

A Report to: AUG 15 1974

The President and The Congress

by the
National
Advisory
Committee on
Oceans and
Atmosphere

National Advisory Committee on Oceans & Atmosphere

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Annual Report

June 28, 1974

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THE SECRETARY OF COMMERCE
Washington, D.C. 20230

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C.S.

August 12, 1974

The President
President of the Senate
Speaker of the House of Representatives

Sirs:

I have the honor to submit, in accordance with Public Law 92-125, August 16, 1971, the Third Annual Report of the National Advisory Committee on Oceans and Atmosphere (NACOA).

Enclosed also are my comments and recommendations which are required by the Act.

Respectfully,

Secretary of Commerce

Enclosures

COMMENTS AND RECOMMENDATIONS OF THE SECRETARY OF COMMERCE ON THE THIRD ANNUAL REPORT OF THE NATIONAL ADVISORY COMMITTEE ON OCEANS AND ATMOSPHERE

PREFACE

Public Law 92-125, which established the National Advisory Committee on Oceans and Atmosphere requires that the annual report of the Committee "shall be submitted to the Secretary of Commerce who shall within 90 days after receipt thereof transmit copies to the President and to the Congress with his comments and recommendations." Accordingly, I have reviewed the Third Annual Report of the National Advisory Committee on Oceans and Atmosphere and have incorporated the viewpoints of all interested Federal agencies in these comments and recommendations. The comments have been organized to parallel the presentation in the Committee report and under the same chapter headings.

INTRODUCTION

Once again it is my pleasure to comment upon the thoughtful findings and recommendations of the National Advisory Committee on Oceans and Atmosphere (NACOA) presented in its third annual report. I am impressed with the manner in which the advisory committee has successively focused during its first three years of existence on problems which are at the heart of some of our most urgent national and global concerns.

CLIMATE AND THE OCEANS, FOOD AND ENERGY

The principal new focus of the committee's report for 1974 is on food and energy as these problems are intertwined with

the oceans and atmosphere. The committee properly addresses the questions of how a better understanding of and ability to use the oceans and atmosphere wisely can ameliorate food and energy problems. In particular, NACOA has identified one of the key links—the climate and its variations—as a product of oceans and atmosphere through which we can hope to make an impact.

The committee questions whether the Federal Government possesses an adequate structure for properly integrating oceanic and atmospheric efforts for the study of climate. I concur fully that problems of climate are more than just atmospheric in nature. They are, in a fundamental sense, also problems of the oceans. One of the pressing reasons for the formation of the National Oceanic and Atmospheric Administration (NOAA) in the Department of Commerce three years ago by President Nixon was to establish just such a mechanism. I also believe it has worked effectively toward this end.

This Administration has been acutely conscious of the critical need for better techniques of long-range weather prediction and for projecting the future course of the climate. Because of this, President Nixon has strongly endorsed the World Weather Program of the World Meteorological Organization and the International Council of Scientific Unions and its associated Global Atmospheric Research Program (GARP). As the advisory committee has recognized, GARP has as one of its major objectives the understanding of the dynamics of the world's climate. In this connection an International Conference on Climate and Climate Modeling is being held during July and August 1974 in Stockholm to define the programs of work required to meet the climate objective of GARP. The United States, along with other nations of the world, is devoting extensive resources to attack this problem.

As I write these comments, the largest international field experiment ever mounted to study the processes of ocean and atmosphere is being carried out in the tropical Atlantic Ocean as part of GARP. In this experiment approximately 40 vessels, 13 aircraft, geostationary and polar orbiting satellite systems, buoy arrays, and special land stations from 70 nations are engaged in a highly integrated and combined assault upon the study of physical processes of the tropical oceans and atmosphere. This tropical Atlantic experiment is but one of a set of

comprehensive experiments dealing with the interaction of oceans and atmosphere being supported strongly by the United States and other nations.

Four years ago, as a result of recommendations of the National Academy of Sciences, the Barbados Oceanographic and Meteorological Experiment (BOMEX) was mounted in the Caribbean by a combine of Federal agencies and United States universities and private corporations to study the details of ocean/atmosphere exchanges. On the horizon is the First GARP Global Experiment scheduled to take place in 1978. This will involve all nations of the world in the largest and most comprehensive attempt to gather the observations on a global basis which will provide us with the information we need to test our theories of climate and look into our predictive capabilities by means of high-speed computers. These activities are proceeding with the Department of Commerce/NOAA as the lead agency for coordination and with key participation from the National Aeronautics and Space Administration, National Science Foundation, Department of Defense, and Department of Transportation.

In addition to these efforts under GARP, the United States has, through the National Science Foundation's International Decade of Ocean Exploration Program (IDOE), committed additional substantial resources towards examination of other aspects of the ocean/atmosphere system which will be critical to our understanding of climate. These involve a commitment to the North Pacific Experiment, an air/sea experiment covering the entire North Pacific Ocean, and the Mid-Ocean Dynamics Experiment which is studying the dynamics of ocean current systems. The National Science Foundation, through its Office of Polar Programs, is organizing the Arctic Ice Dynamics Joint Experiment which is studying the dynamics of polar ice conditions. These programs are supplemented by extensive efforts in the assembly and archiving of climatological information from the world through the Environmental Data Service of NOAA.

I point to these achievements to indicate that the resources being directed towards the problem of climate are substantial and have been deployed to meet key problems as specified and recommended by the National Academy of Sciences including a report to the U.S. GARP Committee now in final preparation

which will provide guidance on national and international plans for climate research.

Nevertheless we recognize, along with NACOA, that the urgency for information and assessments of climatological conditions as they might impact food production in this and other countries has intensified over the past several years. It is for this reason that we welcome the recommendations of the committee to take additional steps which can improve the ability of our decision makers to deal with the problems of variations in climate.

In response to this urgency the Domestic Council has taken the decision to establish a Subcommittee on Climate Change of its Environmental Resources Committee. The Environmental Resources Committee is chaired by Secretary of the Interior Rogers C. B. Morton and the subcommittee will be chaired by Dr. Robert M. White, Administrator of NOAA. The purpose of this Domestic Council action is to undertake a policy assessment of further needs for national and international effort on problems of climate.

The advisory committee specifically recommends that the Department of Commerce/NOAA join with the Department of Agriculture in using available evidence of climatic variations to project the probability of crop failures for periods extending three to five years ahead. We agree that this is an admirable objective and one to which we will address ourselves. Initial work along these lines looking at crop productivity in relation to past and future climates is under way. To systematize and provide a focus for this kind of effort within NOAA so that it can work with the Department of Agriculture, NOAA has established a new Center for Climatic and Environmental Assessment in its Environmental Data Service whose principal function will now be the assessment of the impact of the climate and other environmental variations on crop productivity, water resources, and other questions of concern to policy makers.

The committee also specifically commented on the problem of understanding and separating natural from man-induced climatic changes.

I can report to the committee that considerable progress is being made on the atmospheric aspects of this problem. The National Science Foundation and Department of Commerce/NOAA are jointly preparing a National Climate Plan for

review by the Interagency Committee on Atmospheric Sciences of the Federal Council for Science and Technology. The National Science Foundation has established an Office of Climate Dynamics to fund and coordinate basic research in this field. An international program for the background monitoring of worldwide pollution conditions as they affect the global climate is under way. This perhaps is the most essential element for understanding the impact of man upon climate. The United Nations Environmental Program and the World Meteorological Organization have taken the lead in this endeavor. The United States has moved to establish its monitoring stations which will be part of an agreed worldwide network. Under NOAA's Global Monitoring for Climate Change Program, stations have been established at Mauna Loa, Hawaii; Point Barrow, Alaska; and the South Pole; and one additional station is being established at American Samoa. Other nations are now moving to establish stations. Major new efforts directed at understanding the role of man-induced versus natural changes in climate are proceeding through the medium of mathematical modeling of the ocean/atmosphere system in the laboratories of NOAA as well as those of the National Science Foundation-sponsored National Center for Atmospheric Research and the National Aeronautics and Space Administration-sponsored Goddard Institute for Space Sciences. The Department of Defense is also supporting climate modeling research at the RAND Corporation.

The committee assessment of increased need to deal with the oceanographic aspects of climate makes sense. It is, however, a more difficult aspect to deal with. Here we face the need to develop techniques for monitoring ocean conditions over long periods of time which are economically feasible and technically and scientifically meaningful. We also face a broader gap in our knowledge of the role of the oceans in controlling climate. What needs to be done is to formulate specific programs. We welcome the suggestions of NACOA and the reports on this subject of the Academies of Science and Engineering. I can assure the committee that this will be one of the areas for review of the new Subcommittee on Climate Change of the Domestic Council as we formulate a national climatic effort.

The recommendation of NACOA for increased funding and a joint effort by the National Science Foundation and the Department of Commerce/NOAA to organize the oceanographic

aspects as they relate to climate is noted and will be given consideration in the process of establishing program priorities for future budgets. The two agencies will proceed in a coordinated fashion to ensure that the various aspects of oceanography as they relate to the important problem of climate are considered.

