development. The finding is required to be made if the developer has sufficient points in accordance with a schedule which provides a certain number of points for each type of service available.[82] Concurrently with the establishment of this system, the City adopted a capital improvements program to provide such services on a fixed schedule. The scheme is based on a similar scheme which was judicially upheld in Golden v. Planning Board of Town of Ramapo.[83]

The City of Petaluma adopted a similar point scheme with a significant further embellishment which restricted the number of new units for which points would be issued to 500 per year and providing that the permits would be issued for these 500 units to those with the largest number of points. Points were awarded in various categories (water, sewers, drainage, fire protection, schools, streets, public facilities such as parks and playgrounds, design quality with respect to relationship to the surrounding neighborhood, landscaping and screening, circulation, safety of ingress and egress, privacy, provision of open space, and contribution to greenbelts and bicycle, foot and equestrian paths).[83a]

A lower court has held that the Petaluma scheme violates the right to travel -- the right to migrate and settle, protected by the Fourteenth Amendment.[84] While all of the above-mentioned schemes are susceptible to such an attack, it can be anticipated that the courts will draw the distinction between planned growth such as it provided for in the Irvine scheme and which was upheld in Ramapo and the Petaluma scheme.

In Marin County and Malibu (Los Angeles County), the residents have attempted to restrict growth by preventing the development of required water supply and waste water disposal facilities. In Marin, the Marin Municipal Water District enacted a moratorium on the most new hookups. The moratorium has been challenged in the courts.[84a] Whether the refusal of the District to take action to provide such facilities constitutes a taking is a difficult question. One writer has suggested that it may depend on the availability of such services and whether any reasonable use is allowed which would not depend on such services. In other words, a taking may occur through the refusal to provide such services where an agency has authority to do so which frustrates "any reasonable use" of the land.[85]

(2) Open Space.

The concept of open space has been developed and has become increasingly relevant in connection with increasing urbanization. "Open space" is a catch-all term that generally refers to lands which are used for purposes which prevent or ameliorate the adverse effects of urbanization: lands for recreation, wildlife, agriculture, or which provide a release from the pressures of urban living.[86] The lands involved may be a small green space in the center of a city or vast acreage devoted

to agriculture. The need and concern for open space, as with the control of population density, is at the heart of the urbanization problem.

Prior to the enactment of the Open Space Lands Act in 1970,[87] State programs to preserve or enhance open space consisted primarily of the provision of tax incentives with respect to lands placed in agricultural preserves or burdened with open-space easements or scenic restrictions.[88] Since 1970, each city and county has been required by State law to include in its general plan an open-space element,[88a] to adopt an open-space plan by December 31, 1973,[88b] and to adopt open-space zoning ordinances consistent with its open-space plan and element by January 1, 1974.[89]

The California Supreme Court has recently held that, generally, the provisions of a general plan are not regulatory in nature.[90] However, notwithstanding this decision, the provisions of the open-space element may be found to be regulatory.[91]

In this regard an open-space element of a general plan is the "local open-space plan."[92] Once an open-space plan is adopted, unlike the other provisions of the general plan, it in fact does establish restrictions on land-use, including, among others, the following:

> (a) "Any action by a county or city by which open-space land or any interest therein is acquired or disposed of or its use restricted or requested . . . must be consistent with the local open-space plan."[93]
>
> (b) "No building permit may be issued, no subdivision map approved, and no open-space zoning ordinance adopted unless the proposed construction, subdivision or ordinance is consistent with the local open-space plan."[94]
>
> (c) "Every city and county by December 31, 1973, shall prepare and adopt an open-space zoning ordinance consistent with the local open-space plan . . . ."[95]

Such an interpretation would require city and county planners to consider the effect of the restrictive provisions of the plan on private property in light of the constitutional restrictions on taking. On the other hand, and more significantly, these provisions of the Open Space Lands Act and the provision for the development of a local action program provide the seeds of a new revitalized approach for local land-use planning and regulation in that it provides an opportunity for the combining of land-use planning and programs to implement the planning, all as part of a single visable and comprehensively articulated plan.

The need for such a comprehensive action plan was commented on by the Joint Committee on Open Space Lands of the California Legislature in its Final Report of February, 1970, as follows:

> "There is currently [1970] no requirement that local plans contain a description of the program which the legislative body intends to promulgate for the implementation of the plan. The result is to perpetuate the dichotomy between the plan and the control measures which should carry it out. This in turn tends to result in two paral-

> lel plans. One plan is the official general plan. The other is a de-facto plan drawn by the local legislative body as it administers zoning and other land use programs.
>
> "Ideally, there should be a unity between those two plans. The first step toward that objective is to require that each open space plan contain an action program setting forth the various means by which the planning body proposes to achieve its planning objectives. Only in this way will the various entities concerned with planning matters be placed on notice of the entire planning pattern."[96]

A number of cities and counties have adopted restrictive open-space zoning ordinances. For example, Palo Alto has zoned large portions of the foothills within the City as open-space. The validity of those regulations is now being tested in the courts.[97]

B. Resource Management and Sensitive Areas.

(1) Generally.

Innovation in land-use regulatory schemes has begun in California, as in other states, with areas of special concern -- flood plains,[98] hillsides,[99] and natural and scenic areas, including tide and submerged lands.[101] The County of Los Angeles has established provisions for Resource Management Areas to protect and preserve to the maximum extent possible certain scenic, ecological, cultural and natural resources within the Areas so designated.[102] The Malibu coastline and portions of the Palos Verdes coastline have been designated Resource Management Areas. It has been reported that suit has been brought by landowners in Palos Verdes claiming that this classification of their properties has resulted in a taking of their property for which compensation should be paid and that the Los Angeles Superior Court has held that the mere classification of the property as such in the Environmental Development Guide of the General Plan did not constitute such a taking. Orange County has considered a more comprehensive scheme for the management areas important for their natural resources.[104]

(2) Tide and Submerged Lands.

Tide and submerged lands and navigable waters generally have historically been the subject of special regulatory schemes which have provided to governmental agencies and the public far more discretion and authority in regulating permissible uses with respect to these lands than with respect to uplands.[105] The restrictions and regulatory authority are in many cases constitutional[106] or common law in nature.[107] The primary regulatory scheme in this regard is the tidelands trust for commerce, navigation and fishery[108] with the public as beneficiary, the State as trustee (the State Lands Commission is the administrative agency in California which has been delegated this authority),[109] and with the courts standing ready to assure that the trust is properly administered.[110]

The United State Constitution assures to the Federal government parallel and superior authority in the navigable waters of the United States for navigational and other purposes[111] which may be exercised without deference to the prohibition on non-compensable takings with respect to the ownership of the *jus privatum* (private property interests) in or with respect to such waters (although it is generally acknowledged that if in exercising those rights privately owned improvements are taken, compen-

sation must be paid).[112]

The nature and incidents of these constitutional and common law restrictions and their implementation by governmental agencies has been subject to the same rapid evolution experienced by land-use regulatory schemes generally. For example, the U.S. Army Corps of Engineers in exercising its jurisdiction under the Harbor and Rivers Act of 1899[113] now acknowledges, as the result of the decision in Zabel v. Tabb[114] that is must consider environmental factors in addition to navigational considerations in reviewing applications for permits for work in navigable waters. Further, the Corps now asserts that its jurisdiction extends to the mean of the higher high-tides along the California coast.[115] Previously, the Corps asserted jurisdiction only to the mean of all the high tides along the Pacific Coast. Further, by virtue of the Fish and Wildlife Coordination Act of 1958,[116] as implemented by the 1967 memorandum between the Secretary of Defense and the Secretary of Interior, the Corps presently will issue a permit for work in navigable waters on the regional level only with approval of the regional office of the Bureau of Sport Fisheries and Wildlife, Department of Interior. In the event that an unresolvable conflict arises on the regional level, the matter must be submitted to Washington. The practical result is that the Bureau generally has a veto with respect to the issuance of such permits.

California governmental agencies and the courts have also been instrumental in expanding the incidents of the public trust in navigable waters to contemplate preservation as a proper trust purpose,[117] and in liberalizing the interpretation of the law to promote the public rights in the coastal zone.[118]

The Gion decision was very controversial in that it changed the existing understanding of the law so that those landowners which had allowed the public to use their lands for access to beach areas were held to have dedicated a right to the public for this purpose forever although the earlier Hihn decision of the Supreme Court expressly held that no such dedication would be effected without evidence that the owner actually intended such a dedication to occur and that the presumption was in fact that the owner intended to provide the public only with a revocable license to use his property. Legislation has been enacted changing the Gion Rule.[119]

The Upper Newport Bay Exchange which was the subject of the Heim decision[120] is another example of the changing attitudes of the public, the courts and administrative agencies. Generally, the exchange of tide and submerged lands for uplands between the Irvine Company and the County of Orange as the trustee of the tide and submerged lands would have resulted in the conversion to a residential marina of a large portion of a natural estuarine area surrounded by but separated from the urbanized areas of Newport Beach and the City of Irvine by steep cliffs. Over a period of 10 years, the citizens in the area, then the agencies involved, and finally the courts moved to the position of aggresively preserving the natural character of the area over its use for recreational and residential purposes.

Other evidence of this trend includes the enactment of the California Environmental Bill of Rights which, among other things, authorized the Attorney General on his own initiative to intervene in any case where facts were alleged "concerning pollution or adverse environmental effects which could affect the public generally"[121] and authorizing him to maintain an action for equitable relief "against any person for the protection of the natural resources of the State from pollution, impairment or destruction.[122] The Attorney General has used this authority to threaten litigation in order to prevent private landowners from filling an artificial non-tidal water area within the coastal

zone. While this assertion of authority is highly suspect on Constitutional grounds, it does evidence the willingness of the legislature and administrative agencies to move in this direction. The Attorney General has also established an Environmental Task Force of citizens to advise his office with respect to environmental concerns and a special section within the office to handle such matters. Among its other duties, this section provides legal counsel to the Coastal Zone Conservation Commission.

