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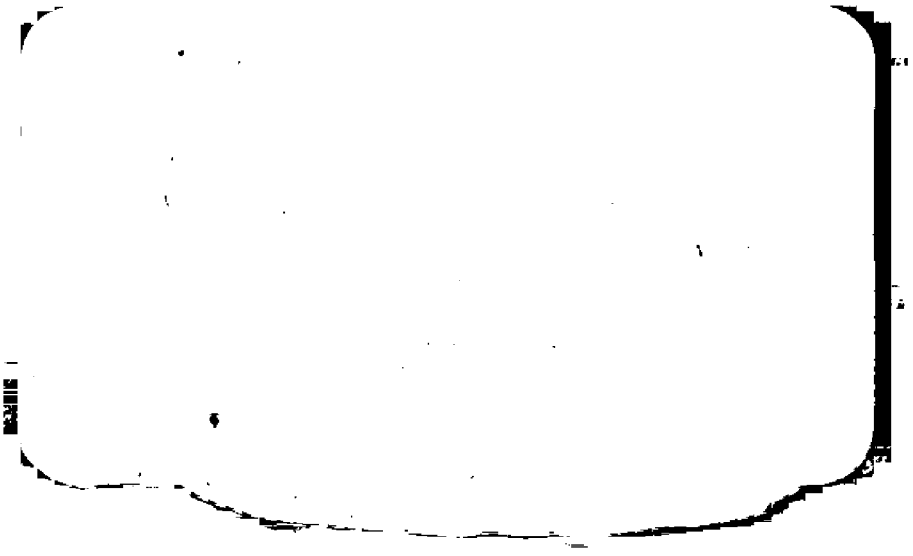

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THE CROWDED COAST

THE DEVELOPMENT AND MANAGEMENT OF THE COASTAL ZONE OF CALIFORNIA

Edited by Barbara S. Gardner

This is a report of a research needs conference series conducted by the University of Southern California Center for Urban Affairs, February 19, March 5 and 19, 1971, on the University campus. The conference series and this report have been made possible through a grant to the Center for Urban Affairs under the National Sea Grant College and Program Act of 1966.

July 1, 1971

March 5, 1971 Conference

Panelists

Robert Bish, Assistant Professor, Economics and Public Affairs, University of Washington
Harold D. Bissell, Manager, COAP Development Program, Department of Navigation and Ocean Development, State of California
George E. Hlavka, Director, Southern California Coastal Water Research Project
Malcolm S. Gordon, Professor of Zoology, Director of the Institute of Evolutionary and Environmental Biology, University of California at Los Angeles

Discussants

Robert W. Warren, Professor, Political Science, University of Washington
Joseph K. Kennedy, Deputy Director, Regional Planning Commission, County of Los Angeles
William F. Garber, Senior Sanitary Engineer, Bureau of Sanitation, City of Los Angeles
Frank R. Bowerman, Professor of Civil Engineering, Director of Environmental Engineering Programs, University of Southern California

March 19, 1971 Conference

Panelists

Robert B. Krueger, Chairman, California Advisory Committee on Marine and Coastal Resources
Richard H. Ball, Vice Chairman of the Los Angeles Chapter of the Sierra Club, physicist at the RAND Corporation
Assemblyman Alan Sieroty, 59th District, State of California
Councilman Thomas Bradley, City of Los Angeles

Discussants

Carl Q. Christol, Professor, International Law and Political Science, University of Southern California
Frank J. Hortig, Executive Officer, Lands Division, State of California
John D. Parkhurst, Chief Engineer, General Manager, Sanitation Districts, County of Los Angeles
Henry W. Wright, Secretary, Western Oil and Gas Association

INTRODUCTION AND SUMMARY

In February and March of 1971, the Center for Urban Affairs of the University of Southern California conducted three research needs conferences on the Development and Management of the Coastal Zone of California. The conference series is one of a number of research and educational activities dealing with marine resources being carried out by the university and supported in part by a grant from the National Sea Grant Program under Public Law 89-688.

The conferences brought together representatives of the academic community, government, industry and conservation groups in a joint effort to identify major issues and research needs, and thus enhance the practical value of all USC Sea Grant programs. It was our hope that the meetings might lead to improved communication among a wide variety of academic disciplines and professions and between researchers and decision makers concerned with the coast. If Sea Grant sponsored research is to make a significant contribution to better management of our coastal resources, it must take account of the needs, problems and priorities of decision makers, planners and citizens as well as of the scientific community. The conferences reported here represent an attempt to elicit this type of information and lay the basis for future communication and even collaboration among the participants.

Each of the three sessions consisted of a luncheon meeting address followed by an afternoon long panel discussion. In his opening address, Robert B. Abel, Director of the National Sea Grant Program, sets the stage for the discussions to follow with a plea for balance in our approach

to the coast. Until very recently, economic values and goals have largely determined the course of development of coastal resources and consequent modifications to the environment. Now, Americans have become aware and articulate about the need to consider ecological values and goals. Some are so anxious for immediate action that they overlook the need for scientifically reasoned policies and programs. They may demand that a factory be closed down to preserve the environment, thus, in a sense, urging that economic goals be rejected and replaced by ecological goals. Mr. Abel argues that we need to develop a balanced and rational approach to our critical coastal zone problems. We should examine carefully the possibilities of converting those problems to opportunities through the wise use of science and technology. He indicates the types of activity which might exemplify this approach.

The second luncheon presentation by Jerome Gilbert, Executive Director of the California State Water Resources Control Board, focuses on the need for improvement in the way governmental institutions carry out their responsibilities. He argues that it is only through coordinated land use planning that the state's resources can be effectively managed in the long run. Until now, they have been pretty much unmanaged because planning was undertaken by a host of agencies with fragmented authority and different interests. He points out some of the limitations of the present system and problems involved in developing a state-wide framework for environmental control.

In the third address, Joseph E. Bodovitz, Executive Director of the San Francisco Bay Conservation and Development Commission, describes the background and operations of that agency. The establishment of the Commission and its continued existence have been largely the result of citizen concern and action, and much of its success to date is attributed by Mr. Bodovitz to important and broad citizen participation in its activities. He suggests that a number of structural and operational features of the Bay Commission might well be adapted for use in planning for other regions of the coast.

Each of the panel discussion sessions is reported in order, but since all three might well be considered parts of a single rather lengthy discourse, we will attempt here a single condensed report of the proceedings.

Panelists, discussants and other participants in the sessions represent a wide variety of interests, viewpoints and approaches to problems of the coastal zone. They include research scholars and students, legislators, policy makers and administrators from several levels of government, planners and engineers, and spokesmen for the oil and power industries and for conservation groups. The researchers represent well over a dozen disciplines and professional fields and range from

pure scientists to eco-activist scientists.

The presentations and the ensuing discussions reveal the diversity of issues and conflicting interests involved in the coastal zone: the competitive demands on limited resources for recreation of various types, transportation, residential, commercial and industrial uses, as well as for its preservation in a natural state; the public vs. the private interest; the needs of seaside community residents vs. those of the inland population; ecological vs. economic values and goals; local vs. regional or state, and state vs. federal planning and regulation; and the multiplicity of single-purpose agencies vs. a single multiple-purpose regulatory agency, to mention the most important issues. The view that we need research to develop more hard data on the ocean was expressed but so was the opinion that we are not using the data we already have.

Although there were clear differences of opinion on many matters among conference participants, these issues were rarely defined as polar situations. As a rule, a problem was described as one of finding better ways of accommodating or reconciling competing value systems, goals and interests.

There was no attempt made to reach an agreed set of recommendations in these sessions. However, the discussion reported in the pages that follow appears to reveal a consensus of sorts. It is that we need to develop clear operational definitions of goals for the coast and the institutional arrangements and management tools to achieve those goals. There is also apparent agreement on the need for improved communication between all levels of government, citizens groups, industry and academia to achieve these ends. Further, it is evident that the coastal zone is no longer viewed simply as the abode of the sea bass, the surfer and other forms of marine life. It is clearly considered an integral part of the total environment of the state and a component of the several urban systems within California.

One might well conclude from this that the biologists, geologists, oceanographers and engineers who have long had the sea to themselves must now be joined by scholars from the social sciences and humanities if research is to serve our needs to preserve, develop and manage our coastal resources wisely. This is not to say that there is any diminution in the need for new data and technology from the marine scientists and engineers. The demands on them for research has increased and will continue to expand to meet the needs of government policy makers and planners, of ocean oriented industry and the public. But the concepts and methodologies of economics, sociology, political science, social ethics and other fields will have to be rallied to the cause of the coast in greater force.

The announced topics for the three panel sessions were: "Issues in Coastal Zone Management in California," "Research Needs of California Decision Makers," and "Legislative Proposals for 1971." Since a major purpose of the conferences was simply to develop a much needed dialogue between the natural and physical sciences and the social sciences, between researchers and users of research findings, there was no attempt made to hold the discussions firmly to the specific agenda topic for each panel session. Consequently, the matters discussed ranged over a very broad field, from theoretical economics to practical politics, from implications of international conferences to small city problems, from strategies for research to criteria for the dumping of sludge.

No attempt will be made to summarize this eclectic discourse. Rather, we have extracted and offer here in rough outline some of the research related questions and problems identified during the course of the three conference sessions.

1. Definition of Goals

   a. A precise definition is needed of "the public interest" which is to be served by our policies and plans. The public interest is not an operational concept. Who is the public--the person who lives on the coast throughout the year, the one who lives in Fresno and visits the seashore on weekends, the one who lives in Maine and spends summers on the California coast, the merchant in a seaside community, the housing developer, etc. ?

   b. What do people really want in the coastal zone? What are relative values that people place on particular qualities of the environment? Can these be expressed in terms of life styles? We need a more precise definition and, hopefully, a means of quantifying amenities.

   c. There is a need to define goals in terms of economics, aesthetic and ecological values. Account must be taken of values outside of the pricing structure and social organization, e.g. human survival, survival of particular species of marine life, the quality of life.

2. Development of Framework for Decision Making

   a. We need to develop means to balance human and ecological values. Aesthetic and social values, environmental and ecological as well as economic considerations have to be accommodated and expressed in the decision making framework. Meeting human needs may require modifications or harm to the environment; how can

these requirements be balanced against the need to preserve or protect the environment? Objectives need to be defined with sufficient clarity that they can be incorporated into the process whereby specific projects are accepted or rejected.

b. How can local, state and federal goals be defined so as to provide a unified approach? How do you establish criteria on which to determine interests at different levels of government? Is a power plant, for example, a matter of local, regional, state or federal concern?

c. Priorities must be developed so as to stop first those actions which are most damaging to the environment.

d. There is a need for decision making machinery which can weigh priorities and conditions and determine what mix of goals should prevail in a given situation.

e. How can criteria be made operational? For example, how can we apply in specific decision making situations the COAP guideline that provides "the primary use of relatively undeveloped segments of coastal zones should be restricted to those uses that are dependent on the zone's inherent resources or its environmental attributes"?

3. Institutional Arrangements and Jurisdictions

a. What area should be included in our planning? The COAP focuses on a strip a half mile inland and three miles seaward from the high tide mark. We cannot very well regulate what comes out of the end of the pipe without being concerned with what goes in at the other end. We cannot separate out the coastal zone for planning purposes or just look at the coastal portion of a watershed. Inland planning should be considered an integral part of coastal zone management because inland pressures affect the coastal environment, as do water reclamation projects and other inland developments.

b. We need to overcome problems posed by many levels of jurisdiction and many agencies within these jurisdictions charged with different limited responsibilities, e.g. water quality, air pollution, land planning, utility regulation, etc., whose goals may conflict with each other. It may not be realistic to think in terms of one overall agency.

c. There is need to assure that interests of localities are not overridden by higher levels of government or by boards and

commissions not responsible nor responsive to citizen control.

d. We need to relate state management mechanisms with others to provide institutional arrangements to deal with federal and local levels of government. Arrangements should be developed to provide for greater state, area and local representation at national and international levels.

e. We need to provide institutional structures which permit responsible participation by all interests in decision making.

4. Management Processes

a. We need an effective and politically feasible system to implement long-term planning for coastal zone management.

b. We need tools to assess benefits and costs resulting from decisions so there is equity between interests and jurisdictions. Mechanism must be set up to compensate people when something done has an adverse effect or to make them pay if it has a beneficial effect; this would include provision for redistribution of money between jurisdictions.

c. Planners need a systematic method of identifying conflicting interests when developing plans for specific areas.

d. We need to explore strategies which will forestall conflict between federal, state and local management standards.

e. We need to develop methods to evaluate the effectiveness of a program set up to achieve planning goals, to ascertain if it is actually achieving intended goals or missing its objectives.

5. Other Information Needs. A variety of research needs were mentioned, all of which, it appears, would help illuminate the planning and decision making processes. Many would require multidisciplinary research efforts. Unfortunately, no priority rankings are attached to these needs.

a. More biological information about the California coast is needed: a survey of types of habitats, more detailed investigations of major habitats, including natural historical studies, autecological studies of effects on organisms present of various physical, chemical and biological influences in the environment, and synecological studies of communities of organisms.

b. In particular, we need to know more about environmental

constraints on activities impacting on the coast, such as power generation.

c. Needed are information on how dumping should be restricted through a federal construction grants program; an evaluation of the federal decision on dumping of digested sludge; criteria for restrictions on dumping of hazardous chemicals; and an assessment of proposed federal standards on thermal pollution.

d. There is need to fund research on alternatives to dumping, rather than simply prohibiting further dumping.

e. Investory of ocean related economic activities, including types of activity and their related levels of employment, incomes, investments, and multiple effects on the economy as a whole, is needed by COAP; also, an index of ocean dependence to show relative needs of each type of business for coastal space and resources; evaluation of impact of different types of ocean related activities on the environment and community; and measures of degree of interdependence and interrelatedness of ocean oriented enterprise in terms of their compatability and incompatability.

f. We need to explore possibilities for reintroducing shared use into urban waterfronts currently restricted to a single use.

g. What is feasibility of developing offshore land, i.e. floating islands or fills, for multiple uses such as airports, power stations and aquaculture?

h. We need more information on effects on coastal resources of changing from natural to artificial maintenance of environmental systems, as occurs with channeling of streams and upland siltation practices. Effects on coastal resources of upland land planning practices and water reclamation projects need to be investigated and quantified.

i. We need to examine present and forecast future demands of growing population on coastal resources and analyze factors which will modify these demands, e.g. changing age structure, availability of public transportation, changing recreation technology and alternatives to the coast to meet these demands, such as inland lakes.

j. We should find out how present political, legal and economic institutions are working to get decisions that are reached so we can predict outputs from alternative political and legal structures. How does the system function and how can constraints on it be

changed to alter its output?

k. Impact of political campaign contributions on environmental decision making needs examination.

l. Research is needed to ascertain desirability and methods of controlling population inflow into the Los Angeles Basin and impact on the county's economy of measures which might be taken, such as rezoning.

6. Problems Related to Research. Some of the realities mentioned to be considered by researchers include:

a. There is need to balance "fire fighting" requirements for information against needs for long-range understanding of the environment.

b. There are implicit biases in data on which research is based and which limit the questions that can be asked. We need to be aware of these biases.

c. There are real difficulties quantifying and analyzing all of the interrelated forces acting on the environment; data may not be quantifiable, and the number of variables may well be unmanageable.

d. Decision makers need to meet deadlines. Decisions must be made now on the basis of information at hand; they cannot wait for research which will be completed next year or five years from now. There is a problem generating information that provides adequate base for decisions when needed.

e. Conservationists often view research funded by "polluters" as biased and unacceptable.

f. Researchers have problems getting their research accepted by decision makers, or it is only used selectively.

g. There is need to develop coalition of research generating institutions to meet information needs of decision makers.

h. We should support intermediaries between research scientists and legislative bodies to help keep the latter up to date on new findings.

i. On some matters, we have enough information, but are not acting; we need to make better use of the information we have.

j. Sea Grant should be used to support information dissemination. There is need for an agency to collect scientific data and present it at public hearings on environmental impact, to help those trying to defend the environment against groups who have much greater resources to defend their own special interests. There is also need to support legal advocacy programs to protect the environment.

The conferences reported here achieved some success in developing dialogue between the diverse groups concerned with the coast and in identifying a broad range of research needs. They produced a measure of agreement on one point: we need to better define our objectives for the coast and develop institutional arrangements and operating procedures which will help us attain those objectives.

The meetings also indicated that our research needs, like our needs for coastal zone resources, may be expanding very rapidly indeed. To carry out the research agenda summarized here might well take many research workers many years, and the cost would run to several millions of dollars. We might conclude then that one of our most urgent requirements is a better definition of research priorities and an improved method of allocating limited research resources among a multiplicity of competing demands.

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TOWARDS A BALANCED APPROACH TO THE COAST

Robert B. Abel, Director

National Sea Grant Program
National Oceanic and Atmospheric Administration
U. S. Department of Commerce

I would like to examine the environmental argument from both sides and then indicate what the government is doing in relation to the environment and the move against pollution.

A conventional sequence of events with respect to the environment, or any similar issue, seems to occur in the following manner: first, there is growing awareness of something wrong, that without remedial action the coastal populations of this country are going to be in serious trouble and, in fact, many of them already are.

The next step is a normal reaction. There must be, there already is a surge of speech making, organizing, reorganizing and general milling around to which, admittedly, I'm contributing at the moment. And then as the pace of anger and outrage accelerates, we tend to skip past the crucially important step of scientifically reasoned activity to frenzied action, mob scenes outside of the expected polluters' factories and power plants and demands for lawsuits without even a casual look at the cause-effect situation.

Senator Jackson, coincidentally, gave a marvelous speech on the subject in Florida just yesterday. He said that the United States is in danger of becoming a technological Appalachia, and he assailed the environmental extremists who would sacrifice economic growth on the altar of ecology. He identified these extremists with both the affluent and the New Left, and said they are guilty of a new McCarthyism, typified by the charge of some supersonic transport opponents that the SST could cause skin cancer. He went on to talk about the current phrases: "Either you shut down the industrial plants or you can't preserve the environment." "Either you dismantle the defense establishment or you can't cure our domestic social problems." All in all, it was a well thought-out speech.

Well, my friends, my plea personally is for balance, for a reasoned approach to our alarming coastal zone problem, and for careful examination of the possibilities of converting problems to opportunities through intelligent use of our science and technology. To develop this thesis, what I'd like to do now is to present to you three examples of what I'll call problem-opportunity situations.

The first is transportation, specifically airports. They are crowded; they are getting noisier everyday; they are getting bigger; and they have voracious appetites for land. They tear off and swallow huge chunks of invaluable property which are normally used for industrial, residential or recreational activities. And yet, it is getting to the point where most pilots simply do not like to land on many of these airports because of their restricted, cramped approaches.

There's the problem. Is there a possibility, an opportunity for solution? Well, there are eight cities at least, to my knowledge, including Long Beach, San Diego, Cleveland, Chicago, New Orleans, Boston, New York and St. Thomas, that are now exploring at least conceptually the possibility of using the water for these airports. This may involve installing pilings; filling, without detriment to land use or without detriment to the marine environment; or making floating airports. However, it is a very expensive undertaking to make a floating island, particularly when it is open to the ravages of storm. This may be a desperation move. It would be very hard to justify--economically, in any case--so should we perhaps give up the idea?

The second example has to do with power. Power companies, you see, now wear the black hats. They create smoke, stench and hot water, which is considered very bad. The desires of our militants range from a variety of lawsuits to outright bombing. And one has to ask the question: Wouldn't it be nice if we could ostracize the polluting power companies? You know, get them out of the crowded coastal zones; maybe even to exile them to islands, from whence their products could be

transmitted to us who need them but where their evil could be contained. The floating islands, however, would be enormously expensive and hard to justify economically.

The third and last example is food. According to FAO statistics, just about one percent of all the food consumed by all of the people in this world comes from the ocean. More important though, about 12 percent of all the protein comes from the ocean because, as most of you know, seafood is very rich in protein content.

The average American eats about 10 to 11 pounds of seafood a year. That is, for every man, woman and child in the United States, there are consumed about 11 pounds of food from the sea. But there is an additional 55 pounds of food consumed for every person in the United States as feed for livestock and poultry. When you eat chicken, you think you are eating chicken, but you are eating fish. And yet we import 70 percent of all the fish we eat in this country. This gives you an idea of the strength of our fishing fleet, which is now sixth in the world and making a valiant bid for seventh place.

This effectively demonstrates, I think, the need for balance, particularly in the new technology called "Fish Protein Concentrate," FPC. This is a tasteless, odorless, colorless derivative of seafood, very rich in protein, obtained by chemical processing. The idea is you can feed it to the people of the world. But FPC has been called "filthy," and the FDA, which is always under the gun to protect the American public anyway, has placed very tough restrictions on the manner in which it can be packaged and disseminated.

Also, with respect to food, we come upon aquaculture, a brand new technology, which is only as old as civilization itself. But fish and shellfish farms are sometimes admittedly unsightly. They do use up valuable water space sometimes and, lately, some of the practitioners of the field have been exploring the concept of utilizing offshore oil rigs for their aquaculture networks. This in turn implies the need for making artificial islands to get them out of the way. As I say, however, an island is frightfully expensive to create, and it may be hard to justify economically.

That is, unless for once we can forget the bits and pieces and look at the whole problem. It might then even be possible if we examine all of our problems together that they can be converted into opportunities. What might be economically unjustifiable with respect to a transportation problem alone or a power plant problem alone or a food growing problem alone may, on the other hand, be feasible approached in an integrated fashion. And this is the essential philosophy of the Sea Grant Program.

Now, as a matter of courtesy, it is time to strike a blow for the conservationist. Our rather nice country, it must be confessed, is a water hog. I'll explain what I mean. Residents of a typical tropical country uses about five gallons of water per capita per day. In a typical manufacturing town in England, 50 gallons of water per capita per day are used. In a typical town in the United States, 200 gallons of water per capita per day are used.

Just as a matter of interesting record, it turns out that the grand champion of water users for the entire planet is an obscure little hamlet called Beverly Hills, which utilizes 500 gallons of water per capita per day! That's a marvelous record. This achievement is based on their expansive lawns which have to be watered everyday no matter how long the dry spell. Further, they have to keep those pools filled.

What makes us water hogs? Well, it's not the drinking of it because, as you'll see in a minute, there is plenty of competition from other substances. It takes 18 barrels of water to refine a single barrel of oil. It takes 300 gallons of water to produce one single barrel of beer. It takes 600 to 1,000 tons of water for every ton of coal used in a steam power plant, and a large paper mill will use as much as an average city of 50,000 people. That, my friends, is a lot of water.

The 1965 Pollution Bill caused screams of anguish from industry because of the interesting phraseology in the bill, which said that wastewater must be as clean as possible whereas what industry had wanted to say was wastewater must be as clean as economically possible. A lot of the counterarguments for the bill were based on a book by Richard Engdahl and Frank Croxton which is entitled Pollution: A Problem in Economics. The key phrase in this book is: "To completely solve the problems involved, though it were technically feasible at this time, would probably so increase the cost of industrial operations as to endanger our ability to compete in world markets." So, our rivers have to be filthy for us to compete. Against whom? Shall we use the West Germans as an example?

You might be interested to know that almost half of West Germany's mighty industrial capacity is contained in just the Ruhr River Basin. What they have for water source and disposal is a miserable little streamflow smaller than the Potomac River, and I use that term advisedly, at its very lowest flow strength. Now, with such a small amount of water available to them and considering the extraordinary competitive strength of the West Germans, you might expect that all they would have for a water area would be, to use the popular jargon, "too thick to swim through and too thin to walk on." And yet, in fact, the Ruhr River water is clean enough to swim in, and it's clean enough to grow fish in, and it's, with just a mild amount of treatment, used for drinking

water. And when last seen, the West Germans were extraordinarily healthy. The miracle in Germany was accomplished by government and semi-government cooperation.

This brings me to the last point: What is the government doing about all this in this country? Well, actually it is doing considerable. Responsibility, authority and activity for ameliorating coastal zone problems currently reside in the Navy; the Army Corps of Engineers; the Coast Guard; Transportation; the Bureau of Outdoor Recreation, the Office of Saline Water, the Geological Survey and the Water Resources Research Office of Interior; the Maritime Administration, the National Oceanic and Atmospheric Administration, including the Fishery Service, Mapping and Charting Service, Ocean Survey and the Sea Grant Program, in Commerce; the Smithsonian Institution; the National Science Foundation; the Atomic Energy Commission; and the Environmental Protection Agency.

What to do? The fact is there has not been a serious debate on organization and management of the executive for the past 20 years. And yet, during those years the structure of the executive has been added to on a sort of patchwork basis. For instance, the number of cabinet departments has increased from nine to twelve. The number of major independent agencies has increased from 27 to 41. The number of federal employees has increased from 2.1 to 2.7 million. The budget has increased from 42 billion dollars to over 200 billion dollars. The number of domestic programs has increased over tenfold to now number 1,400.

Growth in size and complexity alone does not create a situation that is unmanageable from the government's point of view or unresponsive from the people's point of view. It is the way in which the growth took place that has caused the present difficulties. The defects are not in what government set out to do, but in how the government set itself up to do it. Programs were enacted in response to the specific needs. Most of these programs have sound objectives, but little attention has been given necessarily to where responsibility for operating each should be placed in order to relate them properly to the existing programs and to insure maximum effectiveness at the point of impact here at the local level.

Federal effort in aid of economic improvement has expanded vastly in the recent decade, but improvement in the institutions of government to deliver this aid effectively has not kept pace with performance requirements. Policies are often made to conform to existing institutions and structures rather than institutions being modified to make them responsive to the change in policy. The result: ambiguous and inconsistent agency mission; diffused responsibility; no accountability some-

times; piecemeal approaches to economic and social problems; the focus on programs rather than on the results; and, finally, difficulties for state and local government because of these flaws. These are most of the underlying reasons for the President's recent message and his proposal for radical reorganization of the entire executive branch of government. The idea is, first, departments should be organized by major purpose, they should have broadly defined missions, overlap must be reduced, and presidential intervention should be reduced.

The proposed structure will reform eight existing departments into four, including a Department of Human Resources, Department of Community Development, Department of Economic Development and a Department of Natural Resources. It is with the latter we are mostly concerned because it will provide for the balance and constructive use and conservation of land and other resources of the nation. It will have a lands recreation component, a water resources component, an energy and minerals component, and the National Oceanic and Atmospheric Administration.

It is expected that the guts of this reorganization will be going to Congress. A very lively discussion is anticipated when this happens, and the administration expects a full hearing by both Houses of Congress. And so to any questions that one might have respecting the status of that reorganization plan, about all we can say is, listen in next session.

Panel Discussion Session

February 19, 1971

ISSUES IN COASTAL ZONE MANAGEMENT IN CALIFORNIA

Panelists

Mr. Wesley Marx, founder of Friends of Newport Beach, author of The Frail Ocean

Mr. Victor Adorian, Director, Department of Real Estate Management, County of Los Angeles

Mr. Francis A. McCrackin, Manager, Environmental Planning, Southern California Edison Company

Dr. Norman K. Sanders, Assistant Professor, Geography, University of California at Santa Barbara

Mr. John C. Merrell, Jr., Director, California-Nevada Basin Office, Region IX, Water Quality Control Administration, United States Environmental Protection Agency

Discussants

Dr. John L. Mohr, Professor, Biological Sciences, University of Southern California

Mrs. Ellen Stern Harris, Executive Secretary, Council for Conservation and Planning

Mr. Robert B. Abel, Director, National Sea Grant Program, National Oceanic and Atmospheric Administration, U. S. Department of Commerce

Dr. Rimmon Fay, Director-at-Large, Ocean Fish Protective Association

Mr. Arthur E. Bruington, Chief Engineer, Flood Control District, County of Los Angeles

Need to Consider Impact of Inland Developments on Coast

MR. WESLEY MARX, founder of Friends of Newport Beach, author of The Frail Ocean: The coastal zone cannot very well be understood, managed or protected if it is viewed in isolation. The reason is that it is to a large extent a creation of natural and social forces outside of the immediate region. For example, the sandy shore relies on beach nourishment from inland areas. Growing demand for the coastal zone for recreation is a consequence of increasing numbers of inland people wanting to enjoy the beaches.

It is difficult indeed to manage an environment such as this which is affected by a variety of forces converging on it from without. Efforts to carry out a broadly conceived public policy for development and protection can be nullified by factors outside the locality. Time and again, coastal communities have spent money from their own revenue base to set aside beaches, and yet this investment can be jeopardized by jetties upcoast that trigger erosion or by outfalls. The point may even be reached where congestion created by inland people wanting to use the remaining public beaches can require that parking lots be built on the beach itself. Much of this occurs because of the fragmentation of authority. Programs developed for management of the coastal zone will become purely academic exercises unless they assume a wide perspective, take into account all of the various factors acting upon the shoreline, and involve a broad type of management agency at the state level in their implications.

There are a number of ways in which research could help develop an integrated approach to planning for the coastal zone, one of which includes consideration of upland pressures on the coast. More information is needed on the consequences of changing from natural maintenance of environmental systems to artificial maintenance. This occurs when streams are channelized and dammed with the result that nourishment to the beaches is blocked off. Then expensive beach replenishment programs must be undertaken with the cost passed onto society at large. Similarly, when estuaries are compressed into boat canals, their natural assimilative capacity is lost and the costs are passed onto society. Careless siltation practices in upland areas make it necessary to dredge out downstream harbors. Side effects of these practices on the coast need study to permit forecasting the results of alternative types of environmental maintenance. We should try to quantify the effects of bulkheading and channelizing an estuary: How much of its natural assimilative capacity is lost? To what extent will existing facilities in an estuarine or bay area will be endangered?

Effects on coastal resources of upland land planning should receive more consideration. Attention is being given now to keeping our

remaining natural or semi-natural streams as open space corridors to realize their recreation, ground water recharge and scenic benefits. We should know more about the consequences on the coast of maintaining these stream courses in their natural setting through flood plain management rather than channelizing them. What will be the effects of this policy on conservation of beach nourishment sources? Water reclamation in upland areas affects the coast as well through its potential beneficial impact on subsidence, salt water intrusion, siltation control and wasteload pressures on the coastal zone. Can information on these effects be organized in a meaningful manner for decision makers and integrated into water reclamation planning? The result might well be a switch away from waterway disposal to land disposal.

Urban waterfronts need to be studied in relation to upland alternatives. A great deal of attention is given to semi-natural or natural areas in forecasts of marine utilization. More study should be focused on the urban waterfront and particularly on the possibilities for reintroducing shared use into waterfronts that are currently restricted to a single use. This would entail inventorying present upland uses and seeing if a shared use cannot be reintroduced to realize recreation, marine science and education or other benefits. Is exclusive use of a segment of shoreline on the Los Angeles harbor for a prison the most appropriate use of such government property today? Could empty land dedicated for future harbor development be employed in the short term for recreation needs? Could the Redondo Beach-El Segundo area now taken up mainly by power and sewage plants also accommodate marine laboratories for urban elementary and high schools and junior colleges? We need to explore ways in which upland needs for land on the coast might better be met by shared use of the shoreline.