The committee has brought to our attention the fact that an important aspect of environmental impact statements as they relate to the siting of power plants ought to include an assessment of possible effects on the local climate which might result from the concentration of plants at particular sites. This is a problem of some importance, and the Atomic Energy Commission and other appropriate agencies will continue to work to improve our knowledge of the climatic impact of such large sources of heat in order to permit useful impact analyses for specific sites.

The problems posed by climate variation are of worldwide concern. The recent bilateral agreements between the United States and the Soviet Union provide for joint study of the causes of these variations. The concern of the Administration for international efforts to attack the climate problem was given eloquent voice by Secretary of State Kissinger before the recent United Nations Conference on National Resources. In that speech, he said:

“The poorest nations, already beset by man-made disasters, have been threatened by a natural one: the possibility of climatic changes in the monsoon belt and perhaps throughout the world. The implications for global food and population policies are ominous. The United States proposes that the International Council of Scientific Unions and the World Meteorological Organization urgently investigate this problem and offer guidelines for immediate international action.”

The Secretary of State's proposals have been rapidly followed by proposals of the United States in the World Meteorological Organization's Executive Committee meeting to make this a priority area of attention during the coming years.

OCEAN RESOURCES, REGULATION, AND RESEARCH

We are pleased to have the revised views of NACOA on questions of how to organize the Federal effort for national

management of ocean affairs. NACOA's basic recommendation that the major functions having to do with marine and atmospheric resources, regulation and related environmental research and services be amalgamated into a newly structured administration within a single department or agency has been at the base of much of President Nixon's proposal to establish a new Department of Energy and Natural Resources.

As I indicated in my comments on the proposals of NACOA last year, it is our strong belief that the fastest way in which to bring about the amalgamation of most of the functions specified by the committee is through the rapid establishment of the Department of Energy and Natural Resources, a proposal for which is now before the Congress. I was pleased to see in last year's report the endorsement by the committee of the Department of Energy and Natural Resources which was pending at that time before the Congress. Since then, because of the energy crisis faced by this Nation during the past year, the Administration has decided to proceed as a matter of greatest urgency with the establishment of the Federal Energy Administration and the independent Energy Research and Development Administration. The progress of the Energy Research and Development Administration through the Congress is gratifying, and it is our hope that by the time this report is issued, that agency will have been approved by the Congress. We also hope that before too many additional months have passed, we will see action by the Congress to form the new Department of Energy and Natural Resources so that many of the purposes advocated by the committee can be realized.

The Administration does not propose to include the U.S. Coast Guard in the new Department of Energy and Natural Resources. Unlike the other agencies proposed for inclusion, the Coast Guard is not primarily concerned with marine resource exploitation or conservation or with environmental sciences. Its law enforcement, search, rescue and safety functions are intended to serve a broad range of programs and clients, and it should not become devoted to the more narrow interests of a natural resource agency.

I recognize that the detailed structuring of the various functions of the new agency represents the product of much thought by the committee members. The assessment of the Administration, however, is that most of the functions singled out by the

committee for amalgamation, with the exception of those of the U.S. Coast Guard, are presently contemplated for assembly in the Department of Energy and Natural Resources. The Administration strongly feels that Energy and Natural Resources represent the logistical departmental grouping in a world in which natural resources are growing increasingly short and their management and development require an overall institutional structure. The Administration believes that natural resources, whether they are of oceanic, terrestrial or atmospheric origin, should be considered together so that comprehensive long-range national planning for their acquisition and conservation can be made in the light of economic, environmental, and foreign policy trade-offs. Similarly, the Administration feels that management of land as well as coastal and ocean areas is closely intertwined and should be considered within the context of a single department. Such a department would be complemented in its work by the activities of the Department of Defense, the Environmental Protection Agency, and the National Science Foundation.

Without debating the details of the specific functions that will reside in various units of the new Department of Energy and Natural Resources, I am convinced that bringing about the department is indeed the quickest way towards achieving objectives set forth by NACOA.

AFTER CARACAS/VIENNA—WHAT?

The committee once again brings focus to the vital importance of the Law of the Sea Conference in Caracas, Venezuela, and urges that the United States plan in detail for possible outcomes of this conference so that legislation and other appropriate actions can be rapidly implemented to protect legitimate United States interests in the oceans in the event of conference success, failure, or lengthy delay.

The suggestion that the Executive Branch take adequate steps to deal with whatever situation may follow the Law of the Sea Conference is well taken. I can assure the committee and the Congress that the policy issues arising out of the Law of the Sea Conference will receive the highest level of attention. The Department of State and the Under Secretaries' Committee of the National Security Council are prepared to deal with the issues.

There is already in operation a National Security Council Inter-agency Task Force on Law of the Sea in which all interested agencies actively participate. As the Task Force deals with the issues and alternatives, we look forward to the continued advice and comments of NACOA on the many problems which must be attacked.

In addition to the above, I am pleased to inform both the committee and the Congress that a cabinet-level committee of the Domestic Council is being established under my chairmanship to consider a broad range of domestic ocean policy issues. The principal function of this committee will be to develop policy recommendations and to work closely with the Senate Ocean Policy Study Group as it develops the legislative recommendations. In doing this it will be of assistance to the Law of the Sea Task Force.

COMMENTS ON PROGRAMS AND STUDIES

The committee has reviewed a number of previous recommendations and findings to assess progress which has been made in carrying them forward.

COASTAL ZONE MANAGEMENT

I am gratified that the committee has commented favorably on the rapid progress that is being made in implementing the National Coastal Zone Management Act of 1972. The implementation of this Act has been a matter of priority in the Department of Commerce. By the end of fiscal year 1974, 28 of the 34 coastal states and territories had applied for and been granted planning grants under Section 305 of the Coastal Zone Management Act. The total will be increased to 31 when 3 additional grants are made in July. In addition, funds for implementation of the first estuarine sanctuary at Coos Bay, Oregon, were approved. The interest of the coastal states in this program has been enthusiastic.

The committee has noted that data from environmental baseline studies of prospective lease areas should be transmitted in a timely fashion to the states. In establishing a program to undertake such studies in support of lease sales, the Secretary of the

Department of the Interior has established an Outer Continental Shelf Research Advisory Board that includes representatives of the Department of Commerce, the Environmental Protection Agency, and adjacent coastal states. Participation of the state representatives is intended to assure consideration of local interests in planning the studies, to keep them fully informed of progress, and to expedite delivery of resulting data to concerned agencies of the states.

The committee makes several new suggestions with respect to the Coastal Zone Management Act. It recommends that the Act be amended to provide for research and development as needed to support management of the coastal zones within the states. As the committee correctly notes, there are extensive resources presently being applied to a variety of research activities in the coastal zone. The bulk of the resources of the National Sea Grant Program of the Department of Commerce/NOAA supports research activities in the coastal zone. I recognize that the National Sea Grant Program was not intended by the Congress to be directly and closely responsive to the short-term needs of the coastal zone managers and that there may be a need for coastal zone management authorities in the states to have a capability for carrying out short-term, highly responsive analytical studies required in support of local decision making on allocation of coastal resources.

I believe there is merit for ensuring adequate coastal zone research responsive to the needs of management authorities. The problem needs additional study and more specific definition of how the individual programs will interact before modification of the Coastal Zone Management Act to provide for research and development is acceptable to the Administration. I have asked the committee to review this matter and give me its views.

The committee recommends that the estuarine sanctuaries program provided for under Section 312 of the National Coastal Zone Management Act should be extended in time since the funding authorization for that part of the Coastal Zone Management Act was for a single year. We believe strongly in the need for such sanctuaries. This problem is under study within the Executive Branch. We are examining the relationship between the estuarine sanctuaries program under the Coastal Zone Management Act and other sanctuaries and wildlife programs. We be-

lieve that such studies should be undertaken before amendments are made to the present Coastal Zone Management Act. Again, the advice of the committee on this matter would be useful.

NACOA recommends that as we move into the parts of the Coastal Zone Management Program requiring Section 306 grants for the management of the coastal zone areas, funding for the Coastal Zone Management Program should increase. For fiscal year 1975, funds have been provided for initiation of the Section 306 grants. It is the intent of the Administration to request funds to meet the requirements of this section of the Act as the needs are identified, to the extent practical within overall budgetary constraints.

The committee raises the issue of coastal zone information transfer and use, and recommends that one way to deal with this program is to build advisory service programs within the Coastal Zone Management Program. We concur with the committee that such services are essential to the successful conduct of the Coastal Zone Management Program. One of the basic reasons for the placing of the coastal zone management responsibility in NOAA was because it could be affiliated with a wide spectrum of other ocean programs. One of these is the Sea Grant Program, which is specifically authorized by its legislation to provide advisory services of all kinds. It would appear to me that a better way in which to approach the increasing need for advisory service on coastal zone programs is to continue to build and strengthen NOAA's marine advisory services generally, under the National Sea Grant Program's leadership, rather than to build another advisory service under the Coastal Zone Management Act. In recent years we have recognized the key importance of adequate marine advisory services and have been building and strengthening the advisory services of the National Sea Grant Program to the point where we now have functioning advisory services in almost all of the coastal states. Approximately 200 people are now involved in providing such advisory services.

We have recognized the need for closer collaboration and planning on the part of the Sea Grant Program and the Coastal Zone Management Program. To this end, we are planning to colocate the Sea Grant and Coastal Zone Management efforts and to provide for joint planning for both of these efforts so that they are closely coordinated and mutually supporting.