C. Local Planning and Regulatory Schemes Generally.

In order to complete the picture of land-use regulation with respect to the coastal zone, it is necessary to review generally the recent trends with respect to the evolution of local zoning and similar schemes. As discussed above, historically in this country, land-use regulation has been delegated to the lowest levels of government and articulated in the form of zoning schemes such as that considered in Euclid.[123] Underlying these zoning schemes are a number of assumptions and factors which inhibit their effectiveness in dealing with the problems of urbanization, including, among others, the following:

> (i) Zoning as historically applied is based on an unstated but generally accepted assumption that land can be developed and used for at least the purpose zoned and if the market indicates a higher use, the zoning designation of the land will be changed accordingly; that generally zoning will not be reduced or rolled back; and that any increase in the value of the land as a result of a zone change will flow to the landowner.
>
> (ii) Zoning is based on end-state planning, that is, the distribution of uses provided for is articulated as if all might be developed simultaneously; it does not expressly provide for change in use as time passes.
>
> (iii) Zoning is rigid in that it generally does not contemplate administrative discretion in its application to specific situations. This rigidity has been dissipated somewhat by the development of ancillary schemes and arrangements, for example, schemes which provide for the issuance of conditional zoning, expansion of the use of variances and the development of special zones which contemplate the exercise of broad administrative discretion such as planned unit development zones. There is a tendancy, however, for these ancillary schemes to be administered on an ad hoc basis without adequate consideration or articulation of underlying objectives in a comprehensive fashion. This ad hoc approach is particularly inappropriate in the coastal zone where the great number of concerned governmental agencies and diverse interests demand that each agency and group be able to understand the objectives and predict the actions of the other.
>
> (iv) Zoning is passive in nature. It contemplates that the landowner will

determine the sequence of development and, in many cases, the zone designation.

(v) The distribution of uses contemplated by the scheme tends to be arbitrary in that it ends with the local agency boundaries . Historically, while legislative bodies are authorized to consider planning factors relating to lands beyond their jurisdiction, they generally have not. The result has been a highly fragmented patchwork of regulations.

(vi) The aspects of land-use expressly controlled by zoning (including the use of buildings, structures and land as between industry, business, residences, open-space, including agriculture, recreation, enjoyment of scenic beauty and use of natural resources, and other purposes; signs and billboards, location, height, bulk, number of stories and size of buildings and structures; the size and use of lots, yards, courts and other open spaces; the percentage of a lot which may be occupied by a building or structure; the intensity of land-use; offstreet parking and loading; setback lines; and provisions for the creation of civic districts around civic centers, public parks, public buildings or public grounds and the establishment of regulations therefor)[124] are grossly insufficient to regulate the many aspects of land-use which are now of concern.

The result has been the addition of other regulatory schemes, such as those discussed above, which has resulted in a patchwork of overlapping and fragmented regulation to obtain objectives which are generally not articulated in a comprehensive manner.

In summary, historically, the entire land-use regulatory scheme in California, which has its foundation in the local zoning ordinance, can be characterized as fragmented, overlapping, inefficient, intended to provide assurances necessary to promote the development of land for the benefit of private landowners, passive, rigid and inarticulate with respect to the objectives which it is designed to meet[125] and unable to adequately meet the needs of a society which is presently subject to rapid and extensive change.

D. Developing Trends Toward the Integration and Coordination of Planning and Implementation Programs.

As discussed above, innovation in land-use regulatory schemes in order to deal with the inadequacy of the zoning has been on an *ad hoc* basis resulting in a proliferation of narrow purpose schemes dealing with distinctive areas and problems--e.g., open-space and wetlands. Recently, however, with the increasing awareness of the urbanization problem, the inadequacy of local zoning schemes, the proliferation of such schemes, and the resulting inefficiency and inequities, a trend is developing which is supported by both the development oriented interests as well as others toward the reconciliation of divergent schemes on the local, state and Federal level into a coherent system. This trend is bifold. There is a growing consensus that first, the planning and regulatory and other programs of each government body should be more integrated than they have

been in the past;[126] and second, that the programs of governmental agencies on various levels should be more adequately coordinated and in certain instances integrated.

(1) Intra-Agency Integration of Planning and Implementation Programs.

The growing trend toward the articulation of an integrated program of planning and implementation is due in large part to the encouragement of the Federal government. Probably the single, most significant factor in encouraging governmental agencies to articulate the objectives and effects of proposed actions and programs has been the environmental impact report and statement requirements contained in the National Environmental Policy Act of 1969[127] and the California Environmental Quality Act.[128] While some have argued that the requirements for such statements and reports are unduly burdensome, inefficient and without benefit, it is clear that they do require the governmental agency and those commenting on such reports and statements to articulate the relationship between a proposed action or program and its objectives and anticipated effects in a manner not previously required.

Another example of the significant role of the Federal government in this regard, are the requirements of the Federal government in connection with the provision of housing and local assistance. For example, pursuant to the Housing Act of 1949, as amended,[129] the Federal government has required generally that local agencies develop a "workable program" for community improvement including an "official plan of action . . . for effectively dealing with the problems of urban slums and blight and for the establishment and preservation of a well planned community. . . ." The program requirements include land-use regulatory schemes including, among others, building, housing and related codes and an effective action-oriented planning and programming process for community development. Further, under the A-95 review process[130] regional, state and metropolitan reviewing agencies are designated to determine whether the assistance requested is in accordance with a plan for the region, metropolitan area and the state. As a result of these requirements, cities in California seeking such assistance have developed general plans and budget-oriented action programs. The general plans developed pursuant to this requirement, however, tended to be vague and generally were adopted only for the purpose of complying with Federal requirements for obtaining assistance. The State, however, in 1965 further encouraged this trend toward the articulation of planning objectives by requiring that all cities and counties adopt a general plan containing certain required elements.[131] Since that time the list of required elements has increased.[132]

Further, in 1970,[133] as discussed above, the State required that all zoning of cities and counties be consistent with the general plan by a specified date which has since been designated as January 1, 1974. The increasing importance of the general plan as a repository of the principles upon which local land-use regulation is based together with the requirement that the zoning regulatory scheme be consistent with the general plan has raised the question of whether the general plan is regulatory in nature; that is, whether the general plan when taken together with the zoning scheme is in fact a single regulatory scheme. The California Supreme Court in Selby Realty Co. v. City of San Buenaventura, generally held that the general plan is not regulatory in nature.[134]

As discussed above,[135] in 1970, the State required local agencies to adopt an open-space action program, which is part of the open-space element and plan. This requirement further evidences the trend toward the integration of planning and imple-

mentation programs into a single comprehensive scheme. Recently, there has been discussion for establishing a similar action program requirement with respect to community development generally.[136]

Probably the single most promising step in this trend is the recent California legislation permitting cities and counties to adopt a specific plan containing "all detailed regulations, conditions, programs and proposed legislation which shall be necessary or convenient for the systematic implementation of each element of the general plan. . . ."[137] The specific plan scheme provides a complete alternative to the zoning scheme and one which may be far more comprehensive in nature. The City of Cerritos has already implemented an entire land-use regulatory scheme for that city based on the specific plan concept.[138] At the time of the writing of this article, the coastal city of Carlsbad in San Diego County, is considering the adoption of an ordinance to establish a Scenic Preservation Overlay Zone[139] and a Coastal and Lagoon Resources Management Overly Zone District. Both proposed ordinances contemplate the development of specific plans for various portions of the city as part of the regulatory scheme provided for. A proposal for a scheme to control growth has also been proposed for the City of Livermore utilizing specific plans.[140] The value of the specific plan scheme is discussed in greater detail below.

(2) Inter-Agency Planning and Implementation Programs.

(a) The Fragmentation and Proliferation of Regulatory Schemes.

The fragmentation and structuring of government which has occurred in the past generally was designed to promote the industrialization and economic development of this country. It is now difficult for the government so structured to respond to the problems of urbanization on the basis of presently evolving principles which give greater recognition to man as being a part of nature. For example, as discussed above,[141] prior to 1970, the U.S. Army Corps of Engineers took the position that the sole criterion for the issuance of permits to perform work in navigable waters was the effect of the work on navigation and not environmental considerations. In a similar manner, the Atomic Energy Commission took the position that is had no statutory duty to concern itself with the adverse environmental effects of its actions. Even after the enactment of the National Environmental Quality Act of 1969, it took the position that its duties in this regard were severely limited.[142] On the local level, county flood control districts have argued in the past, for example, that they did not have the authority to expend funds to generally landscape their facilities to make them more aesthetic or to generally provide such facilities for open-space uses. School districts have argued that they cannot consider population density or open-space needs of their community when deciding whether to dispose of lands no longer needed for educational purposes.[143] Corporations, which are creatures of the State, argue that their sole criteria for making decisions is profit.

Historically, the result has been that each agency in turn has tended to abdicate responsibility for problems which touch upon but transcend its jurisdiction. Smog, urban sprawl and water pollution were ignored by local agencies as problems for which they were not concerned because their historic responsiblilty did not specifically contemplate such problems. The National Environmental Policy Act of 1969[144] and the California Environmental Quality Act[144a] were intended to change this pattern by requiring all agencies to consider environmental factors in their decision-making process.[145] As a result of these acts and the court decisions which have flowed from them, an enormous

shift is taking place in the land-use regulatory scheme in this country. Unfortunately but predictably this shift has been made up of the disjointed and inconsistent responses of the individual governmental agencies which has resulted in many inequities and inefficiencies.

The impact of this shift has been the greatest within the coastal zone because of the large number of governmental agencies asserting jurisdiction and because of the complex nature of the coastal environment. For example, a proposed land use in the coastal zone may require the obtaining of local zoning and other regulatory approvals, a permit from a Regional Water Quality Control Board, a permit from a Regional Coastal Zone Conservation Commission, a permit from the U.S. Army Corps of Engineers and a permit or lease from the State Lands Commission. Further, these agencies will normally not grant their approval unless the approval of a number of other agencies is obtained, including such agencies as the Federal Bureau of Sport Fisheries and Wildlife, the State Departments of Fish and Game, Parks and Recreation, Navigation and Ocean Development, and Conservation, and the Federal Bureau of Outdoor Recreation, as well as others. Further, in lart part as the result of the environmental impact report and statement process these agencies have generally adopted the position that they will take no action if any other governmental agency objects to the project on environmental grounds. In effect, as an interim de facto arrangement for the resolution of these environmental and ecological value questions, vetoes have been disbursed to all governmental agencies.