If upland pressures on the coastal zone were better understood and if planning for them were considered an integral part of coastal zone planning, this would be a great step forward. Planning for development, however, should not proceed without consideration for preservation. In Florida, they have made a point of not relying on development and management alone, as with aquaculture. Stiff controls on the alteration of the intertidal zone have been established and 30 aquatic preserves have been set aside around their coastline to protect future food and recreational benefits of marine resources. Some of these marine preserves are sizeable and encompass entire bay areas, and some are located right in urban areas. I think Florida's approach is a prudent one, and I would hope that in California, preservation of marine life systems will play a very important part in our coastal zone planning as well.

Los Angeles County Information Needs

MR. VICTOR ADORIAN, Director, Department of Real Estate Management, County of Los Angeles: Government responds eventually to the voice of the people. We have had elements of coastal zone planning, particularly land management, with County Regional Planning Commissions. However, until the people began to object strenuously to certain planning practices, the effectiveness of the planning agencies was questionable.

The State of California is probably the leading governmental agency nationwide in preparing for coastal zone management. Though local governments have lagged, they are becoming more involved; e.g. Los Angeles County participation in the new Ocean Industries Committee and the creation of the County's Environmental Quality Control Committee. We are a large County with 70 different departments of which 15 are directly involved with the environment.

We need input from science, industry and the general public to give us better guidance regarding our environmental needs. Nongovernmental groups and persons can contribute greatly to the overall effort with studies such as the University of Southern California pollution study at Marina del Rey, made possible by the Sea Grant Program.

Substantial progress against pollution has been made in Los Angeles Harbor following substantial input by private groups and persons in cooperation with private industry and governmental agencies. This type of "limited inquiry" study can be very effective.

In some areas, such as air pollution, we have been preempted by the federal government. However, other studies could be made, for example, on methods of reuse of disposable products, on desirability of controlling population inflow, on methods of control such as changing zoning patterns and restrictions on building, on the impact of such measures on the county's economy. In sum, the country needs a wide variety of new information in order to make better planning decisions.

MR. FRANCIS A. MC CRACKIN, Manager, Environmental Planning, Southern California Edison Company: Discussion of environmental issues, including those dealing with the management of the coastal zone, too often involves confrontation rather than dialogue, and simplistic, unrealistic proposals rather than programs based on scientific information and sound planning. Legislative bills are originated by the bushel basket and many of these duplicate one another. Too many are not too well researched and not well thought-out. The result is fractional, multi-level control, regulation and restriction.

I would like to address these problems from the perspective of my industry, although my comments might well be applied to other activities which affect the coastal zone.

Need for Better Communication and Information

First, we need much better dialogue between industry, government at all levels, environmentalists and the academic field. This could reduce confrontation and help us mount constructive, joint efforts to effect compromises and solve problems. Better dialogue would also lessen the chances for arriving at simplistic solutions which lead to even more problems.

Let me illustrate. In the electric energy business, we have massive facilities and are extremely visible, perhaps more so than any other energy supply system. As a consequence we are attacked. We are asked to invert rate structures, to discourage energy use.

People have taken the growth rate of the electric energy business, which has been about eight percent per year nationally, and projected it over the next 30, 50 or 100 years, and predict fantastic environmental problems as a consequence. This sort of forecast is meaningless because it does not take into account the rate of growth of energy use in all forms which has been only about 3.8 percent per year. We need to address the question of how much energy we will need with more realistic projections. Further, we need to assess how energy relates to the quality of life, and its total environmental impact.

Then, we will be in a position to address the problem of how this energy should be produced. In the short run, and by that I mean within the next 10 or 20 years, there will be serious constraints on this decision. The population problem is not yet under control; we face declining quality of raw resources; there are energy requirements for pollution control devices; and there will be increased energy demands by underprivileged people who have something less than their fair share today. My assessment of the next 10 or 20 years is that, in spite of our desires to control

energy consumption, energy needs will go up and will have to be satisfied. Between now and then, we desperately need to manage whatever resources are available to satisfy energy demands, as well as transportation, land use and other demands.

Need for Comprehensive Approach to Environment

We have to find better ways to reconcile conflicts in the public interest. It is not satisfactory to say: "No, you can't build this facility here. Build it someplace else," and then the "someplace else" does not want it built there either. Nor, for example, in the case of my business, do people necessarily want the transmission that would allow the building to be done elsewhere. We need to reconcile conflicting demands in some rational way.

I think there is a serious need for a comprehensive approach that will better weigh those factors which we have not yet quantified in reaching our judgments, our value decisions. This, of course, is the heart of the matter. The reason we have such serious environmental problems today is because concern for environment was not part of the value system of our nation--of political and industrial leaders, individuals or local communities. Today we face the consequences of that neglect. Environmental considerations need to be brought explicitly into decision making along with economic, political, operational and technical considerations. It cannot be done in an arbitrary fashion, by concluding that not another power plant will be placed on the coast or not another linear foot of coastline will be developed for a particular purpose. Precise quantification in dollars and cents may not be possible, but some weights should be attached to various environmental differentials by a grade point system or figure of merit approach so they can be incorporated in the options as are economic differentials.

Turning from management planning to management organization, we and all industry face another serious problem in the multiplicity of regulatory bodies that we have to satisfy at all levels--local, state and federal. Most of these bodies have very limited responsibilities. If you satisfy a water pollution agency by creating an air pollution problem, it is not the legal concern of the water pollution agency. It is perfectly possible and proper under present regulations for a local agency to take action which is adverse to a region because of local considerations. We need a final arbitrator, a final place from which a ruling can be obtained which will balance the priorities in the public interest. In the State of California insofar as the regulated industries are concerned, there are those of us who believe that the Public Utilities Commission is presently constitutionally endowed with the power of being that kind of agency. This is not true for the unregulated industries so the problem remains.

DR. NORMAN K. SANDERS, Assistant Professor, Geography, University of California at Santa Barbara: The Sea Grant Program funded me with $30,000 to build and operate a microwave radiometer with which to detect oil slicks on the ocean surface. That is the last time I am going to waste the government's money and my time on a project like that.

The radiometer worked and we were able to detect oil spills on the surface. But it is no help to detect oil spills on the surface because there is no way to clean them up after they get there. Through this project, I found the best way to handle the problem is not to let the oil get there in the first place. So, I have changed my direction a bit.

I suggest that the Sea Grant Program change its direction a bit. We have to reevaluate what we can do with the Sea Grant Program so universities can "play a major role in marine resource development." I think what we can do is go one step further than what is already being done here at USC, where they are having international law seminars, coastal water resources protection courses for members of the bar, and other such programs. Sea Grant should furnish the balance that Mr. Abel was calling for in his address. In other words, help those who are trying to defend their environment against the people who right now have all the resources and the money, like the man from Southern California Edison. What I am speaking of is an agency or center which would collect scientific data, have it available and present it at public hearings on environmental impact.

I have been doing this myself. I have gone to Vancouver, British Columbia, to testify against the oil industry there. I've gone to Seattle to testify against the oil industry in Puget Sound. I have testified against coastal lagoon development in the San Elijo Lagoon in San Diego. I have come down here to testify and there are a few others who will testify. I think there are a lot of academics who would be willing to get into this, but they don't have the knowledge of the method or the means financially to do it. We need a center to collect data and find out when hearings are scheduled, when these important dates are, because the industries know. They know and they will be there. I think the university community must be more involved than merely researching the facts; they have to act on the facts, otherwise the facts are buried.

This should not be limited merely to physical scientists. There are a number of other things that can be done. We may well need a form of CRLA (California Rural Legal Assistance) for pollution control: a group of people who are funded, lawyers who can go out and prosecute or at least bring prosecution under the 1899 Rivers and Harbors Act. Perhaps university lawyers could do this. From political scientists, we need to find out for society's sake how we can get a strong coastal bill through this year in the face of all the opposition from the power

companies, oil companies and land developers. The sociologists can determine what public atiitudes really are, and perhaps get together with the motivational psychologists to see how to counteract the advertising that will have us each own an electric shoe polisher, an electric toothbrush and all these things which do require energy to make our lives better.

We should get into an active role rather than a passive data collecting role. Teams of scientists and lawyers could come from the university. They do it now in a rather haphazard manner. I think it should be organized, and it could be organized for the coastal area with the nucleus in the Sea Grant Program as it now exists. You are now studying the facts; all you need to do is act on them and this might well be set up under the Sea Grant Program. It is time we got busy because otherwise we are going to develop beautiful reports, nicely written, well bound, which are going to be in archives, but there will be no one left to read them.

MR. JOHN C. MERRELL, JR., Director, California-Nevada Basin Office, Region IX, Water Quality Control Administration, United States Environmental Protection Agency: The recent creation of the Environmental Protection Agency (December 2, 1970) represented a Congressional response to growing public and scientific concern about environmental degradation.

The history of federal activity designed to protect the coastal zone dates from 1898 when Congress gave the U. S. Army Corps of Engineers the right to grant permits for dumping outside of New York Harbor. The 1899 Refuse Act was passed shortly thereafter and today forms the legislative basis for President Nixon's directive which recommends establishing a permit system for ocean dumping. The 1924 Oil Pollution Act, another law that has acquired a new lease on life, was incorporated into the 1970 Water Quality Improvement Act which provides new controls reaching out to the contiguous zone, as well as restrictions on hazardous chemicals and vessel waste. At present, there is a desire on the part of some legislators to extend the provisions of the Water Quality Standards Act (1965) from interstate to navigable waters.

In 1970, the President established the Environmental Quality Council and appointed Russell Train, former President of the Conservation Foundation, as its chairman. In its initial report, "Report of the Council on Environmental Quality on Ocean Dumping," the Council set forth a number of legislative proposals, all but one of which have been recommended to the Congress by the President. These proposals include the establishment of principles and criteria for ocean dumping, with controls on dredge spoil, sewage sludge, solid waste, industrial waste, construction debris and radioactive waste. The report emphasized the need to recognize biological communities, especially those located in estuaries and near-shore waters. From these recommendations, guidelines have subsequently been established to deal with use of the ocean for dumping digested sludge.

The guidelines for dumping of digested sludge can affect actual dumping because they will be used in determining the financial assistance granted to local communities under the Construction Grant Program which the President has proposed at two billion dollars annually. Conformance to guidelines on ocean dumping of sludge will be a factor influencing the distribution of these funds. In addition, the Army Corps of Engineers proposes to develop its own guidelines for dredging projects which will possibly inhibit its dumping of dredge spoil.

Agencies within California are also acting to control ocean dumping.

The San Francisco Regional Water Quality Control Board, in December, 1970, acted to restrict dumping of waste by U. S. Steel and Standard Oil in the gulf of the Farallon Islands. They also acted against the Corps of Engineers dredging in the bar offshore the Golden Gate. Even though it originates in the sea, this dredge spoil will now be monitored. Its toxicity and effect on marine resources, particularly the crab fishery in the area, will be regularly checked. In these and other instances, California appears to be leading the federal government in efforts at environmental protection.

Programs of the Environmental Protection Agency which would be enhanced by additional research include:

Construction Grants Support Program: In many areas this program relates to the disposal of materials into the sea. More information is needed on how dumping should be constrained through the program. How appropriate, for example, is the present decision on digested sludge?

Hazardous Chemicals: New regulations on dumping will be issued by EPA as a part of its requirement under the Water Quality Act of 1970 and a permit system activated. More data is needed for developing restrictions on dumping of hazardous chemicals into the ocean.

Environmental Statements Program: All proposed federal construction requires a statement of environmental effects before construction begins. This policy is applicable whether the construction project is a municipal sewage treatment plant using federal funds for construction grants support or a federal water resource development project. At present, Environmental Impact statements are being prepared for the Alaska pipeline, and will be reviewed by the Environmental Protection Agency. It is possible that research findings from Sea Grant programs might aid this review and the review of future environmental effects of the many federally supported sea using projects, whether they are oil development, the creation of an offshore airport or an undersea power plant.

Thermal Waste Standards: The Water Quality Standards of the State of California were accepted as federal standards three years ago. The state has now augmented them with the development of thermal standards, which also must be considered at the federal level. Further scientific assessment of the proposed standards and utilization of the sea for thermal waste would seem appropriate.

In summation, more and better information is needed to help guide expenditure of federal funds and to establish federal regulations which protect the environment.

DR. JOHN L. MOHR, Professor, Biological Sciences, University of Southern California: When government advisory committees are used for veneer, when only those research institute reports to government that give desired recommendations are used, and when universities have close ties with industry at an administrative and faculty level, how do we get unbiased knowledge in the public interest?

MR. MC CRACKIN: Frankly, to get truly unbiased information, and to do so by avoiding anybody that might have a relationship with industry, is going to be very difficult. This is one reason why the dialogue I mentioned must include the environmental interests and the governmental regulatory interests in the planning process. We, in the utility industry of the state, would like environmental organizations such as the Sierra Club to sit down with us and constructively discuss alternative options that are available in terms of environmental impact. There has been a tendency for some groups to criticize but not to share in the responsibility of trying to reach a reconciliation, a constructive decision.

DR. MOHR: What I am asking is, how do you avoid being taken in and misused?

MRS. ELLEN STERN HARRIS, Executive Secretary, Council for Conservation and Planning: I think what Dr. Mohr is suggesting is that it's time we paid our experts for giving their opinions instead of giving the opinions for which they were paid, and I would certainly endorse that. How do you set up the mechanism for that?

I was particularly encouraged by Mr. Adorian because he now feels that conservationists do have a constructive contribution to make. Unfortunately, the Ocean Industries Committee he mentioned has not seen fit to include any conservationists nor any taxpaying member of the public. This group has applied for federal funds, many hundreds of thousands of dollars, without ever once inviting the public to attend a meeting. I, for one, would appreciate the opportunity of participating with the Chamber of Commerce in my tax dollar expenditure.

A question of the public is, is it the individual citizen's views or the campaign contributor's views which determine what shall happen? In other words, what is the impact on environmental decision making of campaign contributions? I would apply this question at a federal, state and local level. This is, I think, a real problem to grapple with, and until we get reform of campaign practices and funding, we will not get honest kinds of appraisals in decision making.

Mention was made of glassphalt and the whole process of so-called recycling centers, which I consider a complete hoax. The amount of time and energy expended by the public to make a special trip to collect these bottles is absurd, and what occurs is that those bottles are melted down, utilizing even more energy. Instead of being truly recycled and reused, they result in another piece of our coast being taken up with another power plant, which to me is not sensible management of our environment.

Mr. McCrackin commented on the frenzied public response and reaction on environmental issues, the confrontation. I must say I was delighted to meet Mr. McCrackin at the luncheon because we don't normally have a chance to just converse and learn from one another. I agree with him that we should make this a regular get-together and talk about why must these high tension lines scar our whole landscape. I applaud what you, the energy industry, is doing to support work at UC Riverside on geothermal alternatives, which makes tremendous sense and would eliminate the need for coastal use by power plants. I would be delighted to talk with you about the real possibilities in cooling tower alternatives for inland sites so we do not need to take up the coastal space at all with this kind of need.

I would like to know how Edison could encourage the federal government to put money into solar energy and MHD development and other alternatives. Why must we continue to assume that fission is the way to go in the nuclear plant when the dangers are so great? Perhaps we should be going past the fast breeder into fusion, where practically no money is being spent and which holds our greatest hope. There are many things which Mr. McCrackin and I might discuss, given the chance.

Need for Unified Environmental Control

Mr. McCrackin raises the problem of balancing local against regional needs. Who do we have to balance the priorities and needs? You complain that the Water Quality Control Board could care less about air pollution problems, and the air pollution people say, move the muck out of the air and drain it down the pipes. I agree that managing all of the interrelated aspects of the environment is a real problem. It seems to me that we have a new opportunity to do just that. The State Environmental Quality Study Council has proposed legislation which will create regional boards for environmental control, and they will take into account noise pollution, air pollution, radiation, water and, to some extent, land use. I think this is what you are looking for. You would like, Mr. McCrackin, I believe, one-stop shopping for power plants--just go to Washington and get what you want. But I am thrilled that you haven't gotten that bill yet. The Public Utilities

Commission is not concerned about the environment. In fact, it was never charged with that responsibility. It was only charged with providing electricity. We didn't have the problem at the time it was mandated. The proposed state regional boards for environmental control, modeled after the Regional Water Quality Control Boards, would place the state in overall control and provide for regional boards which are easily accessible within an hour or two drive from everyone in the region. Now, this would provide an opportunity for public input, for local government participation, and for an overall regional approach within the state.

MR. ABEL: Dr. Mohr's plea is for unbiased knowledge, for an honest man who is also smart. You want an advisor who is close enough to a problem to be knowledgeable and yet far enough removed to be unbiased and I submit that this man doesnot nor has he ever existed on the face of the earth. We solved the problem with Sea Grant by assuming that if the people on the panel are all smart enough, they will then tend to keep one another honest.

This matter of technology and public awareness might be represented by a conventional Gaussian curve. At the origin, there is no technology; everything is in its natural state of equilibrium. All components of nature tend to cancel one another out as far as derogation is concerned. Then, technology starts and as it becomes successful by whatever criterion you want to use, for example, profit-making, the curve rises. In other words, the first derivative increases, and this will increase with a concomitant derogation to the environment, if it is a detrimental technology. Somewhere along the curve, public awareness begins, and until you get to a point where public awareness and reaction match the rise of technology or the speed of technological advance, the curve will still rise but the rate of ascent will slow itself down or the second derivative will decrease. Finally, you reach a point when they are matched, and then if you have the right kind of human environment and people do the right things, the curve starts to descend so that gradually there is a return to nature's equilibrium. Society is still using technology, but now beneficially.

Difficulty of Considering All Interacting Factors

I want to address myself to what two of our speakers were talking about: the enormous complexity of interaction of all of the forces involved in the environment. We have two Sea Grants out for this purpose right now. The first is to the Traverse Research Center, and it is to describe the situation on Long Island, where an attempt is being made to quantify all of these interactions. It has proven very, very difficult because what they are trying to do is assign figures of merit to every

one of man's actions, and then to assign some kind of a comparable criterion or index of measurement to acts of nature. Such mundane sounding things as duck farms present a fantastic problem because there is probably nothing more odious than a duck farm, unless it is a paper mill, and yet it is a very necessary thing.

The other grant is to the University of Michigan. They will take the Grand Traverse Bay, which is acceptable as a model of Lake Michigan because it, oddly enough, has in miniature all the characteristics of the lake. In their model, they will start with any one of man's actions. This happens to be one of the cherry capitals of the world so they might start with the picking of great quantities of cherries. The local canning industry must dispose of large quantities of cherry pits and skins. If this is done in the water, several things might happen: it could lead to an increase in population of certain fish which would increase sport fishing, and this in turn would lead to more marinas, more service industries and a demand for better roads. On the other hand, it might encourage an increase of lamprey eels. Then fishing would start to disappear, and chemicals used to control eels would foul up the water in another way and lead to different consequences. Or taking a third possible alternative, plant life rather than fish could be affected, increasing the weed or algae problem so eutrophication is vastly accelerated. From these three possible consequences, you can then exponentially go to about 20 in the next series, and from each of the 20, you have about 20. When you try to put this all in a computer, you strain the state of the art enormously. As suggested by the speakers today, it is important that everyone understands just how difficult the problem is.

Information System

MR. STUART DAVIS, School of Business, University of Southern California: I wonder if there is a chance with Sea Grant to devise an information system that has input from the universities and others, and can serve the needs of government regulators and the public.

MR. ADORIAN: I agree that one of our greatest needs is for a place where all of the data on ocean development can be compiled. There are so many people working in the field that two people may be doing the very same thing and not know it.

MR. HAROLD D. BISSELL, Manager, COAP Development Program, Department of Navigation and Ocean Development, State of California: We, in the State Department of Navigation and Ocean Development, have accumulated data from every possible source, some 90 local jurisdictions in California as well as state and federal agencies. The problem

is not simply one of acquiring data, but referencing it. We have just received from our contractor, North American Rockwell, a document which will be included in our Comprehensive Ocean Area Plan dealing with the feasibility of setting up an information gathering, storage and dissemination system.

Need for More Information on Environmental Constraints

MR. J. ROGER MORRIS, Urban and Regional Planning, University of Southern California: I seem to hear the question here, "How can we continue to do what we want and need to do without fouling the environment?" not "What are the constraints on what we do?" I think the latter is a more important question. It is obvious, for example, that we need or want more power, but we should be looking into the question: What are the constraints on generating more power? When we do not yet know what the constraints are, for example, on new activities in an estuary, then we should not do anything until we know how to do it without fouling the environment. I think this would be an approach which would conserve some of our resources and land for the next generation.

MR. R. ADDIS LOCKWOOD, Civil Engineering, University of Southern California: A lot of emphasis is placed on getting facts and the possibility of a logical consensus in environmental matters. I suggest that even if everybody agreed on a set of facts, we could not get a consensus; it would be based on value judgments which are always a personal matter. Who should be making these value decisions? Perhaps the people at the top should deal with the facts, and decision making should be done at a lower level.

Will Present Institutional Structures Work?

MR. VICTOR MAGISTRALE, Public Administration, University of Southern California: I would like to assume that the members of the panel here appreciate that there is an environmental crisis. The question is, can the present system work to deal with it? Will the institutional structures which have their origins in the 18th and 19th century work to resolve this environmental crisis?

MR. MC CRACKIN: I mentioned earlier that the principal reason we are in our present position is that throughout our whole decision making system, we have never had a concern for the environment. We have learned also that when we do put something into the value system, we have learned eventually to deal with it.

I think that it would be catastrophic to abandon our institutional system.

We do need better understanding of the environmental consequences of its operations; for example, the consequences of all types of energy released in a limited geographical area. But while we are gaining that understanding, we cannot simply stop generating energy. The results would be catastrophic. We still have to eat while we are solving environmental problems.

MR. MERRELL: We live in a political system that is very responsive. Conservationists took on 12 Congressmen last fall, including a senior House Public Works Committeeman. They beat him because he was not responsive to what they considered were today's environmental needs.

MRS. HARRIS: That is my conviction as well. It seems we have a magnificent system working right here in Los Angeles. Although one of the speakers earlier credited studies with having cleaned up the Los Angeles Harbor, it was not studies. It was a tremendous concerted effort of concerned citizens, and some of them are here today. I think it was through a forum called the Regional Water Quality Control Board, part of the system, that the public was made to realize something must be done, and the pressure was such that it caused the reordering of the legislation that controlled this whole system.

I get terribly frustrated and depressed at the amount of time and energy people such as Norm Sanders have had to spend on the Santa Barbara Channel when the public overwhelmingly has expressed dispair at the hideous desecration of that channel. Nevertheless, the government continues to pursue its single purpose, strictly on the basis of campaign funding. It is quite apparent that who gives the money to the campaigns gets the leases out in the channel. Now, I don't say that the system cannot change the structure of campaign funding. I have the faith that it, also, can be changed. So, I say the system can work. We have got to continue to exert pressure.

Representation of Public or Environmental Interest

MR. MC CRACKIN: I would like to ask a question of Dr. Sanders, who has urged that the university be more active. Is there a threat in that? The type of activity that seemed to be implied was opposition rather than deliberated consideration in the total public interest.

DR. SANDERS: You are absolutely right about my suggesting opposition. I have gone to a great many hearings up and down the coast. I have written a book about them, as a matter of fact, and the book title is Stop It. Yes, you do detect a negative trend in my thinking.

You must admit that when you people go into a hearing, you hire somebody to do a study; you hire a lawyer to represent you; you have a public relations man; you have yourself. All these people represent your side. Who represents the public?

DR. MOHR: May I add to that? I know that when my colleagues go to, say, an oil meeting to give a point of view that is friendly to the industry, their way is paid. The rest of us, if we even learn the hearing is there, go on our own.

DR. SANDERS: You see, we are trying to establish a balance.

MR. MC CRACKIN: I do not dispute that this has been the fact. But I want to make it very clear that we are committed to reconcile our actions in the public interest, including the environmental interest. We are desperately trying to find the mechanism. I am not sure the adversary system is the best way to do this. What I would hope for is an unbiased, across-the-board representation of the total public interest.

Mrs. Harris made a comment earlier about the formation of some type of a state environmental protection agency being a way to get the needed balance. It might be, but I have a problem with it. Even though such an agency might provide better balance in terms of environmental considerations, still if the charge is only to protect the environment, there might be elements of the total public interest that could require a violation of the environment. For example, the Public Utilities Commission is charged with finding that a proposed project is in the public convenience and necessity. Now, admittedly, the interpretation of that terminology some years ago had only to do with controlling costs and minimizing power costs, protecting the public, for example, against rate gouging, or something like this. But the charge of the Public Utilities Commission is not restrained to that. They are charged with finding in the public convenience and necessity, and the Commission, I believe, is attempting to do exactly that.

Mrs. Harris mentioned the Huntington Beach hearings. The PUC had very extensive environmental hearings in terms of days of testimony, the number of appearances, and the interests that were represented. Now, you can argue with the merits of their decision, but I think a better hearing, a fuller hearing, a broader perspective was given. Whatever this mechanism is, if it's an EPA or whatever, somewhere along the line we need people to represent the total public interest. And I would be very disturbed about the university feeling that its only role was that of opposition, without searching out what might be in the interests of the whole.

MRS. HARRIS: I would like to get back to Dr. Sander's original

statement of how much we need to have some kind of nationally funded adversary center similar to CRLA where people could go and get scientific as well as legal counsel. When it came to the Huntington Beach Plan, it wasn't the PUC hearings that blocked that. It was the Air Pollution Control District of the County of Orange as well as the Board of Supervisors of the County of Orange that really, in effect, blocked it. The PUC cannot be looked to for the public interest any longer because its present charge is inadequate.

The possibility of San Onofre's expansion, I think, is one of the most blatant and heartbreaking kinds of experiences. The man who headed up the opposition to the expansion of the San Onofre plant was a school teacher down at San Clemente. This man was docked three hundred dollars from his pay by the Board of Education for the time he took off to attend these hearings.

Jack Gaskill has given up nearly every day of his vacation pay with his employer in order to attend the Water Quality Control Board meetings, and very often there would be nobody in the audience to back the public's point of view unless Jack gave up his vacation pay. That isn't cricket.

So, how do you set up and insulate a body to represent the public in the same way the CRLA has done? Dr. Goffman, famed for his opposition to the AEC's alleged safety standards, has suggested that we have centers nationally funded for adversary study so that when an impact study comes through, somebody can do some verification of this sort of thing. And I, for one, would hope that more of this would occur.

There are some good things happening, and we can encourage them. For instance, an association of chemical engineers came to me. They said they're calling themselves the Pollution Solution Group.

Nader, as you may know, has started a new group called the Whistle Blowers, I believe, which is asking for responsible corporate employees to come forward and blow the whistle. So, I think there are some things that are hopeful that we can encourage because it isn't fair for a small handful of people to put their professional status on the block and never get any of our contracts from our taxes because they testify at hearings.

MR. JACK GASKILL, Ocean Fish Protective Association: My question to Mr. McCrackin is this: Many agencies have made any dialogue such as you suggest impossible. If a dialogue is going to be one-sided or nonexistent, then what is the point of your remark?

MR. MC CRACKIN: There is no point. The dialogue cannot be one-sided. It must be a two-way street, and we mean that genuinely. We

do have a problem. The problem is there are umpteen different agencies. Look at Planning and Conservation League, nearly a hundred different environmental organizations belong to Planning and Conservation League, and that does not include all of them. Our problem is trying to find out to whom and how to talk. We could so fracture our dialogue as to not be constructive. But we really are trying to seek out ways to overcome this problem. Because of its large number of members, we have been in contact to a much greater degree with the Sierra Club than other people. For example, I have personally appeared before the Conservation Committee of the Los Angeles Chapter of the Sierra Club on two occasions. And we have had two other occasions when we've invited their representatives to come look at our problems, look at what we are doing and what we are not doing, the offenses we are committing, if you will, on the site, that is, up in the Sierras and down at San Onofre. It is not a public relations attempt; it is not an attempt to whitewash our activities. It is a genuine attempt to try to establish a two-way communication.

Now, that does not mean that I expect to convince the Sierra Club of everything in my point of view, not that I expect that they will be able to convert me. But I'm surely interested in what they have to say, and I would hope they would give me the courtesy to reciprocate; and to the extent we can find common grounds, can we work out something? If, for example, in our society we must have a power plant built someplace, is it possible that working with the Sierra Club or other agencies that we could find a site for this plant that is the least onerous to all of us, that is the least abrasive. Now, man can't live without any effect on the environment, but I don't know that it has to be destructive to the point of no return.

DR. MOHR: Do you think industry in general is ready for such dialogue?

MR. MC CRACKIN: I can't speak for industry in general, and I'm sure that there has been and is and will continue to be lots of foot-dragging. And to be very honest with you, even within my own company it's difficult always to have a sustained and continuing sense of awareness. And incidentally, one of my charges within the Edison Company is to act internally as an environmental advocate, to be an internal conscience, the voice of the conscience of the company.

MR. GASKILL: The next time you come up with something like that offshore loading plan off Mandalay Beach, I will personally come and discuss with you our feelings regarding this matter, or the nuclear reactors at San Onofre, about which I testified at San Clemente before the Public Utilities Commission. I will come and discuss these matters with you to illustrate our point of view. Now, we have been in existence here as an organization for the last 21 years. When I was going through

the old files the other day, I found correspondence in there about the deplorable condition of the Los Angeles Harbor that was dated 1951. Here it is 1971, and finally they're starting to do something about cleaning up the harbor.

Need for More Data Collection and Research

DR. DONN S. GORSLINE, Geological Sciences, University of Southern California: Very frankly, I know very few competent scientists who knowingly allow their work to be biased by such a thing as where their money comes from. Now, I am an amateur geopolitician, and certainly you must live in the real world in approaching the problem of grant seeking and everything else. However, very bluntly, I have served on panels, and I am a scientist who is funded reasonably well; I have found that within all of the limitations of the system, good science is supported.

I want to call your attention to something else: that I am in full agreement with everything that's been said. After all, you can't argue with this. I would say this, though, that for all of the things that have been discussed, you have to have some kind of quantitative data on the natural environment. And I suspect, over the last few months and years, that there is a general assumption that great quantities of this data exists. Bob Abel mentioned the University of Michigan's program, which is a very interesting one and one which I think in the future will be very successful because what they are doing, in effect, is simply preparing a matrix into which data can be fed in the future. But I would call your attention to the fact that in many of those pigeonholes on the matrix, there is no data. So, I suppose I'm making a plea for the support of science for science's sake.