NATIONAL FISHERIES PLAN

I am pleased that the committee which initiated this plan through its recommendation calling for a national fisheries plan, regards the planning effort of the National Marine Fisheries Service of the Department of Commerce/NOAA as satisfactory and responsive to its original recommendation.

WEATHER MODIFICATION AND FOOD

The committee has once again commented on the need for a new and vigorous approach to the problems of weather modification, calling attention to the possible applications of weather modification for increasing food production in marginal weather conditions. We agree with NACOA that this is an area for attention. As I indicated in my comments of last year, the Administration believes that the best way to overcome the existing dispersion of activities in weather modification is to bring into being the Department of Energy and Natural Resources which would assemble most of those groups presently active in weather modification in a single department. One of the major points emphasized by NACOA in its previous as well as the present report, is the need to establish international agreement on mechanisms to ensure that all weather modification efforts are devoted to peaceful and mutually beneficial purposes. I am pleased to be able to report to the committee that this topic was discussed at the June 1974 summit meeting in Moscow between President Nixon and General Secretary Brezhnev. These conversations have resulted in an agreement which provides for the opening of consultations between the Soviet Union and the United States looking towards the questions raised by the committee. Because of the great importance of this development and the importance attached to it by the President, the full text of the agreement reached in Moscow is as follows:

The United States of America and the Union of Soviet Socialist Republics;

Desiring to limit the potential danger to mankind from possible new means of warfare;

Taking into consideration the scientific and technical advances in environmental fields, including climate modification, may open possibilities for using environmental modification techniques for military purposes;

Recognizing that such use could have widespread, long-lasting and severe effects harmful to human welfare;

Recognizing also that proper utilization of scientific and technical advances could improve the interrelationships of man and nature:

1. *Advocate the most effective measures possible to overcome the dangers of the use of environmental modification techniques for military purposes.*
2. *Have decided to hold a meeting of United States and Soviet representatives this year for the purpose of exploring this problem.*
3. *Have decided to discuss also what steps might be taken to bring about the measures referred to in Paragraph 1.*

Further international moves in the field of weather modification have been urged by the United States Government. At the recent meeting of the Executive Committee of the World Meteorological Organization, further decisions have been taken to strengthen the activities of that international group in the field of weather modification so that advice and technical assistance can be given to developing countries in circumstances where weather modification activities might help alleviate some of their agricultural or water resource problems.

CAPITAL STRUCTURE FOR OCEANOGRAPHIC AND ATMOSPHERIC RESEARCH

As the committee notes, studies are now under way at the Center for Naval Analyses of the capital structure for oceanographic and atmospheric research. These studies have been sponsored and funded by the Interagency Committee for Marine Science and Engineering and by the Interagency Committee for Atmospheric Sciences. The resources necessary for the prosecution of these studies have been provided, and it is expected that during the course of the next year the results of these studies can form a firm base for further decision on the national needs for capital equipment to support its oceanographic and atmospheric research programs.

OCEAN ENGINEERING STUDY

I am pleased that the committee has established a panel now looking into the questions of national needs in the field of ocean engineering. I look forward with great interest to the results of this study when it is completed.

COAST GUARD ENFORCEMENT AT SEA

The Secretary of Transportation notes with appreciation NACOA's interest in and support for the U.S. Coast Guard, and concurs that new responsibilities levied upon it should receive concomitant resources to carry them out but as in all matters, priorities must be established in the face of finite funding.

The Secretary of Transportation feels that NACOA's comments are mainly oriented to enforcement by the Coast Guard of laws relating to pollution, and do not discuss its many other activities such as search and rescue, aids to navigation, port safety, icebreaking and merchant marine safety, to name a few.

He also would like to clarify that while many agencies are involved in pollution discharge investigations, only the Coast Guard is empowered to conduct enforcement proceedings.

He particularly would like to call attention to the committee's statement that "An almost universal concern among the officers responsible for enforcing the environmental legislation is that the laws are too rigid and do not allow for the application of 'common sense' judgment as to whether or not a penalty shall be assessed for each and every violation, no matter what the circumstances." While this may express the feelings of a number of Coast Guard personnel, it is not a reflection of Coast Guard policy. Further, NACOA's comment that "There is no provision for the issuance of warnings in case of minor and accidental violations where there is no negligence involved" implies a recommended change of law requiring proof of negligence, in which case the cure would be an order of magnitude worse than the ailment.

RESEARCH WITHIN THE NAVY

NACOA's recognition that the Navy-sponsored basic oceanographic research program has proven over the years to be invaluable to the Navy and the Nation emphasizes the committee's concern that this valuable service cannot be maintained under a continuing level-funded budget. The Secretary of the Navy will continue to evaluate this program in accordance with the priorities of the Navy.

A Report to:

The President
and
The Congress

by the
National
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Third Annual Report

Washington, D.C.

June 28, 1994
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**NATIONAL ADVISORY COMMITTEE
ON
OCEANS AND ATMOSPHERE**
Washington, D.C. 20230

To the President and the Congress:

Sirs:

I have the honor to submit to you the third Annual Report of the National Advisory Committee on Oceans and Atmosphere.

The Committee was established by P.L. 92-125, approved on August 16, 1971, and was directed to submit a comprehensive annual report to the President and to the Congress setting forth an overall assessment of the status of the Nation's marine and atmospheric activities.

This report is submitted to the Secretary of Commerce for transmittal as provided by the statute.

Respectfully,


William A. Nierenberg
Chairman

June 28, 1974

FOREWORD

In its first year NACOA put predominant emphasis on the need for developing long-range international approaches to oceanic and atmospheric affairs because no nation can preserve merely its own piece of the oceans or its own atmosphere. NACOA found it necessary to distinguish between what could be accomplished on a national basis and what could be done only by developing international understanding of supranational problems.

In its second year NACOA turned its attention inward. The theme of its annual report was the requirement for improving the Federal management of oceanic affairs as part of the comprehensive management of all the Nation's natural resources, many of which have marine as well as terrestrial components.

This year, NACOA worked with the consciousness that our society may well be on the threshold of a major discontinuity in human history. From a world in which natural resources such as food, energy, fresh water, minerals, protein from the oceans, and the regenerative capacity of forests and plains seemed to exceed effective demands, we appear to be moving toward a state of affairs in which consumption and utilization of vital resources, such as energy and food, are generating new stresses and strains at home and abroad. To

contain the resultant instabilities, we must respond to unprecedented demands on our capabilities to manage national resources. These demands, in turn, aggregate into new imperatives to understand the behavior of *the oceans and the atmosphere and the linkages which connect them*, and to relate them, through climate, to the productivity of our agricultural enterprise, and to the capacity to absorb waste heat and materials from our industrial enterprise.

NACOA is persuaded that if we, as a nation, are to cope successfully with the needs for energy, food, and materials that will confront us with ever-increasing insistency and urgency over the balance of this century, we must deepen our understanding of the combined influences of ocean and atmosphere on climate, we must strengthen the mechanism by which we convert technological dexterity into effective utilization of the mineral and protein resources of the oceans, and we must marshal and husband the resources of our governmental agencies to do this. The diversity and combined strengths of our governmental agencies, and their ability to complement each other, are so great we do not believe major new investment is required. Some increased funding will be needed in certain areas; reorientation of effort should suffice in others. While we are not in a position to recommend precise action on program details, we are in a position, and in fact have the responsibility, to recommend how our sights should be set.

SUMMARY OF RECOMMENDATIONS

NACOA, FINDING that our knowledge of climate and our understanding of what causes it to change are unequal to the importance of its impact on world food supply and its possible burdening by man's activities, RECOMMENDS that:

The National Oceanic and Atmospheric Administration (NOAA) and the Department of Agriculture, using available evidence on climatic variation, estimate the probability of crop failures three to five years ahead as a basis upon which contingency plans could be prepared by an appropriate agency.

Current efforts to understand and separate natural from induced climatic change be enlarged by increased funding and by having the National Science Foundation and NOAA, acting jointly, organize the oceanographic aspects related to climate.

Environmental impact statements for power plant siting include an assessment of the local climatic effects of concentrating power plants at particular sites as opposed to dispersing them.

NACOA, FINDING that the exact form of the agency which integrates marine and atmospheric affairs as well as other related scientific and service functions is less important than to act quickly, RECOMMENDS that:

The major functions having to do with marine and atmospheric resources, regulation, and related environmental research and services be amalgamated into a newly structured administration within a single Department or Agency.*

* The functions we have in mind are those of NOAA, the Geological Survey, marine and coastal zone portions of the civil planning, policy, and funding activities of the Corps of Engineers, the mineral leasing program on the Outer Continental Shelf of the Bureau of Land Management, Department of the Interior, marine-related functions of Interior's Bureau of Sports Fisheries and Wildlife, the U.S. Coast Guard, and three new functions involving the development of a national marine affairs plan, coordinating its execution, and weather modification permit and regulatory activities.

NACOA, FINDING that the best interests of the United States would be served by a successful Law of the Sea Conference, but that prudence demands we be prepared to act whether or not the Conference succeeds, RECOMMENDS that:

The United States plan in detail for both the timely success of the Law of the Sea Conference at Caracas and Vienna or its possible delay and failure by preparing now for legislation which could be rapidly implemented to make our laws consistent with the Treaty or to protect the legitimate interests of the United States in the oceans.