This process has been made even more complex as the result of the requirement that each agency consider the "environmental" or "ecological" effects of the proposed use. What is the value of a least tern nesting site as compared with a beach area for recreational purposes? Is it better to have deep channels for navigation or mud flats for bird feeding areas? Are sloughs beautiful? What happens if agencies disagree on such values? Who is to decide?

The process of resolving conflicts in value judgments and trade-offs has also been made more difficult by the fact that applications for approval are considered by each agency in turn, in seriatum. For example, many of the regional coastal commissions refuse to even discuss a proposed development until the local agency has approved the project in concept.[146] Thus, an applicant may process his proposal through the local agencies, then the Corps of Engineers and the State Lands Commission (which permit concurrent applications) and finally the Regional Coastal Commission. The result in may cases is that each agency tends to consider the application separately from its own parochial view point with little opportunity to consider trade-offs; that is, whether taking into consideration the economics of the project, that it would be preferable to have open-space, additional recreation facilities or a more adequate sewage disposal system. For example, one agency may prefer that residential units to be developed be clustered while another agency may prefer that the units be dispersed. In some instances, an agency with a specialized function which has not historically exercised regulatory authority may have little appreciation for the power which it in fact holds and may establish requirements that may be of relatively minor benefit to their interests while they may be extremely costly to the applicant or to the objectives of other governmental agencies.[147] Yet, the applicant may be faced with either complying with the requirements or not obtaining a necessary permit or approval. Thus, in some cases, a landowner may be precluded from using his land for a particular purpose or may be required to bear an unreasonable burden, not because he is required by law to do so, but because the cost of asserting his rights and interests would be greater than those which would be

incurred in acceding to the demand.

The foregoing is not intended to refute the need for government regulation to halt the excesses of urbanization, particularly in the costal zone. It is, however, intended to point out the need for a more integrated, efficient and equitable regulatory scheme for these purposes -- a scheme which will permit conflicting values and interests to be fully recognized, reconciled and balanced in an efficient and equitable manner.

(b) Intra-agency Integration of Planning and Implementation Programs.

The evidence of the trend toward inter-agency integration of planning and implementation programs within the various agencies has been discussed above. There is also evidence, however, of a growing trend toward the integration and coordination of planning and implementation programs among governmental agencies on various levels. For example, the National Environmental Policy Act of 1969 and the California Environmental Quality Act, in addition to promoting the articulation of objectives and effects with respect to a proposed program or action as discussed above, has also had a significant effect with respect to inter-agency integration and coordination of programs and actions.[148] For example, by burdening the agencies with the requirement of preparing separate environmental impact reports or statements for each individual proposed project or action the acts are stimulating agencies to cooperate in the preparation of base-line reports and information resources for entire areas, thus permitting future individual reports and statements to incorporate such information by reference. The result of course is a bank of base-line information and guidelines which transcend and incorporate the planning information of each individual agency. This, in turn, suggests the further formalization of this trend in the establishment of a permanent repository for such planning information and policy guidelines -- perhaps in the form of a regional land-use planning agency.

There is other evidence of this trend in the form of an increased number of cooperative inter-agency planning efforts. In this regard, as discussed at the beginning of this article, a number of planning efforts which transcend individual regulatory agencies have been undertaken with respect to the urbanization problem.[149] It is significant, however, that only the planning efforts of those agencies which possess regulatory authority have been effective. This recognizes the political nature of planning; that is, the need for planning to reflect the values of the agency's "constituency" -- those who are able to influence decisions with respect to the particular area or matter. Thus, the planning efforts of the San Francisco Bay Conservation and Development Commission have proved to be effective while those of the Inter-agency Council for Ocean Resources in preparing the California Comprehensive Ocean Area Plan[150] and the Lake Tahoe Regional Planning Agency with respect to its plan for the Lake Tahoe Area have been ineffective. To the extent that the Southern California Association of Governments and the Association of Bay Area Governments have been able to assert their A-95 reviewing authority, their plans have been effective. In the same manner, it can be anticipated that the planning efforts of the Coastal Zone Conservation Commission will also prove to be effective. In summary, where the planning agency possesses regulatory authority, it can be anticipated those affected will participate in the planning process if permitted to do so, thereby permitting the plan to reflect a reconciliation of interests necessary to permit it to be implemented. The regional coastal commissions might well recognize their potential role in this regard and actively pursue the development of a series of plans for areas of the coastal zone which reflect and, to the extent

practicable, reconcile conflicting interests.

There is precedent for the development of such cooperative planning efforts. For example, in resolving conflicting public and private interests with respect to approximately 2,000 acres of coastal lands in Orange County within the historic Rancho La Bolsa Chica, a task group of State governmental agencies was formed including representatives of The Resources Agency, the State Lands Division, the Department of Parks and Recreation, the Department of Fish and Game and the Attorney General to develop a plan for land uses within the area in consultation with the private landowner, the local agencies involved and concerned citizens and conservation groups. The result was the establishment of a plan for the area that provided for the reconciliation of private interests favoring the development of the area for oil production and residential uses and public interests which favored recreational and wildlife uses. It includes provision for a large (in excess of 300 acres) consolidated ecological reserve area where tidal influence will be re-introduced after an absence of over 70 years, and provision for a future small-boat marina, as well as an arrangement for the continued production of petroleum from the area and for future residential uses. A similar task force approach is now being used in Corona Del Mar and in the Upper Newport Bay area in Orange County. The task group, with respect to Upper Newport Bay, includes in addition to those who participated in the Bolsa Chica settlement, representatives of the local agencies and the federal Department of Interior. Some precedent with respect to such arrangements also exists in an agreement between the City of San Francisco and the Department of Defense with respect to the historic Presidio grounds within the city; between the State Department of Fish and Game and the federal Department of Defense with respect to the preservation of the marsh area within the Seal Beach Weapons Station in Orange County and between the California Department of Parks and Recreation and the federal Department of Defense with respect to the beaches within Camp Pendleton in San Diego County.

Precedent for on-going multi-level governmental planning and regulatory agencies is also provided in the form of the Lake Tahoe Area Regional Planning Agency[151] and the existing regional river basin authorities.[152]

State and Federal legislation is now being considered which would provide for the integration and coordination of the various general planning and regulatory schemes. Generally, this legislation would provide for the establishment of a state regulatory agency which would develop statewide priorities and principles upon which local regulatory systems would be based. The state agency would retain sufficient authority to revise local plans to assure their conformity with statewide priorities and principles either directly or through regional agencies and would retain the authority to review specific land-use decisions of statewide concern, such as decisions with respect to key facilities (for example, power plants, transportation facilities, etc.), regional and large-scale developments (for example, regional shopping centers and large residential tracts), and sensitive, significant or critical envioronmental areas (for example, wetlands, timberlands, etc.). It is predictable that such legislation will be enacted, although certainly not this year.[153]

(c) Suggestions for Improving the Efficiency and Effectiveness of the Planning and Regulatory Process.

(i) Concurrent Processing of Proposals

With respect to making the regulatory process more efficient, it would be helpful if agencies consid-

ering the same land-use proposal would do so concurrently rather than in seriatum. This approach is being followed in San Francisco with respect to applications for dredging permits which are submitted and processed concurrently by the San Francisco Bay Conservation and Development Commission, the U.S. Army Corps of Engineers, the Regional Water Quality Control Board and the State Lands Commission.[154]

(ii) Specific Plan Approach

An approach to provide for the integration of inter-agency planning and its implementation and for the reconciliation of conflicting interests and values which merits further consideration is the use on an inter-agency basis of the specific plan concept discussed above with respect to local land-use regulation.[155]

A "specific plan" in this context, as provided for with respect to local planning, would be more than simply a map showing permissible land-uses or zones. It would be an action-program. It would set forth programs in the plan including proposals for additional studies, programs and legislation. It would provide regulations as well as specifying permit procedures to be followed in its implementation. It might include a capital improvements program or an acquisition program to acquire, for example, wetlands.[156] It could evidence a multi-agency program, providing a data bank of information,[157] and evidencing agreements between governmental agencies and others with respect to various matters covered by the plan.[158]

A major opportunity provided by the use of this mechanism would be its usefulness in reconciling private and public interests and the interest of the various governmental agencies. As discussed above, while it may be difficult, if not impossible, to find a common denominator with respect to the planning considerations for a specific area. The specific plan approach would permit, however, a reconciliation of such considerations, recognizing as it does that the process for resolving otherwise unrelated values is political in nature.[159] For example, such a plan while providing for the preservation of certain wetlands might avoid the taking issue by permitting the private landowner to develop other lands more densely.[160] It might provide for a bonus system whereby the private landowner is compensated for providing certain public benefits.[161] It might provide tax incentives. It might reconcile, for example, conflicting demands that a particular area be used for wildlife or for recreation. While such a planning process does not assure that a court will determine that a taking has not occurred, it would offer an opportunity to provide a strong defense to such an attack. It offers the opportunity to evidence widespread support for a particular regulatory scheme,[162] to effect an "average reciprocity of advantage"[163] so that it can truly be said that to the extent practicable each individual has received a benefit as well as suffered a burden, and to provide evidence that the interests of all concerned were equitably considered.

Once such a specific plan, together with ancillary agreements and arrangements, such as those discussed above, were to be adopted, it would provide a visible and established set of guidelines for the development and use of that area which, in turn, could be reconciled with plans for larger areas on a regional, state and nation-wide basis, which plans could be implemented in an efficient and predictable fashion.