Now at the same time, I think there is a problem. There are a number of men, scientists and engineers, who feel very strongly and are perhaps our most effective agents in working with these other agencies. They are able with great sincerity and great force to act as champions for people who probably have not been heard in the past. However, I think that many more of us must also spend the great bulk of our time getting this data. You are kidding yourself if you think the simple words, "Let's accumulate data in a data bank; let's get the past information and that will take care of it," is going to take care of it. It won't because, first of all, you find there is very little data and that the older information has been collected in a way that is difficult to confirm or verify. We use different methods now, and the problem of correlation is exceedingly difficult. Along with all of this data collection, you have to have a certain amount of supportive basic science. Much of this must come from industry and the federal government. There are certain constraints on that but, by and large, I know of very

few competent scientists that allow their findings to be influenced by political or social factors. The data is the best they can give you, to the best of their ability.

MRS. HARRIS: But Dr. Gorsline, will you come in the meantime to the Regional Water Control Board, where you nor any of your colleagues have never appeared unless they were paid by an industry who was there seeking a permit to pollute? I mean, how long are you going to wait until all the data is in? In the meantime, that Board is giving away your environment, and none of you people show.

DR. GORSLINE: I have served on some of these panels, not paid, and I have also been paid by both federal and state governments and industries to go to some of these things. Unfortunately, if you are going to attack a scientific problem, you really don't have time to do much of these other things. If you're working on, say, the geological aspects of the continental margin, this is a consuming passion.

What I'm saying is this: Mrs. Harris is quite correct when she says we are, in a sense, abrogating our responsibilities to citizens. I would fully agree. However, there are other men, fortunately, who do not do this.

DR. SANDERS: Right. I never said that we should stop all research; I said that we ought to use this research better than the way that we're using it now.

Existing Knowledge Not Applied

DR. RIMMON FAY, Director-at-Large, Ocean Fish Protective Association: And if I can for a little bit, I'd like to interject a few of the known facts. John Merrell wants to know what sewage sludge is doing on the bottom of the ocean. It's mucking it up, obviously. It is thrown in there on an archaic assumption that the ocean has assimilation capacity. The ocean does have some assimilation capacity but, for a lot of things, it doesn't. Some of the things that it doesn't have assimilation capacity for in any degree, in any terms of kinetic assimilation, is sludge. You're putting nitrogen deficient organic materials into a cold, dark, oxygen limited environment and telling the microbes to go ahead and ferment it. They can't. Microbes don't work that way. They need ammonia, at least, and the only nitrogen around is nitrate. So, that sludge is going to lie there, it's going to smother things, it's going to have a negative effect on the productivity of the environment.

The ocean can't assimilate DDT. We've found out that our good neighbors, Montrose Chemical, have been dumping DDT for something like

24 years, apparently, into our ocean. And if you want to get out and try and find out if the fish are reproducing any longer, the evidence is that reproductive success does not appear to be there. There is some reproduction, I'll admit; but in terms of commercial potential, there's none.

The ocean doesn't have any assimilation for mercury. We've got something like 90,000 tons of swordfish in freezers in this state right now which can't be sold because there is anywhere from 0.3 to 1.8 parts per million mercury in them. Chow and Patterson tell us of the lead picture. Lead is up fourfold over its former natural abundance in the inshore waters, and fishes are now running around with 20 parts per million lead in their livers. There's no assimilation capacity for chromium or for the polychlorobiphenyls. We're still treating the ocean, though, as if it had unlimited assimilation capacity. One of the hard aspects of the data already available is that we're setting up a model for the rest of the world of how to abuse the productivity of the ocean.

Mr. McCrackin asks what kind of a final arbitrator of public interest we are going to deal with. The final arbiter of public interest is the environment, and we're not paying any attention to our environmental constraints.

I'm trying to point out here that what we need is environmental responsibility. What we need is a change in priority. What we need to do is consider the ocean, that it doesn't have assimilation capacity for our waste in the amount that we're putting in. We have six percent of the world's population in this country using half of the world's energy supply per year and 40 percent of the raw materials of the earth per year. This country is setting a pattern of environmental degradation with wanton use of energy, wanton use of raw materials, that the environment cannot tolerate, and the rest of the world is trying to follow this pattern. We're not going to make it; there's no way that we can make it.

Here's our legal problem: DDT's coming out that sewer outfall inhibiting the reproduction of fishes. The argument in federal court now is whether or not anybody has the right to sue Montrose Chemical to stop them from that discharge. Legally, there's no way that you can get in and really force a waste discharger to cease. We have laws. We have the Porter-Cologne Act, we have policies of the Water Quality Control Board, but when you get right down to the nitty-gritty, to get environmental responsibility, it's the bloodiest, hardest battle in the world to achieve any responsibility towards the environment. We need better legal techniques by far, and justice, bless it, must be swift and certain. But, obviously, the legal fraternity is insuring that if anything is

swift and certain anymore, it won't be justice.

Institutional Arrangements

DR. MALCOLM S. GORDON, Professor of Zoology, Director of the Institute of Evolutionary and Environmental Biology, University of California at Los Angeles: From the lawyer's point of view anyway, it appears that what is really important in most of these areas is change in institutional patterns of organization. The long-term way to solve most of the problems is to change your organization, not so much to worry about the details of how things are now going on. And one of the main ways in which you can change your organization is to use what the economists increasingly are talking about; namely, the principle of internalizing the externalities in various processes. I would urge this as being a major policy effort on the part of conservation groups and industry alike in terms of their way of looking at things. By "internalizing the externalities," what I mean is the kind of thing that has increasingly been discussed in the last couple of years; namely, to ask what are the social costs, say the cost to the general population, of doing something in the environment. How much is it going to cost for people who are going to be having trouble breathing or having trouble drinking water or having accumulations of various kinds of pesticides in their bloodstream, or whatever it happens to be? This is the kind of goal that we should work towards, and there are many possible ways of achieving it. You can manipulate price structures, you can manipulate tax incentives, you can manipulate penalty arrangements and laws, for example. I think that's one of the main directions, really, that I would urge Sea Grant and USC and everybody else to work.

Now, to be more specific, there are already a number of lawyers and political scientists who are concerned about setting up arrangements for a combination of the CRLA kind of approach to things and the ombudsman kind of approach. I think that possibly some combination of these two kinds of institutions will be most useful. Say you have not necessarily one ombudsman, but a group of reasonably knowledgeable people who are paid from various sources so that there's no preponderance of allegiance to any one of these particular sources. Then you can have, hopefully, reasonably unbiased judgments made on the facts which the scientific research can provide. James Krier has a paper entitled "Environment Watchdogs--Some Lessons from the Study Council" in the next issue of the Stanford Law Review exactly advocating a program of this kind. It is a detailed study of the first year of operation of the California Environmental Study Council. Shortly before he got the final version of his paper in the press, somebody anticipated him. Senator John Tunney had submitted a law in the last session of Congress, when he was still a Congressman, which advocates the

establishment of a combination of institutions of just this kind.

DR. SANDERS: You need a scientific input into this, too, don't you?

DR. GORDON: Yes, but there has to be an institutional organization into which this scientific input can go so it is effective.

Now, one last thing is this area that I would suggest Sea Grant do because I don't see any universities able to do this on their own with their own present resources. This is to support some people who are intermediaries between the research scientists and the legislative bodies, the regulatory agencies, and so on; people who can keep in touch with what is happening scientifically in the literature and research labs and also get to the practical problems and attending the hearings with subsidy from an external source like perhaps the Sea Grant Program. That strikes me as being a good way of approaching the matter.

Information Needs of a Small Coastal Community

MR. GEORGE M. DAWES, Harbor and Tidelands Administrator, City of Newport Beach: Dr. Sanders has heaped frustrations upon my frustrations. I would rather have you spend your time, Dr. Sanders, in coming down and helping me before we do something, rather than standing up in front of my city council and saying don't do domething. I have been trying now for two years to get this sort of assistance in our little coastal zone management problems in our area, which does happen to include an estuary. And our city council, I think, is a very good city council. They are, by law, going to have to make a decision someday, and they want the scientific advice. And I have tried to get the scientific advice, and I mean applied scientific advice, not theoretical research. I want it on the ground, and I have been notably unsuccessful in getting any voluntary efforts to come in. It always revolves around the dollar, which falls back on the city council again who feel the pressure of the voters. I haven't got any dollars to do this, and the city council isn't getting anything but negative responses when they want to raise the taxes so that we can get dollars to do this sort of thing. I could tell you percisely what my research needs are: I want a marine biologist, I want an ornithologist, I want a geologist, I want an oceanographer. We've got it all outlined, but I can't get them.

MR. RONALD B. LINSKY, Coordinator for Advisory Services, Sea Grant Program, University of Southern California: George, I'll take the challenge of that. See you after the session.

DR. RICHARD H. BALL, Vice Chairman of the Los Angeles Chapter of the Sierra Club, physicist at the RAND Corporation: I think one of the

conclusions that you might draw from what Mr. Dawes says is the problem of the local government in trying to do that kind of research suggests that perhaps it's impractical for local government to make resource decisions of that kind. We have to push those decisions up to a higher level of government where the resources for making this kind of scientific study could be exercised properly. I don't think we are ever going to have each little city along our coastline have the kind of oceanographic experience to go in there. They could use some advice, and I think somebody else may have to make some of those studies besides the local governments.

Current Federal Controls

I want to ask Mr. Merrell if he could say more about the carrot and stick approach as to what do these federal programs have written in them in the way of hard criteria. Can we really expect that when the political crunch comes that the hard criteria will be applied? Are they hard enough to be able to make them stick when a governor of a state, for example, gets upset because the federal government said his program wasn't good enough, and is the federal government going to be able to hold back against this kind of tremendous political force that can be applied?

I would also like to ask a more specific question on the funding of new sewage disposal treatment plants, for which we are talking about a couple billion dollar program. For example, from what Dr. Fay has suggested, we already know certain things that the sewage disposal district has denied over the years. You know, they have always been saying that there's no proof that this stuff is harmful. I think that the concrete things that Rimmon Fay mentioned here in the last few years have kind of proven beyond a shadow of a reasonable man's doubt that at least some of the waste that's going out these pipes is exceeding the capacity of the environment--the heavy metals, for example. And yet, we are continuing to construct new sewage facilities that call for ocean outfalls that are only going to exacerbate the problem.

Now, can the federal government's stick be sharp enough that it can apply it and say, "No federal money for this kind of approach to the system"? Is this likely to come about?

MR. MERRELL: I think it is. Right now, no grants are being given pending the development of some interim regional and metropolitan plans; something that should have been done a long time ago. Now, the state, all states are having to react to this because they have made the hard decision in Washington: "Nothing will be given until you give us an interim plan."

Now, as to getting toxic industrial materials out of the system, the way we're planning to do this is through a permit process. If an industry hides in a municipality, then it's going to be different or we're going to have to develop a new mechanism in going back through the state to the regional area to the municipality to get that out.

MR. ABEL: I hope that a lot of the very excellent dialogue that's been going on here this afternoon will eventually be translated in some way or another into Sea Grant doctrine because this is the kind of thing that's very useful. Donn Gorsline and Dr. Sanders both put their finger on a nerve in discussing the need for research data. And I know one kind of knowledge needed is that which will help us arrive at a quantifiable balance, because environmental questions are not subject to simple black or white answers.

I'd like to reply to some of Dr. Sanders' suggestions. First of all, there may have been an implication that I'm on one side or another of the conservation question or, perhaps by my use of the word "development," that I'll tend to favor power interests. There are two ways to comment on that; the first is semantic.

In formulating the kinds of papers the government needs to develop its program, it is difficult to find the right words to use in this era because the word "development" has become a bad word; and "utilization" is a bad word; and "protection," which should be a good word, seems to imply a favoring of somebody. "Recovery" has become a bad word and, frankly, sometimes we don't know how to phrase the kinds of plans we want for our programs without alienating one or another sector of the economy or the cultural interests.

Sea Grant Program Approach

The second has to do with the administrative angle. And there I am really in the comfortable position of the arguer who has prima facie evidence available because I have spent five million of your dollars over the past year or so in the interests of conservation. Now, in this regard, last year all you folks here teamed up with several million other citizens and gave me 13 million of your dollars to spend. Well, my colleagues and I in the Sea Grant Program staff don't take this responsibility lightly, but we are all aware that as human beings we are subject to human frailities, and it is not possible, by judicious or less judicious use of this money, to satisfy all the interests. For instance, we know one thing: It is true that more research data is needed, and a better description of some of these parameters is needed. But if we apply your money to grants which are dedicated wholly to the gathering

of data, we will be doing nothing more or less than duplicating the Office of Naval Research, the National Science Foundation, the Atomic Energy Commission and the National Institute of Health. I can go on into the night, but you probably have not brought your pajamas to listen to it. What I'm saying is we don't want to duplicate another program's objectives. The name of our game is "application," and we try to adhere to this.

Furthermore, there is a very strong need, as everyone has said, for some kind of a data collection-data dissemination service, and I would refer you to the Environmental Data Service which is now established in the National Oceanic and Atmospheric Agency for this purpose. It combines the old National Oceanographic Data Center, the Environmental Data Service of ESA and some other services built in. The objective of this service is precisely the objectives that you have been enunciating this afternoon.

Last, the suggestion that we use Sea Grant money to educate more political scientists to the problem is extremely valid. Now, I spoke of a 13 million dollar program. To give you proper perspective, you should understand that the National Oceanographic Program of the United States runs to 570 million dollars this year, of which we have $13 million. Of that $13 million, we have devoted more money to the political science aspect of marine science and technology than any other program in or by the federal government. But the point is extremely delicate because there is always an implication that when one suggests that you educate a person in a particular discipline or area or have him do more research, he will tend more toward one's own way of thinking, that is, the suggester's way. But it doesn't necessarily have to be so because it isn't a black or white situation. The conservationist cannot be completely 100 percent right in his outlook, and the power company cannot be 100 percent wrong in their outlook. And, in fact, the power companies supply an enormous amount of matching funds for Sea Grant Program projects which are aimed at conservation. So, while we are educating political scientists and then supporting them in their work, I could not in all honesty state that the product of this research and education will be completely narrowly oriented to the conservationists' way of thinking.

My conscience bothers me because, as an oceanographer, I'm very familiar with the evil caused by DDT in the marine environment. Yet, I have to admit that I'm not equally knowledgeable regarding the number of thousands of lives that may have been saved by the use of DDT on crops to kill disease carriers. I just don't know these answers. And, again, it's the old plea for balance.

LAND USE PLANNING

THE BASE OF THE PYRAMID FOR ENVIRONMENTAL CONTROL

Jerome B. Gilbert, Executive Officer

California State Water Resources Control Board

I was impressed as I read and became more acquainted with the U. S. C. Sea Grant Program and its attempts to bring different disciplines together, which in itself is not new. Its efforts to relate those disciplines and their thinking to what is going on in society, both at the regulatory and policy level of government and also in local government, is new. I think we can bridge the gap between the government policy makers, particularly those at the state level that are increasingly subject to public pressure directly or indirectly through the Legislature, and the academic and scientific communities who are developing new programs.

The more difficult problem and one I think we need to direct ourselves to in the main, is trying to make our institutions of government work, and particularly local government. It is easier to do that in large cities, although those of you who live here in Los Angeles may disagree with that. However, from a state-wide view, it is easier to get flexibility, and understanding of problems in the large communities of our state. Their staffs are professional. They generally have developed some

feeling of long-range view. While they may disagree, for example, on new high environmental standards with the authority imposed upon them from Sacramento or by regional agencies, they understand there is need for a long-range approach. It has been much harder to get that message across to local government in small towns around California, and that is understandable.

We all know the traditional influences that affect city councilmen, the reason they depart from a well conceived master plan or do not have a master plan and only give lip service to preparing one in the first place. All those things we are aware of, and we know how they come about. The question now, from our point of view, is to do somthing about it.

I phoned back to the office from the airport and they said that the City Managers' Association is concerned about what the State Board is doing. I said, "What are they concerned about?" My secretary said, "They are concerned about the grant regulations and how you are going to distribute all that money voters approved in November, and they would like to hear what you have to say about it."

I know that the local communities are disturbed because a change in decision making is taking place. The fundamental direction of our state, in regard to environmental matters, is no longer coming from local government or even county government. It is coming from Sacramento, and we have just started that now. That may result in new institutions at the regional and local level, but that fundamental change is now taking place; and I think it is through the State Water Resources Control Board and Regional Board Program that that change is first being felt around the state.

We are just not going to give a community the amount of money they ask for a waste management facility without looking into how that fits in the broad concept, not only of the management of the waters but how that fits into a long-range plan for the whole area and other aspects of the environment in that area.

Let me just say a word or two for those of you who are perhaps not too familiar with our program, how it came about, and then go into the principal theme which is "Land Use Planning--The Base of the Pyramid for Environmental Control."

In 1967, some farsighted people in both houses of the State Legislature, and one staff man particularly who is now a member of the State Board, Mr. Ronald Robe, realized that you couldn't manage the water resources of California by just considering pollution control separate from the right to take water from streams. You couldn't do those two things separately and have any sensible program for managing the water resources

of California. So they put the two functions, the historic water rights functions that have been administered since 1914 and the water pollution control function, into one board; and that is a good concept. It was the first semblance of thinking in a broader sense from a water standpoint. That was further expanded by a study project to develop the Porter-Cologne Act. That Act gave muscle and structure to this combination of water quantity and quality, and did it through five full-time people who had technical, professional qualifications.

One of the fundamental elements of that Act is a planning concept for water resource management. You develop the waters of a basin by basin planning throughout the state. You enforce controls that relate to plans, and you issue water rights that also relate to controls and to the plans. We are starting to implement that now, and we hope to have the first results in the next couple of months.

The new philosophy was one of enhancement and protection of the state's waters and the state regional boards have been implementing that philosophy. I am sure some of you have followed the actions here in the Los Angeles inner harbor, enforcement action at Simi, and problems in Northern California in restriction of inflow for communities that are polluted, and I think you are going to see other actions in the future.

In Northern California we have extremely serious problems in the Bay area, and there have been enforcement actions there, including one against the City of San Francisco. But every time we took an action, every time we tested Porter-Cologne, we realized we were trying to impose on an activity, whatever that activity was, a new approach or new direction from the end of the waste discharge pipe. We became convinced, and when I say we, I mean all five members of the State Board and our staff, that it was only through effective land use planning that we were going to manage California's resources effectively. Certainly, we can set waste discharge requirements on outfall pipes and move toward waste water reclamation. And we can establish other environmental standards, but setting fences around any project or waste producing activity without dealing with the activity itself, is not an intelligent way to protect our environment.

Now it has been pretty much unmanaged, and we have a whole host of institutions, those with a good deal of authority unexercised, and those without much authority, that do all of our talking regionally, locally and state-wide. This whole area of land use planning is overwhelmed by people of different interests, different authorities, and confusion. We have to do something about that. That is the toughest problem we face.

As we develop our planning program, we know that we are not land use planners. The sanitary engineers on the staffs of the regional boards,

even augmented with environmental specialists and a few economists, biologists, and others whom we have employed in the last year or so, are not so equipped nor should they be. It isn't their real charge to set forth the basic goals for society, and how we are going to manage our natural resources in the overall sense, including all man's, water and everything else. So we are very much in favor of some new strong effort for land use management in California, and we have been doing what we can to see what we can get started, and it is started now. The question is what form it will take and how fast it will come.

The reaction to that new authority is to be expected from those who like more freedom to do what they want with the land, but whether it is a recreation subdivision in the foothills of the Sierras or a dredge at the mouth of the Russian River, all of them are now far more concerned with environmental effects and know that the roof is going to fall in if they do not consider them.

We have delegations coming to regional boards and to our offices in Sacramento from the major developers before they now select sites, so there is awareness that people are concerned about this. In fact, the comments of the Central Valley Regional Board in regard to the Stumpy Meadows Project of Boise Cascade have resulted in its abandonment. The Lahonton Regional Board prohibited siltation from land development through a provision of the Porter-Cologne Act that enabled us to deal with things broader than sewage discharges, and we are now enforcing that through controls not only on development but on highway construction; and I mentioned the dredging at the mouth of the Russian River that can be controlled. So you can see we are using these controls. We are dealing increasingly with land use planning, but we do not really have a basic land use program to carry out what might be long-range goals that could be established.

The question is, "How will these goals be established?" "Who will decide where the population centers shall be in California?" "Who will decide that resources should be used, where the water transfer will take place?"

Those that argue against that kind of comprehensive planning have an awfully good argument. I would worry about one office in Sacramento deciding all of these things, so some then say that the best thing to do is to let nature take its course, give gradual increase in authority here and there whenever things get out of line, and hope for the best.

Well, I don't think that is the best way either, but we have got to establish a coordinated land use planning system that starts with state-wide goals that the California Legislature will establish. In a sense, those I am sure will reflect a federal enthusiasm for land use planning con-

tained in the proposed bill by Senator Jackson.

We have to start with a state-wide approach. We have to implement it regionally in terms of regional land use management, and have local government operate within that framework, leaving the detailed decisions as much as possible to the existing structure of local government. Even if that wasn't theoretically desirable, it is the only practical way to get any form of land use planning on a broad scale in California.

As we look at our goals for our planning program, we have to anticipate that and think about uses of our resources in the future. One of the most difficult problems we are up against is the growing sentiment in the public and in large sections of the scientific community that water resources and all our resources are extremely limited. Therefore, the only approach is complete recycling.

We have had opposition to improvements in waste treatment along the coast of California; not here in Southern California, but up in Northern California. For instance, in one community we have a primary plant that discharges on the beach. It doesn't work half the time and this is a bad situation. It is in one of the most beautiful areas of Northern California, and yet we had strong opposition from those who were concerned about the environment to extending outfall into the ocean because this "transfers the problem from the shore to the ocean."

Ideally, they say, "You should recycle the water." We say, "Recycle it where?" They say, "Reuse it for domestic supply."

There isn't one reuse program for domestic supply except in South Africa, where, in fact, they have about a month's buffer supply, and there are other problems with that technology. I am not saying we shouldn't do it, I think we will do it ultimately, but somehow we have to build a system that will go from where we are to that point with some confidence we are going to get to that point.

That gets back again to the people who are involved in the control program, those in the scientific community, and those in local government who are building the sewer plants. Our planning effort is going to try and set a state-wide framework of policy that would move toward waste water reclamation for our massive ocean discharges as is now taking place in Southern California with increasing reclamation, not fast enough for some, perhaps too fast for others. It would establish a program in which we could allocate the billion dollar amount of money that includes federal, state, and local participation for waste water management facilities, and to do so, providing facilities that will cost the least to each community.

Now that is tough because every community wants to have its own plant. It has become a mark of excellence to operate tertiary treatment plants and irrigate a local golf course at the same time. We have engineers who are recommending irrigation on golf courses at three times the level that any manual will tell you grass can use just to get rid of the water.

Now is that waste water reclamation? No, it is not.

We have some who advocate very, very advanced systems of waste water treatment, and if we funded all of those, we would have no money left to assist in our major waste discharge problems which are from the major communities along the coast, San Francisco, Los Angeles, and so forth. So, somehow we have to arrive at the balanced program that will move toward reclamation, that integrates those reclaimed waters with the fresh water supplies in this area that come from Northern California. Those of you that read that in the newspaper know there is a little bit of a controversy about it, and it is tough for us to fight that battle or get involved in it because the State Board within two or three months is going to be issuing a decision on the environmental standards that must be maintained in the Delta. To issue that decision, the Board has to assume the uses that will be made of the San Joaquin Delta.

Will agriculture continue? Should there be greater recreational uses? Should it be protected for boating? What will be the long-range future of the land use planning function?

It will be made although no one ever recognized this five years ago when the Board reserved its jurisdiction on the State Water Project. It will be made in the context of a water right decision.

One of the things that has caused us some concern about the direction of coastal area planning and thinking has been the tendency to think of the coast as a separate part of our environment. That goes against our fundamental thinking that we have to manage California's waters in basins, that they originate in the watersheds, that there may be some importation of water to those watersheds from elsewhere. But basically you have a system within each watershed that may be altered by imports or exports, but that system has to be recognized. That system carries down to the estuary, affects the fresh-salt balance and life structure in the estuary, and then affects the near shore, and so forth. So, to separate out for the purpose of planning that coastal zone gives us some concern, and we recognize the great concern for the loss of the coast or at least reduction in its usefulness as we look ahead to the future, has caused this emphasis on coastal zone authority.

That has spawned a number of bills in the Legislature and all I can say is that commissions with forty-five people on them, five or six on them, or twenty-seven on them make me shudder. But the intentions are good and perhaps we can integrate that with a state-wide approach to land use planning and control.

There are other problems and I would like to just list them for a minute or so to show you all the different aspects of land use that we get involved in.

What about the oil platform? Well, California's position with regard to drilling for oil, principally in the Santa Barbara area, is against further drilling at this time, but that is not the federal position. The State Board has the authority to regulate waste discharges outside the boundaries of California. That is beyond the three mile limit that affects the waters. Under that authority we have moved to require waste discharge reports from operators of every platform off the coast. Unfortunately, the federal government decided that was their exclusive bailiwick, and suggested that some of the operators, at least through the United States Geological Survey, ignore us.

We can't very well manage our land and near coastal areas unless we take a unified approach to this. Separation of land use in the broad sense, state and federal, is going to hurt the uses, the control program and the long-range goals that we will need to carry them.

We are concerned about vessel waste. There will be a bill pending in the Legislature to give California a little head start on the National Vessel Waste Program. There has been a stronger battle here in California between the boat owners and the people who are interested in minimizing the hardship to those who own boats with toilets, minimizing their hardship as opposed to ending pollution, but we are moving.

In other states such as in Michigan and New York, strong controls have already been adopted and they don't go through all of this business of trying to find out what kind of a fancy treatment device you can put on a 32-foot boat. I mean, that is not going to be physically possible, so we have to develop some kind of boating facilities and some kind of shoreside facilities, and have areas where discharge is restricted and get on about our business. But we have had a lot of trouble doing that in California. Hopefully, the bill pending, that we have done some work on with the Ocean Navigation Department and our own people, will pass this year and we will get on from that point.

We recently adopted a thermal policy which is primarily again related to coastal waters. We think that is a stringent policy, but there are those on one hand who want absolute numbers adopted. You shall not

exceed this or this and apply it on a blanket basis, and that will protect the environment.

We have taken a more middle ground. We say that we need studies in advance of each site selection. We need to work it in with an overall land use program. We need some basic standards of control. The 20 degree rise was one, there were others. Those may or may not be good enough, but we have to be able to use our brains to figure out where to put power plants, and not just do it by some arbitrary numbers put down on paper; but again, that affects land use planning. Shouldn't the fundamental thing be the relationship of those plants to the demand for energy? Then we consider the water, the air, and all of those things.

Municipal and industrial waste is our toughest immediate problem. Constituents in that waste may include such substances as mercury and chlorinated hydrocarbons that are of tremendous public concern. The Legislature has bills in to ban this or ban that and end it now. We are very much concerned about this. We want to make our control program responsive to the use and to the production of those chemicals to find out where they are.

One control technique we have thought of will be for special metals and chlorinated hydrocarbons to the extent we can identify sources that are moving into municipal, industrial systems. It will prohibit them to the extent they can be prevented from entering the sewer system. We are looking into that now as a part of a broader ocean policy that is now being considered by the State Board.

Source control is very important. Part of environment management should assure that those things that are going to hurt the environment, whether it be pesticides or anything else, shouldn't be used in the first place; so that has to be part of the planning program.

This is one aspect of the environmental control issue directly avoided by the planners. We are concerned where you put the pipes because the location of sewer pipes or water pipes influences development. We want to use the location of those pipes to push the development in the areas we want; and that is putting the cart before the horse. It is an attempt to rectify the lack of authority in the land use planning programs. Programs that have not had the muscle, that have not had the guts in many instances to say you can't put this factory here or you can't build with that density have said, "Well, we will tell our water department not to extend the water main out there." That is no way to manage the water resources, and there is another reason we are in desperate need of a sound land use planning program that can be enforced. Then utility systems can use the resource wisely, whether it is a waste system or water supply system or ultimately the whole system that should be

considered together.

We run into this all the time in our Bay Delta Program. Those of you who are familiar with the Northern California scene probably are aware that the State Board, in an attempt to end pollution in the San Francisco Bay, commissioned Kaiser Engineers to do a study. It did, at that time, perhaps one of the most extensive estuary and pollution studies in the world, and they decided you couldn't discharge waste into the Bay anymore, which is what people figured out in San Diego and Seattle long before. Then they said, "We will put it all in one great big pipe system, one treatment plant which will be labeled, 'advanced primary,' and put it out in the ocean in giant outfall pipes."

Well, the Bay area broke apart. Conservation joined the local consulting engineers who joined the councilmen to say, "You can't do that to us." So we have been arguing for five years about "not doing that to them" while the Bay continues to be polluted.

Now, it is true they have made some improvements in waste treatment up there, but San Francisco has 70 separate municipalities all discharging waste in an uncoordinated fashion in most cases, with growth planned or unplanned, with open spaces abounding and about to be gradually reduced if growth is not limited. Perhaps more than any area around, this one can benefit now and can reverse bad practice now by some kind of regional authority. In the absense of a multipurpose area-wide government that could do planning as well, we are advocating an area-wide waste disposal agency, in effect, a Los Angeles County Sanitation District or Bureau of Sanitation for the Bay area.

Just a final word about what the prospects are for building the base of environment control, the base of the pyramid that is in land use planning, and building some kind of a structure on a state level.

As you know, there are a number of proposals now pending. They range from a proposal to create a department of the environment at that level to perhaps extending the State Water Resources Control Board into an environmental protection board to include land use planning. There are all kinds of controversies about that. I am afraid again that out of the controversy, at least this year, nothing will come. I certainly hope that is not the case, but what we have to avoid, and in a way I guess I am a little bit pessimistic on this subject, is the continued duplication, establishment of new agencies, and bringing more people into the act.

In our concern for the environment, we now have environmental impact reports. We have certification by the Corps of Engineers that requires future environmental reports. We have every agency that has the re-

motest concern for environmental matters at a state and federal level trying to make its influences felt, and in a way that stops everything; and that might be good in some respects.

We may stop some undesirable development in the giant bureaucratic wheel-spinning, but it also stops the construction of environment improving facilities, whether they be waste treatment plants or anything else. So we have to somehow streamline that machinery. I think it was done very well at the federal level, at least in theory. I think it still has to prove itself, but the authority is there; the single direction is there; and now we can see it. I think we need some approach like that in California and hopefully local government can be brought about to respond to this need.

Everybody is now talking about the environment and now we have to do something about it.

Question: You said pesticides should not be used because they are harmful to the environment. Did I hear you correctly?

Answer: I think I made a lot of generalizations in the past half hour or so. I can refine that.

There are certain pesticides which should not be used because they have been demonstrated to be harmful to the environment, and there are alternatives that are perfectly satisfactory for the job. DDT is one of those; there are others.