NACOA, FINDING a welcome increase in coastal zone management activity, but a heavy increase in offshore activities engendered by the energy crisis and the absence of an organized method for providing research, development, and advisory services on issues raised therefrom at the state level, RECOMMENDS that:

The National Coastal Zone Management Act of 1972 be amended to include the encouragement and support of the research, development, and advisory services by the States needed to provide a basis for careful, long-enduring decisions on coastal zone matters.

The level of funding under the Coastal Zone Management Act supporting matching grants for management be increased to \$20 million for FY '75 and the full \$30 million for FY '76 authorized in the legislation.

The Sea Grant program, with its current useful emphasis on coastal zone activities, be funded to its authorized level.

The Estuarine Sanctuaries program be extended in time, and funding raised to a level consistent with Congressional intent to provide an estuarine sanctuary in each of the identified zoogeographic regions.

NACOA, FINDING that the recent passage of environmental legislation and the additional duties stemming from increased offshore activity under coastal nation control affect the United States Coast Guard to the point where the laws will not be effectively enforced, RECOMMENDS that:

A better balance between assigned responsibilities of the Coast Guard and the resources to fulfill them be achieved by some combination of increased funding and reasonable statutory flexibility.

NACOA, FINDING that the ocean science program within the Navy, already weakened by restrictions on funding for research, is being further diminished by transfer of funds from oceanographic research to underwater acoustics, RECOMMENDS that:

The Navy review its planned diversion of funds from the basic oceanography program, long one of the mainstays of ocean research in the country, and make the effort to maintain the basic science

research program at a strength sufficient to the Navy's and the Nation's long-term needs.

NACOA, FINDING that a marginal capability now exists in some types of weather modification and that economic pressures, such as the increased economic value of food, are forcing it to go operational without sufficient scientific understanding or concomitant careful public management RECOMMENDS, as it has in previous annual reports, that:

We overcome the existing fragmentation of Federal R&D programs in weather modification by assigning a lead-agency role to NOAA.

Greater emphasis be placed on research on the physics of cloud formation and the science and technology of rainfall augmentation.

That legislative and public policy issues governing the proper use of a new technological capability be examined, and in particular that the United States take the initiative in establishing international agreement to insure that weather modification efforts be devoted to mutually beneficial purposes.

TABLE OF CONTENTS

Letter of Transmittal	iii
Foreword	v
Summary of Recommendations	vii
Introduction	1
Climate and the Oceans, Food, and Energy	5
Ocean Resources, Regulation, and Research	13
After Caracas/Vienna—What?	21
Comments on Programs and Studies	29
Appendix I: NACOA Enabling Legislation	41

Introduction

The ability to sustain our economy in the face of the fuel shortage this last winter, with only minor discomforts as a nation, was due largely to a spell of warm winter weather in the United States. What luck next time?

NACOA wishes to focus attention on the essential role occupied by the ocean-atmosphere interaction in short- and long-range aspects of climate prediction and energy use and development. The adverse effects of weather on world food production in recent years have largely occurred elsewhere. But the natural variability of climate and weather is such that deviations from the expected norm could have a strong effect both on energy consumption and on the production of food here at home. We need increased emphasis on planning so as to strengthen our capabilities and make ready for these effects.

Doing the best we can about climate prediction is not good enough. But we can, at least, take advantage of what we do know to estimate risk and plan accordingly. We must also intensify the effort to understand better the natural variations in climate and begin some sustained and well-supported efforts to estimate the effect man's activities have upon it in the long as well as the short term.

NACOA has not strained to reach this problem. It forced itself upon us because its proper consideration rests heavily on a linkage between the oceans and the atmosphere which is inadequately reflected in national organization. This, in turn, leads to neglect.

Presently, the connection between the oceans and the atmosphere is traced largely by title rather than by function. While the National Oceanic and Atmospheric Administration (NOAA) and ourselves, the National Advisory Committee on Oceans and Atmosphere (NACOA), were created in recognition of the link, the ocean missions of NOAA have been too restricted, inadequately defined, and inadequately supported. An eight-foot chain cannot cover a ten-foot gap.

The oceans have a long memory and the atmosphere has a short memory. It is the oceans which force or buffer the global environment. The oceans have a memory ranging up to hundreds of years. They are so vast in extent, so deep, so retentive of the sun's energy, and their great currents and burdens of ice so slow to react to temperature change, that the effects of a systematic shift in long-term energy flux, which takes a long time to show, persists as climate once it does. Shorter cycles affect the seasons, and perturbations or "temperature anomalies," as they are called, produce runs of cold-wet or warm-dry years in particular regions.

The atmosphere has a short memory of days or weeks. Storms blow over, the weather changes. Even so, there are longer term circulation patterns upon which the oceans exert a sustained influence. The ocean is thus a major key in maintaining stability or forcing change—not only through the physical effects of heating and cooling, but also through the chemical effects of creating or absorbing atmospheric constituents, pollutants, and in other ways.

Some scientists, at least, have recognized this interdependence. The progress of recent years reflects the growth of cooperative efforts amongst them. But NACOA believes the effort is inadequate to the task and the means for sustaining it jury-rigged and sporadic. We say why in our chapter on "Climate and the Oceans, Food, and Energy."

Thus, once again, we are faced with the lack of institutional support for many matters having to do with oceans. In the allocations of the great funds to be devoted to the U.S. Energy Programs amounting to some \$10 billion, the importance of the oceans to the production, dissipation, and management of energy is reflected only peripherally. The emphasis is on energy production. Little is devoted to understanding what the major global effects of energy use might be.

NACOA believes this came about largely because there exists no agency with a broad civil ocean mission, resource-oriented as well as research-oriented, which can respond to this need. The working group which proposed the energy program allocation was pulled together from established agencies. The budget reflects the responsibilities and programs its members already have. It is clear that oceans and atmosphere are not better represented in the national energy *program* because there is no strong independent agency in this area. NACOA is heartened by Senate Resolution 222, which embarks on a program to formulate a National Ocean Policy and we welcome the opportunity to contribute as appropriate. Though we miss consideration of the necessary interaction with atmospheric matters, we applaud the purpose and anticipate its forthcoming illumination of national ocean goals.

This is, however, but a step. Last year NACOA supported consideration of a Department of Energy and Natural Resources because we felt such

an organization provided within it the opportunity to create a focus for maritime affairs which current statutes have not made possible for NOAA. Attention has faded from this proposal, but the national need for ocean management has not diminished. This year we go into more detail on the nature of the organization for marine affairs we feel would be desirable. We could see it in a DENR, or an existing Department. We would welcome it in an independent agency if that proves the practical way to get proper attention for marine and atmospheric affairs and if it would strengthen the link between the work on the oceans and on the atmosphere. Most of all we would welcome it as soon as possible. We deal with the need to focus the management of the national oceanic affairs in a major chapter of this Report: "Ocean Resources, Regulation, and Research."

In a third chapter, NACOA treats a subject of perennial concern to the Nation and of annual concern to the Committee: Law of the Sea. In it we ask for early consideration of alternative courses of action and their respective values with relation to various possible outcomes of the Law of the Sea Convention at Caracas and Vienna. NACOA feels that diffidence about affecting delicate international negotiations is a poor excuse for being unprepared to move when the time has come.

In a final chapter we give a rundown on topics NACOA has asked others to take up, topics we have promised to look into ourselves, and short comments on other subjects of importance. One has to do with our concern that the Coast Guard is required to enforce an increasing burden of detailed standards and regulations but is not given the means to do it properly. This mismatch may already be very serious indeed, and we ask careful study of the balancing of assignments to the Coast Guard and the resources for carrying them out.

Another topic has to do with the state of support for fundamental ocean research in ONR, to whose stubborn defense, in the past, of funding the "R" part of R&D we owe so much.

Another topic has to do with the need to augment and tailor the level of effort in the coastal zone, and provide for obtaining the necessary information so that good management is possible.

Once again there emerges, in each major area of marine and atmospheric affairs we take up, the need to take the necessary steps to relate their management more closely.

Climate and the Oceans, Food, and Energy

Climate affects food production. Food production affects people. People affect energy use. Energy use affects climate. We neglect any link in this chain at our peril.

NACOA is aware that a serious start has been made to improve understanding of the nature of climate and those factors which influence it. But we wish to make certain that a fundamental aspect, the ocean-atmosphere link, is developed in an integrated and planned way. Merely coordinating programs separately pursued for a variety of reasons will fall short.

NACOA also points out that, despite our ignorance of the causes of climate change, enough historical information exists to make it possible to estimate the likelihood of variations in local climate so as to anticipate such things as the environmental impact of over-concentration of power-generating plants, the probability of crop failure, etc. Longer range crop assessment than is now done could make possible contingency planning on a scale large enough to be equal to the magnitude of the problem of possible large-scale food shortages.

Introduction

Climate changes. It has changed before and it is changing now. Moreover, with the ever-growing consumption of energy, with working so much of the land surface, and with what we put into the atmosphere by simply going about the business of existing in such great numbers, we are entering an era in which local climate changes already result from man's activities. The possibility of inducing global climate change is not out of the question.