This approach would be especially effective in the development of the plan for the coastal zone which is now being prepared by the Coastal Zone Conservation Commission and could be implemented by the regional and state commissions on an ad-

hoc or comprehensive basis.[155]

In summary, the specific plan approach recognizes the need to have a clearly articulated action-plan which includes all of the regulations and programs necessary to its implementation and which reflects, to the extent practicable, a reconciliation of conflicting public and private rights and interests in the lands covered by it. It further recognizes that such a comprehensive plan can only be the product of a carefully developed political process which provides to all interested and concerned public and private agencies, groups and individuals the opportunity to participate in its development.[164]

FOOTNOTES

1. The term "coastal zone" has various definitions. The California Coastal Zone Conservation Act of 1972 defines it as: "that land and water area. . .extending seaward to the outer limit of the state jurisdiction, including all islands. . .and extending inland to the highest elevation of the nearest coastal mountain range, except that in Los Angeles, Orange, and San Diego Counties, the inland boundary of the coastal zone shall be the highest elevation of the nearest coastal mountain range or five miles from the mean high tide line, whichever is the shorter distance." Cal. Pub. Res. Code § 27100. The Comprehensive Ocean Area Plan prepared by the State of California in 1972 (page I-2) defines the coastal zone for the purpose of inventorying coastal zone resources "to extend from the seaward limits of the State's jurisdiction to approximately one-half mile inland of the ordinary high water mark." The Federal Coastal Zone Management Act of 1972, 16 U.S.C. 1456, Pub. L 92-583 86 Stat. 1280, Section 304 defines the coastal zone as "the coastal waters (including the lands therein and thereunder) and the adjacent shorelands (including the waters therein and thereunder), strongly influenced by each other and in proximity to the shorelines of the several coastal states, and includes transitional and intertidal areas, salt marshes, wetlands, and beaches. The zone extends. . .seaward to the other outer limit of the United States territorial sea. . . . [and] inland. . .only to the extent necessary to control shorelands, the uses of which have a direct and significant impact on the coastal waters." It is used in this article in a general sense.

2. For example, in California, "[W]ith over two-thirds of the state's population residing in the San Francisco Bay and Los Angeles basin regions, over 80% of the people in the state are within one hour's time of the coast. Three people living within thirty miles of the coast compete for every foot of shoreline." ECKBO, DEAN, AUSTIN & WILLIAMS, STATE OPEN SPACE AND RESOURCES CONSERVATION PROGRAM FOR CALIFORNIA, prepared for the California Legislature Joint Committee on Open-Space Lands, p. 29 (April, 1972).

3. The fragmentation of government has resulted in the lack of consideration of many of the emerging problems related to urbanization because the problems are beyond the historic limits of responsibility or authority of already established agencies as applied in practice. See footnote 141 et seq. and the accompanying text.

4. PUBLIC LAND LAW REVIEW COMMISSION, ONE-THIRD OF THE NATION'S LAND, a Report to the President and Congress (June, 1970); COMMISSION ON MARINE SCIENCE, ENGINEERING AND RESOURCES, OUR NATION AND THE SEA (1969); U.S. ARMY CORPS OF ENGINEERS, NATIONAL SHORELINE STUDY (1970); U.S. DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE, BUREAU OF SPORT FISHERIES AND WILDLIFE SERVICE, BUREAU OF COMMERCIAL FISHERIES, NATIONAL ESTUARY STUDY (1970); STATE OF CALIFORNIA, COMPREHENSIVE OCEAN AREA PLAN (1972). See also in this regard, CALIFORNIA ADVISORY COMMISSION ON MARINE AND COASTAL RESOURCES, THE REVIEW OF THE CALIFORNIA COMPREHENSIVE OCEAN AREA PLAN (December, 1972). CALIFORNIA DEPARTMENT OF PARKS AND RECREATION, CALIFORNIA COASTLINE, PRESERVATION AND RECREATION PLAN (1971); ECKBO, DEAN, AUSTIN & WILLIAMS, STATE OPEN SPACE AND RESOURCES CONSERVATION PROGRAM FOR CALIFORNIA, prepared for the California Legislative Joint Committee on Open-Space Lands (April, 1972); SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION, THE SAN FRANCISCO BAY PLAN (1969), particularly see, the background report prepared by HEYMAN, entitled POWERS, Volume I,

REGULATION-LEGAL QUESTIONS (1968); FEDERAL COUNCIL ON ENVIRONMENTAL QUALITY ANNUAL REPORTS FOR 1970, 1971, 1972 and 1973, particularly, see, the FOURTH ANNUAL REPORT, BOSSELMAN, F., and CALLIES, D., THE QUIET REVOLUTION IN LAND USE CONTROL, prepared for the Council on Environmental Quality (1971); BOSSELMAN, F., CALLIES, D., and BANTA, J., THE TAKING ISSUE, prepared for the Council on Environmental Quality (1973); TASK FORCE ON LAND USE AND URBAN GROWTH, THE USE OF LAND, A CITIZENS' POLICY GUIDE TO URBAN GROWTH sponsored by The Rockefeller Brother's Fund (1973); and, THE CALIFORNIA TOMORROW PLAN, Revised Edition, prepared by California Tomorrow, a nonprofit educational organization (Heller, A., ed. 1972).

5. See generally, Rosenthal, The Federal Power to Protect The Environment: Available Devices to Compel or Induce Desired Conduct, 45 So. Calif. L. Rev. 397 (1972); The National Environmental Policy Act of 1969, 42 U.S.C. §§4321 et seq.; The Environmental Quality Improvement Act of 1970, 42 U.S.C. §§4371 et seq., establishing the Office of Environmental Quality; Executive Order No. 11514, 35 Fed. Reg. 4247, Mar. 5, 1970, Executive Order No. 11574, 35 Fed. Reg. 19627, Dec. 23, 1970, with respect to administration of the Refuse Act; Reorganization Plan No. 3 of 1970, 35 Fed. Reg. 15623, 84 Stat. 2086, Dec. 2, 1970, establishing the Environmental Protection Agency; Reorganization Plan No. 4 of 1970, 35 Fed. Reg. 15627, 84 Stat. 2090, Oct. 3, 1970, establishing the National Oceanic and Atmospheric Administration; Executive Order No. 11507, 35 Fed. Reg. 2573, Feb. 4, 1970, with respect to prevention, control and abatement of air and water pollution at Federal facilities; the Coastal Zone Management Act of 1972, footnote 1, supra; the Marine Protection, Research and Sanctuaries Act of 1972, Pub. L. 92-532, 86 Stat. 1052; the Estuary Protection Act of 1968, Pub. L. 90-454; The Clean Air Act Amendments of 1970, 42 U.S.C. §§1857 et seq., see generally, Mandelker and Rothchild, The Role of Land Use Controls in Combating Air Pollution under the Clean Air Act of 1970, 3 Eco. L.Q. 235 (1973); Federal Water Pollution Control Act, 33 U.S.C. §§1151 et seq.; Noise Pollution and Abatement Act, 42 U.S.C. §§1858-1858a; Noise Control Act of 1972, 42 U.S.C. §§4901 et seq. and 49 U.S.C. §1431; and the Federal Disaster Prevention Act of 1973, Pub. L. 93-234, providing for the strict regulation of flood plains and providing in this regard for a ban on further residential development below the 100 year flood elevation level.

5a. See, generally, Binder, D., Taking Versus Reasonable Regulation; A Reappraisal in Light of Regional Planning and Wetlands, 25 Univ. of Fla. L. Rev. 1 (1972); BOSSELMAN, F., and CALLIES, D., THE QUIET REVOLUTION IN LAND USE CONTROL, footnote 4, supra; BOSSELMAN, F., et al., THE TAKING ISSUE, footnote 4, supra; Heath, Estuarine Conservation Legislation in the States, 5 Land & Water L. Rev. 351 (1970); Crooks, G., The Washington Shoreline Management Act of 1971, 49 Wash. L. Rev. 423 (1974); NATIONAL LAND USE POLICY LEGISLATION, 93D CONGRESS, AN ANALYSIS OF LEGISLATIVE PROPOSALS AND STATE LAWS, prepared by the Environmental Policy Division, Congressional Resource Service, Library of Congress, at the request of the Senate Committee on Interior and Insular Affairs, 93d Congress, April, 1973, and LAND USE POLICY AND PLANNING ACT, REPORT OF THE COMMITTEE ON INTERIOR AND INSULAR AFFAIRS, UNITED STATES SENATE, TOGETHER WITH MINORITY AND ADDITIONAL VIEWS TO ACCOMPANY S. 268, June, 1973.

6. Cal. Gov. Code §§66600 et seq., establishing the San Francisco Bay Conservation and Development Commission; see, generally, Student Note, Saving San Francisco Bay: A Case Study in Environmental Legislation, 23 Stan. L. Rev. 349 (1971).

7. The California Coastal Zone Conservation Act of 1972, enacted by initiative, Cal. Pub. Res. Code §§21000 et seq.

8. Cal. Gov. Code §§66800 et seq.; Student Comment, Regional Government for Lake Tahoe, 22 Hast. L. Journ. 705 (1971); see also, Muys, Interstate Compacts and Water Resources Planning and Management, 4 Nat. Res. L. 153 (1973).

9. See also, Cal. Pub. Res. Code §§22000 et seq., establishing the Ventura-Los Angeles Mountain and Coastal Study Commission.

10. E.g., the California Land Conservation Act of 1965, Cal. Gov. Code §§51200 et seq.; and Cal. Rev. & Tax. Code §§402.1 and 421-425, with respect to the taxation of agricultural lands; and The Open-Space Lands Act of 1970, Cal. Gov. Code §§65560 et seq. See also footnotes 86 et seq. and accompanying text.

11. See footnotes 82 et seq. and the accompanying text.

12. See footnotes 98 et seq. below and the accompanying text.

13. Legislation is presently before Congress to establish a national land use policy. See, NATIONAL LAND USE POLICY LEGISLATION, footnote 5a, supra. California Assemblyman Paul Priolo has also introduced a pre-print of a proposed State Land Use Bill as Assembly Bill Number 1 in the 1973-1974 California Legislature.