Question: A few years ago, the federal government set out to establish somewhat uniform standards throughout the fifty states. Can you comment on what happened to that program?

Answer: We have been kind of fighting the program, but we put on a black hat when we do. The idea had to do with the federal government's establishment of uniform standards throughout the states. I believe the federal government thinks in those terms, and many of the people who are influential in E. P. A. are thinking in those terms. There are certain standards which we all can agree to, but the important ones, the ones that will affect the investment of millions of dollars, have to be based on evaluations in each area. Congress is pushing E. P. A. to get instant environmental improvement, instant environmental management. The way they perceive to do that is through arbitrary standards which will be nationwide. Secondary treatment is a good example of

that. 85 percent B.O.D. removal was the critical thing to do. So nowadays when we belt for ocean discharge, it may not be best to go for 85 percent B.O.D. removal, but do a more effective job with chemical treatment.

The local communities say, "We want to build an activated sludge (secondary) plant because we have to meet those federal standards." Because the federal government said they might adopt that standard, everybody thinks that they did, and so we are caught in the position of having to fight them over what to do. But we would hope that any national standards that are established, and there are going to be more, would ultimately result in some intelligent decisions and not absolutes. I know there is a great tendency toward that, but we have to live through that period.

Question: I wonder if anybody from the national level is getting away from national standards down to regional standards. Is the state going to move toward providing more direction in setting more specific objectives or parameters for the ocean?

Answer: The answer to that question is yes, but that has advantages and disadvantages. To set a specific standard, you have to have a body of knowledge in which to face the standard. We all recognize that the body of knowledge is very weak. There are enough reports, but are we going to take an analysis that was done in 1967 or one that was done in 1969, and how do we do it?

So we tend, in this period of evolution in the whole structure of knowledge of our environment, to want to establish arbitrarily high standards. We might resent the federal government doing it, but we will be doing it at a state level. We know they are going to be arbitrarily high. What we say is that it may mean an overexpenditure in this direction in society, and we know that that is the pendulum swing and one of the things we have to live with.

I wish we had more information, but it gets back to the old thing, do you have to prove adverse effect before you do something about it?

Question: Would you say that the level of input of the general public interests, as compared with the interests of organized outfits like big business and government agencies and so on, is being redressed reasonably now in terms of the activities of your Board and/or similar activities, or is there still a long way to go?

Answer: If I had to guess, I would say that the average person thinks the waters of our state are polluted, generally, and very little or not enough is being done about it. The thrust of our whole effort is to establish a program that is doing something about it, and the public knows is doing something about it. There is a lack of confidence at the present.

Let me give you one example. Yesterday we met with some marine biologists, experts on Northern California coastal conditions. We talked about waste water reclamation versus ocean disposal waste systems, and we described what our philosophy was about disposal now with higher treatment and ultimate reclamation, with the line going to the ocean to handle brines that are not ecnomically treatable or to handle breakdowns in the plants. The investment you would make in such a line wouldn't commit you ultimately.

They stopped us and said, "What do you mean, wouldn't commit you ultimately? How do we know what you are going to do five years from now? Once you get that line out there, you are going to pollute the ocean from here on out."

Then they pointed to Southern California outfalls. We tried to say to them that the structure, at least at the state level, and we see it changing in regions and also locally, is going to insist on changes in the future. This is a much higher level priority subject everywhere, and when you put a pipe here or you build a plant at this level, you aren't locked in forever. But that means that the people in the academic community and also in the scientific community have to have some confidence that the government is doing something about this. I realize there is a lot of weight on the other side, particularly in local government.

Question: You talked about environmental impact information. Do you feel the environmental impact on Southern California coastal waters enable you to do the kind of job you want to do in Sacramento?

Answer: No. We need to know all of the present effects of waste discharges. We need to know what happens to all of the special compounds and metals that are in these giant waste discharges, how they affect the food chain, where they end up ultimately. We need to know all those things so we can intelligently control them. The trouble is we are going to have to wait an awfully long time to get that information, and the public is saying, "You should anticipate now what adverse effects may come about ten years from now as a result of what we are doing today to control them."

It is an almost impossible position to be in, but we are trying.

Question: What does the budget picture look like at the state level? We have heard a great deal that has been said about the interest that the state has and so forth, but what are we talking about in terms of increased dollar expenditures?

Answer: The budget picture is never good to someone that wants to do the job and has a vision of what that job takes. It is a lot better than it was two years ago. The staff of our program has expanded from about two hundred in early 1969 to three hundred by the end of next year. We probably couldn't absorb people faster than that, but there is a demand for more activity and we have to grow.

We are spending most of the money that is coming from that expansion related to the Clean Water Bond Program, the basin planning effort. We are hiring people in the planning effort, but our big lack is in surveillance, and we have been trying to find ways of funding that.

We have been looking at effluent taxes on industry. We have been looking at general waste discharge fees. Everytime you propose a bill in the Legislature, you run into an absolute hornet's nest, and we have been fighting that battle for two years.

Question: What is the nature of that hornet's nest? Why are people objecting to charges on people creating pollution problems?

Answer: The main voices in opposition to, let's say, an effluent tax would be the traditional industry you would expect, but also it would be municipalities and their viewpoint expressed through the League of Cities, their County Supervisors Associations, and others. They have been steadily opposed to any charges against cities, for instance, for surveillance. But how do you treat cities separately from industry, particularly when there is a lot of industrial discharge to the city systems?

Many cities like Los Angeles have extensive internal monitoring systems of their own, of industries discharging to their system, but that is almost unique to Los Angeles City, County, and San Diego. Northern California does not know about that.

So, it is hard to set up a state funding program like that that will do the job state-wide. We are having great difficulty.

Hopefully, the President is going to double the program grant this year. If we could get federal assistance, that might allow more surveillance.

Question: You referred to a system developed from our present condition to something more ideal. Then you said the ideal waste water reclamation doesn't fit in.

I was wondering if you could give us a picture of how we can progress from our present condition.

Answer: It is hard to say in generalities. In a typical kind of situation where most of the waste is being discharged to the ocean here in California, you have a level of treatment now which is probably primary and an outfall pipe that may or may not go out some distance. It seems to me that it should be constructed to a point that is reasonable, considering the environmental conditions. Secondary treatment should be built to remove those things we realize are harmful to the environment, and that plan should be designed as part of a regional system that can ultimately reclaim most, if not all, of the water. It depends a lot on the constituents of the waste. If you have a residential community, it is one thing. If you have an industrial contribution, it is something else. The long-range goal should be a massive reuse system. That is easier in Northern California where the water quality is much higher.

The water the City of San Francisco is using has 70 parts per millions of hardness. It is the finest water, and to dump it out with all kinds of stuff in it just doesn't make a lot of sense. But to advocate direct reuse today would not be acceptable at all. But I can look ahead and I can see technology developing to a point where we will be doing that.

Question: Is the State Water Resources Control Board supporting research along any of the areas that you are talking about?

Answer: Yes, we would like to support a lot more. We are helping fund a study dealing with environmental monitoring systems for waste effluent. This is a biological system where we measure bioproductivity and changes in constituency in a certain place and compare that with the quality of the effluent discharge.

This is the first attempt to set that up as a standard. The basic thrust of our program now is a study on biostimulation to toxicity, nutrients and heavy metals and toxicants in the Bay area, which will try to develop treatment techniques to remove toxic elements and to find what is

happening.

We add chlorine to waste for disinfection, and we had to find the extent to which that is toxic, and to relate that to practical programs. That is now half done and we expect a report on that in a year. It is an outgrowth of the Bay Delta Study. Those are just two of the elements. We have got a basic state-wide data system for our own program now about to go out for proposals. We are going to be talking about a state-wide monitoring program which will pull together all of the various agencies involved, and we would just like to do a lot more in the ocean.

Question: Do you have incentives in the Water Board to consider that when you may improve the water quality situation and water management and water waste situation, that you may increase the solid waste problem or air pollution problem? Do you have incentives that force you to consider when you improve one form of waste management, you may make the other form of waste management more difficult?

Answer: We have those incentives because those concepts are part of our philosophy. But not in law, and we need them in law to relate to the overall environment.

Panel Discussion Session

March 5, 1971

RESEARCH NEEDS OF CALIFORNIA DECISION MAKERS

Panelists

Dr. Robert Bish, Assistant Professor, Economics and Public Affairs, University of Washington

Mr. Harold D. Bissell, Manager, COAP Development Program, Department of Navigation and Ocean Development, State of California

Dr. George E. Hlavka, Director, Southern California Coastal Water Research Project

Dr. Malcolm S. Gordon, Professor of Zoology, Director of the Institute of Evolutionary and Environmental Biology, University of California at Los Angeles

Discussants

Dr. Robert W. Warren, Professor, Political Science, University of Washington

Mr. Joseph K. Kennedy, Deputy Director, Regional Planning Commission, County of Los Angeles

Mr. William F. Garber, Senior Sanitary Engineer, Bureau of Sanitation, City of Los Angeles

Mr. Frank R. Bowerman, Professor of Civil Engineering, Director of Environmental Engineering Programs, University of Southern California

DR. ROBERT BISH, Assistant Professor, Economics and Public Affairs, University of Washington: During the last three years at Washington, I have been working on a Sea Grant Program as a social scientist as part of an interdisciplinary team, primarily economists, political scientists and some lawyers, so that the perspective that I bring to Sea Grant research is essentially that of a social scientist and within social science, primarily that of an economist.

Coastal Zone Management as Problem in Resource Allocation

The problem of the coastal zone to an economist is like any other problem of allocating scarce resources. There are a lot of people who would like to use the resources of the coastal zone. Many of their uses preclude others from using the zone for what they may prefer. It is another allocation of resources problem that economists have long dealt with.

There are many aspects, however, that make it different from the kind of problems that are generally dealt with in a market economy. Many of the uses have interdependencies where you cannot package a good and service and sell it. One use affects another. Frequently, a resource constitutes what we might call a common pool, which many people can use at once, but the combination of all of them using it at the same time may destroy it. This set of problems is generally dealt with by public rather than private agencies in terms of resource allocation.

Prediction of Outcomes from Alternative Decision Making Structures

There are two ways we are looking at research. One is trying to find out how the present political, legal and economic institutions are working to get the decisions that are reached. There is really not a very good understanding among most social scientists in the sense of being able to predict outputs from alternative political and legal structures.

Economists have long been concerned primarily with predicting outputs from alternative types of market arrangements and alternative types of industrial organizations among firms. There has been much less concentration on predicting output from different types of property right assignments, different kinds of laws and legal restrictions on activities, and different types of political institutions per se, and the way that they interact with one another.

To understand an analysis of this kind requires the participants know more than economics, law or political science. It requires an inter-

disciplinary mix of people who try to begin to understand what regularities and patterns there are to the outputs of different kinds of political structures. And this is a very important part of the type of research we are doing, which is to try to understand how a system functions, how to change constraints in it and alter the output you get.

There is one problem that people who are not social scientists often do not recognize in the bigger issue of predicting outputs for political and legal structures, and that is that the people are not like molecules or so many biological organisms. They learn, so that a person who might be disappointed or figures he loses one round of a transaction in a political or economic system is likely to learn an alternative strategy when he enters into a similar type of situation in the future. Because people learn the context of interactions, the game that is being played is one that is constantly changing.

You never reach a final decision making structure, a final allocation mechanism. You have an on-going system where you hope you have the type of game where no one eventually comes to dominate it in all situations, but one which the participants consider relatively fair.

Evaluation of Alternative Outcomes

There is a second component to this that is extremely important. You have to have some way of evaluating outputs. There has to be some agreement as to whether outputs are good or bad in a normative sense. Many times the analysis that we would undertake to evaluate the outputs resembles the kind of questions the manager would ask. Should this plant be located here or somewhere else? Should this area have a marina? What level of sewage treatment do you want? These often are very specific decisions where choices may be made about a location decision, about some output or input to a productive process, or to a consumption process in terms of leaving the area natural for consumers who prefer recreation.

This area of decision making and of analysis is much more closely associated with traditional microeconomics or systems analysis where you try to look at a single problem and get some idea of values individuals might place on different outputs. It is with this kind of evaluation that the most serious problems probably arise and some of the most difficult judgments have to be made.

From an economist's perspective, when he looks at value, the value measured is that to people. This, in a sense, is the way individuals perceive the choices they have. Do I gain from this or lose from this? However, it is very hard to place values from other people's point of

view. There are those that say that life should be indestructible; birds should not be displaced and so on. The real measure comes down to what people are willing to give up so that birds are not displaced or that some other living organism is not destroyed. It is something that has to be expressed in terms of the people or individuals who make decisions that affect other forms of life. This itself puts economists in a framework that may be somewhat different, but you find you usually have to predict people's actions in terms of values that way. It is very hard to use models based on other value structures for prediction.

Most of you know the kinds of conflicts that exist in terms of evaluation. You are aware that if you want to do one thing, you have to give up something else. That is what economists refer to as "opportunity costs." Whether you want to measure them in dollars or not is really of indifference to most economists. Having a common denominator to make comparisons is often very useful, and having a medium of exchange in terms of dollars is much easier than bartering in physical goods and services. There is really no ethical connotation, in the sense of whether you want to use dollars or apples or anything else as a measure of value or medium of exchange.

The concept of a price is important because in the private market, prices are the result of voluntary transactions. And if you are dealing with packagable goods where there are no external effects, the price is, in a sense, the outcome of a noncoercive interaction between people. The idea is that most transactions, where possible, should be voluntary rather than coerced by one side or the other in the sense of individuals making choices from among options they have. Price setting in a private market in many, although not all, cases is related to the idea of voluntariness rather than coercion.

When you move to something like a seacoast or coastal zone, you have external effects; you don't have packagability. It is much harder to get any concept of what value is.

We know that if a lot of beach is available for people to use for recreation, at the margin they will place a lower value on it than if there is a very limited amount of beach available for recreation. If you decide to have no port facilities on water, people would pay a very high price to have some port facilities so that they could save on transportation costs over alternative modes. The different allocation you start with will radically affect values for any given decision at the margin because across different quantities of goods, prices would be different at different levels.

When we look at the studies in Puget Sound, we boil the evaluation problem down to trying to identify values where there is a change in existing

use. It is always useful to start from what is occurring and try to find out what happens if you change something. We have taken two approaches to this. One is the undertaking of large surveys in detail to find out what people perceive as costs or benefits from a change in the use of the shoreline. These are very specific instances. The two case studies we finished are on an oil refinery location and on an aluminum reduction plant location; both are in areas where there are presently only residences and very low density uses along the Sound. We go through a set of interviews designed to pick out what people perceive as the benefits or costs of these locational decisions, and try to get some feeling as to whether there is any kind of agreement that can be reached in terms of net costs or net benefits.

The second way we have been analyzing these problems is with techniques more strictly from microeconomics. We use the state input-output table with regional coefficients. An input-output table is simply a large matrix which relates all the input to a firm to all of the other firms that buy its outputs. So you have, in a sense, a picture of the relationship among all the sectors of the economy from your natural resources to your final outputs.

We can take a table like this with some breakdowns to the local level, and trace through what we would call the value added in terms of additional employment. That would be additional incomes that would not be received elsewhere. We can break this down into the way different resources or different payments are received. For example, if you put in an oil refinery, who collects certain tax revenues? What kind of additional public service costs are generated? What kind of increments do you have in land values and who owns the land? You can work in this context, and develop some reasonably accurate estimates of the impact on the firm in those areas of the market economy that we can measure. This often helps public decision makers and others, especially because the two cases we have looked at in Puget Sound are industrial plant locations in what are relatively rural areas of the Sound, and where there is high unemployment levels and relatively low income levels as compared to more urbanized portions. So some of the techniques from economics will at least let you lay out specifically what you can measure in terms of market prices.

However, some things become apparent very quickly when we begin to do this in terms of perception, and using economic techniques. One of these is that the area that we picked for the analysis itself radically affects the kind of outputs we get. If you look at the local community, you find their cost and benefit picture may be quite different from what you would find in a larger region, say in the twelve county region surrounding Puget Sound, which is entirely different from the cost and benefit picture you get from looking at the state or from the national level.

This is because, generally at the national level, we abstract out all effects of location per se, while at the local level what often occurs is the transfer of some income generating activity from outside the area into the area. If you make a national measurement, you cannot spell those transfers out.

When you make a local measurement, it indicates the additional income the local people may receive, or opportunities for income they would forego if they decide not to have an industry locate in their area. This brings you abruptly to the problem of benefits and costs accruing differently to different people, and you have to take into account that you simply may not have available transfer mechanisms to reconcile some of those differences.

What is generally recommended in these areas is that you look at issues from the state perspective, as is attempted in California, and as bills in the legislature in Washington would promote. But remember, looking at it from a state perspective will give you a different answer than from the national perspective or from the county or local community's perspective. You have to recognize that differences do exist, and we find it very important to identify who benefits, as well as any estimate of net benefits.

Selective Use of Technical Information

There are other interesting things we have come up with while we were trying to develop some techniques for analyzing the costs and benefits of alternative developments. They relate to uses of information generated by our other Sea Grant colleagues, especially in the oceanographic school, in marine biology, in environmental engineering, and so on.

How is this technical information used by people who are interacting to make decisions about whether a plant should be located in a particular site, or in trying to predict different outcomes from political and legal structures? The decision making structure is extremely complex. No one has a monopoly in it. There are a variety of state and local agencies, all of which interact. All are constrained by other agencies and by certain precedents.

We find the technical information is generally only picked up by people who feel that it supports their position, which I don't think should be unexpected. However, if you continually look for the monopolist who is going to pick up technical information and implement policy based on it, you will fail to find any client whatsoever for your information.

Research findings are often selectively used and considered by the

people who originally produced them to be distorted. This use of knowledge in decision making, in economics, in political processes is very common. One can continually hope that it would be different, but I would suspect it would be better, at least in the meantime, to assume this is the way information is often used, and that it is pretty hard to avoid its selective use in these types of matters.

We have reached one general conclusion in terms of the broad question of predicting inputs and outputs in general legal and political structures.

Generally, in talking about management, there is the idea you will get an ultimate regulatory agency, the final organization that will make the decisions. Yet in your everyday activities, you carry on as if there is no ultimate agency that is going to make decisions. Your agency has a certain mission and you look after that, and someone else looks after theirs.

I would suggest that it is probably best not to wait or rely on there ever being a single ultimate monopoly agency in environmental regulations or any place else. Plato sought that in looking for his philosopher king. Man hasn't generally been able to create a benevolent despot so far, so you had better expect that you are going to be interacting in a larger system at all times, even though you try to make hard management decisions based on your perception of what the public interests may be.

The public interest is not a very operational concept. If you look at it as agreement of the people who are involved in the decision and affected by the decision, then it becomes somewhat operational and meaningful. Abstracted from that, the public interest is simply another term that different people use to advance their own bargaining position. If you recognize how technical information is used and how the entire system functions, you can have much more impact in the system rather than spend your time worrying when technical information is not used in what you consider the proper manner.

These are some observations we have derived from studies over the past three years. I think this is a very fruitful area of research in the social sciences and law, one which is interdisciplinary and one that has a great deal of promise for the future.

MR. HAROLD D. BISSELL, Manager, COAP Development Program, Department of Navigation and Ocean Development, State of California: I will explain briefly what we are trying to do in Sacramento to formulate a plan for the eleven or twelve hundred mile California coastline and the waters offshore. This plan is being prepared at the direction of Section 1, Chapter 10, Division 1, Title 2, Government Code 1967, which called upon the Governor to prepare a Comprehensive Ocean Area Plan (COAP) and which created a California Advisory Commission on Marine and Coastal Resources (CMC) to review the plan.

Development of the State Plan

The COAP is to provide for the "orderly, long-range conservation and development of marine and coastal resources which will ensure their wise use in the total public interest."

I will summarize by saying that we are preparing the COAP at the state level. This includes developing guidelines for local or regional planners. We are trying to include local input wherever possible, including materials from local government when it is available and appears appropriate and up-to-date enough to be useful.

We are making attempts to get the input from all agencies, whether federal, state or local, and to look for the conflicts between the proposals they make, and to try to reconcile these conflicts.

When we get all of this information at hand, and we have quite a bit right now, we are going to have to make some hard decisions in order to make recommendations to meet projected needs for 1980 or beyond.

First, there is a problem of defining the coastal zone areas. Where are we going to do the planning? We have spent literally months trying to define the area we are going to consider in getting this plan together, and we ended up finally with three zones. We had to talk zones because we could not get a single definition to suit everybody. Our project has had quite a lot of people to satisfy.

We have a high priority Zone A ranging from a half mile inland from the high tide mark and out to sea three miles. Zone B is not quite as high priority. It moves inward to the landward boundary of the coastal county and out to sea to the continental shelf. That still did not satisfy everybody, so we have Zone C, which is the rest of the world. That takes care of fisheries, transportation people and economists.

Now, that is a pretty big order, and with the time and money available to us, we must focus primarily on that half mile inland strip, and to

almost the same degree as the three miles offshore. But the most pressure is for action within this narrow coastal land strip.

The first thing we did was to obtain an inventory of the uses, resources and certain topographical features within this half mile strip. We have done this with the aid of aerial photography, through photo-interpretation, and with the use of field trips and maps. We now have a record, for the first time, of what is in this narrow strip as well as "how much" in terms of area and numbers. And it gives us a firm basis from which to start--relating to April and May of 1970--concurrent with U.S. Census results.

As we get this information from local and state entities and from our photo maps, we must decide what we are going to do with the data. We have to evaluate, to assign priorities, and come up with, as I have indicated, an ultimate recommendation for allocation of uses to meet the needs of 1980.

We have had a study done by North American Rockwell, under contract to us, to develop an information system. This is an important problem because it is very evident as we go along that an overwhelming amount of information exists, and it must be obtained, stored and disseminated in an orderly fashion. I wonder sometimes if we really need to know anything new, or if we can't do all right with what is already there buried in somebody's files or on maps. I am convinced that most of the information needed is already there. One way or the other, though, we have to find out who wants what; what it is worth to them; what they are going to do with it; and perhaps most important, what they are going to pay for it!

I will just throw in a question. Those of you who have attended hearings by the dozens or hundreds might just decide in your own mind how many of the decisions at these hearings have ever been made on the basis of information or hard numbers handed to the decision making board. I will wager that most of these decisions have been made on perhaps slightly softer, more subjective grounds, representing a practical immediate solution.

COAP Research Needs

Our needs in this COAP are many, and I will indicate some that are important to us.

We would like to know what all the ocean related industries, business and commerce activities are in California. We would like to have a list, if nothing else. We want to know types of businesses, the em-

ployment, the incomes associated with these industries, the earnings, the bank deposits, the investments, all the activities in the community involved with the ocean. We would like to determine the spillover of costs and benefits to adjacent areas of economic enterprise.

We would like to have an index of ocean dependence showing the relative needs of each type of business in the competition for coastal zone space and resources. It is another way of getting to the priority problem. Conversely, we should know the impact of a given enterprise upon the environment or community.

We need measures of the degree of interdependence and interrelatedness of the wide variety of ocean oriented enterprises, in terms of compatibility and incompatibility. This is very important to us.

We would like to know what people really do want in this coastal zone of ours in California. What is the quality of life? What are the amenities that seem to attract people to California, and particularly to the coastline? We would like to have these defined--perhaps expressed as a "life style".

It would seem that the people who live in an area should have the occasion to express what they wish to have in the way of a life style. The Del Norte County life style is different than the Orange County life style. What are the relative values that we place on these qualities of environment? One way of going at this would be to group counties with similar life styles into regions. We really need to know more on this topic. We have at hand several matrices that show the relationship of one use to another in terms of compatibility or incompatibility. Fresh thinking on these would be useful.

Housing in the coastal zone presents one of the major problems we are faced with. We need criteria that we could use as a basis for acceptance or exclusion of residential development within the coastal zone. Land management policy generally is needed. We really won't get anywhere until there is a firm land policy, both federal and state.

The area of legal problems and restraints is important, not only on the land itself, but at the interface between the land and water. Measurements for the interface have to be known. Legal decisions have to be made on boundaries which affect everything from local activities up to the international scale.

There is a new attitude emerging that is very apparent. There is a changing public attitude toward the public right and the private right. It is especially apparent in cases having to do with ownership and with access. The courts are currently handling cases which, when

finally settled, will set precedents for much of the public's use or access to the shoreline.

Our office has some problems in terms of timing--getting materials in hand to complete our product--which we hope to have wrapped up by the end of this year. We would have difficulty working with you on Sea Grant projects and obtaining a final product unless results could be developed on short term projects to meet our own deadlines. We also have deadlines in our office for developing planning criteria. There are several types of criteria that we feel are crucial and that we either will have to develop ourselves or have developed or will need help on. They are very simple. They are ridiculously simple until you try to test them and make them practical.

How do you establish the criteria on which we determine local, state or national interest, for example? Is a power plant a matter of local concern or state concern or federal or regional? Who is the public?

Almost every piece of legislation mentions doing this or that "in the public interest." Again, who is the public? Is it the fellow who lives on the coastline 365 days a year? Is it the person who lives in Fresno and visits the coast on weekends? Is it the tourist from the Middle West that comes to visit all summer? The merchant who makes his living there is "public". Who do you plan for in the "public interest"? Each person will claim his is the "public interest"!

I have mentioned this matter of life style, and I will mention it again. The more we get into this, the more crucial it is that we find what life style is and pin it down as precisely as we can. We should have "environmental quality" defined. We see those two words every day, but what do they mean? What are the amenities? What are things that make life worth living? Now, our office can make up our own definitions, and we will probably end up doing that, but we need help.

Sooner or later, we are going to draw the line. Some uses will be in, and some uses will be out.

I have a couple of things I am going to read you out of seven proposed guidelines for planners and decision makers. One of them is "that the primary use of relatively undeveloped segments of coastal zones should be restricted to those uses that are dependent on the zone's inherent resources or its environmental attributes." That simply says that if a use or activity doesn't have to be there, it shouldn't be there. This could apply to houses or residences.

Now, think of the consequences if you take that literally and believe it and endorse it. It would be a radical change, and there would be a lot

of unhappy people. It would make a significant difference on the development of any given segment of coastline, but this is the kind of decision that is going to have to made sooner or later. We are going to have to say yes or no, and make a choice.

Another guideline is, "the environmental modifications and uses within a coastal zone should not reduce unnecessarily the number of options available for future generations." Now, we can all say, at first glance, "fine." We all believe we want to do something for our children and grandchildren. However, if you really mean it, there are going to be consequences. Many uses just won't be permitted in this coastal zone. But there are also going to be serious consequences when you do something that is going to irreversibly modify coastal attributes and reduce options. Choose--will you give up today or tomorrow?

The main thought I want to leave you with is that we are really getting down to the place where we have to make a choice, and somebody is going to get left out. It is inevitable, so we better have some good reasons for making a choice. Let us base those choices on all the facts we can get, but let us not be afraid to involve our values in decision making as well.

SCCWRP Organization and Research Program

DR. GEORGE E. HLAVKA, Director, Southern California Coastal Water Research Project: The Southern California Coastal Water Research Project (SCCWRP), in effect, constitutes a microcosm of the many subjects discussed at this series of conferences; it has not, however, been set up to deal with the entire range of problems being considered here. We do not deal with socio-political or economic issues, not because we are not interested in these matters, but because they are not included in our charter. Nor are we an action group--we are not out to stop the polluters, encourage the polluters, or change the laws. And we are definitely not a regulatory agency, so questions as why don't you stop something from happening are inappropriate for SCCWRP. We will, however, play a very definite role in defining research needs in connection with at least some of the problems of the Southern California coastal waters, and we feel a very strong and compelling need to integrate the many different aspects of these problems in a way that they have perhaps not been approached and treated before. So in that sense we have had to tackle the kinds of problems that this conference has been organized to investigate.

At the last meeting in this series, it was obvious to the audience that a very serious problem arises when vital information about environmental matters is suspect because the agencies responsible for the undesirable discharges into our environment are the very ones paying for the research to determine discharge effects. In a sense, SCCWRP is also subject to that type of criticism because it was created by a group of local government agencies who are responsible for the discharge of a billion gallons a day of waste waters into the Southern California coastal waters. But no one else had set up such a research project and these agencies felt that it was urgently needed. Their approach to solving this credibility dilemma was to set up a project with complete independence from its sponsors. They pledged a million dollars and left control of the project in the hands of a Commission composed of officials who are responsible to the public. This, at least, is one way to solve the problem of separating the design and implementation of a research program from funding agencies having a direct stake in the results of the investigation.

We at SCCWRP also had the problem of defining research needs and this was accomplished by the five SCCWRP commissioners who are in overall charge of this project. They appointed a consulting board of the best men they could find anywhere in the United States in the technical disciplines important to this project. Using their advice as to what this program should include and how it should be run, the commissioners launched the program itself.

The net result of that attempt to define research needs was a research plan derived from an initial outline. The outline consists of about eight or ten pages of things that we would like to know, and it attempts to define the important problems. The project would not necessarily be able to answer all the questions posed in that outline, but it should be recognized that there are a lot of unanswered questions.

Ours is very much a research oriented organization. We are engaged in Phase 1 of the program now, whose objective is, and has been for some eight or nine months, just to understand what is available in the way of information pertinent to the effects of waste waters on the coastal waters of Southern California. We are now at the point where about 90 percent of the information is in our hands and has been examined, read, and understood; and we are beginning to draw conclusions and to make preliminary plans to begin Phase 2. We plan to engage in research work of our own and to sponsor, initiate, or promote research by others in areas where further studies are found to be necessary.

Our research approach is also characterized by an attempt to solve the dilemma that faces everyone in problem areas, dealing with cause and effect relationships. If you observe an effect in the ocean, an ecological condition, and you wish to establish what caused that effect, how do you do so? Basically our approach is to use the tools of statistics, to examine the data and decide from a statistical analysis whether an hypothesis has validity, considering at the same time all of the other reasonable causes that may account for the phenomena observed.

As to where we are now, it looks to us as though, contrary to what Mr. Bissell has said, the existing information doesn't provide answers to the important environmental questions being asked today. At least from the scientific standpoint, when setting up different hypotheses and trying to test them on the basis of existing data, we find the data inadequate or at least the answers inconclusive and not precise enough for the kind of decisions that society as a whole is going to have to reach about some of these very vital problems. So that is why we are so anxious to begin Phase 2 and design a program that will provide better answers to some of those unanswered questions. We have heard that the government is moving ahead because of public pressure and that they want to do something about the situation. We are trying to help by furnishing the kind of scientific basis that should be a part of the process of reaching these environmental decisions.

Within the next month, we will report to the SCCWRP Commission on what we have been doing, so they know the taxpayers' dollars have been reasonably spent. We also expect to turn out some proposals to other funding agencies so that the monies that we have can be expanded to meet the kinds of expenditures that are required to solve the problems

that we see and to study the questions we feel need answers. We also expect to turn out a series of technical reports in some of the areas we have investigated and a central summary that reflects our attempt to integrate across the many different disciplines, such as physical oceanography, biology, sanitary engineering, geology and public health.