The critical importance to us today of knowing more about climate stems from its connection with two major forces affecting international society—the increasing demand for food and for energy because of world population growth and the struggle for an improved standard of living.

Food production depends to a large extent on climate. What we do produce is uncomfortably close to what we can produce under present conditions. There is reason to believe that for the past thirty years or so

we have experienced a period of abnormally "good" climate, unusually favorable for food production (especially in the United States). This will not continue indefinitely. Changes in climate, well within the normal range of variation, can be expected to have heavy impact on world food supply.

NACOA thus addresses first the question of what action we should take now, based on what we already know about climate, which could ameliorate the impact on food of unfavorable yearly climate variation. But we cannot afford to remain content with near-term planning to which we are limited if we depend solely on historical evidence. For long-term planning we must understand better why and how climate changes on a scale of decades. Thus the second issue NACOA addresses in this chapter is what should be done to understand better the complicated nature of climate change, what influences it, and particularly how it depends on the long-term interaction of the oceans and the atmosphere.

NACOA then turns from the effect of climate on world food to consider the effect world energy use may have upon climate. This ranges from short-term, small-scale effects known to be occurring today ("hot spots"), to long-range, large-scale, even global effects which might take place within the next half century. This concern came about when considering side-effects of the intensifying use of fossil and nuclear fuels. Energy cannot be destroyed, so except for that very small amount which is stored by biological processes, it is either radiated into space or it is embedded in the atmosphere and the oceans as heat. The additional heat embedded as the result of power-generation and use may, within less than a century, be sufficient to impose significant disturbances on climate.* Perhaps we can learn enough to foresee what will happen, perhaps enough to forestall what is undesirable, soften the effects, or delay them so that we could adjust in other ways. We must already begin to deal with local "hot spots."

Food: Joseph in Egypt

World food reserves vary from about 7% to 10% of annual requirements and even small departures from normal productivity can mean malnutrition and starvation for many. In recent years relatively small climatic fluctuations caused the poor crop-growing conditions which led to the Russian wheat crop failure in 1972, the temporary disappearance of the cold surface waters of the Peruvian Current which contributed to the virtual disappearance of Peru's anchovy fishery and generated a world crisis in livestock feed, and the persistent drought in northern Africa which has allowed the Sahara Desert to encroach southward causing widespread famine and massive population migrations.

* "Energy Systems," by Wolf Haefele, Proceedings of the IIASA Planning Conference on Energy Systems. International Institute for Applied Systems Analysis, Schloss Laxenburg, Austria, July 17-20, 1973.

What are the chances of a summer drought, or a cold wet spring occurring in two major food-producing areas of the globe at the same time? How could knowing the odds for regional or seasonal climate variations assist in agricultural planning or in the storage or substitution of one kind of food for another? Climatology has a large potential contribution to such matters that remains untapped. It can at least provide statistics which would allow us to estimate the probabilities of good and bad years.

The supply of fresh water is also climate-dependent. When water is in short supply, areas which do not normally irrigate for agriculture are forced to do so, thus further reducing the amount available for other human and industrial use. Energy demand is likewise dependent on climate. A severe winter in any of the northern portions of the U.S. can impose regionally higher-than-normal demand for heating fuels and electricity.

Detailed records of temperature, rainfall, and crop statistics extend back for decades. This is a basis for estimating what we face in the near future when reflected against the background of the larger-cycle changes in climate. NACOA feels we must take better advantage of this information than we now do and supply statistical climatic prediction for next year's agricultural and energy planning. Agriculture, power, and water-resource dependent industry have long used current statistics on temperature and rainfall to estimate seasonal or yearly yield and demand, and to assist in the better management of reserves and the manipulation of alternatives. What is not customary, as far as we have been able to determine, is to estimate the risks on a large scale, over the next several seasons, and over large areas of the earth, and then to prepare contingency plans for what might occur.

Joseph had, in the Pharaoh, both the source of the vision and the power to do something about it. The Pharaoh had in Joseph an agent who could plan in advance how to mitigate a future disaster. The message and the power are less clear today, and it is more difficult to agree on a course of action. But:

- (1) The need for estimating the odds of adverse climatic effects on crops exists because we are no longer isolated from food disasters elsewhere on the globe and must plan our own reserves accordingly.
- (2) The means for estimating such odds exists because we have information on what has happened to climate and crops over the past several decades.
- (3) Buying time allows for sober contingency planning.

NACOA, therefore, recommends that NOAA and the Department of Agriculture, who already jointly prepare weekly and seasonal weather and crop bulletins and advisories, work out the means by which crop estimates for the next several years may be extended to a large-scale basis. NACOA

then suggests that the results be used to examine the contingencies so estimated and the associated costs and benefits of providing reasonable reserves against these contingencies.

The Crucial Role of the Oceans: Long-Term Global Climate*

Aside from the normal large-amplitude year-to-year climatic fluctuations, there are longer term variations of smaller amplitude but of far-reaching consequence. Over tens and hundreds of thousands of years, these have manifested themselves as alternating ice ages and warm interglacial periods. But even within the limited range of recent history, significant changes have taken place.

Considering only very recent geological history, the earth has, for the past ten thousand years, been experiencing a warm interglacial period. Within this period, from roughly 950 to 400 B.C. there was a cool spell, a warm spell occurred from 800 to 1200 A.D., a cool spell (the "little ice age") from 1550 to 1850, and from 1900 on another relatively warm spell—a climate "optimum," which may be ending. Average global temperatures varied by no more than several degrees in the course of these changes but this was sufficient, if they persisted over many years, to create large fluctuations in living conditions around the globe. For climate changes on this scale, the possibility exists to adapt agricultural and other cultural practices provided adequate warning can be given. But these changes go far beyond the realm of chance and their causes must be understood before prediction is possible.

We are not, at present, capable of predicting such changes. Yet even very small variations, such as changes of only several tenths of a degree in the earth's surface temperature, may have significant effect on society. This lack has not been unrecognized. The Global Atmospheric Research Program (GARP) was begun in the midsixties with the twofold aim of:

- Achieving understanding of the transient behavior of the atmosphere as manifested in the large-scale fluctuations which control changes of the weather. This would lead to increasing the accuracy of forecasting over periods from one day to several weeks.
- Achieving understanding of the factors that determine the statistical properties of the general circulation of the atmosphere. This would lead to better understanding of the physical basis of climate.

Considerable progress has been made toward the first of these goals but not toward the second. This may have come about because, although the GARP mandate was addressed to, and has been accepted by, the atmospheric science community, the second objective of GARP depends

* We are indebted to J. O. Fletcher of the National Science Foundation for much of the material in this section.

heavily on the linkage between the oceans and the atmosphere. It is not exclusively an atmospheric problem and atmospheric scientists find it somewhat alien to their main interests. The broader scientific community, which might logically be identified with the second GARP objective, has never recognized and accepted this mandate in any way comparable to the way in which meteorologists have responded to the first objective. It seems to have fallen through the cracks. Not being a purely atmospheric problem, it did not generate a response from the atmospheric sciences; not being a purely oceanographic problem, no explicit strategy came from the oceanographic community.

The reason the ocean-atmospheric link is so important for climate merits at least a brief explanation. Most of the solar energy reaching the earth's surface falls on the sea. This energy is initially absorbed in the upper layers of the oceans; there it provides a source for immediate local transport of heat and water vapor from the oceans to the atmosphere (and is responsible for the extensive convective activity in the tropics that plays such a major role in weather). It serves as a vast reservoir of heat which ultimately drives the circulation of the deeper layers of the ocean and of the atmosphere. Because the oceans are so vast, and their heat capacity so large compared to land, oceanic changes can be virtually ignored in studying day-to-day changes in weather. They play a major role, however, in the longer term variations in weather regimes. Changes in the near-surface layer of the ocean are significant in determining year-to-year changes. The deeper into the ocean we go, the slower the changes in thermal pattern and circulation, so that when we look at climatic changes occurring over periods measured in centuries and even longer, it is necessary to take the entire ocean into account.

The process is further complicated by the extent to which the polar seas are covered with ice, which in turn affects the atmospheric thermal balance in polar regions. The result is that changes in "climate," that is, in the general pattern of wind, temperature, and rainfall, are the result of a complex interaction involving the envelope of air, water, and ice which surrounds the solid earth. Of these, only the air has been studied to any great extent. Comparatively little investigative work has been done on the dynamics of the ocean.

Owing to fundamental indeterminacies in atmospheric behavior, it is unlikely that we will ever be able to predict "weather" more than about two weeks ahead; hence the time period specified in the first GARP goal. When it comes to predicting long-term changes in climate, the predictability of the oceans becomes the important factor. While a great deal of research has been conducted in recent years on atmospheric behavior over a wide range of time and space scales, very little has been done about the oceans — especially the deep oceans. Without this and other knowledge from the

oceans we are unlikely to make much progress in our understanding of climatic change.

We do not wish to give the impression that nothing is being done to fill the gap. In addition to GARP, discussed above, important contributions have been and are being made by scientists in such groups as NOAA's Geophysical Fluid Dynamics Laboratory, the National Center for Atmospheric Research, and numerous public and private institutions carrying on activities connected with the Department of Transportation's Climatic Impact Assessment Program (concerned with climatic effects of aircraft operations in the stratosphere), the National Science Foundation's International Decade of Ocean Exploration, and other programs.