14. Chicago, B.&Q.R. Co. v. City of Chicago, 166 U.S. 266 (1897).

15. Section 14 of Article I of the California Constitution provides that "Private property shall not be taken or damaged for public use without just compensation having first been made. . . ." (Emphasis added.)

16. See, generally, PUBLIC LAND LAW REVIEW COMMISSION, HISTORY OF PUBLIC LAND LAW DEVELOPMENT, Chapters IV, VII-XI (1968), prepared in connection with the Commission's Report, ONE-THIRD OF THE NATION'S LAND, footnote 4, supra.

17. See, e.g., GILLINGHAM, THE RANCHO SAN PEDRO (1961).

18. See, e.g. Cal. Civ. Code §§830 and 1069; and, e.g., Los Angeles v. San Pedro Railroad Co., 182 Cal. 652 (1920), cert. denied 245 U.S. 636 (1920); and People v. California Fish Co., 166 Cal. 576 (1913).

19. See, e.g., the survey of Rancho San Pedro as reproduced in GILLINGHAM, THE RANCHO SAN PEDRO (1961), p. 208, showing the exclusion of the "Inner Bay" and the islands therein from the survey and thereby from the confirmatory patent although the Decree of Confirmation provided that the boundary extended "along the sea."

20. In excess of 65,000 acres of swamp and overflowed lands were sold pursuant to the Swamp Lands Acts of 1849, 1850 and 1860, SHAW, S., and FREIDINE, WETLANDS OF THE UNITED STATES 5 (1956). See, also, HISTORY OF PUBLIC LAND LAW DEVELOPMENT, p. 325, footnote 16, supra.

21. Taylor, N., Patented Tidelands: A Naked Fee? Marks v. Whitney and The Public Trust Easement, 47 Calif. St. B. Journ. 420, 421 (1972).

22. See, e.g., People v. California Fish Co., 1966 Cal. 576 (1913); and Marks v. Whitney, 6 Cal. 3d 251 (1973).

24. See, e.g., BOSSELMAN, F., et al., THE TAKING ISSUE, footnote 4, supra; BOSSELMAN, F., and CALLIES, D., THE QUIET REVOLUTION IN LAND USE CONTROL, footnote 5, supra; Dunham, A Legal and Economic Basis for City Planning, 58 Colum. L. Rev. 650 (1958); Dunham, Property, City Planning, and Liberty, in LAW AND LAND 28 (HAAR, C, ed., 1964); Michaelman, Property, Utility and Fairness: Comments on the Ethical Foundations of "Just Compensation" Law, 80 Harv. L. Rev. 1165 (1967); Sax, Takings and the Police Power, 74 Yale L. Journ. 36 (1964); Sax, Takings, Private Property and Public Rights, 81 Yale L. Journ. 149 (1971); Van Alstyne, A., Taking or Damaging by Police Power: The Search for Inverse Condemnation Criteria 44 So. Calif. L. Rev. 39 (1971); Van Alstyne, A. Modernizing Inverse Condemnation, A Legislative Prospectus, 8 Santa Clara Lawyer (1967); Heyman, I., Innovative Land Use Regulation and Comprehensive Planning, 13 Santa Clare Lawyer 183 (1972); Harris, C., Environmental Regulations, Zoning and Withheld Municipal Services: Takings of Property by Multi-Government Action, 4 Univ. of Fla. L. Rev. 635 (1973); Ausness, R., Land Use Controls in Coastal Areas, 9 Cal. Western L. Rev. 391 (1973); Netherton, Implementation of Land Use Policy: Police Power v. Eminent Domain, 3 Land & Water L. Rev. 33 (1968); Kratovil & Harrison, Eminent Domain -- Policy and Concept, 42 Calif. L. Rev. 596 (1954); Binder, D., Taking Versus Reasonable Regulation: A Reappraisal in Light of Regional Planning and Wetlands, footnote 5a, supra; Student Note, State and Local Wetlands Regulation: The Problem of Taking Without Just Compensation, 58 Va. L. Rev. 876 (1972); OPEN SPACE AND THE LAW (HERRING, F., ed., 1965); Kusler, J., Open Space Zoning: Valid Regulation or Invalid Taking, 57 Minn. L. Rev. 1 (1972).

24a. BOSSELMAN, et al., THE TAKING ISSUE, p. 53 et seq., footnote 4, supra.

25. Brice Presbyterian Church v. City of New York, 5 Law. 537 (N.Y., 1826).

26. Baker v. Boston, 12 Pick. 183 (Mass., 1831).

27. Commonwealth v. Tewkesbury, 11 Mete. 55 (Mass., 1846).

28. Commonwealth v. Alger, 7 Cush. 53 (Mass., 1853).

29. Mugler v. Kansas, 123 U.S. 623 (1887).

30. Pumpelly v. Green Bay Co., 80 U.S. 166 (1871).

31. With respect to the foregoing generally, see BOSSELMAN, et al., THE TAKING ISSUE, p. 105 et seq., footnote 4, supra.

32. In this regard, see the contemporaneous decision in Village of Euclid v. Ambler Realty Co., 272 U.S. 365, 386-387 (1926). "Building zone laws are of modern origin. They began in this country about twenty-five years ago. Until recent years, urban life was comparatively simple; but with the great increase and concentration of population, problems have developed, and constantly are developing, which require, and will continue to require, additional restrictions in respect of the use and occupation of private lands in urban communities. Regulations, the wisdom, necessity and validity of which, as applied to existing conditions, are so apparent that they are now uniformly sustained,

a century ago, or even half a century ago, probably would have been rejected as arbitrary and oppressive."

33. 260 U.S. 393 (1922).

34. See, Sax, The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention, 63 Mich. L. Rev. 471, 478 et seq. (1970). Interestingly, the question has been recently raised as to whether the jurisdiction of the U.S. Army Corps of Engineers in navigable waters is based on the concept of jus publicum -- property rights and interests, or regulatory authority. In this regard the Corps recently asserted jurisdiction to the mean of the higher high tidal waters along the Pacific Coast, 33 C.F.R., Part 209, §209.260; 37 Fed. Reg. 18289, September 9, 1972, although historically it had asserted jurisdiction only to the mean of the high tidal waters. The question of whether the basis of the Corps' additional assertion of authority is in the nature of a property right or based on regulatory authority is important, particularly with respect to title insurance coverage. Standard title insurance coverage does not insure against loss as the result of assertion of governmental regulatory authority and therefore if the assertion of the Corps is regulatory in nature, there is no compensation for any resulting loss. This question has come up specifically with respect to the Corps' assertion of authority in San Francisco Bay and in San Diego County.

35. 260 U.S. 393, 413 (1922). Holmes did suggest that "One fact for consideration in determining such limits is the extent of the diminution. When it reaches a certain magnitude, in most cases if not all cases there must be an exercise of eminent domain and compensation to sustain the act."

36. 272 U.S. 365 (1926).

37. Van Alstyne, A., Modernizing Inverse Condemnation: A Legislative Prospectus, p. 25, footnote 24, supra; "There is no set formula to determine where regulation ends and taking begins." Goldblatt v. Town of Hempstead, 369 U.S. 590, 594 (1962).

38. See footnote 125, below and accompanying text.

39. For example, the flooding from the erection of a dam. See footnote 30, supra.

40. E.g., see Vernon Park Realty, Inc. v. City of Mount Vernon, 121 N.E. 2d 517 (1954), where a city zoned as "parking" certain land which a railroad intended to develop, in order to assure that the city would have it available for that use. Also see, Morris County Land Improvement Co. v. Township of Parsipanny-Troy Hills, 193 A.2d 232 (N.J., 1963), where the court found that the purpose of certain regulations was to provide a flood water detention basin and open space; Dooley v. Town Plan and Zoning Commission of Town of Fairfield, 197 A.2d 770 (Conn., 1964), where the court found that lands consisting primarily of tidal marsh and the regulations restricted permissible uses to parks, playgrounds, marinas, clubhouses and wildlife sanctuaries operated by governmental agencies or non-profit organizations, and farming and gardening; that 170 out of 404 acres was privately owned, a portion of which had been assessed for sewer improvements; that the private owners were left with no economic uses; and that permitted uses were limited to those normally thought of as public uses. Also see, State v. Johnson, 265 A.2d 711 (Me., 1970) held denial of permit to fill invalid; Bartlett v. Zoning Commission of Town of Old Lyme, 282 A.2d 907 (Conn., 1971); and Commissioner of Natural Resources v. S. Volpe & Co., 206 N.E. 2d 666 (Mass., 1965), which involved a State

statute establishing permit procedure for dredging and filling of tidal marsh under which the owner of a portion of the tidal marsh was denied permit to construct marina; the court remanded the case for further proceedings noting that while the protection of fisheries was a proper purpose, it could not be used to completely deny the owner of any economic use of his property. But see, Golden v. Board of Selectmen of Falmouth, 265 N.E. 2d 573 (Mass., 1970), upholding local regulation of Wetlands; Candlestick Properties, Inc. v. San Francisco Bay Conservation and Development Commission, 11 Cal. App. 3d 557, 572 (1st Dist., 1970), upholding the denial of a permit to fill, stating that "[t]he purpose of the regulations and restrictions. . . is not merely to provide open spaces. Rather, they are designed to preserve the existing character of the bay while it is determined how the bay should be developed in the future." A recent Maryland court of appeals case upheld state wetlands legislation partially based upon the ecological importance of the wetlands involved. Potomac Sand & Gravel Co. v. Gov. of Maryland, 293 A.2d 241 (1972). See also, Board of Public Works v. Lamar, 2 E.R.C. 1544 (Md., 1971) and Goldblatt v. Town of Hempstead, 369 U.S. 590 (1962), in which the court upheld a local ordinance terminating certain sand and gravel operations on basis of the potential harm to persons in the area from the deep pools created.