I would like to indicate that we have found U.S.C. to be extremely important, frequently turning up in our investigations. A great deal of very important work has gone on here. The Hancock Foundation work has been a source of much of the knowledge we feel we have at hand. Even now, a great deal of very interesting work is going on, including the work of Nancy Nicholson and Donn Gorsline. All this has been part of the type of information we have tried to gather, so I hope you will see the output of all of our work begin to appear sometime in the next few months, and that you will have a better idea about what we have learned and the conclusions we have drawn. This information ultimately will be used for the purposes for which we were set up, namely better designs of systems for waste treatment relative to ocean disposal and the ecology of our ocean wastes, and better systems of regulation by regulatory agencies.

DR. MALCOLM S. GORDON, Professor of Zoology, Director of the Institute of Evolutionary and Environmental Biology, University of California at Los Angeles: I would like to discuss some of the infrastructure of a broad research program having to do with the coastal zone. Specifically, I view this as a problem in research management and strategy.

I think we all agree on one thing. This is that, in principle, the role of the scientist should be to try to provide the facts. Whether or not the facts get used in any objective, reasonable way is another issue altogether. In all cases where one is trying to provide the facts, one hopes that the facts will come out objectively and clearly. One also hopes they will be very well done. One of the problems that frequently obstructs utilization of facts is that they often are not well determined. There is no substitute for good people. If you have a good man to do the job, you will get a good job. If you don't have good people, no matter how good the idea is, the chances are it won't get done well.

The California coastline, from the biological point of view, is one of the best known coastlines on earth. However, it is still very poorly known in many, many ways. The only ways in which it is reasonably well known are on what a physical oceanographer would call a synoptic scale, meaning over fairly broad areas, over fairly long periods of time. There is essentially nothing known in detail for most areas of the coastline on a more micro scale. The micro scale is where the kinds of planning and operational problems that have been mentioned up until now come in. I thought I might set forth, from an academic point of view, what looks like a proper way of going at such micro scale programs.

My remarks are patterned after a discussion that took place in a committee I participated in a while ago. For patently political reasons, that committee didn't have much attention paid to it. It was the National Academy of Science Committee on possible biological problems associated with the construction of a sea level canal across the Isthmus of Panama. If you have been reading the journal, Science, recently, you may have noticed that the report of the National Academy Committee on this subject was ignored very thoroughly by the Nixon administration in favor of a report that was written by another kind of group which did not worry very much about environmental impacts, at least from our point of view anyway.

One of the first things you have to start off with in any biological study is a survey, a map of the types of habitats that are present. COAP is well along in doing this for the California coast, but I suspect that they really have not done very much below the high tide line. It is, after all, difficult to see through water with aerial photographs. It is possible

to do a bit of this kind of thing with some of the more sophisticated remote sensing procedures, but you really can't do very much even this way. There is no way of doing this that I am aware of without on the spot surveys with ships and divers and related items.

Once you have made your survey and mapped the habitats that are present, you can start doing more detailed investigations on what you consider to be the major habitats. The question immediately arises: What are your criteria for major? There are a number of possible criteria. One, of course, is simply surface area. A second one is the possible economic significance of the habitat in terms of the resources that are present in the habitat. In this connection, you have to concern yourself with renewable and nonrenewable resources. Another criterion is the recreational significance of the habitat. Another one is the degree to which there is something in the habitat that may relate to health concerns in one way or another. Another one is the aesthetics, and still another one is possible future uses for the habitat that may not exist right now, but can be visualized in one way or another.

Once the decision is made about what constitutes major habitats, in terms of these criteria, there are a whole series of different kinds of studies that are worth getting involved with or necessary to get involved with in terms of the organisms which are present. These fall into three major categories. The first catagory is what might be called natural historical studies. By natural history, I mean what kinds of organisms are present, how these organisms are distributed; and how abundant they are in various places. Natural historical studies necessarily include the microorganisms, plants and animals.

The second category is autecological studies. These are studies relating to the properties of the specific kinds of organisms which are present. In particular, these are studies of the effects on survival, behavior, physiology, reproductive capacities, genetics, chemical composition, and so on, of individual kinds of organisms of all the various physical, chemical and biological influences which are present in the environment.

Of course, as soon as you start doing things like this, you have to come out with another set of criteria as to which kinds of organisms should be studied. Thousands and thousands of species of organisms live in any area of any size. One needs a set of criteria for choices as to which organisms to work on, which is similar to that originally generated for the habitats themselves.

The third category of problems includes the synecological questions. These are the problems that relate primarily to populations associations and communities of organisms. They include the structure of

these communities, in terms of age, for example; sizes of organisms; the diversities of the communities; the number of kinds of species present; the different systematic groups represented and their distribution; the energetics of the community and how energy is partitioned through the various parts of the food chains, and so forth. It is also necessary to look at populations and communities from the standpoint of their responses to all of the various physical, chemical and biological influences that occur in their environment.

I think it is apparent that this program has enough in the way of research potential to keep everybody on earth busy for the rest of their lives just studying the inshore waters and shoreline communities of coastal Southern California, not to mention Northern California. This is obviously impossible, so choices must be made on the basis of the criteria that I alluded to previously.

There are a few additional factors that need to be taken into account. I will very briefly list these. I think it is important to emphasize in any study the features of the greatest probable relevance to human welfare. You obviously have to worry about both short and long-term concerns. You have to include man-made influences among the environmental influences that affect your organisms. This is what is called "technology assessment".

You also have to do the kind of thing George Hlavka has had his staff doing from some time now, finding out what is known, doing literature research and analysis, and developing bibliographies and things of that sort. You have to balance your mission orientation versus basic studies. From the university standpoint, you must balance what people consider to be usable results versus training aspects. You have to balance fire fighting needs against needs for long-range understanding, and you have to try to work towards some predictability of the effects of changes as they might occur.

It is further necessary to recognize the pluralism of interests, needs and wants in our society, in the research communities, in the governmental communities, and so on, and to try to satisfy everybody as best you can. I call it maximizing the good and minimizing the damage as much as possible. Finally, from the research management point of view, you have to determine some balance between observational and descriptive kinds of field studies as compared with more experimental laboratory or mechanistic types of studies.

What you end up with, or what you <u>can</u> end up with in principle from all of this, are materials which will let you answer what I think are the four most important policy making questions:

1. What are both short and long-term trends in the living communities as they exist along the coastline?

2. Are these trends anything that might require action by government agencies, businesses or private parties? There are obviously a lot of things that go on that you don't have to worry about because they aren't going to affect anything important.

3. If there are things that require action, what kind of action should it be?

4. Are there any presently low-level trends which may foreseeable become high-level problems at some later time?

If you can provide answers to all these questions, it seems to me you have a rational system for getting somewhere. The extent to which it is ever possible to provide such answers is something that a biologist hasn't much to say about.

The Process of Coastal Zone Management

DR. ROBERT W. WARREN, Professor, Political Science, University of Washington: I find it pleasing, but a little frustrating, to have economists, biologists and almost everybody else outline what type of research should be undertaken to solve seacoast problems and then grandly leave it to the political scientist to say how the resulting solutions can be implemented; almost as an afterthought. I think there are problems both ways, to find out the type of research that should be engaged in, and how it can be implemented.

Implicit Biases in Data

What I would like to do is look at not only the manifest problems that have to be responded to on a day to day basis by people in the administrative agencies, but also at some of the implicit processes that are going on.

Why look at processes? What can we do by looking a little beyond the existing set of assumptions and the existing wisdom in making responses to the problems of seacoast management?

For example, the type of research discussed today requires not only identifying the kind of data needed, but also determining if biases are being introduced by those generating it. I think this is a very serious problem as George Hlavka has mentioned, and that there can be certain biases and distortions in the source of information. If you look at something as widely used and normally unquestioned as Bureau of Census data, it is not difficult to find certain built-in conceptual straight jackets that limit the questions that can be asked, and how far you can pursue those that the data will allow you to make inquiries about.

Consider the population count. The census tells us how many people there are distributed horizontally over land. At close look, the things the data does not tell us become quite interesting. It doesn't deal with actual density for functional or recreational activities. Also, it limits how much we can visualize things spatially.

For example, I haven't heard one word about population extending over water. It is technically feasible to build cities of forty, fifty or sixty thousand off the shore of Southern California. There are detailed plans that have been developed in Britain by Pilkington Brothers Limited, and Buckminister Fuller also has designed a floating city. However, breaking this conceptual barrier is only the first problem in giving serious consideration to locating people on floating platforms over water. It may be that our land oriented legal system, in its present form, cannot

handle the implications of a floating city.

In addition to mirroring the dominant thought of the day, the data generated by public agencies, for the most part, tends to reflect the interest of the dominant groups in society. Albert D. Biderman makes a series of telling points on this matter. He notes that the quantitative information that is normally available to decision makers tends to be information that allows those who are most influential to assess their position in the distribution of benefits by public policy, while those with the least resources in society normally have no such benefits.

You look at the poor, you look at the disadvantaged groups, and it is only very recently that we started talking of social accounts that go beyond the normal economic, industrial and business population statistics we have available. If we are going to talk about research for seacoast management, we should carefully consider the limitation of the data that is customarily used.

Changing Demands on the Coast by People

I have heard a great deal of talk about indigenous marine life on the seacoast. I have heard very little talk about people. It might be healthy to reverse the framework for some purposes and assume the seacoast is a subsystem serving ten million people in the South Coastal Basin, as well as large numbers of tourists.

If you start dealing with people, it becomes necessary to ask what kind of demands are they making now and will make in the future, and what is the capacity of the coast. How many square feet per person is needed for somebody to be on the beach? If you simply divide up the population by the amount of beach available, how many people can be there at one time? How does this figure fit the demand pattern? What factors are likely to affect demand? A changing age structure? Availability of public transportation to the beach? If future demands will exceed capacity or there are transportation cost barriers to beach access for some, what kind of substitutes are there? Why can't a lake be built in Watts? I am sure the Corps of Engineers would be up to the task. When a marina replaces a beach, certain opportunities are foreclosed for citizens who swim but cannot afford boats. Is there any reason not to consider providing alternatives for those people who are removed from access?

Changing recreation technology is another factor influencing demand. If you look over the last seventy years, people initially went out and swam, sunbathed and boated a bit. Progressively, surfing, boating and water-skiing have become mass activities. What have been the

time periods between introduction and widespread use? What factors have made it possible for boat ownership to be divorced from social class? Is it possible to identify the next advanced technology in recreation? What space demands will it have? How many people will be utilizing it? If something like the hula hoop, which had to be used near water, were to be invented, it would be nice to have a little advance notice.

Anticipatory Actions by Local and State Governments

There are several other things I would like to mention that relate to political science. The first matter concerns anticipatory or preemptive actions. A point was made earlier about conflicts among federal to state and local regulation of the seacoast. Federal interests are not necessarily the interests of the state or localities. If the relevant national agency advises people operating oil platforms, "It is not necessary to provide information about discharges of pollutants to an appropriate agency of the State of California," could this behavior have been anticipated? Are there other strategies that could be used to gain the information or modify the behavior of the federal unit?

One method of attempting to forestall conflict between federal and state and local standards would be to become involved in the process by which federal policy is set. The State of California should be intervening early enough in national decision making concerning the seacoast to at least have its interests or objectives taken into account before the policy is made. But the normal pattern is to have the policy laid down and then for a state to respond, saying, "This doesn't work as far as we are concerned, and we would prefer to do something different."

A question about innovation in local agencies has also been raised. Attitudes toward the recycling of water was used as an example of rigidity. It was suggested that some administrators in water districts and the public health agencies, who are negatively inclined to reuse of water, will respond differently as technology catches up to them. This may or may not be true. The evidence in this area is limited. One option is to wait until the generation retires. But then the question becomes, how long will this take and will the new generation be any different?

A more interesting possibility, backed by some research findings, would be to subsidize desired changes on the part of the most innovative, rather than try to "educate" or provide technical advice to agencies that are less likely to pick up new things. In studies made on the diffusion of innovations among local governmental agencies, it has been found that once the units of high status institute a change, others tend

to follow. If this is true, it would be efficient to support change in those agencies that would naturally be the most receptive rather than ignore them to work on the least innovative.

MR. JOSEPH K. KENNEDY, Deputy Director, Regional Planning Commission, County of Los Angeles: I will try to give you a few reactions of a planner to some of the shortcomings of the planning process that normally might be expected to be used by a local planning agency in a coastal zone study. There is certainly no argument that we need the type of scientific facts that have been suggested here today to begin the planning process. The normal process would analyze this basic information to develop goals, spell out policies and set up programs to accomplish the goals. This so-called normal process seems to be good for making plans, but it leaves much to be desired in the area of finding realistic ways of putting them into effect.

Policy Issues

One of the critical missing ingredients in the planning process is an evaluation and recognition of existing related policies. I think we could profit from some good research on the part of political scientists on how to systematically grapple with the issues of policy planning. This area has traditionally been primarily a political decision maker arena in which planners have had little involvement. Because of this, we have had many technically sound but fiscally and politically unfeasible plans developed over the years. Therefore, I think that more emphasis should be placed on trying to understand the real world process in which a plan is actually implemented or realized.

For a start, I suggest that a systematic inventory be made for comparison of the many policy issues inherent to coastal zone planning. For example, we have the issues of the public interest versus the private right; the constitutional basis versus the political expediency; or the issues of land use conflicts such as between recreation and industry, recreation and housing, or housing and industry, etc. These types of issues come up in various ways during the course of the planning process, but I don't think anybody sets them down in columns so that all who are in the process can know the full spectrum of issues being dealt with.

This lack of a systematic evaluation of policy issues becomes most evident in public hearings. If the hearing part of the planning process could spend less time ferreting out the issues, more hearing time could be spent on considering alternatives which best represent the

broad public interest. This should contribute to a much sounder set of goals and sounder plan.

Interlocking Goals

The need for a hierarchy of goals has been mentioned by several speakers today. For example, it has been suggested that logically we must have a federal land use plan, a state land use plan, and a local land use plan for truly comprehensive and meaningful water plans to result. I don't think many planners could argue too much with this type of approach. However, being realistic, we must consider the likelihood of this occurring. Based on the past track record, I'd say the possibilities are slim.

So, I feel that local governments and regions are going to have to infer on a basis of a set of most likely assumptions, state and national goals for conservation and development.

Goals Evaluation

I think the research process might address itself to some method of evaluating proposed goals. This would involve checking out how realistic policies are and how effective similar programs have been to carry out a given goal. This would better enable you to ask, are these policies doing what you intend to do or are they missing the objective?

I think these are some of the areas in which we could use assistance to develop more systematic inputs in the planning process, which would be most helpful in the very complex coastal planning and management studies ahead.

MR. WILLIAM F. GARBER, Senior Sanitary Engineer, Bureau of Sanitation, City of Los Angeles: I represent an operational agency and usually enter a meeting such as this somewhat defensively since I have often had a black hat placed firmly on my head by my auditors before I had a chance to say anything. However, because a university group is supposed to be more willing to listen to all facets of a subject before making a judgment, I am hoping to be able to show you some of the factors facing an operator conducting research on ocean effects. Thus, a major wastewater treatment facility, such as that for the City of Los Angeles, has the strengths of being large enough to cut unit costs, to even out waste variations, and to employ specialists such as biologists, chemists, engineers and trained operations men who insure top grade

treatment and knowledgeable review of ecological effects. On the other hand, it is highly visible and tends to be automatically associated with environmental problems, whatever their cause, which appear in the receiving waters and which are in this case those of Santa Monica Bay.

The public appears to have missed the basic point that a large metropolitan area with over seven million people in residence is bound to result in major environmental dislocations involving land, air and water resources and that each of these is related to the other. A ready example is the lead alkyls emitted in automobile exhausts which then eventually reach the ocean waters to contribute the major input of that environmentally important metal. To extend this point, wastewater discharge operations have also been blamed for oceanographic phenomena ranging from beach erosion to "Red Tide" blooms. It is, of course, recognizable that in the first case the structures placed to dispose of wastewater may have some local effect on beach stability, but the basic reason is the interruption in sand replenishment arising from the damming of rivers and the removal of their waters for water supply or flood control. Likewise, "Red Tide" is always a regionwide phenomenon usually reaching from south into Baja California to north of Santa Barbara. Wastewater nutrients may locally intensify blooms, but the amount of these nutrients is similar to what was formerly brought to the littoral waters by the natural perennial streams, so effects should have been similar. My main plea is that we continue to use scientific methods in studies of wastewater effects and not be stampeded by the extreme demands of well-meaning but inadequately informed advocates of environmental improvement.

Realities of Research

I would hope that we would recognize the importance of using the scientific method instead of bowing to what my daughter calls "the true believer syndrome." What people apparently find hard to understand is that controversy is inherent in the scientific method. You find a bit of the truth and somebody else finds a bit of the truth, then maybe you disagree, but eventually you get together and try to come up with the correct answer. I believe we are being pushed by the true believers into decisions for which there is not valid scientific reason. This in turn is necessitating the expenditure of funds that may not be necessary. We need the true believers as a goad to make us cut off research at some point and make a decision, but we cannot leave decision making to them alone.

With this in mind, we try deliberately to work with the universities for several reasons. We happen to have a civil service setup in which one can become very ingrown unless there is an opportunity to go outside

to places such as the universities and let somebody else try their different ideas upon you. In our work with the university, we have trouble with the "ivory tower syndrome." University people love their work, and they are usually doing a very good job in a somewhat narrow field, but one cannot push them and say, "Look, we have a decision to make and we have to have a firm recommendation from you now."

However, under conditions such as the current environmental improvement push, there are not too many alternates left to us. For example, the charge is made that, "None of the research you do is any good because you are dischargers and therefore your whole stake is in preserving your right to pollute." The same thing is said of SCCWRP now because they are financed by the wastewater treatment agencies. In the same way, experts from the universities that we have retained to look at ecological effects are said to have sold out; and when we gave Fish and Game free reign in a study program, their published results were attacked because they did not show an ecological disaster. Under such conditions, it is difficult indeed to utilize the scientific method. We hope the universities can help in this by undertaking some of the studies and avoiding the curse of being charged with discharge agency control.

The Problem of the Single-Purpose Agencies

I was glad to hear Dr. Bish talk about the problem of an overall versus a single-mission agency. It definitely is a problem we face, and we tend to agree with him that it is probably not realistic to think in terms of an overall agency, although in theory such a step would appear to be quite logical. Our contacts with single-mission agencies have generally been satisfactory, but from time to time situations which are difficult to account for have arisen.

For example, we are discharging about 200 tons per day of digested and screened wastewater solids to the sea. The choice of this method was made after extensive work by the Hancock Foundation of this university had indicated that the minimum effect upon the total environment would so result. Representatives of the federal single-mission water quality agency subsequently came to us and indicated that discharge to the sea would no longer be acceptable. Our response was that our studies had shown the process to be suitable, but if it were not to be acceptable, what alternates were possible? It was then indicated that incineration would be preferable. We noted that the air pollution control agency in Los Angeles would not allow this. Besides, the airshed was the most heavily stressed portion of the Los Angeles environment and discharge of gaseous wastes would not be a conscienable act. The response was, "That isn't our problem, our problem is water."

Looking at the Los Angeles Basin as a unit, a quick measure of the stresses upon the total environment is possible in terms of the wastes discharged to the water, land and air. Thus, there are about four-tenths of a pound per person per day in the liquid waste system. The solid wastes amount to about twelve pounds per person per day. Gaseous and particulate wastes into the atmosphere amount to from four to five pounds per person per day. The airshed is therefore receiving 30 to 40% as much material as the land is and over ten times as much as the water. Examining this move closely, however, it is evident that much of the discharge to the air eventually reaches the land and the water. There is, for example, very good evidence that the bulk of mercury, lead and chlorinated hydrocarbons reaching the ocean is coming from the atmosphere. Right now, the major emphasis in terms of environmental improvement is on water, whereas it probably should be on the total waste problem since the effects are interrelated. In selfish terms, we are rather glad that water is the center of attention because we are finally getting more money, but still, in logical scientific terms, we need to look at the total problem and at where the greatest stresses are.

To particularize some of these general statements, it might be well to look at some of the specific items of environmental importance which have received a great deal of publicity. The first of these is mercury. The City of Los Angeles presently discharges less than four pounds of mercury per day to the ocean. When the health scientists and sanitary engineers, not the environmentalists, discovered that mercury could be a problem, the discharge was as much as 25 pounds per day. Using the the existing industrial waste control mechanisms, it was found that most of the mercury was coming from diaper laundries, general linen laundries, paint manufacturers and cooling tower wastes since mercury salts were excellent fungicides and slimicides. These were controlled, but the remainder comes from many minor sources such as dental offices, laboratories, medical uses, and the like, spread over more than 5,000 miles of sewers making effective control impossible. In addition, at 1 to 3 parts per billion concentrations in 350 million gallons a day of wastewater, removal is essentially impossible. Further removal would have to result from the legislative banning of sales for all such minor uses.

The second chemical would be DDT. Dr. Wurster from the State University of New York at Stony Brook and Dr. Risebrough from the University of California at Berkeley have very eloquently led the attack against DDT based upon the reproductive failure of birds such as the Bald Eagle, the Peregrine Falcon, the Osprey, the Bermuda Petrel, the California Brown Pelican, the Mallard Duck and others. No case of human poisoning has been shown. However, the case against DDT is not that clear. Dr. J. Gordon Edwards of San Jose State College

has documented the following: Excellent feeding experiments including 200 parts per million to quail, 50 parts per million pheasants and 10 parts per million to Mallard ducks over long periods of time show up to 50% more chicks with better survival than non-DDT fed birds. In addition, the Clear Lake area of California, with one of the highest DDT application levels known, has experienced problems with bird overgrowth and has had to use other methods of biological control to keep populations down. Also, a review of the literature of wild bird decline and reproductive failure shows that almost all of the birds cited were having reproductive difficulties for many years prior to the introduction of DDT. It then appears evident that rather than judging this very useful material in the newspapers, a good scientific study should be made. Competent scientists disagree as to its effects. This is normal to the scientific method of reaching the truth. We should continue the scientific investigation and find out what the facts really are. In terms of the discharge from the City of Los Angeles, there is about one (1) pound of DDT in 350 million gallons per day. This is what the connected population excretes insofar as available information shows and therefore cannot be further controlled. Removal by treatment is also impractical so complete removal would require banning for all uses and gradual removal from the reservoir in the population. As noted, banning may not be a wise step.

Human versus Ecological Values

Another point that was brought up by Dr. Bish was that we have to consider people values. That is, we have to balance the human against the ecological values that appear to be desirable to protect. For example, about two years ago in Ceylon they became concerned about DDT and banned it. In two years, the malaria rate climbed from about 400 to two million cases per year. They have gone back to using DDT because it is cheaper by a factor of 10 than any other comparable chemical, and for the undeveloped countries such savings are important. The world-wide anti-malaria campaigns of WHO is based on the use of DDT, with the bulk of it being produced here in Los Angeles. I am not preaching that DDT is great and we should be using it regardless of factors such as wild bird reproduction and human intake. I am saying there are other factors we need to consider, including the fact that the effect upon birds is not clear and that it is fine for us with no important insect vector problem and plenty of money to say that it should be banned, but the undeveloped majority of the world may have other priorities.

Another example of the interaction between human and ecological values might be the disposition of our treated wastewater solids. These are suitable for use as an organic soil amendment and low grade fertilizer. We at one time processed them as such with a cost to the citizens of the

city of about $20 per ton and a gross return of less than $4 per ton. With a potential production at that time of about 150 tons per day, this meant a minimum cost to the city and its taxpayers of the order of $2,400 per day. Not unnaturally, the City Council had the studies by the Hancock Foundation which led to ocean discharge. However, at the time we ceased producing fertilizer, almost every park district and every school district in the Los Angeles area then had to start buying fertilizer because we had been supplying it to them free. We were not able to show this as a benefit or as a cost decrement in our budget. All we were showing was a rather large net loss. It was never studied in terms of its overall value to the Los Angeles area, and the problem of how to keep the total cost from falling on the taxpayers of one political subdivision was not faced. However, here was a material of some possible negative effect in the ocean and a probable positive effect on land where problems such as those handled by the social scientists dictated ocean discharge.

Another example is the fact that Standard Oil Company of California wants to use water produced by the Hyperion secondary treatment system for process water. The water is now presently roughly equivalent in dissolved solids to the Colorado River water they now use, and its quality is steadily improving as more water from the northern mountains is used in the city. Furthermore, the cost to them would be lower while still allowing water treatment costs to be recovered. It appears to be an ideal situation but social science problems again arise. The El Segundo Water Department obtains a large portion of its income from its sale of water to Standard Oil. Purchase of reclaimed water from the City of Los Angeles would result in an increase in the water bill paid by all of the citizens of El Segundo. Sale of water to Standard Oil is then dependent upon some fairly difficult negotiations. Perhaps if this were looked upon as a regional benefit and the financial benefits or costs spread regionally, such steps would not be so difficult.

Need for Joint Physical and Social Science Research

It appears to be becoming clearer and clearer that in areas such as wastes and ecology, there needs to be a concerted joint effort by physical and social scientists if our environment is in fact to be cleaned up. The sanitary engineer, for example, is becoming more and more aware that the basic decisions covering his field of work are made politically and, although he may design the "world's best" plant, it has no chance of being used unless it has been sold to the people and the political decision makers. Likewise, the social scientists need to depend upon the technical expertise of the physical scientists in areas such as waste treatment and ecological matters if they are not to lose creditability because of obvious errors in their presentations.

In terms of the future, we know that two-thirds of the population lives in urban centers and that most of these are near the coast. Their wastes have to go someplace, and this most probably means the ocean. We have seen predictions that there will be a one hundred ten million population increase in our country in the next thirty years and that 85 percent of this will occur in the coastal cities. This concerns me technically because taking care of that kind of increase in waste load is going to be a staggering problem in terms of preventing environmental degradation with particular reference to standards being proposed for heavy metals and certain organic materials.

The only real solution to a problem of this magnitude must result from a combined attack by physical and social scientists. The planners have to be listened to and to be supported in placing our population growth in the best locations in terms of factors such as waste treatment, waste recycling and water reclamation. Our monetary, human and natural resources are limited, and there are many priorities. All specialists need to be concerned with these priorities and to help the decision makers utilize resources so that our lives and our environment can be enhanced. If enough money is made available, we can usually blunder through to a technical solution. I am not sure that this is enough now. We do not have a relatively simplistic goal such as reaching the moon. We have important social and technical problems all needing attention at the same time. The social and physical scientists are in it together and they had better learn to cooperate.

MR. FRANK R. BOWERMAN, Professor of Civil Engineering, Director of Environmental Engineering Programs, University of Southern California: Dr. Bish pointed out that the seacoasts are not easily packaged and therefore it is difficult to establish values for them and set prices.

Research on Marinas

The School of Engineering is working on a study at Marina del Rey to determine the pollutional effects of storm waters flowing into the Marina. The Marina is a neat research package; it is a very elaborate system, but its boundaries are easily defined. It has very strong social implications, some of which relate to the question of its use by disadvantaged people. We are building marinas with public funds to serve relatively few people, and the needs that are provided are basically for people with relatively high incomes. Since marinas are readily identifiable as packages, I think they could be costed out rather carefully in terms of their value to society.

Establishing "Needs"

Mr. Bissell, your statement, "If it doesn't need to be there, it shouldn't be there," is not as clear a criterion as it appears to be. I would like you to expand on the question of need because the definition could be very interesting. For example, I do not need offshore wells. Maybe somebody might be able to convince me the world needs them in terms of total fuel sources. However, I would guess, in terms of a public referendum, that most people would be willing to pay more for gasoline and not have offshore drilling. I consider an aesthetic view of the ocean, one without offshore platforms, as a real need. So the question of how we are to establish needs might be a very interesting research project.

Monitoring of Discharges

I asked John Parkhurst, Chief Engineer and General Manager of the Los Angeles County Sanitation Districts, what sort of research was needed. He felt they needed an on-line system for detecting low level toxicity, something that might continually monitor ocean waters or, as an alternative, monitor discharges to ocean waters. Most existing systems do not continually monitor. Evaluating pesticides or things that are in trace amounts, parts per million or parts per billion, requires very sophisticated laboratory techniques. You have to take a sample, bring it to the laboratory, analyze it with trained technicians and, by that time, maybe the damage has been done in the ocean environment.

Having worked with sewerage systems, I know if we could detect pollutants starting to pass through a sewage treatment plant, we could go upstream and trace sources and stop the discharge from continuing. One research need might therefore be for a continuous on-line detection of low level toxicities. I suspect it will come out of the biological sciences.

Priorities

I think we have to establish an order of priorities. We cannot necessarily put out brush fires all the time, but we can do the most important things first and stop those activities that are going to be the most damaging to our environment. The priority list might place a very low priority on something that is interesting, but has very little effect on the environment. By establishing priorities, we could get more value for the money spent and maybe a quicker change.

DR. RICHARD H. BALL, Vice Chairman of the Los Angeles Chapter of the Sierra Club, physicist at the RAND Corporation: I would like to address a question to Dr. Bish. Suppose you identify different kinds of equities and benefits and who gets them. What kind of tool would a broad management agency use to rectify some of the inequities or maximize the benefits to accomplish its policy goals? Is your research able to identify what the best and most efficient tools would be in the hands of some agency, assuming we will be operating at least partly in the market system?

DR. BISH: If you could just get people to identify what kinds of benefits exist in terms of simple sophomore microeconomic theory, then you can begin to move from there and look at proxies for prices of things which are not sold. There have been attempts at pricing recreation at water resources recreation areas. If you try to get people to think in these terms, they can usually go a long way and begin to identify some of the costs and benefits.

DR. BALL: I was thinking about the kind of devices to be used by government. Let us say you find an imperfection in the market. To correct that market deficiency to bring about equity in land use, for example, you need some kind of legal or economic device to correct the situation.

DR. BISH: I suppose the general answer is simply if you can identify who benefits from something, try to find a way to make him pay for it. You can do it using taxation on the land where you have some sort of public investment that results in the increase of land values adjacent to the investment. You then finance part of the investment from the increased taxes on land. If you use these tools in a strategic way, the benefits are revealed very directly by how much people are willing to pay for them.

DR. JEROME W. MILLIMAN, Director, Center for Urban Affairs, University of Southern California: Have you been struck by the fact that the Department of Water and Power makes decisions with respect to prices for water supply while the decisions with respect to investment and pricing of the Sanitation Districts are made entirely separately and yet they are part of the same general system? Perhaps a better price policy with respect to water supply could help not only rationalize waste loads, but finance policies for dealing with them, at least with liquid waste loads.