However, while the United States possesses a formidable array of resources and capabilities with which to address the problems of understanding and predicting climate variation, they are widely dispersed. Significant portions of the present Federal program in climate are carried out as indicated above, by the National Science Foundation, the Department of Defense, NOAA, and the Department of Transportation, with important peripheral activities in the National Aeronautics and Space Administration, the Atomic Energy Commission, the Department of the Interior, and elsewhere. In each of these agencies climate research is but one of many competing research programs, and no single organization is able to conduct an integrated study of the entire problem. This has led to a proliferation of subcritical efforts—particularly in the areas of monitoring and modeling. The scientific community is aware of these shortcomings, and in recent months a number of studies recommending remedies have been initiated.

We are encouraged by the fact that the President's Domestic Council has recognized the seriousness and the national importance of the problem of climatic change, and has established a committee to look into this matter. NACOA believes that there should be a clearly identified focus of authority within the Federal Government with responsibility for developing and maintaining momentum in climatological research. NACOA recommends additional funding in this area and oversight jointly by NSF and NOAA who would coordinate academic and private investigation with those undertaken within the Government.

Man's Impact on Climate

While many of man's activities can and do affect local climate—deforestation, irrigation, large cities, industrial smoke, etc.—these efforts pale to insignificance when compared with the potential climatic impact of the rapid growth of energy consumption and its conversion to waste heat that has taken place in recent years.

The global rate of energy consumption is growing at a rate of about

5.5% per year. This corresponds to an increase by a factor of five every thirty years. Even if the current growth rate is not maintained, it is conceivable that consumer demand for energy in the year 2050 may be more than twenty-five times what it is today. The energy we use ultimately appears as heat which is either radiated immediately into space, stored in the biosphere, or stored in the atmosphere and the oceans. At present, the total manmade thermal load is so small compared to the solar heat load as to be insignificant. However, the local manmade load is already becoming sizeable in heavily industrialized regions.

The balance between radiant energy received from the sun and that radiated out again determines the earth's temperature. If we take the energy which has been locked up as fossil fuel over hundreds of millions of years and release it in a few centuries, we could push up the earth's temperature.

For the year 1970, the amount of heat released by man's energy consumption activities, averaged over the whole globe, was estimated to be about 0.016% of the net solar radiation.* If the present rate of growth were to continue, then a century from now the global average would be more than one hundred times what it is today, or about 2% of the net solar load, and the continental average would be close to 7%. These figures correspond to temperature rises of approximately 2.5° and 9°F, respectively. Clearly, continuation of the present growth of energy usage implies the possibility of global climatic upset in only a century or so.

Climate, like all of global geophysics, is much more complex than a mere statement of the gross inflow of solar energy and the reradiation of most of it into space. Various feedback mechanisms exist which may serve to amplify or diminish the impact of man's activities. For example, the increased temperatures resulting from the manmade thermal load may lead to increased cloudiness and a decrease in solar energy reaching the earth's surface, resulting in only a slight change in surface temperature. On the other hand, in arctic regions a small amount of warming may melt some of the highly reflective ice and snow cover, so that less solar radiation is reflected away from the surface and temperatures rise even higher. The detailed effects of such changes on climate patterns are beyond our ability to predict today. This constitutes further evidence of the need for a major effort to develop a predictive climatology, as discussed in the previous section.

A temperature rise resulting from man's activities will not be distributed evenly over the globe. The problem of climatic "hot spots" is being aggravated by the tendency to build power plants of ever-increasing

* Figures on energy consumption are drawn from "Inadvertent Weather Modification. Report of the Study of Man's Impact on Climate." MIT Press, Cambridge, Mass., 1971.

capacity, and to concentrate such plants in clusters (power parks). Power plants having capacities of 2000 megawatts exist today, and 20,000 megawatt power parks are being planned. For facilities of this size, it is essential that the frequency and impact of significant man-induced changes in weather and climate downwind be determined and planned for. Considerable data already exist with which we can develop preliminary assessments. The problem is not a trivial one. We have already seen lines of manmade clouds downstream from 2000 megawatt plants.*

Decisions on power plant siting are an increasingly important responsibility of State and local regulatory commissions and such Federal agencies as the Atomic Energy Commission and the Environmental Protection Agency. With the trend toward planning power facilities offshore and along the coast, maritime and coastal zone management agencies too will become involved.

It is important that when decisions are made, climatic impact be taken into account. NACOA therefore recommends that power plant siting environmental impact statements be required to include an evaluation of the effect on local *climate* resulting from the heat discharge. Since the capability of assessing the cumulative long-term effects of such decisions, despite its importance, is rudimentary, NACOA also recommends that a climatic effect research program be funded as an integral part of the R&D effort to develop new energy techniques and concepts.

* Facilities of this size release approximately 3×10^9 watts of heat to the environment, more than the total kinetic energy production in a tornado and only slightly less than that in a thunderstorm. A shower producing 1 cm of rain in 30 minutes over an area of 36 square kilometers releases 5×10^{11} watts of latent heat. As power parks continue to increase in size, there is an increasing likelihood that showers and even severe local weather will take place in their vicinity. The energy release from a 20,000 megawatt power park is great enough to trigger natural showers and thunderstorms, and recent studies in St. Louis have already shown such effects.

Ocean Resources, Regulation, and Research

NACOA returns here to the question of how to organize best for national management of our ocean affairs. The appropriate organization, NACOA believes, is shaped by the changing nature of current activities in the marine environment which reflects a greater need to mediate between the sea and its users. While NACOA has expressed preference for amalgamating oceanic functions within a Department of Energy and Natural Resources, alternatives are available, such as within an existing Department, or as an independent agency. But the form is less crucial than the need to take action now. For the Nation's good, Marine Resource Management, Marine Resource Regulation, and Marine Resource Research must be provided an organizational setting that enhances their marine orientation and relates them in a way which keeps them mutually supportive without being subordinated to each other. Care will have to be taken to accomplish this without disrupting the performance of these functions in their traditional land-oriented context. We believe that the urgency of meeting long-neglected marine needs justifies the attempt.

NACOA last year advocated greater centralization in the Federal management of the Nation's ocean and atmospheric affairs. This advocacy did not prove persuasive to officials and legislators preoccupied with the energy problem. Even though many recognized that what was happening in energy was a preview of coming events for other natural resources, the new organizational arrangements which they sought reflected terrestrial preconceptions. We have in mind Administration bills to establish a Department of Energy and Natural Resources (DENR) introduced in both Houses after we went to press last year, and which were notable for their lack of a suitable marine focus.

The prospects for the DENR legislation have faded in favor of energy-related issues and we do not yet see new organizational initiatives for dealing adequately with marine affairs, including those related to energy resources. Only in the Senate is there forward movement in this regard. Senate Resolution 222, passed unanimously in February of this year,

authorized a major program on national ocean policy and its implications, which a special Senate Committee now has under way.

Although heartened by prospects attendant on S.Res. 222, NACOA once again feels compelled to address the question of why an ocean affairs focus is needed, why we feel the need for associating organizationally the functions of marine resource development, regulation, and research, and where the competence to carry out these functions should reside. How this competence is brought together—whether within a DENR, an existing Department, or by establishing a new independent agency—is less important than that it be done soon. Our present assessment favors amalgamating the desired competence, the bulk of which can come from several existing organizations, within an existing Department or Agency as the most expeditious way of getting on with the business of the United States and the sea.

Why an Ocean Program?

NACOA wishes to note that although the need for specialized technology in the oceans, such as seagoing platforms and support systems, and the need for specialized knowledge of the environment by those who plan and use the technology at sea, has always provided a plausible rationale for a correspondingly specialized Federal management, two new elements are all but compelling. These new elements are the need to protect the environment from the users of the sea and the need to protect the users of the sea from each other.

The environmental threat from oil spillage is the clearest example of the former, although pesticides, toxic metals, and other terrestrial pollutants are serious threats as well. The deliberate overboard pumping of oil to empty bilges or clear cargo tanks and the inadvertent leakage and accident-caused spillage from tankers are potentially very large as the size of tankers, volume of shipping, and the amount of cargo carried grows to unprecedented proportions. The tanker's story is the most dramatic. Starting after World War II when the largest was of approximately 20,000 deadweight tons, supertankers now exist in the 500,000 deadweight ton class with 90-foot drafts and there is talk of tankers even larger. Such ships present a new kind of problem because the amount of oil involved in any one accident can be so large. Containing the environmental threat in just this one area thus becomes more urgent as it becomes more difficult.

The second critical development in recent years is the astonishing growth in the number and levels of seagoing activities. A consequence is the increasing conflict over the use of sealanes themselves. This traffic will increasingly conflict with fisheries as could offshore oil and mineral extraction, deepwater ports, and so forth. All these activities will, in turn, threaten some of the amenities sought for recreation by boaters, swimmers,

and coastal residents. Finally, buoy systems and other monitoring or survey and research operations increasingly interact with the above. The impact on Coast Guard law enforcement, search, rescue, and safety operations will be intense, as will the possibility of interfering with or compromising Naval defense missions.