41. McCarthy v. City of Manhattan Beach, 4 Cal. 2d 879 (1953).

42. Miller v. Schoene, 276 U.S. 272 (1928).

43. Sorocco v. Geary, 3 Cal. 69 (1853).

44. Consolidated Rock Products Co. v. The City of Los Angeles, 57 Cal. 2d 515 (1962); Hadacheck v. Sebastian, 239 U.S. 394 (1915).

45. See, Heyman, I. & Gilhool, T., The Constitutionality of Imposing Increased Community Costs on New Suburban Residents Through Subdivision Exactions, 73 Yale L. Journ. 1119 (1964); and Johnston, The Constitutionality of Subdivision Control Exactions: The Quest for a Rationale, 52 Cornell L. Q. 871 (1967).

46. FREUND, E., THE POLICE POWER §511, at 546-47 (1904). Sometimes it is difficult, however, to distinguish whether a benefit is being conferred or harm prevented. Van Alstyne points out the lack of clarity in this regard with respect to regulations prohibiting billboards along highways. Van Alstyne, A., Modernizing Inverse Condemnation: A Legislative Prospectus, p. 21, footnote 24 above.

47. Footnote 32, supra.

47a. Gion v. City of Santa Cruz, 2 Cal 3d 29 (1970). See generally, Shavelson, J., Gion v. City of Santa Cruz Where do We go from Here?, 46 Cal. St. B. Journ. 415 (1972)

47b. Marks v. Whitney, 6 Cal. 3d 251 (1971).

48. See Sax, Takings, Private Property and Public Rights, 81 Yale L. Journ. 149, 161 et seq. (1971). Thus, he argues, not only should a state be able to destroy cedar trees which harbor parasites which threaten neighboring apple orchards, but it should also be able to prevent the filling and dredging of estuarine areas which provide fishery breeding grounds and nurseries and the destruction or disturbance of areas of natural scenic beauty, in which all of the public have an "interest."

49. Just v. Marinette County, 201 N.W. 2d 761 (Wisc., 1972); discussed in BOSSELMAN et al., THE TAKING ISSUE, p. 217 et seq., footnote 24 supra.

50. See also, Golden v. Board of Selectment of Falmouth, 265 N.E. 2d 573 (Mass., 1970), where the court upheld the denial of a permit by a local agency to dredge a channel through a tidal marsh; but see MacGibbon et al. v. Board of Appeals of Duxbury, 255 N.E. 2d 347 (Mass., 1970). See also ASSEMBLY SELECT COMMITTEE ON OPEN SPACE LANDS, CALIFORNIA LEGISLATURE, OPEN SPACE ZONING HANDBOOK, p. 20 (1973) referring to the Sax article, footnote 48 supra, and the cases referred to generally in footnotes 49 and 50 above in finding that "[t]hese cases sustain directives by governmental agencies to private land owners to leave their lands in their natural state because to alter that condition would adversely affect some aspects of the natural environment beyond their property lines."

51. See footnote 17, supra and the accompanying text.

52. See footnote 21, supra.

53. See, e.g. Act of April 21, 1958, Stats. 1858, p. 198; Act of May 14, 1961, Stats. 1861, p. 363; Title VIII of the Political Code of 1872; Act of March 28, 1868, Stats. 1867-68, p. 716; and Act of March 27, 1872, Stats. 1871-72, p. 587. See generally, Kimball v. McPherson, 46 Cal. 103 (1873); People v. Morrill, 26 Cal. 336 (1864); Ward v. Mulford, 32 Cal. 365 (1867); People v. Cowell, 60 Cal. 400 (1882); and Upham v. Hosking, 62 Cal. 250 (1882).

54. 166 Cal. 576 (1913); See Taylor, N., Patented Tidelands: A Naked Fee? Marks v. Whitney and the Public Trust Easement, footnote 21, supra.

55. It has been argued that a distinction should be drawn between conveyances of lands which could be useful for trust purposes and those which would not. In the latter case, the conveyance would convey the lands free of the trust. In this regard, however, the Marks v. Whitney decision, footnote 47b, supra, holding that the permissible trust uses may be expanded to include preservation for wildlife purposes would present a problem with respect to the determination of the extent of trust purposes at any particular time.

56. See, the Gion case, footnote 47a, supra.

57. See, e.g., Sibson v. State, 4 E.L.R. 200 (Sup. Ct. N.H., 1973).

58. In this regard, see footnote 156 below, and the accompanying text.

59. "'[T]he purpose of zoning is in general two-fold: to preserve the existing character of an area for the development of the general area in a manner consistent with the uses for which they are suited. The regulations should be related to the character of the district which they affect; and should be designed to serve the welfare of those who are to occupy the land in those districts.'" Board of County Supervisors of Fairfax County v. Carper, 107 S.E. 2d 390, 395 (Va. 1959).

60. Arverne Bay Construction Co. v. Thatcher, 15 N.E. 2d 587, 591-592 (1938), area zoned residential unusable for that purpose because of proximity to incinerator and sewage outlet. Accord, William Murray Builders, Inc. v. City of Jacksonville, 254 Sl. 2d 364 (Fla., 1971). See, also, Morris County Land Im-

provement Co. v. Township of Parsipanny - Troy Hills, 193 A.2d 232 (N.J., 1963), invalidating zoning ordinance covering a 1,500 acre swamp while finding that the uses permitted (woods, herbaceous plants, fish and fish food, outdoor recreational uses operated by a government agency, conservation area, hunting and fishing reserves, transmission lines and substations, antenna towers, sewerage treatment plants, and water supply facilities) were generally impractical; Hofkin v. Whitemarsh, 42 Pa. D. & C. 2d 417 (1967), permitted uses (including, e.g., cultivation and harvesting of wild crops, game farms, fish hatcheries, wildlife sanctuaries, sewage treatment plants, and utility transmission lines) found by the trial court to be "impractical and completely profitless," "fantastic;" Commission of Natural Resources v. S. Volpe & Co., 206 N.E. 2d 666 (Mass., 1965); Skalko v. City of Sunnyvale, 14 Cal. 2d 213 (1939), property zoned residential adjacent to canneries in bordering industrial zone; and Bassey v. City of Huntington Woods, 74 N.W. 2d 897 (Mich., 1956), property fronting on a heavily travelled highway zoned for single family residences. See also, Bartlett v. Zoning Commissions of Town of Old Lyme 282 A 2d 907 (Conn., 1971).

61. Taschner v. City Council of City of Laguna Beach, 31 C.A. 3d 48 (1973), height limitation established by initiative held void which recited that "the ecology of the City of Laguna Beach is unique and dependent upon the preservation of the natural contours of the hills and the integrity of the shoreline." But see, San Diego Building Contractors Assoc. v. City Council of the City of San Diego, 110 Cal. Rptr. 758 (1973).

62. See, generally, Lamm, R., and Davidson, S., The Legal Control of Population Growth and Distribution in a Quality Environment: The Land Use Alternatives, 49 Denver L. J. 1 (1972); Bingham, W., & Bostick, C., Exclusionary Zoning Practices: An Examination of the Current Controversy, 25 Vanderbilt L. Rev. 1111 (1972); Steel Hill Development, Inc. v. Town of Sanbornton, 469 F. 2d 956 (1972); Oakwood at Madison, Inc. v. Township of Madison, 283, A. 2d 353 (N.J., 1971); National Land and Investment Company v. Kohn, 215 A.2d 597 (Pa., 1965, rehearing denied 1966); Board of County Supervisors of Fairfax County v. Carper, 107 S.E. 2d 390 (Va., 1959); Appeal of Kit-Mar Builders, Inc., 268 A.2d 765 (Pa., 1970); Appeal of Girsh, 263 A.2d 395 (Pa., 1970); Norbeck Village Joint Venture v. Montgomery County Council, 254 A.2d 700 (Md., 1969); Kavanewsky v. Zoning Board of Appeals of the Town of Warren, 279 A.2d 567 (Conn., 1971). But see, Confederacion de la Raza Unida v. City of Morgan Hill, 324 F. Supp. 895 (N.D. Cal., 1971), where the court upheld hillside zoning over objections that the regulatory scheme was exclusionary, noting, however, that the general plan of the city with respect to housing had not been attacked as exclusionary.

63. See, for example, Southern Alameda Span. Sp. Org. v. City of Union Hill, Cal., 424 F.2d 291 (9th Cir., 1970). See, generally Freilich, R. & Bass, G., Exclusionary Zoning: Suggested Litigation Approaches, 3 Urb. L. 344 (1971); and Sager, Tight Little Islands Exclusionary Zoning, Equal Protection and the Indigent, 21 Stan. L. Rev. 767 (1969).

64. 469 F.2d 956 (1st Cir., 1972).

65. Id at 961, quoting from Note, in 57 Iowa L. Rev. 126 at 140 (1972); See also Oakwood at Madison, Inc. v. Township of Madison, at 356, footnote 62, supra.

66. Town of Los Altos Hills v. Adobe Creek Properties, Inc., 108 Cal. Rptr. 271, 287 (1973).

67. "The test must be whether it [the zoning ordinance] promotes reasonably a balanced and well-ordered plan for the en-

tire municipality." Oakwood at Madison, Inc. v. Township of Madison, 283 A.2d 353, 357 (N.J., 1971).

68. See, generally, Oakwood at Madison v. Township of Madison, at 357, footnote 62, supra; Student Note, Zoning -- Municipal Corporations -- General Welfare as a Zoning Purpose Held to Encompass Local and Regional Housing Needs, 26 Rutgers L. Rev. 401 (1973);

68a. See, e.g., Golden v. Planning Board of the Town of Ramapo, 285 N.E. 2d 291 (1972). See generally, Bosselman, F., Can the Town of Ramapo Pass a Law to Bind the Rights of the Whole World, 1 Fla. St. U. L. Rev. 234 (1973); and Freilich, Interim Development Controls: Essential Tools for Implementing Flexible Planning and Zoning, 49 Urb. L. 65 (1971). See also, footnotes 82 et seq. and the accompanying text.