DR. BISH: I have one additional point here. I think a very good case can be made for approaching an investment project not in an overall

benefit-cost sense, but through identifying who is going to benefit. Try to get a structure in which the beneficiaries pay, and then you can be pretty well assured it is efficient. If you use a benefits received model, you do not proceed with those projects where the people who benefit are not willing to pay. That is different from what most people would advocate for making investment decisions, but in the water development area especially, it would yield some more efficient decisions than, say, the Corps of Engineers' benefit-cost studies.

Discount Rates

MR. J. ROGER MORRIS, Urban and Regional Planning, University of Southern California: I would like to ask Mr. Garber and Dr. Bish to comment on the discount rates applied to future costs and benefits in determining public projects and allowable project profits.

DR. BISH: You want discount rates that reflect whatever you are going to give up. If the market is functioning reasonably well, one can argue for an interest rate of eight or ten percent. Or one can say that the future is not discounted properly and we should really do more for the future; then use a lower discount rate. Other people will say that in the future, people will be richer than we are now, so why should we worry so much about them?

I think what you want to do is see how sensitive your benefits and costs are to the discount rate. If it makes any difference if you use four, eight or ten percent, you are probably pretty close at the margin to whether benefits exceed costs. If you haven't included a risk factor, you may find the decision is very marginal. I would only really begin to worry about the discount rate if it is a marginal case where it makes a lot of difference.

MR. MORRIS: I am particularly concerned with the case of depletable resources such as a school of fish. If the economic discount rate applied to it is greater than the rate at which it produces a sustained yield, then the decision will be to deplete it. I am concerned with this general problem of discounting, particularly of sustained use resources.

DR. BISH: It occasionally may be rational to use resources faster than the rate of replacement, depending on what substitutes of those resources are available. You can also expect, as you begin to deplete a resource, the supply is going to diminish and perhaps the value of it goes up. As the value increases, you slow down your rate of use of it, and probably approach some equilibrium that does not result in the destruction of the resource.

DR. HLAVKA: You spoke, Dr. Bish, about the value of opinion surveys to determine how much the public is willing to pay in various ways to preserve the environment in certain senses. The ecology action groups and conservationists are doing a very good job of educating the public about the value of our environment and biological species, so there is a general change in the public's attitude. How do you take temporal changes of this kind to count in your surveys?

DR. BISH: In our study, we are looking at an investment decision that would have a major impact on a rural community, and trying to find out what the perceptions of those people are in terms of why they favor it and what they expect to gain. We really have not been able to put a dollar price on what they would pay, although we have made some estimates of what increases there would be in, say, profits in a particular type of business.

I expect you are going to pick up the changes in tastes just as quickly through the political structure as you are through surveys of this type. If people don't like what is happening, they begin to make a lot of noise. They start to convince their legislators that their preferences have changed. If they now want something done differently than it used to be done, this will become evident as it is with the ecology issue.

DR. HLAVKA: Meanwhile, you just hope the species hasn't disappeared.

DR. BISH: Well, there may be indifference to the disappearance of a species except as they affect men. If individuals don't worry about a species, if they are not willing to give up what it costs, then I would not predict they will make the sacrifices necessary to keep that species around.

MR. STUART DAVIS, School of Business, University of Southern California: The idea has been advanced of a society that has a goal in terms of balance with nature rather than growth of an economy. I am wondering if Dr. Gordon and Dr. Bish could address themselves to the question of how the biologists might define a value structure that the economists can work in.

DR. BISH: All you have to do is convince people that they don't want more, and if you can do that, you are in very good shape. There are societies based on the ethics that assume the pie doesn't grow larger. Medieval Europe was similar to this in many ways. Perhaps some eastern religions approach it. And a lot of Utopians have tried. Anyone can undertake such an effort.

MR. DAVIS: If the values are described by the biologists and not by the economists...

DR. BISH: I don't think I am describing any values. I am observing what people do. I am not a psychologist. Economists aren't psychologists. We simply observe that most people seem to want more if the price is less. Then we reason from certain implications from that.

It is up to the people of religion and ethics if they want people to change that behavior. If you get people to change the way they act, we will try to build predictive models as to how they use resources under those new sets of behavior.

DR. GORDON: I do not think this is only a matter of theology and philosophy. There are real considerations here in terms of plain physical survival. I think the food supply and the quality of life are affected by biological factors in a great variety of ways. And the social scientists that I have talked with over the past several years tend to discount this to a much greater extent than I think is sensible, frankly.

They ignore the fact that there is a biological concept know as "the carrying capacity of the environment," which is what Malthus pointed out. They say that Malthus made all these predictions of gloom and doom over a hundred years ago and what he foresaw hasn't happened because technology has changed and kept up with population growth.

The fact that it hasn't happened does not mean the limit does not still exist, and it does not mean the limit is getting further away from us all the time. We really can't tell how close we are getting in many cases. Yet there are certain factors that have already limited what happens in terms of human population, and the food supply is obviously one of the most important.

Really, one of the major limitations is, I think, that there are certain facts that need to be taken into account outside of the pricing structure and outside of the social organization. The world is three-quarters poor and malnourished, and this is a fact we cannot continue to ignore indefinitely.

More on Monitoring

DR. BENJAMIN AKPATI, Environmental Engineering, University of Southern California: I want to add a word to what Dr. Gordon said about monitoring methods for detecting low toxicity in marine conditions. I think a problem we face is trying to find out the organism we are going to use and pin down the variable in the water system.

Dr. Hlavka mentioned that in trying to go to a region, you can't find any relation between work that has been done 20 years ago and the things that we need immediately today. Would you say that this is because the previous workers did not envision the problems that we have at this time?

DR. HLAVKA: No, I think their vision was pretty good, but they didn't have enough money. As an illustration, instead of taking samples, they barely got one bucket full and the ship would have to move off. That wasn't due to lack of biological vision.

DR. GORDON: Actually, there is already a good deal of effort devoted to biological monitoring in a number of places, and it works very well, especially dealing with things that come out of mines and with enclosed bodies of water such as fresh water streams and ponds.

Even relatively crude indicators like goldfish will tell you a great deal because they are very sensitive to quite low levels of heavy metal toxicity and they will change their behavior in certain rather characteristic ways depending on what is poisoning them. So, you can get them calibrated pretty well to be a warning system. It is like having a system of aquaria downstream from whatever you are interested in monitoring. It is not completely accurate, but a number of people have tried it with some success.

Instrumentation for Monitoring

MR. WILLIAM MERSELIS, Oceanic Division, Inter-State Electronics Corporation: I have a question for Dr. Hlavka. I am interested in getting your opinion on what kind of measurements you feel are necessary, the kind of data you need in the ocean, and the degree of accuracy that is required.

There seems to be a trend here recently by some of the instrument manufacturers to get away from the original high precision deep water instrumentation that was developed five to ten years ago and go to instrumentation that can be used within the coastal scene.

Are you as a group, for instance, interested in basic research tools or tools for mass monitoring, the collection of large volumes of data?

DR. HLAVKA: We are interested in all of those things. The difference between inshore problems and the problems of the ocean, where most of the instrumentation is developed, is very much a matter of concern for us.

Inshore we are interested, for example, in following the field that results from the ocean discharge of wastewater. It has a half dozen different complements, biological, sedimentary, plus all the contaminants that are in it, conservative or otherwise. This is what will tell us more about exactly what happens to discharge after it leaves the pipe and it would be very useful. I would envision that instrumentation would be much more sophisticated and accurate than what we have available now, and also more flexible in the sense that once the field is found, we can track it rather than take measurements all around it outside of the field.

But that scale of nearshore problem is not in our present view, the really big problem to be solved. The crucial question to be answered is: How much will the Southern California bite absorb in the way of various contaminants? That is a much more profound and important question for which the answer simply is not available, and we are very anxious to try to get some kind of rough estimate of that as a near-term objective. This may require the development of more sophisticated or cheaper instrumentation that may be dispersed over a wider area. Or the answer may be that a modeling approach or numerical calculation would be quicker and perhaps better than a measurement program alone.

Collaboration between Research Projects

DR. MILLIMAN: Would it be possible for us to piggyback SCCWRP with economic and political science research which it does not seem to include? We might look at some of the data gathering that it suggests and use our resources to supplement that research.

PROF. BOWERMAN: I think the project could benefit greatly by peripheral support. As George Hlavka pointed out, SCCWRP has a specific assignment. The question of trade offs or alternatives to the present system for disposal is not part of his concern.

DR. HLAVKA: No, not concern; it is not part of our charter.

DR. MILLIMAN: Why can't we work with that?

PROF. BOWERMAN: Either he is going to have to do it or somebody is going to have to help him.

DR. DONN S. GORSLINE, Geological Sciences, University of Southern California: What direct connections are there between SCCWRP and COAP?

Research Will Not Solve Immediate Problems

MR. BISSELL: We try to keep each other advised of what direction we are going. I would like to come back to something that was indicated earlier and emphasize that I am still leery of acquiring data for data's sake. I would be the last one to stop research and technology. But we have both short and long-range problems. The short-range problem is in the field of policy planning, and we have to face up to it right now. Nothing is going to wait for us. I can't think of a single problem on the coastline, in terms of the Russian River or Newport Bay or Tiajuana Slough, that is going to wait for somebody to gather sand transport data or fish spawning information or whatever you want to name. There is going to be a decision made on the basis of some kind of local, regional or state policy. The boards of of supervisors or planning commissions or water quality boards themselves are going to say yes or no. They are not going to wait ten years for more data.

Ideally, we should have the data and catch all the natural cycles so we are not working on the basis of the low or the high or the abnormal data. But we have got to deal with the facts right now. Keep the research going, as we will need everything we get sooner or later, but there isn't anything going on now that is going to be the snswer to these immediate questions. The decisions will be made on another basis. I hope we don't think we are going to solve the problems by just getting the data.

Accelerating the Pace of Applied Research

DR. HLAVKA: I think SCCWRP is a little more optimistic than COAP. We appreciate the fact that crucial decisions are going to be reached in near terms, perhaps without the benefit of any of this research.

As a result, we have a tremendous urge to leapfrog in any way possible what everyone else is thinking of as the way to solve the problems. We are constantly trying to look for and assign the type of people to the work we do who will look for breakthroughs. Now, I can't name the first breakthrough we are going to make, but we are anxious to do this for just that reason.

Let me give you a rough analogy on what we would like to do. I recently saw a report of the National Academy of Science Committee dealing with the disposal of low level radioactive wastes. The clever thing they did was to bypass all areas of biology that are giving us so much trouble in our work. Using a specific activity approach, they simply made sure that whenever a radioactive substance was disposed of, enough of an innocuous substance that behaved biologically the same was disposed

with it. Thus, whenever it appeared in a biological food chain, it would not constitute a danger because the ratio of radioactive to stable atoms would not exceed anywhere in the environment the limit that has been determined to be safe for organisms. Now, that is the kind of an ingenious breakthrough that avoids a whole area like biology, where knowledge is insufficient and the quantitative relationships are not understood. Maybe, out of our work we will find some of these shortcuts to help with decisions earlier than would otherwise be possible.

MR. BISSELL: I am all for this. I am sure we have to keep going at high speed on this.

Use of Research in Policy Decisions

MR. GARBER: I am sure every scientist and engineer in our staff or in the city staff has come up with a problem where you have done a very good job of research, and you have come up with a perfect design. How do you get it accepted? The basic decisions are political, and the question of how you get researched solutions to a political man is really a difficult one.

DR. WARREN: I think one problem here is that there is a tendency to treat research as a homogeneous product. We are talking about a number of different things. One is, if you have a defined problem, if you want better monitoring equipment, then you need a market or you need to subsidize it and you can get it. Or you are looking for some proxy that is similar to atomic waste; that is one matter.

There is another one. There is no way research can solve policy conflicts. It can influence the outcome. But the real question is, can you have as much information available at the time you make a decision to allow you to identify all the major benefits and costs and how they are likely to be distributed. I think for the ongoing decisions, this is the real problem. We have to structure the process of decision making to get enough diverse information into the system. This is a crucial problem that has not been dealt with.

Dr. Gordon said, "If you get a good man, you get a good job." I would like to believe that, but given the way large-scale organizations behave, we have a lot of good men who have been put in jobs and it has not worked. So you have to go beyond that and provide a favorable environment which includes enough money to do the job. You get somebody like Russell Train heading an agency that is given an impossible task. They have fewer people involved in research than the Department of the Interior has in lobbying with Congress, and this creates a little difficulty.

Even beyond that, other things are happening in the environment and in social patterns. Who is going to flag these developments and try to work out implications, and then feed this information back to the public? This is equally crucial.

Thus, there are really three different kinds of problems: One, how do you respond to an identifiable research need? Two, how do you generate information that provides an adequate base for a decision? And three, how do you handle these new developments? They can't all be treated the same way. I think one of the questions Jerry Milliman raised was: How do you develop a sort of coalition of the public sector and the private sector of the universities consciously interacting with one another to meet all three of those needs?

THE SAN FRANCISCO BAY

CONSERVATION AND DEVELOPMENT COMMISSION

Joseph E. Bodovitz, Executive Director

The San Francisco Bay Conservation and Development Commission was started in 1965, not as a result of some farsighted governmental agency seeing a need and trying to do something about it, but because a number of citizens and citizens' organizations became concerned with what was happening to the Bay. They in turn pressured local governments and state legislators to try to get something done. They wanted to put a stop to unrestricted filling of San Francisco Bay, which has been shrunk by about one-third by man's filling and diking over a period of many years.

The first point, therefore, is that this Commission has from the beginning had a great deal of public support. For example, one of the prime supporters was a disc jockey named Don Sherwood. Many of you may know that he had the most popular radio program in the Bay area, from 6:00 to 9:00 in the morning, and for a period of time, he exhorted his listeners to write letters about the Bay to their legislators.

The effort has been to do something, to get certain kinds of action, and not simply to engage in an exercise in planning. I think this is important to those of you who are planners; we have tried

to use plans as tools to get something done, not as ends in themselves. Too many plans wind up on shelves, as all of you know. Their authors thereafter justify them and say what wonderful documents they are, but it is difficult to see what was achieved as a result of their having been prepared.

I would like today to describe the Bay Commission, tell how it was created, and what its headaches are now, and then leave most of the time to answer questions that may be of interest to you.

The Bay Commission is large. It represents federal, state and local governments and the general public. Its extremely able chairman is Melvin B. Lane, Executive Vice President of Sunset Magazine. He works very hard on this part-time, unpaid job. Although the Commission is large, its members have worked well together, and it has not become polarized.

When the 1965 legislation was being proposed, there was a great deal of opposition to a commission having as many as twenty-seven members. Many people said it would be better to have a commission of five or seven or nine people, but no one could figure out how you could represent all of the interests that needed representing and still have a small number of people. It doesn't seem to me we should be afraid of large public bodies that have many people involved. I think one of the political problems in the state right now is that there is a shortage of opportunities for people to participate in democratic processes. So it should not bother us if we make a large commission that creates new opportunities for democratic decision making.

Ours was set up originally as a temporary commission. I think this was very important, too. We had to submit a plan by a certain day and soon thereafter the Commission was to go out of existence if the Legislature did not take action. That is a very healthy pressure to work under. I am very much in favor of deadlines. The most difficult job of public planning bodies is making hard decisions. It is always easy to put them off to another day, or to wait for further research because inevitably there are things you don't know enough about; but having to meet a deadline is a great discipline. We met the deadline, with exhaustion, and the Bay Plan was submitted on time.

Then in 1969, there was considerable controversy in the Legislature over whether the controls that had been instituted in 1965 should be allowed to expire and whether the Plan should be discarded. It became a major political issue in the 1969 Legislature. There were bumber strips printed by the thousands in the Bay area, and newspaper ads that said, "Save Our Bay."

The Bay Plan, in essence, simply says there are certain things that have to be on or near the water, such as marinas, beaches, shipping terminals, certain kinds of industry, etc., and room should be made for them. You ought to allow them on the water's edge, and permit some filling if there is no other way to have these projects. But the Plan points out that the Bay can accommodate these uses, even with some fills, without any significant damage. The Bay Plan also emphasizes that the things that don't have to be in the Bay ought not to be.

The pressures in the past have been to put into the Bay area such things as garbage dumps, housing projects, supermarkets, anything that is a normal part of modern, urban civilization. The pressures of this kind, for what we would regard as misuse of the Bay, continue to be strong.

The Commission's planning for the Bay was fully open to the public. We resisted all efforts to hire a "master contractor" or to turn the planning and research over to some outside group. I realize this may not be pleasant advice to those concerned with university research programs, but in my experience, there has never been one successful, useful planning program that resulted from a public body's turning its responsibilities over to either a university or private research firm.

In the Bay area, where multimillion dollar studies were done in this way, lots of employment for computer operators was provided, but I have never seen really useful results from this kind of thing.

The planning procedure of our Commission was to look at a number of topics (industry, recreation, water quality and so forth) one at a time, and to publish our conclusions and findings as widely as possible; to hold public hearings as frequently and widely as possible; and to try to make this a plan that was built point by point with a lot of public support.

For those of you who are considering some kind of planning for other coastline areas, it would seem to me this type of procedure is simply indispensable. If you hire some outsider to spend a year or two on your planning, he will then present you with a thousand page document which he will say is a summary of the full report that will come later. You have two weeks to digest it and take final action on it, then no one can understand why the plan isn't understood and loved.

It just doesn't work that way. You have to go step by step. If you think about your own lives, you don't learn everything in one big gulp. You take things one step at a time, and I think in any kind of successful public planning, you have to do the same thing.

Let me make one final point and then stop for questioning. I think one of the extremely hard things for anybody now involved in public programs

that have an impact on the environment is the rapid change in public attitudes. For example, as recently as 1968, at the time the Commission was preparing its Bay Plan, it was assumed by everybody that rapid population growth, perhaps horrendous population growth in California, was something nobody could do anything about. Planning by our agency, and everybody else, as far as I know, simply took the latest estimates of the State Department of Finance and thought they might be a little bit high, but assumed that kind of population growth was going to continue.

Now, however, no public body could prepare a plan based on population assumptions like that without having a lot of people from Zero Population Growth, the Sierra Club, and others challenging it vigorously. This is an enormously healthy thing. There is public willingness to get down to some very basic issues that people have not always been willing to consider in the past.

I would like to give another illustration of this kind of change. For about twenty years, there have been proposals to build another bridge across the Bay south of the Bay Bridge; it is called the Southern Crossing. There have been, according to the State Public Works Department, something like twenty-two publicly financed studies made by highway engineers that have come to the same surprising conclusion, and that is that more highways are needed.

A few years ago, a specific route was approved by the Toll Bridge Authority for a multimillion dollar crossing with some freeway approaches. It was just assumed that, like population growth, freeways and bridges were inevitable and nothing could be done about them, although from the beginning, small groups of conservationists were opposed.

There has been growing opposition to the Southern Crossing, but really not serious opposition; quiet muttering would be as good a way to put it as any. Last year in the Legislature, one of the opponents of the crossing, Assemblyman Robert Crown of the City of Alameda, tried hard to get some legislation passed to stop the Southern Crossing. The best bill he could get, though, was a weak resolution asking the Toll Bridge Authority to restudy the Southern Crossing and see whether it was still a good idea. The Toll Bridge Authority restudied the Southern Crossing, and surprise, concluded that it was needed. This was last year, remember, when environment was very much a public issue.

This year, Assemblyman Crown put in another bill which provides that the Southern Crossing cannot be built unless the Legislature takes further action to allow it. One of the problems is that the Crossing would be almost on top of the Bay Area Rapid Transit line, and would thus be another automobile and truck facility built in direct competition with

mass public transit. It would help create a need for even more freeways. But it has become a symbol that we let technology, so to speak, run away with us in building facilities for automobiles instead of people.

So this year, almost without fanfare, a bill by Assemblyman Crown to stop the Crossing went through the Assembly by 54-7 vote. None of the Assemblymen who voted in favor of building the bridge lives north of Orange County; that is, not a single Bay area Assemblyman voted with the highway people on this issue.

The bill went through the Senate by a vote of 30-5.

The point I am trying to make is not that a Southern Crossing should or should not be built, but that in the space of a year, a strong bill has gone through almost without opposition.

What accounts for this change in attitude? Why have the elected representatives of the people in the Bay area now voted against the Crossing? One of the reasons, reputedly, that there has been such a change is that the legislators in the Bay area have taken polls of constituents and are finding a tremendous response to environmental issues. People in public life who have tended to be timid about environmental concerns may well find themselves challenged.

Our Commission is concerned both with conservation and development. This isn't a "Stop the World Commission" or a "Down with Industry Commission" or a "Down with Development Commission," but a Commission that tries to achieve conservation coupled with carefully regulated, necessary development. There is a permit process requiring public hearings on proposed projects within the Commission's jurisdiction. The pressures are great, but fortunately, there is growing public awareness on environmental matters.

Question: Could you comment about the enforcement powers you actually have and what kind of enforcement powers might make sense?

Answer: One of the things that has been very important to the work in the Commission from the beginning, and I would strongly suggest for any legislation of this type, is that the agency preparing the plans also have some regulatory responsibility. It is often difficult for an agency that is only preparing plans to take itself seriously or to be taken seriously by the public; or even more important, to really understand the nature of the problems. Our Commission, from the beginning, had the

duty and responsibility of either issuing or denying permits for all projects involving filling or dredging in the Bay while the Bay Plan was being prepared. This meant that a good deal of the Commission's time was spent on broad planning, but a good deal of time was also spent on specific applications from people who wanted to do specific things in the Bay. This helped keep the Plan rooted in reality in a way that may be hard to do otherwise because the permit applications and public hearings on specific projects form a very valuable basis for understanding what the issues are and upon which the broader planned policies can be based.

This was in the law from 1965 through 1969. The legislation of 1969 which continued the Commission in existence gave the Commission added responsibilities over the salt ponds adjacent to the Bay, over certain kinds of managed wetlands, and also some very limited responsibility within a 100-foot strip of dry land bordering the Bay.

The primary concern within the 100-foot strip was public access to the water. One of the findings of the Commission's study was that there were all too few opportunities for the public to get down to the Bay and enjoy the Bay. Therefore, the law requires that whenever there is any substantial change in use of the land within this 100-foot strip, which means any major new development, a permit is needed from the Commission.

The project must also comply with local zoning or whatever other rules there are in effect. But the project must provide what the Commission determines is the maximum feasible public access to the Bay consistent with the proposed project. The Bay has a varied shoreline, steep cliffs and deep water to comparatively flat areas with mud flats offshore. The kind of access desirable in one area might not be the same as in another. But over the course of a number of permit hearings, standards are beginning to emerge, and one result of this has been, I think, a very healthy one of getting much more public access to the water dedicated in shoreline projects.

The Commission had before it yesterday afternoon a project in which a developer of a major shoreline area is going to dedicate a 25-foot wide public access area that will extend for a couple of miles. One can say that 25 isn't enough, it ought to be 50; nevertheless, 25 is infinitely better than would be achieved without this kind of law.

Question: Do you have a budget sufficient to allow you to go out and purchase lands. What is your annual budget? Where is money coming from?

Answer: The Commission's budget all comes from the State General Fund. The budget is $225,000 to $250,000 a year. The Commission is entirely a regulatory agency. It does not have any operating or land owning responsibilities, and I don't think it should, as presently constituted. One of the problems with an agency like the Atomic Energy Commission is that it has always been designed to both regulate and encourage certain kinds of development, and I think philosophically, there are problems with that kind of agency.

There is no shortage of other agencies in the Bay area having power of eminent domain to acquire park lands; there are plenty of port districts that develop the necessary port facilities and so forth.

May I use that as a spring board to answer a question nobody has asked? If you were to ask me how viable is this kind of agency with limited regulatory powers, the answer is very. I think, for the short run, the law that was passed by the Legislature in 1969 is extremely strong. It is a fair and workable law, and I think it will serve to protect the values in the Bay that very much need protecting. Our plan, incidentally, is a plan designed to benefit man. The conclusions of the Commission are that the very values of the Bay that concern biologists and fish and wildlife people are also extremely important to man.

For instance, the size of the water surface area of the Bay has a very important effect on the air quality and smog in the Bay area, and the same fill that may be damaging to the smaller crustaceans is also very damaging to man by having harmful effects on air quality. So we have not gotten into dead-end questions of whether industry is more important than striped bass, etc. It isn't that kind of an issue at all; filling the Bay is in many ways as harmful to man as to any other species.

There is a problem, however, which will be increasingly important in metropolitan regions. Single-purpose agencies are going to have to be merged into something broader. There are in California separate systems of air pollution control in different areas. There are regional water quality boards. There is in our area a Bay Fill Control Commission. The dilemma is that no general-purpose agency of government is able to look at <u>all</u> aspects of environmental issues.

The argument for the special district or agency is obviously one of efficiency. If the agency is concerned only with water supply or with water quality regulation or with waste disposal or only with fire protection, it can be undeterred by any side issues. But the public frustration, I mentioned before, is I think in a large measure due to the inability of the public to make its vote register in environmental and metropolitan priorities. I see no way, with the proliferation of single-purpose districts, that the problem will be solved, largely because

directors of single-purpose districts are appointed or, if directly elected, are in elections where hardly anybody knows who is running.

The challenge we all face is not how to protect the environment, which is complicated enough, but how to protect the environment within a framework of democratic self-government. Some conservationists, and I count myself a conservationist, although they would object very strenuously to my putting it this way, are really close to sounding like totalitarians on some issues. They would be happy to have somebody with almost dictatorial powers so long as he did something they want done.

When we started in 1965, some people argued that we should not create a commission, but rather turn the responsibility entirely over to the Army Corps of Engineers. Many conservationists have become so disillusioned with local governments on planning and conservation matters that they tend almost to distrust the democratic process.

That is talking pretty bluntly, but I think it is correct. It seems to me the end doesn't justify the means.

Question: Since you mentioned the Army Corps of Engineers, how do you interface with them?

Answer: The Army District Engineers in the San Fransisco Bay area, and I don't know about any other districts, sound more like conservationists in the speeches they make today than Secretaries of the Interior sounded five years ago. Judging from their speeches, they got the environmental message sooner than lots of other people. There are problems with their transmitting this down to lower echelons, but we have gotten along very well with the Army Corps of Engineers. We have made great use of their resources because the Army District Engineer is a member of our Commission. I think it would be fair to say that we have benefited greatly by the expertise and engineering ability that the Corps has, but at the same time, the Corps has been in a position to hear firsthand what the environmentalists are concerned about. I think it is a fine process of mutual education.

Question: One of the major issues is the values of trade-offs of various kinds. When you have a permit application before you, do you try to balance some of the things considered to be intangible, like the values of aesthetics and wildlife, against things purely economic and financial? Have you come up with any mechanisms for doing this?

Answer: The law sets forth the standards that a project must meet to be issued a permit, and it allows some discretion to the Commission, but not a lot. There are four or five standards; for example, any fill in the Bay must be for a project for which there is no alternative upland location. That can obviously mean a shipping terminal, but it would be difficult to conclude that an office building or apartment house has to be built on fill in the water; i.e., that there is no dry land site for it.

But we have never found, and we have done a lot of looking at sophisticated or unsophisticated computer oriented and other techniques, a mechanism that balances tangibles against intangibles. My strong feeling is that every environmentalist who has tried to find one has come out deciding that fishermen in a boat spending eight hours in the Bay are worth $2.98 or two for a quarter or $3.15 or whatever, and your cost-benefit ratio goes onward and upward from there.

It seems to me that is playing the old cost-benefit game of the Corps of Engineers and Bureau of Reclamation, and they have yet to lose playing at the game, but I don't think it is the way to make decisions affecting the environment.

One study has been made in the Bay area that might be of interest. The City of Palo Alto was considering plans for 1,000 acres or so of hillside property above Stanford. Some of the conservationist groups in the area were saying that it would be cheaper for the city to buy it than to allow it to develop, considering the cost of roads, schools, sewers and so on, because it is hilly and far removed from existing services and facilities. The city hired a team of planners, engineers, geologists, and other experts, and they, too, came to the conclusion that it would indeed be cheaper for the city to buy it. The cost of city schools, roads, fire protection, and so on, would exceed tax revenue.

This study is becoming more widely known in the Bay area. There is obviously a need for some caution here; a city like Palo Alto may be able to buy up property to forestall development, but poor people need some place to live.

Question: Do your public hearings differ in any major way from those conducted by the Legislature, boards of supervisors, and city councils, and so on?

Answer: No, essentially it is the same process, and we get the same proportion of articulate people and other kinds that boards of supervisors get.

Question: You mentioned your agency was fairly workable for the Bay. I wonder if an agency patterned after yours would be fair and workable for the coastline?

Answer: Let me mention the things in our process that I think would be adaptable to a coastline program. First, it is very important that the people making the decisions be close, geographically and politically, to the public. I don't think you could have one state commission, such as the Park Commission, of five or seven people, however able and well-intentioned they are, do all the planning for the coastline. Any of you who are familiar with the Park Commission know that it schedules its meetings in different places. If it happens you are interested in a park project in San Diego, it may turn out to be on the agenda for the next Commission meeting in Oroville. By leaving two days ahead of schedule, you can manage to get there.

It seems to me that to build the public support necessary for something to come of this planning, you really have to be within reasonable distance of the people being affected. The idea of a regional commission which operates within broad state guidelines is a good one. Bills introduced last year along these lines certainly made sense to me because the California coastline is extremely long and varied, and the problems in Humboldt County may or may not be the same as those in Orange County or San Diego. How many such regional bodies there should be in Southern California I really don't know; but I do think it is important to have meetings accessible to the people.

My second point is that a large commission would have some advantage because by having roots in the community being planned for, it can build public support.

Our Commission had an appointee of each Board of Supervisors in all nine Bay area counties. It had representatives of city government appointed by the Association of Bay Area Governments, which is the council of governments in the Bay area. It had representatives of the public. The size and the variety of this group meant that once there was agreement on a plan, there were people in local government and in various elements of the community willing to go to bat for it because they had been involved in preparing the plan. I think a smaller group of people chosen in some other way would not have been able to do it.

Question: What is the planning process itself? Would you recommend the same kind of planning process for the coastline?

Answer: Yes, the planning and procedures for reaching policy decisions

can very well be done for the coast in the way we are doing them. I think they can best be done that way.

We have been asked the same question by people trying to set up similar agencies on the east coast, and although political situations differ everywhere, particularly where several states are involved, it still seems to me the general pattern ought to be the same.

I want to be as fair as I can and I should offer equal time to people in disagreement. However, if the goal of the plan is to influence public policy and to have more happen than just the publication of a document with a lot of multicolored maps, you have to plan in such a way that everyone, the local governments and the general public, (a) know what is in the plan, and (b) have a part in shaping it. I don't know any other way to meet those goals.

Question: You mentioned there was a tremendous amount of public support for the Plan in the Bay. Now, if in fact a similar plan for the coastline met tremendous apathy, would it be your conclusion that the plan couldn't be viable under such circumstances?