Now is the time to establish a comprehensive national strategy harmonizing these multifarious activities, and to assign the job of carrying it out to an agency with the appropriate expertise. The need for doing so *within* the coastal zone was recognized in the National Coastal Zone Management Act of 1972 and assigned to NOAA. Extending a strengthened version of this responsibility seaward requires new legislation and is not simple, but the sooner it is done, the better. It is bound to become more awkward and contentious as time goes on and one or another specific interest begins to dominate the local scene.

Problems with Present Legislative Approaches

Although prospects for passage of the present DENR bills are not promising, NACOA sees four major deficiencies which are worth noting because they pertain to any legislation in this area. First, they lack a suitable marine affairs policy statement which would draw attention to the uniqueness of the problems of marine resources management and would give a fresh impetus to the policy statement in the 1966 Marine Resources and Engineering Development Act. Secondly, the bills are inadequate with regard to the functions we feel must be carried out by the DENR to implement marine affairs policy. These functions are briefly:

- encouraging the development and conservation of marine resources, and other uses of the coastal and marine environment;
- coordinating and regulating these activities to minimize environmental, economic, multiuse and international conflicts; and
- providing technical, engineering development, and scientific services that cut across agency and departmental lines, including surveys, environmental monitoring, prediction, and control, as well as basic scientific and engineering knowledge.

A third deficiency is the failure to specify which functions will and which functions will not be the responsibility of a Marine Affairs Administrator. This left unresolved where the present programs in coastal zone management, fisheries, Sea Grant, and marine law enforcement would go. Fourth, the function of marine multiple-use coordination and regulation was not recognized at all.

NACOA is wedded to the principle of national ocean use management, not to any particular manner of carrying it out. The functional approach is the essential feature. Though NACOA regarded the DENR concept with favor as a possible vehicle for implementing national ocean policy,

the Committee would turn elsewhere for this purpose. Most certainly an independent agency would serve the ocean policy need if it could be created.

Functions of an Agency for Marine and Atmospheric Affairs

We wish once again to emphasize *function* as the basic principle. In this section we explain what we mean in somewhat greater detail than we did in last year's report. Drawing for the most part on statements found in current budget justifications for the agencies involved in marine and atmospheric affairs and grouping them appropriately, we have the following major functional groupings and their breakdowns.

Marine Resource Development and Conservation: This function covers responsibility for establishing resource production and usage goals in recognition of supply and demand projections, determining the appropriate means required to achieve these goals, and bringing these means to bear in light of policy constraints regarding national priorities and laws governing the protection of the environment. Included specifically are:

- the assessment and management of marine fisheries resources and marine mammals;
- the provision of assistance to the commercial fishing industry;
- the stimulation and support of marine sport fishing and recreation;
- the assessment and management of marine nonliving resources;
- the provision of assistance to commercial energy and mineral industries operating in the marine environment.

Marine, Atmospheric, and Coastal Zone Affairs Coordination, Regulation, and Enforcement: This function covers responsibility for determining the economic and social consequences of proposed marine and coastal development activity, determining the probable impacts on other developmental efforts and the environment, determining the tradeoffs of alternative development plans or policies, regulating development execution in accordance with law and established policies, and the planning, funding, and arranging for the conduct of marine-related public works of national importance. Specifically:

- the protection and multiple-use management of the coastal zone and its resources;
- the supervision of exploration and development under mineral leases and permits on Federal coastal and offshore submerged lands;
- the enforcement of Federal marine laws and regulations and promotion of marine safety;
- the minimizing and assisting in the resolution of use conflicts in the marine environment by the provision of advice and counsel to Federal and State agencies on questions of multiple use;

- the development of an overall plan for the use of marine areas within and beyond the territorial sea;
- the coordination of permit and regulatory activities in the marine area;
- the planning, evaluation, and budgeting of the civil works function of the Corps of Engineers within the marine area;
- the management of leasing programs for oil and gas, and for other minerals, on the U.S. Outer Continental Shelf;
- the coordination of permit and regulatory activities in weather modification.

Environmental Science, Engineering, and Technical Support Services:

This function covers responsibility for carrying out scientific, engineering, and support services activities necessary to assure the timely availability of the scientific, technological, and environmental knowledge needed to support decisions on proposed development activity, and the support and dissemination of appropriate technical information and scientific services where the benefits accrue to the public at large.

The marine functions in this category cannot realistically be separated from the nonmarine. They are directly based on observing and understanding natural phenomena which reflect the interaction of sea, air, and solid earth which underlies both, and the hydrologic cycle which renews our streams and lakes through the process we call weather. The specific functions we have in mind come exclusively from the Geological Survey and NOAA and we state them in the form in which they now exist. Taken together with several functions listed in the previous two categories they represent collectively *all* the functions of the Geological Survey and NOAA, whose amalgamation in their entirety constitutes one of our major reorganization objectives. Specifically:

- the conduct of surveys, assessments, and investigations of the physical, chemical, and biological characteristics of the oceans and lakes;
- the conduct of surveys, assessments, and investigations of the geological and geophysical processes of the solid earth and its resources;
- the provision of the Nation's weather monitoring and prediction services;
- the conduct of weather modifications research;
- the monitoring of stream flow and water quality, the determination of the distribution and character of subsurface water, and the assessment of the Nation's water supply;
- the operation of environmental and earth resources satellite monitoring systems, and the application of data therefrom;
- the provision of warnings and development of knowledge of natural hazards (tornadoes, hurricanes, severe storms, earthquakes, tsunamis, volcanic eruptions, and landslides) for the preservation of life and protection of property;

- the production of maps and charts for the earth, the oceans, and the national air space;
- the establishment of geodetic data;
- the provision of comprehensive environmental and other data services;
- the classification of public lands for leasable minerals and water power sites;
- the identification and evaluation of potential energy and mineral resources, including those of the Outer Continental Shelf;
- the conduct of research and technological development consistent with agency responsibilities.

In summary, the functions we have in mind are those of NOAA, the Geological Survey, the marine and coastal zone portion of the civil planning, policy, and funding activities of the Corps of Engineers, the submerged lands management and mineral leasing program on the Outer Continental Shelf presently assigned to the Bureau of Land Management of the Department of the Interior, marine-related functions of Interior's Bureau of Sports Fisheries and Wildlife, and finally the U.S. Coast Guard. Three functions involving the establishment of a national marine affairs plan, regulating U.S. affairs accordingly, and coordinating permit and regulatory activities for weather modification are new.

The possibility that such a reorganization might seriously disrupt existing land-oriented functions carried out by these organizations must be recognized. We believe it need not, and that the enhancement of the ocean-oriented prospects is important enough to put this belief to the test. Although we cannot document our belief rigorously, it seems clear that the Geological Survey, NOAA, and the Coast Guard can—and do—provide their services to the Federal and private sector at large, not to just the Departments in which they are at the moment lodged, and that they could continue to do so while benefiting from closer organizational ties and a greater emphasis on lagging oceanic requirements. One cannot be so sure of the other suggested transfers, but we justify the serious consideration of these possibilities and an effort to make it work in the next section.

The Three R's

An important aspect of the functional approach is the need NACOA sees to associate, for proper marine management, the three broad functions: resource management, regulation, and research. It is general experience that each would tend to go its own way unless there is a capstone, some longer view that sees to it:

- that regulation is sensitive not only to the larger need of the public good, but to the practical conditions in which it must operate;

- that regulation can call on research to illuminate the dark corners of its field of work;
- that resource management is made more efficient and productive by making sure the technical standards of regulation, and the practicalities of enforcement, are consistent with the real world;
- that the potentialities of the future and the difficulties of the present are worked at by an associated research arm; and
- that research can find its balance in the operation of its sister divisions.

The reason we suggest an integrated tripartite arrangement of resource management, regulation, and research is that none can survive and work healthily without contact with the other two, and none could work in the full public interest were any of them subordinated to the others.

Tying these three functions together for balance of effort and harmony of purpose in the light of overall national policy is itself a fourth function and there must, of course, be a higher level in the management hierarchy to carry it out.

It is not a function that can generally be left to an interagency coordinating committee. The bulk of the federally managed civil marine affairs activity must be collected into a single operating unit with management authority. There will, of course, always be some marine responsibilities that for one reason or other remain outside such an authority. The Department of Defense, State Department, National Science Foundation, and Environmental Protection Agency are important players in the oceans game and should obviously remain independent, implying the need for continuing to bring the White House and interagency coordination into the management process. But we would hope that the "critical mass" of marine programs would be included in the central management body that we urge be established.

Events challenging the Nation's marine affairs strategy and management are accelerating. We feel that our response cannot wait for the revival and appropriate revision of the DENR Bill nor for resolving the complications in establishing an independent agency, though NACOA would welcome this solution, too, in principle. Accordingly, we urge that the functions discussed above, and the means to carry them out, be brought together within an existing Department or Agency in an organizational setting that enhances their marine orientation and opportunity for mutual reinforcement and collective strength.

After Caracas/Vienna—What?

NACOA considers here some possible outcomes of the Law of the Sea Conference in Caracas, Venezuela. Our purpose is to sense where it might be important to prepare in detail for possible eventualities and where it might be more suitable to hold off.

It does not make sense to remain mute about what the United States might be faced with in 1975 when it comes to mining the deep sea, fisheries conservation, pollution control, and all the other important matters hinging on the outcome of the Law of the Sea Conference at Caracas.