69. See, e.g., Morris County Land Improvement Company v. Parsippany - Troy Hills Township, 193 A.2d 232 (N.J., 1963), restriction of swampland to some agricultural uses, wildlife sanctuaries and outdoor recreation, held to constitute a taking; Dooley v. Town Plan and Zoning Commission of Town of Fairfield, 197 A. 2d 770 (Conn., 1964); Commissioner of National Resources v. S. Volpe Co., Inc., 206 N.E. 2d 666 (Mass., 1965); Candlestick Properties, Inc. v. San Francisco Bay Construction and Development Commission, 11 Cal.App. 3d 557 (1970); Consolidated Rock Products Co., v. The City of Los Angeles, 57 Cal. 2d 515, appeal dismissed, 371 U.S. 36 (1962). See also, McCarthy v. City of Manhattan Beach, 4 Cal. 2d 879 (1953).

70. See, e.g., National Land and Investment Company v. Kohn, 215 A.2d 597, 608 (Pa., 1966). See, generally, Krasnowiecki & Strong, Compensible Regulations for Open Space, Journ. of the Am. Inst. of Planners 87, 89 (1963).

71. Sibson v. State, 4 E.L.R. 200 (Sup. Ct., N.H., 1973).

72. BOSSELMAN et al. THE TAKING ISSUE, p. 208 et seq. footnote 24, supra.

73. See, e.g., Just v. Marinette County, 201 N.W. 2d 761 (Wisc. 1972), in which the court stated: "An owner of land has no absolute and unlimited right to change the essential natural character of his land so as to use it for a purpose for which it is unsuited in its natural state and which injures the rights of others" p. 768. This decision should be compared with other recent decisions which on various bases support regulatory or other schemes deny the owner of lands the right to develop then, including, Marks v. Whitney, 6 Cal. 3d 251 (1971), tide and submerged lands; State ex rel. Thornton v. Hay, 462 P.2d 671 (Ore., 1969), beach lands; Gion v. City of Santa Cruz, 2 Cal. 3d 29 (1970), public access to beaches; Turner v. County of Del Norte, 24 Cal. App. 3d 311 (1972), flood plain zoning; Goldblatt v. Town of Hempstead, 369 U.S. 590 (1962); Zabel v. Tabb, 430 2d 199 (1970), navigable waters; and Wilbour v. Gallagher, 462 P.2d 232 (Wash., 1969) cert. denied, 400 U.S. 878 (1970), inland lake.

74. Michaelman, Property, Utility and Fairness: Comments on the Ethical Foundations of "Just Compensation" Law. supra, p. 1234, footnote 24, suggests that it may be a method to determine that the needs of the group are sufficiently great to demand the sacrifice on the part of the individual.

75. Sirocco v. Geary, 3 Cal. 69 (1853).

76. PROSSER, TORTS, p. 126 (4th ed, 1971).

77. Justice Holmes in Mahon, footnote 35, supra, espoused the concept of "an average reciprocity of advantage."

78. Footnote 32, supra.

79. Associated Home Builders v. City of Walnut Creek, 4 Cal. 3d 633 (1971), upholding requirement of fee in lieu of dedication of land for park and recreational purposes.

80. Michaelman, Property, Utility and Fairness: Comments on the Ethical Foundations of "Just Compensation" Law, p. 1193, footnote 24, supra.

81. See, generally, Heyman, I., Innovative Land Regulation and Comprehensive Planning, footnote 24, supra; Newark Milk and Cream Co. v. Parsippany - Troy Hills, 135 A.2d 682, 695 (1957). See also, Smith v. County of Santa Barbara, 243 Cal. 2d 126 (1966), upholding zone change from residential to design industrial covering land under an airport approach on the basis that it was part of a "comprehensive zoning scheme" and that the landowner was entitled to relief only if the regulation deprived him of all reasonable use of his land. Zahn v. Board of Public Works, 195 Cal. 497 (1925), affirmed 274 U.S. 235 (1927); Miller v. Board of Public Works, 195 Cal. 477 (1925), appeal dismissed, 273 U.S. 781 (1927); Magruder v. Redwood City, 203 Cal. 665 (1928); Feraut v. Sacramento, 204 Cal. 687 (1928); Beverly Oil Co. v. Los Angeles, 40 Cal. 2d 552 (1953); Clemons v. Los Angeles, 36 Cal. 2d 95 (1950); McCarthy v. Manhattan Beach, 4 Cal. 2d 879 (1953); and Harr, C. In Accordance With a Comprehensive Plan, 68 Harv. L. Rev. 1154 (1955).

81a. Ordinance 38.235 adopted by the City Council of the City of Milpitas December 5, 1972.

81b. Standard Pacific Corp. v. City of Pleasanton, (Alameda County Super. Ct., No. 423602, filed May 1, 1972).

81c. See footnote 68a, supra.

81d. Associated Home Builders of the Greater East Bay v. City of Livermore, (Alameda County Super. Ct., No. 425754, December 29, 1972); CRANSTON, M., GARTH, B., PLATTNER, R., and VARON, J., A HANDBOOK FOR CONTROLLING LOCAL GROWTH, Stanford Environmental Law Society (1973) pp. 90 et seq. Since that time interim ordinance number 813 was adopted by the City on March 15, 1973 to rezone certain residentially zoned property to agricultural zones clearly as holding zones pending the revision of the City's general plan.

81e. CRANSTON et al., A HANDBOOK FOR CONTROLLING LOCAL GROWTH, pp. 103 et seq. footnote 81b, supra.

82. Urgency Interim Ordinance adopted by the City Council of the City of Irvine December 18, 1973, §12.

83. Footnote 68a. See also accompanying text.

83a. Resolution 6113 N.C.S. adopted by the City of Petaluma City Council August 21, 1972.

84. Construction Industry Association of Sonoma County et al v. City of Petaluma, (Sonoma Cty. Super. Ct. No. 73-0663-LHB). See footnote 68a, supra. See also, Edwards v. California, 314 U.S. 160 (1940), criminal penalty for bringing an indigent non-resident into State enacted by California to stand the influx of indigents

from the "dust bowl;" Shapiro v. Thompson, 394 U.S. 618 (1969), requirement that persons reside within state or the District of Columbia for one year before being eligible for welfare payments; Dunn v. Blumstein, 92 U.S. 995 (1972), requirement of one-year residency in State and three-month residency in the county before eligibility to vote for various elected officials; Cole v. Housing Authority, 435 F.2d 807 (1st Cir., 1970), two-year residency in city requirement for access to federally assisted housing program; King v. Rochelle Municipal Housing Authority, 442 F.2d 646 (2d Cir., 1971), cert. denied, 404 U.S. 863 (1971), similar result, the court acknowledging right to travel includes right to travel within a state; and Student Note, Depression Migrants and the States, 53 Harv. L. Rev. 1031 (1940); Student Comment, State Control of Interstate Migration of Indigents, 40 Mich. L. Rev. 711 (1942); Boudin, The Constitutional Right to Travel, 56 Colum. L. Rev. 47 (1956); Student Note, Residence Requirements After Shapiro v. Thompson, 70 Colum. L. Rev. 134 (1970); Student Note, Shapiro v. Thompson: Travel, Welfare and the Constitution, 44 N.Y.U. L. Rev. 989 (1969); Student Comment, The Right to Travel and its Application to Restrictive Housing Laws, 66 N.Y.U. L. Rev. 635 (1971); Student Comment, The Right to Travel -- Its Protection and Application Under the Constitution, 40 U.S. 137 (1971).

84a. CRANSTON, et al., A HANDBOOK FOR CONTROLLING LOCAL GROWTH, footnote 81b, supra.

85. Harris, C., Environmental Regulations, Zoning, and Withheld Municipal Services: Takings of Property by Multi-Government Action, 4 Unis. of Fla. L. Rev. 635 (1973).

86. See, generally, ECKBO, DEAN, AUSTIN & WILLIAMS, STATE OPEN SPACE AND RESOURCE CONSERVATION PROGRAM FOR CALIFORNIA, prepared for the California Legislature Joint Committee on Open Space Land (1972); CALIFORNIA LEGISLATURE, JOINT COMMITTEE ON OPEN SPACE LAND, FINAL REPORT (1970); ASSEMBLY SELECT COMMITTEE ON OPEN SPACE LANDS, CALIFORNIA LEGISLATURE, OPEN SPACE ZONING HANDBOOK (1973).

87. Cal. Stats of 1970, Chapter 1590, p. 3315, Section 15.

88. Cal. Gov. Code §§51200-51294; Cal. Rev. & Tax. Code §§402.1, and 421-25. See, generally, OPEN SPACE AND THE LAW (HERRING, F., ed., 1965).

88a. Cal. Gov. Code §65302.

88b. Cal. Gov. Code §65563.

89. Cal. Gov. Code §65860.

90. Selby Realty Company v. City of San Buenaventura, 10 Cal. 3d 110 (1973).

91. In this regard, the Los Angeles Superior Court recently was reported to have held that the Environmental Development Guide of 1970, adopted by the Los Angeles County Regional Planning Commission as part of the General Plan of the County is not regulatory and until a building permit or tentative tract map is denied, no taking occurs.

92. Cal. Gov. Code §65560.

93. Cal. Gov. Code §65566.

94. Cal. Gov. Code §65567.

95. Cal. Gov. Code §65910.

96. P. 24, cited in footnote 86, supra.

97. Eldridge v. City of Palo Alto (County of Santa Clara Super. Ct., No. 282965), dismissed March 26, 1973, upon the sustaining of a demurrer; Beyer v. City of Palo Alto, et al. (County of Santa Clara Super. Ct., No. P22974), dismissed June 27, 1973, upon the sustaining of a demurrer; and Arastra Limited Partnership v. City of Palo Alto (U.S. District Ct., N.D. Cal., No. C-27 - 2305 - RHS) pending.

98. Turner v. Del Norte County, 24 Cal. App. 3d 311 (1972), upholding flood-plain zoning; California participates in the Federal flood plain insurance program. See, National Flood Insurance Act of 1968, 42 U.S.C. §§4001 et seq.; The Federal Disaster Prevention Act of 1973, footnote 5, supra; and Cal. Wat. Code §§8325 et seq. See generally Student Comment, Flood Plain Zoning in California -- Open Space by Another Name: Policy and Practice, 10 San Diego L. Rev. 381 (1973).