Answer: I would say that if it were met with tremendous apathy, and if on the other hand tremendous opposition arose from various special interests affected by the plan, and if legislative action at some level were needed to carry out the plan, then I would say the prognosis would be pretty grim. Our experience was that environmental legislation needs all the help it can get from the public to succeed in the Legislature. In 1969, newspapers in the Bay area reported that the lobbyists for various interests spent more money lobbying against our bill than against any other statewide or local issue in the Legislature that year.

Question: Would you name those interests?

Answer: I will quote what the newspapers said. One group was West Bay Community Associates, a joint venture of David Rockefeller, the Crocker Land Company, and Ideal Cement Company, which owns a great deal of tideland property in the South Bay. It was, I think, listed several times in the papers as having hired the most lobbyists and spent the most money to try to defeat the legislation.

Leslie Salt Company, which owns some forty or fifty thousand acres of salt pond property, was also listed as having hired two or three lobbyists and spent a great deal of money on this.

I want to be fair in saying that I am quoting the press. I assume there are statements on file on what the expenses of the lobbyists were, but I have not personally examined them.

Question: Do you have a master plan for the Bay area?

Answer: Not for all the Bay area, meaning all the nine Bay area counties. There is the BCDC Plan for the Bay and its bayshore. Copies are available for $2 plus sales tax from the State Printing Office.

Question: When people come for a permit, do they have to conform in great detail to the Plan that you have?

Answer: They must comply with the law and the Plan, yes. That is the basis of the hearing, whether the project applied for is or is not in compliance with the law and the Plan.

Question: Have you had any problems with fights over condemnation, where people feel they have logical, properly engineered, well thought out projects that take into consideration conservation, aesthetics, and other points, and still you have turned them down because of your authority?

Have you been in any lawsuits or legal maneuverings because of adverse condemnation?

Answer: The answer is no, but this is obviously a potential problem of considerable magnitude, in part because much of San Francisco Bay, unlike other waterways, is privately owned. Perhaps it is 20 or 22 percent privately held.

The ownership question is further complicated, however, and this issue is involved in several lawsuits. The State Lands Commission, our Commission and the Attorney General are engaged in a lawsuit with the West Bay Community Associates, the Rockefeller group, on this matter. First, it isn't clear whether the private claimants really own what they claim because these land sales were all eighty, ninety, a hundred years ago, and many of the documents of sale are in dispute. And it is not clear if the private owners actually own the bottom as they claim to own it, whether they therefore have an unlimited right to fill.

All of the tidelands sold by the state were sold subject to a public trust which came into the California Constitution from English common law. That trust says that the waters are reserved to the public for commerce, navigation and fishing. It may be that the owner of the property has the right to use it for anything consistent with that public trust, but not necessarily any right to fill.

Question: I noticed you do control one hundred feet back from the interface of the water and the land. The question is simply this: Can you control where there is a non-fill, just simple shoreline development?

Answer: The Commission's jurisdiction within the 100-foot shoreline band back from the Bay is not a municipal zoning jurisdiction. The municipality, city, or county still controls zoning except, and we are not in disagreement with any municipality about this, the Plan provides that certain areas should be reserved for industrial or recreational use. In other areas where the zoning may be housing, commercial, etc., our Commission issues or denies permits solely on the basis of adequacy of the access to the water in the proposed project.

Question: Is industry responding to the kind of values and systems in your legislation?

Answer: Definitely. Our Plan provides for and recognizes that the Bay is and should continue to be a major world harbor, and some of its shores should be a site for heavy industry that requires access to the water. This is one of the few purposes where filling should be allowed, if necessary.

Issues that affect heavy industry in the Bay area may have more to do with such things as channel depth or oil spills. The collision of two Standard Oil tankers last January made many people question the idea of dredging deeper and deeper channels to bring bigger and bigger tankers into the Bay. I think this is a public policy question that involves many other considerations besides those of our Commission. There are many people, for example, who believe tankers ought to be limited to ocean terminals, that they ought to be kept outside of the Golden Gate. One of the problems obviously is that weather conditions are miserable a good part of the time in the ocean off the Golden Gate. Thus, there is a danger of oil spills if tankers are discharging into pipelines out there.

Question: What are the appeals open after the Commission?

Answer: The courts. However, I should point out that there is a kind of double or triple veto system at work. The projects involving development in navigable waters generally need a permit from a city or county, from our Commission, and also perhaps the Coast Guard or the Army Corps of Engineers. No one of these levels can force a project on a lower level of government that doesn't want it, but each level along the way has a right to say no. To streamline the process, we all try to get together to see whether there are problems with a particular project.

Panel Discussion Session

March 19, 1971

LEGISLATIVE PROPOSALS DEALING WITH THE COASTAL ZONE

Panelists

Mr. Robert B. Krueger, Chairman, California Advisory Committee on Marine and Coastal Resources

Dr. Richard H. Ball, Vice Chairman of the Los Angeles Chapter of the Sierra Club, physicist at the RAND Corporation

Assemblyman Alan Sieroty, 59th District, State of California

Councilman Thomas Bradley, City of Los Angeles

Discussants

Dr. Carl Q. Christol, Professor, International Law and Political Science, University of Southern California

Mr. Frank J. Hortig, Executive Officer, Lands Division, State of California

Mr. John D. Parkhurst, Chief Engineer, General Manager, Sanitation Districts, County of Los Angeles

Mr. Henry W. Wright, Secretary, Western Oil and Gas Association

MR. ROBERT B. KRUEGER, Chairman, California Advisory Committee on Marine and Coastal Resources: I would like to emphasize that the issue of ocean and coastal management, indeed the environment generally, is not a regional, national or state issue, but a global one. If we are to achieve a reasonable management system that will accommodate the conservation of uses and resources and their development, it will require global institutions.

We will, in the brave new world of the environment, ultimately have an interlocking web of jurisdictions, municipal, state, and in our own federal-state context, national, and probably regional and international. The choice of whether it should be municipal or state or national or international rule or institution will depend largely upon the jurisdiction for a particular role.

A management system for the oceans and coastal zones will require certain essentials. It will, in a broad sense, require a knowledge of the resources, values and amenities of the oceans and the overall environment that is so affected by them.

We have a recognition of this factor already at the international level. Pollution of all kinds is being studied by such formerly disparate parts of the U.N. as the Food and Agriculture Organization, the International Oceanographic Council of UNESCO, the newly formed Natural Resources Committee on the Economic and Social Council, U.N. Sea Beds Committee, which is meeting in Geneva this month in preparation for a 1973 conference to discuss the whole spectrum of issues involving the ocean. It is also being discussed by the preparatory committee for the 1972 Stockholm Conference on the Human Environment. Many of these activities are redundant or overlapping, but the fact they are taking place does point up to those involved that there is commonality of interests of all their organizations in the broader subject of the environment.

After we have developed a recognition of the values and resources which we have and those which we wish to protect, we will then have to develop criteria to evaluate and identify beneficial and detrimental aspects of them. In any given context, an element or characteristic may be positive or many be negative or pollutive. Thermal pollution may constitute a beneficial use in a fisheries sense, for example.

Next, there should be decision making machinery which can effectively determine and weigh priorities among and conditions upon uses and values and determine the mix which should exist in any given situation. That is an important point, of course, because the mix could vary. Offshore oil production, which might be desirable and sought after for economic and social benefits in an area such as Indonesia or Tanzania, might be determined to be appropriate or inappropriate for offshore

Riviera or the Santa Barbara Channel. The management mechanism should be able to take into account individual characteristics at particular times and under given conditions.

After the identification of uses and values and criteria for evaluating them, there should be a "plan" or program as it would be in a computer sense. In an area as dynamic and topical as ocean and coastal management, it is unrealistic to view a plan as a static goal to be achieved; it must be on-going and flexible.

We have had underway in California since 1967, a Comprehensive Ocean Area Plan. The State Department of Navigation and Ocean Development has gathered a great deal of data. They have photographed the coast from the line of low tide to half a mile inland on a large scale, and have collated a great deal of other raw data. There is a growing concern, however, in many responsible circles, as to whether the state should wait for a "plan" before beginning to manage and implement working policy for its coastal zone.

Lastly and most importantly, there has to be a system established which will implement the plan. Now I say a system without any qualifiers because, conceivably, if we had a completely efficiently functioning egalitarian system, you would prescribe that certain uses would not be allowed and that is the way it would work. Unfortunately, in pollution and environmental matters, the self-effectuating type of regulation does very little good. So at any level, be it global, national or state, an effective regulatory scheme--one with investigatory powers and sanctions--should be provided.

One point I would like to emphasize is that the feasibility, the practicability of any plan has to be judged in the particular political context in which it is proposed. You do have vested interests in individual states, nations, and even some few in international organizations. Any alteration of these vested interests must take into account the political role that the person possessing that right has. Robert Ardrey, who wrote Territorial Imperative, makes a very good point of the fact that nations, men, bobcats, birds, all creatures seek to carve out and establish for themselves rights and interests, and that they will defend those rights and interests as part of the integrity of their selves.

This is a process we see in the coastal zone of the ocean and in all of the environment. What we are working toward, of course, is an ecosystem management approach toward resources and environmental uses and values of all kinds. But this approach is inconsistent with many of the institutions, jurisdictions, and concepts, such as even the basic concept of private property, which has been highly regarded in many countries, even our own in recent history. The feasibility of any

proposal should, therefore, be analyzed in terms of whether a sufficient number of those that will be affected by it will support it to give it viability. This is true whether we are attempting to negotiate fishery rights asserted by the Latin American countries or modify the regime of the continental shelf, regarding which there has been so much talk of late. It is in this context one sees both nationally, internationally, and to some extent at the state level, that the purely environmental approach is not a feasible one.

This is brought out very dramatically at the international level. The developing countries of the world view any restrictions that would impinge upon their economic progress for environmental or ecological purposes as conditions to further what is essentially a rich man's set of values. They would like to first enjoy the benefits of technology and industrialization--the first chance to also pollute--before they give any priority to environmental control. The developing countries made it clear in December, 1970, in a resolution affirming the 1972 Conference on Human Environment which stated in a rider that the developed countries of the world should support and subsidize environmental control regulations that may be endorsed by the world community.

I will close by pointing out that there is a bill in the United States Senate, S. 582, that would implement the recommendation made by the Marine Sciences Council Commission in 1969 that there be a national program for funding the planning of state coastal zones through a grant. This bill has the backing of Senator Hollings, Chairman of the Oceanographic Committee, the Senate Congress Committee, and twenty-five other senators, including Senator Cranston.

California will have a coastal zone management program, irrespective of whether we obtain federal funding. This is not true in many coastal states and certainly in all states the passage of S. 582 would be a catalyst to further action.

I am hopeful that we will bring about a thoughtful coastal zone management act in California along the lines suggested by the California Advisory Commission on Marine and Coastal Resources. I am also hopeful that there will be federal legislation responsive to the needs of all of the coastal states.

Research Needs Arising from Proposed State Legislation

DR. RICHARD H. BALL, Vice Chairman of the Los Angeles Chapter of the Sierra Club, physicist at the RAND Corporation: I would like to direct my remarks to what I think will be research needs that will arise out of proposed state legislation for coastal management. I am assuming, for this purpose, that there will be some sort of state management legislation passed. In addition, there is the current state program for development of the Comprehensive Ocean Area Plan. I will try to identify what kinds of policy oriented research we are going to need to truly support this kind of activity, both in the short run and in the long run.

Since there are several kinds of approaches being proposed in state legislative bills, I should distinguish between them. I will discuss the research implications of Assemblyman Sieroty's type of bill. Assemblyman Wilson also has a bill, but it differs considerably in its implications, due both to governmental structure and to timing. For the present purposes, I will characterize these differences as follows.

Assemblyman Wilson's bill will essentially put the initiative for coastal planning at the local level, in that local agencies in cities and counties will formulate coastal zone elements, and these will be amalgamated by regional commissions, and finally amalgamated at the state level by a state commission. This state commission will promulgate certain criteria and guidelines very early in the process, in the first 90 days. These will guide the local agencies in formulating their plans.

The bill that Assemblyman Sieroty is proposing would also have a state commission, along with regional commissions, which operates for three years. The commission will have three years to formulate a coastal zone policy and plan which will then have to undergo legislative approval. Following that, presumably a considerable amount of initiative would revert to the cities. But they would have to operate within the guidelines and the particular reservations of areas or identification of state-wide interest that the commission had been able to formulate with legislative approval. With the Sieroty proposal, there will be three years in which to develop a much more scientific and comprehensive set of policies, planning procedures and guidelines; to identify the resources available; and to identify the public needs, including the needs for transportation, housing, recreation, preservation, ecological balance, resource management, siting of public utilities, waste disposal, scientific research and education, etc.; all the various purposes for which we must use the coastal zone.

I think it is clear that we don't presently have all these matters adequately defined, nor do we have policy making procedures established

which are adequate to guide local government in formulating satisfactory coastal zone plans.

If we have coastal zone management mechanism of the type proposed in Assemblyman Sieroty's bill, what will be the resulting research needs? What information would help the state commission and regional commissions during their three year lifetime, starting next January, to promulgate a state-wide plan and guidelines for the future? What will be the needs, following that three year period, for information and methods to aid various levels of government in doing more explicit planning? Because such a state-wide plan is not necessarily going to be a final, precise plan saying, "This shall go here and that shall go there," it will probably be a more flexible type of plan that develops procedures for making decisions and allows for future changes in the specific plan to accommodate changes in society's needs and desires as they develop.

Some of the tasks that a commission will have in formulating such a plan will be, as I said, to ascertain the long-range requirements for public uses. If, as one expects, there will be more demands for the use of the coastline than there is coastline to meet them, there will be allocation problems which require a method for setting priorities and allocating uses. A logical, rational framework is needed in which there is a fairly precise definition of the public interest and a set of procedures for deciding which uses are most necessary or will best serve that public interest.

Another important need will be a scheme for implementing the plan, which the commission will have to develop by the end of the three year period. This will really constitute a scheme for long-term coastal management. They are going to have to recommend institutional arrangements with powers and management tools appropriate to carry out this kind of management in the future. Finally, of course, the plan will have to be translated into specific state legislation and perhaps specific actions recommended for private, public and local government agencies in order to implement this plan.

Development of such a comprehensive management plan is a central task of the commission. In addition, there would be the immediate task of governing changes in the use of the coastal zone through permits. Both of the current legislative proposals would require that decisions be made on permissible uses of the coast during the three year planning period, although by different agencies.

I think we still have a very great problem in defining our objectives in such a way that they can be used for evaluating projects. One of the objectives we would want to include is maintenance of environmental

quality, both for human beings and in terms of maintenance of healthy eco-systems. Another objective should be balanced development, balanced in the sense that resources are used for the good of society. This will be fairly difficult to do, but it is important that the benefits or costs which will evolve from these decisions shall be equitably distributed among individuals. The public's interests should be defended, but in a way that is equitable to the landowners in the zone.

There should also be equity among the various jurisdictions. If we decide that it is in the greater public interest state-wide, for instance, that one particular area should be intensely developed and another should not, we must consider the effect upon the tax base of the jurisdictions involved. For example, we should do some fairly hard calculations to decide if it is necessary to have a mechanism to reallocate money between these jurisdictions to compensate one or the other for any imbalance.

A very important thing that is often forgotten when we try to set up rational decision making procedures for the environment is the lack of symmetry in the process of a development vs. no development decision. If you make a decision that allows development in a certain way, you may foreclose for all time the possibility of an alternative course later because your original decision resulted in the destruction of a particular resource. You cannot change your mind later and say, "I wish we had left that in its natural state as an estuary or whatever for its biological value."

This is unsymmetrical because if you had made a decision the other way around and said, "Let's preserve it," you could have always reserved that resource and developed it later, not, I should point out, without losing certain economic opportunities at least in the short run. Still, there is this basic asymmetric character to the decision making procedure when we are dealing with irreversible destruction of natural areas. When people try to apply what they feel is a rational decision making procedure in conservation matters, they often forget about this basic problem. Their decision making seems to be balanced, but it is not always balanced if you look at the long run and calculate what the possible future value of the resource might have been if the decision had been made the other way. So, this asymmetry is an important characteristic to be taken into account when building the decision making procedure.

I would like to mention a few specific research tasks and associated problems. I already spoke of the problem of defining our assumptions, goals and values in an operational manner, which is not easy. I think it is very important to emphasize that this should be policy oriented research. The problem is not necessarily to answer all of the scientific

questions involved, but to do the research based upon the question: What do we really need to know to make the decision now? We recognize that we are dealing with a system in which we are not going to have all the answers to our questions and, therefore, the decision making procedure has to operate in the absence of much of the information we think we really ought to know. For example, we cannot assume we are going to do a benefit-cost analysis and come up with a number that helps us make our decision. Even if we could quantify what is sometimes called "intangible benefits," we do not even have the scientific information in most cases and won't have it in the near future to be able to evaluate, for example, the economic effect of a change in a certain eco-system on the world's fisheries. Since we don't have all the information, we must recognize that our decisions are going to have to be made with the absense of complete knowledge as an inherent factor. Hence, we probably should be conservative and provide for the maximum options for the future.

There are some very specific types of economic research we could do. Mr. Bodovitz mentioned the case of Palo Alto where engineers, geologists and others went into an area to assess the ultimate costs to the city of providing services to a new kind of development. That is important and has not been done enough in the past. The commission will not do all of the necessary studies in a particular area, but it will have to be able to lay down guidelines, to tell local government what kinds of studies are needed. Research is needed to assist the commission in this job; including the identification of the important factors to be studied, development of criteria to be applied in making decisions, and management mechanisms for resolving problems.

Secondly, we are going to have to look very carefully at the economics of the market allocation system in the coastal zone context. We are clearly going to be making some non-market decisions, but we should also, as a free enterprise society, be making use of the market system as much as we can. We recognize there are many imperfections in the market. So, the question is: What kind of economic or fiscal mechanisms do we need to apply in order to compensate for market imperfections? I am referring to such things as taxing powers and, as part of land use controls, such mechanisms as taxes on capital gains resulting from land use changes and changes in values brought about by governmental action. If rezoning increases the value of somebody's land, shouldn't the governmental agency recoup some of the benefits for the public out of this increase in land value? The objective, then, is to develop a comprehensive set of policies, planning principles and implementing mechanisms to maximize the benefits to society, particularly with regard to state-wide interests.

I think Mr. Bodovitz made an important point when he mentioned that

the initiative for a development project should not be assumed by an agency such as the Bay Commission or a coastal commission. However, the matter of development must be dealt with in planning the coastline in a manner that does not foreclose the possibility of creative solutions to problems; for example, projects which would create shoreline areas or artificial lands increasing the quantity of land resources available. A question we have to ask is: Should the coastal zone commission itself propose creative solutions such as this or should it be one that responds to proposals of another agency? Mr. Bodovitz made a good point that perhaps it shouldn't initiate such plans, but neither should its procedures stymie what might be a creative solution to a problem. It must remain as an objective judge of the merits of any proposal.

Regarding institutions, we recognize we are already setting up a mechanism which has a federal, a state and a local level in decision making. We have to think carefully about the balance of power between the levels, keeping in mind two things. First, as a system the coastal zone interacts strongly with other systems. We do not have control over the entire system. It is important that we do not have control over what is happening in the rest of the state outside of the coastal zone economically and socially. We do not have control over the remainder of the ocean eco-system. We are only controlling a particular interface, so our management mechanism must recognize what these other interactions are and provide institutional arrangements that can deal with them. As far as what powers should be at the federal, state and local level, it may be argued that, ideally, the federal level would identify what things are uniquely of national interest that would not necessarily be of great local interest. The same would be done at the state level in order that the state might be able to deal effectively and economically with those particular things that would not be optimized naturally at lower levels of government. The counter argument to that is that you can't always assume that the lower levels of government will even optimize things for their own best benefit; i.e., in their enlightened self-interest. However, the system will probably not be quite that tightly defined. The federal government may, for example, also end up looking at things that are perhaps of more local interest, but where the local government involved doesn't have the capability or the local political situation is not conducive to a complete recognition of the public interest.

ASSEMBLYMAN ALAN SIEROTY, 59th District, State of California: I think we have seen somewhat of a revolution in terms of the conservation effort. It has not yet resulted in substantial legislation, but it will. It has resulted in a greater sensitivity by public officials at all levels to these issues and, in many cases, led to decisions which otherwise might not have been made two or three years ago.

Although our bill contemplates both conservation and development, as does the one establishing the Bay Commission, my prejudices are strictly for conservation. That does not mean to say that is the way the final commission is going to operate because I probably won't be on the commission. As we will point out later, it will depend greatly on which people are appointed. But in the drafting of the bill, I will admit to you my bias is toward preventing further deterioration of our coastline.

Dick Ball has given you a good idea of what is involved in our legislation. He is one of the authors of our bill. And I want to thank him and other members of conservation groups, not only for helping us in this particular legislation, but for their participation in helping the Legislature over long periods of time before they were recognized for their importance and the importance of their message.

Representatives of many groups have testified before the Assembly Natural Resources Committee, of which I have been a member since 1967. But as I recall, Dick Ball or other representatives of the Sierra Club or other conservation organizations would usually come on last and often after everyone had left. They would submit a written paper and maybe it would be read and probably it wouldn't be. Things are different today, and the conservationists are being listened to and are participating fully in the process of drafting legislation and seeing that it gets passed. But I don't think we ought to forget the fact that it took many years of almost unrewarded effort for that to come about.

The legislation which we will be introducing this session will not be the same as last year's bill, A. B. 730. We have tried to bring together conservation groups in California even though they don't always see eye to eye. We have tried to bring together other legislators who have somewhat different ideas, and to come up with a bill which will have broad support within the Legislature, and total support from conservation groups that are interested in the coastline.

Our bill is a result of the experience of the Bay Conservation and Development Commission legislation. It is not a new idea.

Specific Problem Areas along California Coast

In 1968, I was the Chairman of the Assembly Natural Resources Sub-Committee on Conservation and Beaches, and we held hearings up and down the coastline in California. We started in Sonoma County where there was a question about access to the ocean. Public access was limited at the Sea Ranch, a ten mile development along the Sonoma County coast, and conservation groups attacked the Sonoma County Board of Supervisors for its failure to insist upon public access to that coast area. The conservationists lost that battle, and there is no requirement today that the public have any access to this ten miles of the northern Sonoma County coast.

However, I think, as a result of that fight and that hearing, Assemblyman John Dunlap, who has been working with me on the coastline legislation, initiated a bill that passed last year which now requires cities and counties to provide access in any subdivision approved along the coastline. In addition, Orange County has recently passed an ordinance which requires access. This issue of public access has become a very lively one and, of course, the recent California Supreme Court case has become quite a controversial element in this.

We, of course, recall the fight at Bodega Head, where Pacific Gas and Electric wanted to put an atomic reactor. That battle was won not on an environmental basis but upon the earthquake issue. However, I do not think that even the Atomic Energy Commission's final decision on this matter was entirely without notice of the environmental aspects of it.

In San Mateo County, we found a threat to the open space which still exists. Northern San Mateo County has become urbanized, but the rest of the western county still remains pretty much in its rural setting so that there is a beautiful coastline very close to heavily urbanized areas. But the threat of extensive development is real, and we have about two or three years maximum to preserve large areas of that coast if we are going to do so. Santa Cruz is very much in the same situation, where there are threats of development and already proposed development along the coast. Monterey has water pollution from Fort Ord and the city, and its coastline is becoming spotted with housing.

In Morro Bay, the P. G. and E. power plant stands out as an ugly symbol of what has happened to large portions of our coastline. In Santa Barbara, we know about the oil derricks on federal waters there and about the spills. In Ventura County, there are oil operations, refineries and storage tanks along the coastline.

In Los Angeles, we have recreational needs and problems of public access to beaches. We have problems of transportation to beaches, parking and utilization of beaches themselves for parking. This is what the plan has been for the Venice Beach. Finally, we have problems of the ugliness of these beaches.

Cities, first of all, do not have the financial capacity to purchase or to properly maintain beaches. Secondly, not all city councilmen are like Councilman Bradley, concerned about beaches and parks. It is usually the last item on the city or county budget, the first one to be cut, the last one to be provided for. So it usually receives a very low priority by most cities and counties.

Manhattan and Hermosa Beaches are providing regional resources and getting some regional support, but are they really interested in providing regional resources or is that pretty much against the interest of the residents? Do they really want to provide sufficient parking for people to use these beaches? Do they provide sufficient restroom facilities, for instance, so that the beaches can be adequately used?

Sewage disposal plants along El Segundo and the Standard Oil Refinery there restrict numbers of people from using it. Even with the opening of access to the public recently, there is a question of whether the water has sufficient quality to be available for swimming. Redondo Beach has power plants, and the list could go on. If you take a look at what is happening to our coastline, you recognize it has been subject to unrestrained use as an economic resource for housing, power and other developments.

One of the things that struck me the most in Orange County was the shaving of the bluffs by Laguna Niguel Corporation, and I suppose others are doing it, too. I have described this use of our coastline resource in such a blatantly private way as almost a criminal act. Something that has taken millions of years to create, something of great beauty is simply shaved away in order to facilitate building a few more homes.

This has been the pattern along our coastline. We have no way of measuring what our beaches and recreational opportunities are worth. I guess we could if we started to see how much people would pay for them, but we have never done that. So it is hard for the public interest to compete against the private interest for our coastline.

Part of this problem, of course, is the acquisition of more coastal lands by the state. We have introduced legislation to provide a bond issue for this. The State Department of Parks and Recreation will come in later this year with a plan for the entire coastline in terms of

what lands should be acquired by the public for public use. This should give us some indication of the amount of money needed for acquisitions. We are talking about acquisitions of beaches, of access to the beaches for public use and acquisition of open space lands along the coastline.

In the past, the need for a tax base and the lack of other kinds of revenue devices have had the effect of forcing local governments to be too responsive to demands for private economic development of our coastline. I don't mean to be overly critical of local governments. They are being judged today by 1971 standards in terms of conservation. Also, the need for revenues was perhaps greater in early years and forced the things to happen that local government might not approve of today.

So, our thinking now is that the coastline has to be looked upon as a natural resource not only for the people who live along the coast, not only for the people of California, but as a national and even international resource, and ought to be retained in as natural and as beautiful a state as possible for future generations. When we travel to other countries, we realize that right here in California we have one of the most beautiful resources in the world.

Proposed State Legislation and Its Opponents

Our legislation will pretty much follow the BCDC approach, although the representation is different. We will propose a state commission and probably six regional commissions with responsibilities in two general areas. One is to develop a plan for the California coastline which will be submitted to the Legislature for adoption. In addition, a recommendation for management of this plan and for funding of the management institutions will be submitted.

Secondly, the Commission between now and 1975 will have interim powers to control developments in what we call the permit area. The permit area will be a one thousand yard inland area to the three mile limit in the ocean. There will be tests of what can be allowed during this time.

It is not a moratorium, although some people have suggested a moratorium, but there are probably things that must go forward in this area and it would be unreasonable to restrict them. While this legislation involves interference with private property and creates another layer of government, in the sense that prople who do qualify under local zoning laws still will have to get a permit from another agency, we feel it is necessary to protect the coastline from irreversible modifications that might occur while the planning program is in process. The same

commissions that are working on planning will be working on permits. As Joe Bodovitz pointed out, there is a value in doing both jobs.

There will be a conflict of interest clause, but no matter what qualifications for membership on the commissions we might put in the bill, we cannot determine who we will end up with. This means that people who are really interested in having a strong conservation element created here will have to participate quite fully in the process of suggesting people to the appointing powers, and using what influence can be used upon the appointing powers to get the right people on the commissions. Even before appointments are made, citizen participation is important because this legislation we are talking about will not pass without it.

I do want to mention one of the critical points here. Probably one of the most conspicuous, but not necessarily the most powerful opponent of this type of legislation, has been the public utilities, both publicly and privately owned, and their "need" to provide facilities for generating power over the next ten years and the next forty or fifty years. They would like to be immune from this type of legislation. We have resisted this because we feel quite strongly that utilities, as well as every other use, must compete for use of the shoreline. The commission should be in a position, I think, to have to evaluate the needs for every use. We must suggest there are other ways of producing power without the utilization of onshore coastal sites.

Real estate developers are very much opposed to this legislation, and there are others who see this as a threat to their private interests. But in the long run, I think this kind of legislation has to be passed if there is going to be adequate protection for the scenic and recreational use of our coastline which cannot be measured in dollars. There is no way we can put this in terms of dollars and say, "this is worth so much as against your use which is measurable." There has to be a sense that the coastline is an invaluable resource which must be preserved for its environmental values.

COUNCILMAN THOMAS BRADLEY, City of Los Angeles: I know that there are many people, especially among the conservationists, who have given up on local government, and they are therefore turning to the state or federal government for some help. They are willing to turn over to these other agencies the power to regulate, to control and to plan, either at the state-wide level or regional level, even those areas which for centuries have been the province of local government. I can clearly understand that there is a reason for some of this feeling of alienation, of disillusionment with local government because we have been engaged in petty parochialism in too many cases.

We have been inept in other cases. We have been stupid in some cases. We have lacked integrity in others, and we certainly have lacked courage in many cases to do and say the kinds of things that need to be done with regard to protecting not only our coastline, but the rest of our state.

However, we have to be careful about the way in which we move now so that in our haste to correct the mistakes of the centuries, we do not create more problems that by careful analysis we might avoid. These kinds of warnings are in order because we are concerned not so much about what Alan Sieroty's bill says in its present form, but what the ultimate bill may say. If you just look at some of the bills that were introduced last year, you will find they were proposing to plan and to legislate all the way from three miles at sea to the nearest mountain range and the highest peak on that mountain range. If you look at the topography of the State of California, you will see that is going pretty far inland.

Obviously, a number of local officials were alarmed by the prospect that many of their prerogatives were going to be taken away from them. They saw the proposal to plan coastal matters as a foot in the door to regulate other areas. Just last year, for example, the state took over the whole business of building codes, and they have adopted some uniform building codes for the state that in many cases will prevent a city like Los Angeles from enacting more strict regulations appropriate to our local conditions. So, we have to be concerned with not what is actually presented in print, but what might happen in the course of discussion and debate, what may finally become law for this state.

I think, as we look at the present trend, we hear the federal government saying, "In our new federalism, we are going to move power away from the central government back to the state and local government." Yet here we are saying exactly the opposite. We now want to

take away from local government certain powers to plan, to regulate, and we want to put them at a regional level or state level. I want you to clearly understand that I am really addressing my remarks beyond the coastal range plan to some of the wider implications of the proposed legislation. I am trying to get across to you why there is this kind of unrest, this uneasiness on the part of local officials, and I think you ought to be aware of it.

We are not so sure that turning over many things, planning as well as regulating, to the state is going to produce any more perfect picture, any better response. I have seen a state legislature and I have seen Sacramento succumb to the same kinds of pressures and, in some cases, succumb even faster than local elected officials do. I am talking about special interest groups, about the powerful lobbyists that operate even more effectively in Sacramento than they do at the local level, and in some cases they have even more reson to operate there as they do. The state, if you look at its past record, has not been that responsive, not that concerned about local government or local communities, so do not tell me just turning it over to the state is going to solve the problem because that is no magic formula to the solution of our problem.

If you are talking about turning powers to a region, I wonder now if again we are moving away from the direction we seemed to be taking at one time, that toward consolidation of effort and comprehensive planning. Again we are moving toward a proliferation of agencies dealing with special problems. We seem to be saying, "Here is a special problem we ought to turn over to a special commission." I have seen commissions work, and there have been good ones and bad ones. I wonder how well commissions will function when they are not directly responsible to the local electorate. A commissioner may not be really responsive, and he may yield to pressure just as anybody else does, but the one beauty about the local official or the state official who does not respond to the constituent needs is that he can be removed at the next election. But what do you do about the person who is appointed by the governor or that serves on a commission?

I do not want you to think I am opposed to the idea of developing a better system of protecting our coastlines because I certainly am in favor of that. I am concerned about the several items that Alan Sieroty listed, and there have been many more examples of how we have destroyed the environment and how we have destroyed the coastline. I think we have got to change that. I just want us to be careful as we do it and to think through these various processes.

I would say to the conservationists that I am one of them. I would say to them that we are concerned at the local level, that you not judge lo-

cal government in terms of the past. What you see today is really an accumulation of many years of action or inaction on the part of government at all levels. It has been only in the last couple of years that we have been able to make any impact at any level of government in terms of protection of the environment.

So, I think we ought to look now at what kinds of response we are getting at the present time, and I think at every level, including local government, we are getting a better response to these issues. And it is my hope it will improve in the future. That is the basis, and I hope we look at all of these issues in our concern and not throw out the baby with the bath water.

DR. CARL Q. CHRISTOL, Professor, International Law and Political Science, University of Southern California: I would emphasize the importance of Mr. Krueger's earlier comment that we are confronted here with a global problem and that it must be dealt with from an international law point of view. It is also a national and a state problem to be managed within the U.S. Constitutional system. There are competing interests among several parts of our Constitutional structure as well as among users of the ocean; those who would like to enjoy beaches on the one hand and those who pollute oceans, even though accidentally, on the other.

Recent International Legal Developments

I would like to mention a number of legal developments at both the national and state level since 1945 and then relate them to research needs.

First of all in 1945, there was the Truman Proclamation relating to the extension of U.S. influence into the so-called continental shelf area. In 1953, the Submerged Lands Act and the Outer Continental Shelf Act were passed. In 1954, the IMCO sponsored a Convention on Oil Pollution. IMCO, the International Governmental Maritime Consulting Organization, is one of the specialized agencies of the United Nations. The 1954 agreement was followed in 1958 by one Geneva Convention dealing with territorial waters and by another dealing with the continental shelf, among others.

Then in 1962, there was a revised IMCO Oil Pollution Convention, followed in 1966 and 1970 by a series of national statutes relating to fishing zones and fishing rights. In 1970, there was also the Water Quality Improvement statute. At the same time this statute was under consideration and being passed, there was being held in Brussels in 1969 another conference, again sponsored by IMCO, which provided us with the final drafts of two treaties. The first was the so-called public treaty dealing with the possibility of abating oil pollution damages that would occur if oil from a vessel were to carry on to the coastal zone. The second one was a private convention that would provide for damages up to fourteen millions of dollars in the event that harm caused by oil from a vessel were actually done to territorial waters or coastal zones. Any injured individual could assert such a claim.

The interesting thing is that at the same time that the conferees were meeting in Brussels establishing this fourteen million dollar figure, the Congress of the United States, in the Water Quality Improvement Act, enacted a law saying that the maximum figure would be fourteen million dollars, except that where the harm was produced by a Texas tower the figure was eight million. Furthermore, under the statute

only the United States government could claim for the harms that were done.

During the 1970 hearings on these two matters, Senator Muskie asked what rights of the Maine lobstermen would be in view of the priority assigned by the treaty as governing in the event of conflicting provisions in a statute. It is well established in international law and in American Constitutional law that as between contesting or competing treaties or statutes, the last one in the point of time governs. So, if the treaty is ratified and goes into force, there is some hope that substantial rights for U.S. citizens will be effectively established.

Needs for Representation of State Interests at International Level

The point I wish to make is simply this: Do the citizens of the State of California, do the people in the cities, the counties, the regions, the areas, the special districts, and so on, have sufficient representation of their needs and protection of their rights at the time the State Department or our representatives are engaged in negotiating international agreements? It would appear that Senator Muskie was very much surprised to learn there was a difference between the provisions of the statute and the proposed treaty.

Let me go a little further by saying that in 1970, the United States proposed that we engage in an open international conference with the view to extending our territorial waters from the three mile limit to twelve miles. There will probably be an environmental conference in 1972 and a new Law of the Sea Conference in 1973. What will the rights of the citizens of California be at the time when such conferences take place? In short, how are we going to get the needs of the state, the area, the localities, and so on, protected when many of the great decisions are now being taken, not here in California, not even in Washington, but on a global scale as a result of negotiations preliminary to the international conferences.

So, I would like to propose then as a research topic: the development of arrangements which provide for greater state, area and local representation at the national and international level with respect to California's coastal zone needs. Not having our own foreign office or our own Department of State to represent us internationally, which obviously can't be done, we should at least have some contacts so the needs of the people of California will be protected at international forums.

Science and technology are permitting us to reach ever further outward and national claims are ever more extended. This is reflected in our efforts at redefining or possibly simply interpreting the meaning of the

term "continental shelf".

California's own interest in extending the three mile limit is an illustration of the problem I have been discussing. If territorial waters of the United States are extended to twelve miles, will this mean that the State of California is still restricted to the three mile zone pursuant to the language of the Submerged Land Act, or may California extend its authority to those areas from four miles out to twelve? Who, for example, will have the benefit of the oil royalties involved?

I do not urge a totally perfect or utopian decision in these matters. The political pulse of the national community at this time is pretty clear. There is a demand for accomplishing things which are accomplishable now.

Background of Legislative Proposals

MR. FRANK J. HORTIG, Executive Officer, Lands Division, State of California: First, I would like to point out that legislative proposals, such as that of Assemblyman Sieroty, are not simply a result of the public's discovery of the terms of ecology and environmental protection two years ago. They are outgrowths and developments intended to codify, to coordinate, and to make effective the administration of resources in a constantly changing world. The emphasis is changing and the values are changing, and the omnipresent problem of allocating scarce resources gets more complicated by the day.

Possibly, the best illustration of my point is the publication I have here. It is entitled Office of the Surveyor General of the State of California, Rules and Regulations Concerning Oil and Gas Permits and Leases, Including Penalties and Restrictions and Also Permits and Leases to Develop Other Minerals, approved January 25, 1932.

Another publication that has had a tremendous impact on the California coastal zone and coastal zone management is Rules and Regulations Governing Construction, Alteration, Maintenance, Removal and Repairs of Groins, Jetties, Seawalls, Breakwaters, Bulkheads, Upon, Across, or Over Any of the Swamp Overflows, Marshes, Either/Or Submerged Lands of the State of California. It was approved November 14, 1931.

It is not that there are no statutes or that there is not any administration in government, and now suddenly a whole new series of statutes is going to have to be developed "from scratch" in order to effectively cover the administration of these new found public concerns for ecology.

Rather, because of the accelerated pressures in terms of population explosion and technological advances, we in the resource administration end of the business do need the effective controls and the authorizations and the concepts that can be developed only though an organizational structure such as that proposed by Assemblyman Sieroty's bill, and others. I think, to complete the record, I should report that as of yesterday there had been introduced in the Legislature, in both houses, at least twenty-two bills having an impact on the environment and coastal zone management and administration.

Need for Objective Measures to Aid Decision Making

I would like to make a reference to a research need that has been clearly indicated, but possibly not recognized as being a matter of common focus in the previous presentations here.

Let's review the elements going into the Comprehensive Ocean Area Plan (there is a graphic demonstration on the wall in the back of the room entitled "Decision Matrices") that are intended to help solve the dilemma of all managers who have scarce resource allocation problems by identifying the combination or mix of the problem elements in order to arrive at a management decision. First, however, we need to know the value of the resources, including the value of amenities to go into the "mix". This is an area of research which could be of inestimable value to a resource administrator. It is research on the development of a mechanism that will permit an objective evaluation, determination and measurement of what the constituents of a mix or the value of the respective components might be. Otherwise, we will continue as we have since time immemorial--arriving at a management decision which is primarily a political decision in the broadest sense.

This is necessarily so because a staff can currently give the Legislature or the State Lands Commission only a recommendation based on an objective analysis of the elements which can be measured and a "biased" recommendation on the subjective elements. Then, patently, the actual decisions that are going to be made will reflect the subjectivity of the decision makers.

MR. JOHN D. PARKHURST, Chief Engineer, General Manager, Sanitation Districts, County of Los Angeles: I probably have a somewhat different perspective than the previous speakers. When a decision is made, somebody has to do something, and it is usually a technician such as I am who has to do it, so I do have a little different viewpoint.

I am a civil engineer, sanitary engineer or environmental engineer, whichever term you prefer. We are working in a field which is changing very, very rapidly. Until a few years ago, the sanitary engineer was concerned primarily with the public health, and it has only been in recent years we have taken another look at the aspect of man's effects on his environment.

Need for Practical Systems to Achieve Goals

I am very interested in some of the prospective legislation we have heard about. I would hope that Assemblyman Sieroty, in his proposed bill, provides a means to develop realistically what is needed in terms of institutional, management and technical concepts to carry out the necessary programs effectively. It is not enough to simply say we are going to stop all development over a period of time or regulate development if we do not have a clear idea of how to go about it. Being a technician, I realize that we do not have all the technical competence that is needed.

I refer you to the Southern California Coastal Water Research Project which is being sponsored by the City of San Diego, Orange County, the Los Angeles City Sanitation District, the Los Angeles County Sanitation District, and Ventura County. The intention of this study is to try to draw a base line as to where we stand now, to get a fix on what we know and where the gaps in our present level of knowledge may be, then to try to fill in the gaps and ultimately to come up with a recommended plan for managing our coastal resources, particularly with regard to waste discharges. This project has been under way for better than a year now, and has had a very difficult time trying to get oriented. Some of the problems are not easily defined and a starting place is hard to locate.

We need a lot of applied research which will take into consideration our basic research and apply it to our needs. We also have to monitor the results of our efforts. Unfortunately, we are still not doing this to a great extent today. We are looking on the next cloud and saying, "I would like to be sitting up there," but really none of us have a good idea of how we are going to get there, including myself.

What we need to do is take a hard look at where we are, where we want to be, and what we need to get there. That is why I say what is required is more than just some legislation, whether it be on a state or national level, to set forth our goals. We have got to get down to the drawing board, put our best technical brains to use, and develop these concepts into practical systems which will work and which will produce what we all want. I don't think there is anybody in this room that would disagree

on what we want. What we don't understand is how we are to get there, nor have we as yet dedicated a large enough portion of our national resources that will be necessary to accomplish this. That is why I hope that some of the legislation coming out of Sacramento is going to provide funding and authorization to do some of these things.

I think that the frustration we have heard expressed today results simply because none of us have been able to get a grasp on how to achieve our objectives. This is why the local agencies have passed it to the state, the state has passed it to the federal government, and now the federal government is passing it back to the local agencies and saying, "You do it."

Recently, I testified in Washington before Senator Hollings' Sub-committee on Oceanography in regard to a bill he had introduced. This bill proposed to authorize construction of six or possibly more marine laboratories in various portions of the country to consider some of the problems I have mentioned and try to develop some answers. Along with this is a companion proposal by the administration to effectuate a national ocean dumping policy. I testified at that time that in my opinion both of these proposals are very closely associated since if we prohibit dumping materials that have dilatorious effects on the environment on the national scale, at the same time we have to provide some other means for their disposal.

Let's just not say, "Thou shalt not do or thou shalt not dump." We have to find a better way of doing it. I think that the people who are concerned have said too often, "Thou shalt not," but have not taken a look and said, "Let's find a better way to do it and this is the way to do it."

I refer you to a document published by the National Academy of Science, National Academy of Engineers. It is entitled Waste Management Concepts for the Coastal Zones. It was published in 1970 and is available through the National Academy in Washington, D.C. It sets out requirements for research and investigation. This document is a concensus of about forty-five engineers and scientists who spent a good portion of a month in developing recommendations for research to accomplish much of what we have been talking about today. They lean heavily on the need for monitoring, and emphasize the interrelationships of the various disciplines that are involved.

MR. HENRY W. WRIGHT, Secretary, Western Oil and Gas Association: I represent the oil industry, a somewhat frustrated industry at the moment, and if it has any sins, they are ones of omission and a certain myopia induced by the need for competitive survival in the open market.

Arguments Against Control at State Level

As an industry, we see no need for the enactment of this bill, and I can assure you that all of our resources at the government level will be spent on defeating this legislation. Now why do we say that? We think planning should stay close to the people. We have seen nothing at all that convinces us that raising the level of management or planning to a higher governmental level in any way assures a better product.

There is inherent in the entire conservation movement something that precludes its effective rapport with business. The conservationists have a strong desire to return to Walden, but that isn't going to happen.

Now as an industry, we have a great deal of respect for certain national beauties of the coastline. We sincerely regret Santa Barbara. But the fact remains that our most important goal, as far as our coastline is concerned, is to give all the people access to it. We agree to that. However, when it comes to creating commissions and boards who are going to sit back and allocate land uses a thousand miles or a thousand feet inland and three miles seaward, then you are going to meet our resistance.

Need for Both Public and Oil Industry Access to Shore

Now, the California oil industry is declining rapidly. The upland portion of this industry has been operating more than seventy years now, but it is on its way out. As far as exploration is concerned, today hundreds of millions of dollars annually are being turned away and diverted from California. There are a number of reasons, but they are not germane to our discussion here today.

While the ocean is very important, and while we believe the public must have access to the beaches and enjoy a clean ocean, we also believe we must have access to the coastline.

We are capable today of drilling and producing wells in fifteen hundred feet of water. In five years that will go to five thousand, and in ten to fifteen years we believe we can operate in ten thousand feet of water and thumb our nose at the coastline.

We will be able to produce, to get men out there for indefinite periods. We will be able to ship from the open ocean. Perhaps this will solve a lot of problems because there is an understandable aesthetic reaction to our erection of drilling platforms near shore.

If there is research to be done, we are going to pay for some of it be-

cause we want to know this: How effective has municipal and county planning been, and what is the probability that by raising the level of planning to the state it will be more effective than it has been? What is the economic future of the ocean adjacent to the State of California and more specifically Southern California?

We believe in multiple use. In the near inshore waters, we see new industries arising.

Inherent in any of our activities is the desire to improve our track record with respect to pollution. It has put us in bad shape in the State of California. We will remain there probably, as far as the state tide and submerged lands are concerned, until we can prove otherwise. We hope to do it effectively and to prove we can contain and recover spills with brand new equipment that is now being built.

But that really is not enough. We feel the people have a right to enjoy the coastline, and also that people who have already invested in the coastline have a right to enjoy the benefit of their purchase. As a state, perhaps we missed the boat a hundred years ago. Oregon certainly has had much more foresight than California. They control most of their coastline. The same, but perhaps to a lesser extent, holds true in the State of Washington. We do not see in the fiscal management of the State of California the capacity to buy back at the market cost a significant portion of the California coastline.

MR. JERRY MOORE, member of the Commission on California Marine and Coastal Resources, Department of Navigation and Ocean Development: We have done a considerable amount of work in investigating the economics of the coastal zone in support of offshore industries. In our research, we have discovered 95.5 billion dollars invested in the coastal zone facilities for logistical support of offshore industry in marine activities. This excludes residential, commercial development and utilities in support of those values. We project this investment to increase 76 percent in the next ten years as our technology allows greater exploitation of deeper waters.

Need to Incorporate Economic Values in Coastal Planning

Up until now and in all efforts in which I have been involved in several commissions, there is no evidence that the economics of the coastal zone has been given any consideration. Those in a decision position are left to equate the economic allocation or reallocation of resources against maintenance of the environment and the ecology. Until there is some

effort to put economics and the environment into perspective, it is my personal opinion that no rational opinion can be made on behalf of the electorate.

Now, I have just provided you with a figure on one aspect of coastal zone economics. You may use up to eight to ten times this as a measure of the interior effect of offshore industry on the populace of these coastal zone states.

The second point, in terms of economics, is that the main problems within the coastal zone are those where there are demographic pressures from the interior for the use of the limited geographic coastline and economic uses of the exterior. Where these two conflicting interests arise, there is no way to resolve the reallocation of land values.

It is well to plan for the use of Oregon's coast or Washington's coast on the premise that one can allocate land values to lower density uses. It is another process to plan for the reallocation of land values in areas of metropolitan concentration such as Southern California and the Bay area. There has been no effort to study what the problems would be in the relocation of certain functions which do not belong in the coast and are not germane to providing access to the environment. There are a number of facilities that exist on the coast that could possibly be moved into the interior with certain means of transportation or communication to that environment provided through rapid transit, for example, or some means of conveyor belt.

There has been no economic study of the value of concentration of development areas in certain high rises. For example, instead of a horizontal marina, a vertical type marina. All of this would expand the geographic resources and give us a greater scope for decision making.

There has been no consideration of the probabilities or possibilities of creating offshore land values such as with offshore islands. We have six along the coast of California. It is possible to develop offshore land values at less cost than the $2,000 per front foot of Malibu land or the quarter million dollars per front foot of Newport land.

I think that one of the areas of research which is needed this year is to find a means for the accommodation of the aesthetic values, the social amenities, the environmental and ecological considerations in our economic framework. Although the coastal zone management policy may only go a thousand yards inland, any policies that are directed to the management of these resources will impinge upon all the economic developments in this nation.

MR. STUART DAVIS, School of Business, University of Southern California: I would like to ask Mr. Wright if he feels that USC can contribute in the development of aquaculture by the oil industry.

MR. WRIGHT: I think very definitely. One of the other speakers mentioned that thermal discharge may serve a beneficial use in the propagation of certain types of fish.

MR. MOORE: Aquaculture is the potential use of the coastal zone for the reproduction of living resources, somewhat akin to the use of land for citrus farms in Los Angeles. Proximity to the market is very important in all forms of aquaculture, as are the environment and the adjacent land use. There is no area to my knowledge in the State of California, except in the very far north, which would economically permit any form of aquaculture because of the high adjacent land value. Now, as desirable as it may be for the benefit of mankind, economics preclude it.

MR. WRIGHT: You mean your economics.

MR. MOORE: The economics of anything.

MR. DAVID JOSEPH, General Behavioral Systems: Since we are talking about research, I get a little concerned about remarks that aquaculture won't work, which seems to shut off all questions on that. I would like to ask if the remark was meant to include the impracticability, let us say, of the oyster development such as is being done in Orlando. I believe it is the Light and Power Company which is using the outfall of a generating plant, the heat, to develop a productive and economically sound oyster industry in the area. Is your comment meant to say that in any place but the northernmost part of California such a thing could not be made to work?

MR. MOORE: From a practical and biological point of view, aquaculture certainly can be used. There is no question about it. I know of the Orlando situation, and it is rather peculiar and pertains directly to coastal zone management. That particular plant was going to be required to reprocess this discharge at the cost of roughly a million dollars. Then they discovered there might be a potential for aquaculture.

My categorical remarks are purely from economics and based on the premise that agricultural land or aquacultural areas on the coastal zone have to give an economic return. All I am saying is that the economic return to be derived from the value of the adjacent coastal zone, anywhere but in the far reaches of Northern California, preclude

aquaculture.

MR. KRUEGER: Would this be true if you used the oil rig itself? The offshore islands or platforms could be employed in aquaculture.

MR. MOORE: As a matter of fact, the installation of platforms encourages the habitats of living organisms for sport fisheries. It is possible to harvest a greater abundance from that.

MR. JOSEPH: San Onofre was not going to charge anybody for the heat they are generating since they are dumping it anyhow; would you still say it isn't economic?

MR. MOORE: No, but I am going to make the assumption here, as is being required by the environmentalists, that the integrity of the environment be maintained in any installation of any facility along the coast. Therefore, the presumption is that the water temperatures would not substantially change in an area that would support aquaculture.

Now, if you are saying that you are going to encourage what is called thermal pollution or thermal discharge for some kind of symbiotic relationship between the aquaculture developments, that is a different situation.

MR. JOSEPH: Mr. Parkhurst said we have to dump it some place. We have this plant on the coast, and let us say there is no economic charge. It is there already. We can't take it away. I don't think anybody is proposing to take away that particular plant.

MR. MOORE: Yes, you can create an economic value under those circumstances. But up until now, the presumption has been that any use of the environment must maintain the integrity of the environment. Therefore, there would be no substantial change.

MR. HORTIG: Mr. Moore's assumption is not only founded on what has been the practice, but the State Water and Resources Control Board has set standards and limits on the amount of temperature rise which will be permitted with respect to thermal discharges into the waters of the State of California. And these are probably so limiting that they would have an adverse impact on the feasibility of an aquaculture project offshore of California today.

MR. JOSEPH: I believe the individual regional board has authority to change this. My company finished a two year study on regional boards, which do have the authority to set various beneficial uses and to determine the levels of discharge. Now, under the Porter-Cologne Act,

they have authority to charge up to six thousand dollars a day if you don't desist under certain regulations. They can decide and it is their business, if you will, to determine whether in fact it is beneficial use or maximum beneficial use of water resources, rather than just saying, as this gentleman (Mr. Moore) keeps saying, that we must maintain the integrity of the environment.

MR. HORTIG: Regional boards are limited to their findings to maximum limits which come within the State Water Resources Control Board's maximum limits. If those limits are too low for successful aquaculture, why so be it.

MR. MOORE: I think it would be worthwhile if you could discover technological ways to diminish conflicting interests, to reduce them to competing interests, to reduce them to compatible interests, to reduce them to symbiotic interests, In other words, there are a number of technological changes and advances that can be made to diminish the impact of use of the coastal zone or recovery of the coastal zone resources, and we should bend our technology toward that because the more you diminish the impact, the greater the multiple use and the less the contention on the coast.

Problems in Balancing Economic, Aesthetic and Ecological Values

MR. R. ADDIS LOCKWOOD, Civil Engineering, University of Southern California: Do we necessarily have to choose the economic value as the determining factor in making a judgment? I wonder what other considerations there are. For example, if you choose economics, you almost certainly prejudice the decision to not change because any change is going to have economic consequences to somebody. He either has to move out or not perform some activity he is set up to do by investment.

MR. KRUEGER: Economic consequences may be positive as well as negative. Jamaica found this out in its bauxite mines. It started restoring the mine areas and found this process more than paid for itself. So, preserving environmental quality can be a positive and necessary economic factor.

MR. LOCKWOOD: I am sure that is true, but it was implied a moment ago that we must not take action that is economically unsound.

MR. MOORE: I said that we should put the environment and economics in context so a value judgment can be made by the electorate. All I am saying is that we are making every effort to inventory aesthetic and environmental and ecological values of the coastline. We are making

absolutely no effort to evaluate this area as an economic matrix. All I care about is that we consider both sides of the scale and that we "balance." All I ever hear is a redefinition of balance and nobody tells me where the fulcrum should lie between the economic and environmental contingency.

DR. BALL: I would like to comment on two aspects here. First of all, I think what we really want is to have the tools so we are not forced simply to do or not to do, but rather can employ mechanisms for compensating people when something has an adverse effect, and for taking something away if someone benefits to a greater degree than you consider justified. It has to work both ways, but the latter is opposed more than the former.

Economic values of coastal uses are certainly inherently included in the concept we are talking about in coastal management, and we are not proposing excluding them. There is a problem here, however. It is one thing to say in an economic theory that you might be able to assign uniform dollar values to all these different kinds of uses and add them up and make a decision. As a practical matter, we are not at the point where we can actually do this. It is unrealistic to believe we have all the information we need at our disposal to do it. In some cases, if we think a commission is going to do a benefit-cost analysis, we are probably kidding ourselves because it does not have the necessary information.

MR. KRUEGER: Of course, there are some things which really cannot be subject to cost-benefit analysis. When you get to whether or not you terminate the existence of a particular species, it may be you have reached a question where economics offers no real advantage.

I think that cost-benefit analysis may be irrelevant to some decisions.

DR. BALL: It may be you do not need to make the decision. In a lot of cases, I am told the people in the Bay Commission have not needed to have an a priori means of deciding between two values. It is hard to compare, but if you look carefully, youcould find you do not need to choose.

MR. KRUEGER: I would agree with that.

DR. BALL: In regard to Jerry Moore's comment on balance, I think what many environmentalists feel is not that you don't ever change the environment by any means. However, before you change the environment, you know what it is you are doing to it. You know what all the effects are. We are not saying that you absolutely don't change it, but you have to maintain the quality. We do not maintain quality as we do

things now.

With respect to thermal pollution and aquaculture, I think it is plausible to heat up certain bodies of water and use them for aquaculture, but we are not in a position to know what the effects are or if we can contain the effects to a limited degree. If we only knew, we could contain the effects of the experiment so that it would only affect a limited part of the ocean. But we do not know.

MR. MOORE: My remarks were directed to the practicality of the present decision matrices developed through the California Ocean Area Plan. There is no provision for funding for any economic determinations. I would suggest that rather than resolving the problem of maintaining the integrity of the environment by incendiary semantics, it might be better to measure the cost of maintaining the environment.

Membership of Proposed State Commission

MR. RONALD B. LINSKY, Coordinator of Advisory Services, Sea Grant Program, University of Southern California: Mr. Sieroty, in your comments earlier, you talked about your bill and your hope that the "right" people would serve on the commission or board. I know we are talking about conservationists, but I wonder if you are including other types of people and, if you are, who are the "right" people for these various commissions or regional boards?

MR. SIEROTY: What I was trying to say is no matter what qualifications we put in the legislation, the appointing powers will decide what kinds of people are chosen. We break up the appointments between the Governor or Speaker of the Assembly and President Pro Tem of the Senate and Senate Rules Committee. Whatever qualifications for appointees we write into the legislation, the appointing powers can get around the intent of those qualifications. I would like to see the majority of the commission be conservation minded, but I cannot assure that will be what comes out. Again, it will depend upon what the appointing powers want to do and how much interest and political pressure is exerted by the conservationists and other forces.

MR. KRUEGER: In a broader sense, all of us who are interested in resources and their intelligent use are conservationists. However, it is probably worth observing that some so-called conservationists are largely single use oriented people. The single use they advocate being the preservation or nonuse of coastal areas.

We are undergoing a reevaluation of goals and philosophy in the coastal zone, but the case has not yet been made to me that single use is

entitled to greater priority than any other valid, lawful, social use by our society. This was pointed out by the District Court of Appeals in the Sierra Club-Mineral King case. They said that there is no one group in our society that is entitled to preference over all others. The Sierra Club was in essence proclaiming their credentials to represent the good philosophy in this country. This seems to suggest that all others who have an identifiable affiliation on a business or professional basis may be suspect, but there is nothing suspect or nothing that should be criticized in an unmitigated, unqualified, single use approach to the coastal zone.

I happen to feel that if this commission is dominated by so-called conservationists, nothing would move. That is the reason our commission, the California Advisory Commission on Marine and Coastal Resources, is balanced. Half of our members are from the academic communities.

Many environmental quality people, however, might appear to fall within a conflict of interests. Herman Pearson, head of Sanitary Engineering at the University of California, does work for all the large engineering corporations. Would you disqualify a man like this? I don't mean to belabor the point, but I would be a lot happier with everyone, both in Sacramento and elsewhere, paying more attention to what is said and the merits of it rather than who said it and what his particular background happens to be.

MR. SIEROTY: When I suggested the commission ought to be dominated by conservationists, I was giving my personal preference, but the chances are it probably won't be that way. My experience in government, going back ten years in both the executive and the legislative branches, is that business interests, those wanting to exploit the environment, are very well represented and very persistent, and they do a very good job. I have no fears for their safety and for their ability to present their case effectively. I am concerned, on the other hand, with the ability of those who want to preserve the environment. It will be difficult to assert conservation values and develop a balance. But if I had to make the decision, it would be on the side of the conservationists because I believe that we want to know the consequences of whatever development takes place. Secondly, if there is a question mark, it is better not to act than act when dealing with the preservation of resources.

Developments in International Law

DR. BENJAMIN AKPATI, Environmental Engineering, University of Southern California: I have a question for Mr. Krueger.

Do you think that any international body or organization is capable of

formulating any law or guidelines for environmental protection considering, for example, that different nations have different interests and goals? Do you think they could come up with any law that could be applied worldwide?

MR. KRUEGER: That is a matter of what one means by law. I believe that the international community is capable of establishing norms of behavior dealing with common ocean management and environmental issues that will be followed in most cases. It will be a question of time because part of the problem here, a very large part of it, is education.

This ocean issue was introduced in the United Nations General Assembly about 1967 when Cervid Pardo from Malta introduced a resolution that would have created an international regime beyond the limits of national jurisdiction. He didn't say what they were. It would have earmarked the proceeds from the development of sea bed resources for the aid of developing countries. At the time that this came out, there was a great furor. The domestic oil industry came out against it. There were a number of others who opposed it because it was internationalizing the ocean.

Following that proposal in December of 1967, the U.N. General Assembly formed an ad hoc Sea Beds Committee which met several times in New York and discussed these broad issues. And there was a great deal of misinformation passed around as to what would happen and what kind of wealth could be expected from the ocean. It met again 1968, and the General Assembly passed some international principles, for example, that each country should minimize pollution, and it made this committee a permanent committee.

Then further meetings were held, and gradually people from these quiet, small developing countries became expert in a number of these areas. As a result, this year the U.N. General Assembly passed, with the leadership of the United States, a set of principles which incorporated those that had raised so much trouble in 1967. The Soviet Union was behind the measures, and I do not think there were any dissents.

Now, there were some escape clauses for people in semantics, but I think the international community is now on the next plateau, which is working toward specifics for futher refinement of these principles. I am enough of an optimist that I think that with the 1972 Conference, with what they are doing in the Sea Beds Committee and the type of support this is getting from President Nixon's administration, we should begin to see some specifics. Of course, United States' backing in itself does quite a bit to assist and enforce it.

DR. CHRISTOL: I agree with what Mr. Krueger has said, and also emphasize the fact that the current administration is very much concerned lest its proposal, which was submitted in Geneva in August of last year, not receive proper attention. That proposal is to create an international authority which would regulate uses of the deep sea beds and ocean floor. This is for the common heritage of all mankind for the common people everywhere and certainly for the benefit of the emerging nations. So, it would seem there is a very good probability this will be acted on.

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