99. See, e.g., Confederacion de la Raza Unida v. Morgan Hill, 324 F. Supp. 895 (N.D. Cal., 1971).

101. See e.g., on the state level the regulatory schemes administered by the San Francisco Bay Conservation and Development Commission with respect to San Francisco Bay (Cal. Gov. Code §§66600 et seq.), the Tahoe Regional Planning Agency with respect to the Lake Tahoe area (Cal. Gov. Code §§66801 et seq.; and the Coastal Zone Conservation Commission with respect to the coastal zone (Cal. Pub. Res. Code §§27000 et seq.). See, generally, Note, Regional Government for Lake Tahoe, 22 Hast. L. Journ. 705 (1971). California entered into an interstate compact with Nevada which was approved by Congress (pub. Law 91-148, 83 Stat. 360) establishing the Tahoe Regional Planning Agency with powers to make and enforce a comprehensive plan. The constitutionality of the Agency was upheld in People Ex Rel Younger v. County of El Dorado, 5 Cal. 3d 480 (1971). In that case the California Supreme Court stated that "[T]here is good reason to fear the region's national wealth contains the virus of its ultimate impoverishment. A staggering increase in population, a greater mobility of people, an affluent society and an incessant urge to invest, to develop, to acquire and merely to spend--all combined to pose a severe threat to the Tahoe region." Id at 482. See also, ODELL, R., THE SAVING OF SAN FRANCISCO BAY (Conservation Foundation, 1972);and Jackson, H., & Baum, A., Regional Planning: The Coastal Zone Initiative Analyzed in Light of the BCDC Experience, 47 Cal. St. B. Journ. 426 (1972).

102. See, County of Los Angeles General Plan, p. 119, adopted June 28, 1973, which supplemented the Environmental Development Guide, adopted in October of 1970.

104. See, Second Draft, Resource Management Ordinance, Orange County, California, dated March 19, 1973, prepared by Eckbo, Dean, Austin & Williams with Ira Michael Heyman as legal consultant. The proposed ordinance would establish the following management districts: natural resources, agricultural resources, cultural resources, water resources and hillside and soils resources. With respect to regulatory schemes in other states established with regard to wetlands, and mountain and scenic areas, see, generally, BOSSELMAN and CALLIES, THE QUIET REVOLUTION IN LAND USE CONTROLS, footnote 24, supra; OPEN SPACE ZONING HANDBOOK, p. 17, footnote 50, supra; Binder, Taking Versus Reasonable Regulation: A Reappraisal in Light of Regional Planning and Wetlands, footnote 5a, supra; Heath, Estuarine Conservation Legislation in the States, footnote 5a, supra; and Student Note, State and Local

Wetlands Regulation: The Problem of Taking Without Just Compensation, 58 Va. L. Rev. 876 (1972).

105. See, e.g., Colberg, Inc. v. State of California, 67 Cal. 2d 408 (1967), holding that there is no compensation required where a state exercises its authority with respect to navigable waters to construct a bridge which interferes with navigable access to private uplands. See, generally, Krueger, Coastal Zone Management: The California Experience, 47 Cal. State Bar J. 403 (1972); Sax, The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention, 68 Mich. L. Rev. 471 (1970);

106. Cal. Const., Art. 15.

107. See, e.g., County of Orange v. Heim, 30 Cal. App. 3d 694 (1973).

108. Including preservation for "ecological units, for scientific study, as open spaces, and as environments which provide food and habitat for birds and marine life, and which favorably affect the scenery and climate of the area." Marks v. Whitney, 6 Cal. 3d 251, 259-60 (1971)

109. Cal. Pub. Res. Code §§6300 et seq.

110. E.g., Marks v. Whitney, footnote 108, supra, and County of Orange v. Heim, footnote 107, supra.

111. See footnote 34, supra.

112. City of Oakland v. Oakland Waterfront Co., 118 Cal. 160 (1897).

113. 33 U.S.C. §§401 et seq.

114. 430 2d 199 (1970).

115. See, proposed regulations regarding permits for activities in navigable waters, 33 C.F.R., Part 209, §209.120; 38 Fed. Reg. 12217, May 10, 1973; and definitions of navigable waters, 33 C.F.R., Part 209, §209.260; 37 Fed. Reg. 18289, September 9, 1972.

116. 16 U.S.C. §662.

117. See, Marks v. Whitney, footnote 108 supra.

118. Gion v. City of Santa Cruz, footnote 47a, supra, which expressly overruled the earlier decision of F. A. Hihn v. City of Santa Cruz, 170 Cal. 436 (1915).

119. Cal. Civ. Code §1009(f), provides as follows:

> "No use, subsequent to the effective date of this section, by the public of . . . [generally, any coastal property within 1,000 yards of the mean high tide line] shall constitute evidence or be admissible as evidence that the public or any governmental body or unit has any right in such property by implied dedication . . ."

provided the owner posts certain signs, publishes a certain notice, records a notice pursuant to Cal. Civ. Code §813 or enters into an agreement with a Federal, state or local agency providing for the public use of such property.

120. Footnote 107, supra.

121. Cal. Gov. Code §12606.

122. Ibid.

123. Footnote 32, supra.

124. Cal. Gov. Code §65850.

125. See, generally, Ellickson, Alternatives to Zoning: Covenants, Nuisance Rules, and Fines as Land Use Controls, 40 Univ. of Chi. L. Rev. 681 (1973); and Student Comment, Land Use Control in Metropolitan Areas: The Failure of Zoning and a Proposed Alternative, 45 So. Calif. L. Rev. 335 (1972).

126. See, e.g., footnote 96, supra.

127. 42 U.S.C. §§4321 et seq.

128. Cal. Pub. Res. Code §§21000 et seq.

129. 42 U.S.C. §1457.

130. Established by directive of the Director of the Bureau of the Budget, Office of Management and Budget (Circular Number A-95, October, 1968, as revised February 9, 1972).

131. Cal. Stats. of 1965, ch. 1880.

132. Cal. Gov. Code §65302.

133. Cal. Stats. of 1970, ch. 1590.

134. See footnote 90, supra.

135. Footnote 88b, supra.

136. See, for example, the letter from Assemblyman Frank Holoman, Chairman of the Joint Subcommittee of the California Legislature on Community Development, dated April, 1974, to interested persons requesting testimony on various topics including the question of whether the State should require cities to develop a "community development process" which would require the identification of community needs and strategies to meet those needs, acknowledging that "the regulatory and budgeting process should be brought together in an identifiable way so that they can be directed toward community needs."

137. Cal. Gov. Code §65451.

138. E.g., see City of Cerritos Ordinance Number 425.

139. Proposed Ordinance No. 9386.

140. See, A Handbook for Controlling Local Growth, footnote 81b, supra.

141. Footnote 114, supra.

142. Calvert Cliffs' Coordinating Committee, Inc. v. U.S. Atomic Energy Commission, 1 E.L.R. 20346 (D.C. Cir., 1971).

143. For example, recently, the Manhattan Beach School District, Manhattan Beach, California stated its intention to sell excess school lands shown as open-space on the city's open-space plan, rejecting the arguments that it had any duty in this

regard other than to provide educational services and facilities for the students.

144. Footnote 5, supra, together with the executive orders referred to in that footnote.

144a. Footnote 128, supra.

145. Calvert Cliffs' Coordinating Committee v. U.S. Atomic Energy Commission, footnote 142, supra.

146. See, generally, Cal. Adm. Code, Title 14, Section 13210.

147. For example, Russell D. Earnest, then Field Supervisor, Southern California Office, Division of River Basin Studies, Bureau of Sport Fisheries and Wildlife, at a recent conference on dredging stated that: "Although the proposed EPA criteria state that the selection of disposal sites will be based on considerations of the need for disposal, economic costs involved, available alternatives and the extent of the environmental impact, the Bureau will continue to evaluate dredging projects only from the standpoint of the impact on fish and wildlife resources. Decisions of the Bureau will not be swayed by economic considerations." SUMMARY PROCEEDINGS, ECOLOGY, ECONOMICS & DREDGING, A BALANCING POINT FOR NAVIGATION, with respect to the California Marine Affairs and Navigation Conference held October 13, 1973 in San Diego, California.

148. Footnote 145, supra, and the accompanying text.

149. See, footnote 4, supra.

150. Footnote 4, supra.

151. See Student Comment, Regional Government for Lake Tahoe, footnote 8, supra.

152. See, generally, Muys, Interstate Compacts and Regional Water Resources Planning and Management, footnote 8, supra, above.

153. See BOSSELMAN, F., & CALLIES, D., THE QUIET REVOLUTION IN LAND-USE CONTROLS, footnote 4, supra; NATIONAL LAND USE POLICY LEGISLATION, footnote 5a, supra.

154. Speech by Brigadier General George Fink, Division Engineer, South Pacific Division, Corps of Engineers, at the Marine Affairs and Navigation Conference, Ecology, Economics & Dredging, A Balancing Point for Navigation, held Saturday, October 13, 1973, in San Diego, California.

155. See, footnote 137, supra.

156. See, the text accompanying footnote 58, supra.

157. See, the text accompanying footnote 148, supra.

158. See, the text preceding footnote 151, supra.

159. See, the text preceding footnote 146, supra.

160. See, for example, student comment, Development Rights Transfer in New York City, 82 Yale L. Journ. 338 (1972).

161. See, e.g., Svirsky, P., San Francisco: The Downtown Development Bonus System, In THE NEW ZONING: LEGAL, ADMINISTRATIVE AND ECONOMIC CONCEPTS AND TECHNIQUES, p. 139, (Marcus, N., & Groves, M., eds, 1972).

162. See, text accompanying footnote 80, supra.

163. See, footnote 77, supra.

164. It is the intent of the author to further refine the ideas set forth in a second article. Accordingly, he would appreciate receiving comments or suggestions with respect to the ideas presented.