Interim legislation now being considered in the Congress about extended fisheries jurisdiction, and investment protection and authority for deep seabed mining, are only a few of the manifestations of the pressures—or the pessimism—regarding the possibilities of that important U.N. Conference.

NACOA does not wish to complicate the already complex problems faced by the conferees, and in particular those of our own negotiating team. But neither does NACOA feel it should remain silent about the need to formulate alternatives in advance and to assess possible impacts of various Conference outcomes and what we might do about them. We realize that suppositions about the Conference outcomes might be taken as a prediction of what may happen. This misunderstanding is a danger we must risk. The Committee is not unanimous in either its hopes or predictions, but it is unanimous that the implications of possible outcomes should be examined and considered in advance. It is as much in the national interest to be ready should Conference progress stall as it is in the national interest to work for successful international agreement.

BACKGROUND

Eighty-six states met at Geneva in 1958 to address questions having to do with the appropriate breadth of the territorial sea and the zone con-

tiguous to it. The three-mile cannon-shot range suggested by Jefferson had long been outdated as a natural limit and alternate extensions of control of many sorts and extent had been proliferating. Substantive committees were formed. They considered, in addition to the extent of seaward zones, questions of the living resources of the high seas, the resources of the Outer Continental Shelf, the regime of the high seas, and the matter of free access to the sea by land-locked countries. Specific conventions were proposed by four out of five committees. These were entered into force for the United States within the eight years following the Convention of 1958.

This meant the United States had agreed to them. It did not mean they were ratified by all the nations involved so as to be enforceable internationally, nor even that international agreement would remove ambiguities and differences of interpretation, especially since negotiated agreements so often bypass what they cannot solve. In fact so much was left unsettled that another Geneva conference was called in 1960 to deal with the breadth of the territorial sea alone. It failed by one vote of the two-thirds majority needed and the issue is still with us.

The desire expressed by many that the nations of the world avoid a claims-stake race for the rich resources of the oceans led finally to the creation of a U.N. "Committee on the Peaceful Uses of the Seabed and the Ocean Floor Beyond the Limits of National Jurisdiction." This Committee convened six times between 1970 and 1973 to prepare for the Conference on Law of the Sea being held in Caracas in the summer of 1974, and possibly in Vienna in 1975. Its subcommittees met in dozens and dozens of individual meetings.

The numbers of issues, alternatives, interested parties, cross-connections and influences are so profoundly numerous and complex that it is not rational, on the face of it, to consider agreement on all issues possible. However, it is perfectly possible that the good will and foresight of nations will be marshalled by the frightening consequences of failure.

In any event, the task is not easy. In some cases the committees produced drafts of alternative positions which made the number of choices manageable, but the choice no easier because the positions were polarized. In other cases many drafts were produced. Positions were not hardened, but the numbers of choices were multitudinous. And they did not eliminate even what appeared to be minor differences.

The Interagency Task Force on Law of the Sea, with help from broadly-based advisory groups, has arrived at positions for each of the major issues which are supported by most of the interested parties. There remain divergent U.S. interests in almost every one of these areas. This is not surprising and is tolerable because these differences were at least considered in arriving at a United States position. What has been difficult,

and remains so, is that negotiated agreements in one area can have important effects in other areas. These are not easy to accommodate even when they are predictable and the tendency to revert to hard advocacy for one's primary interest is tempting. NACOA feels strongly that the spirit of accommodation must be maintained during the Conference—and just as strongly that it is both unfair and unwise to forestall action indefinitely.

In the pages that follow, we will review some major issues, interactions, and implications of possible outcomes.

POSSIBLE OUTCOMES

Success of the Law of the Sea Conference will be measured by the degree to which regimes are established that will permit the creation of wise and productive conservation-management programs. Failure will be measured not only by lack of agreement, but by inordinate delays even if agreement is eventually reached. The question we ask here is whether the position of international responsibility which the United States occupies imposes an unacceptable burden of specific restraints on our vital self-interests.

One general concept helps set the stage: It is hard to conceive that the United States could benefit by fracturing the growing international consensus and the development of international law. Nevertheless, to be sure this is so, we must examine coolly, case by case, how likely it is for the United States to be pinned down and penalized in important areas under international consideration.

Agreements not too far from the current positions of the United States delegation appear possible with two exceptions, freedom of research and distant water fisheries. And here we find it conceivable that success in other aspects of Law of the Sea could ease the situation in these areas as well.

The Area Beyond the Limits of National Jurisdiction

Because there is no international agreement on the limits of various forms of national jurisdiction, the practice has grown of referring to the international areas of the oceans, however defined, as the "area beyond the limits of national jurisdiction." This allows nations to negotiate on questions of common interest and international law without first waiting for precise agreement on boundaries. At this writing, it seems reasonably clear that there will at some point be established a regime for the governance of the seabed beyond the limits of national jurisdiction. There will be in all likelihood an arrangement to implement that regime, although its nature, i.e., the amount of power it will exercise, and the type of voting arrangements it will use, are not yet clear. A severely restrictive regime would benefit neither the United States, nor the best long-range interests of developing nations because it would constrain unnecessarily the economic

benefit otherwise available to the international community. Further, overly restrictive rules could seriously impede the conduct of marine scientific research. NACOA believes that the creation of a deep seabed arrangement similar to that presently advocated by the United States, could avoid unwanted consequences of uncontrolled exploitation, would provide needed guarantees to developed countries, and would ensure a mechanism by which the developing nations of the world could also benefit.

Zones of Extended Resource Jurisdiction

A second trend is the creation of special zones allocating to coastal nations special rights with regard to the exploitation of resources beyond the generally accepted limits of a territorial sea. While the United States has taken no position on the breadth of such zones, 200 miles, or the limit of the continental margin (whichever is the greater) is often mentioned.

The question of which resources might be included in the special area of jurisdiction is subject to considerable debate. For example, the United States prefers to deal with living and nonliving resources separately, while this is not true of proposals by many other nations. Regardless of the results of this debate, the establishment of an extended economic zone will have obvious consequences, both economic and political, for the United States. For example, if the United States should establish its own economic zone to a distance beyond its territorial sea, questions would be raised with regard to Federal/State relationships, particularly revenue sharing; and with regard to the operation of the coastal zone management plans now being prepared. This will certainly pertain if the territorial sea is extended from 3 to 12 miles, and we discuss this point in more detail later.

The United States treats fisheries as a separate issue. NACOA believes that the trend in negotiations is toward a zonal concept of fisheries management by coastal nations, but that an accommodation of the many interests involved, including especially conservation, could be negotiated. Certainly such a regime will result in some adjustment in fishing effort, assuming that the economics of fishing as well as the conservation needs of the industry are considered seriously. The resulting regime, if effective, will provide the machinery to redress the imbalance which presently exists between many coastal and distant water fisheries. That is, when distant water fisheries operate in the zone of the coastal state, these fisheries will be called upon to bear their full share of the regulatory costs necessary to maintain the resources in the area in a condition of optimum productivity.

NACOA believes that the long-range impact of a stable fisheries regime will be beneficial to the United States though there will surely be short-range disruptions to all. Further, NACOA points again to the need for strong and effective management and enforcement mechanisms for all fisheries in waters and U.S. Federal jurisdiction, which is presently lacking.

This need becomes increased many fold in the light of possible extended jurisdiction. Likewise, NACOA suggests the need to reexamine existing bilateral, small multilateral, or regional arrangements so that they can be meshed smoothly with any extended jurisdictional arrangement arrived at during the Conference.

Territorial Seas

It is probable that an agreed-upon limit to the territorial seas of the nations of the world will be selected, and it is almost as probable that the limit will be 12 nautical miles. The attainment of this agreement is dependent upon the degree to which certain conditions attached by some nations are satisfied. For example, the United States conditions its acceptance of a 12-mile limit on the accommodation of its need for unimpeded transit through those international straits which may be closed by this territorial extension. At the present time, only a handful of nations have voiced opinions on this issue, and it is not likely to become a serious point of contention, although bargaining may make it so. NACOA reiterates its strong support of the U.S. position on freedom of transit.

It should be noted that extending the limits of the territorial sea to 12 nautical miles raises the question of the allocation of rights and revenues between the States and the Federal Government in the zone between 3 and 12 miles—particularly with regard to oil and gas. The Committee split on which way this allocation should lean. It was unanimous, however, in recognizing the importance of settling the issue, and in recognizing that it can only be settled by the political process. NACOA therefore recommends it to the urgent attention of the Congress.

The Quality of the Marine Environment

The basic disagreements in this area, at this stage of the negotiations, arise from disputes over who is entitled to prescribe regulations for pollution control and who may enforce them. On the one hand, the United States is advocating exclusively international regulations with flag-nation and port-nation enforcement mechanisms, while others are striving to attain a degree of residual coastal nation competence to regulate and enforce. A loss on this position is seen by some as causing potential difficulties arising out of lack of worldwide uniformity in standards for marine pollution from vessels, along with potentially disruptive enforcement practices by coastal nations. NACOA endorses the U.S. position on competency to prescribe regulations. Further, NACOA recognizes that traditional flag nation enforcement will and should be an element in any new treaty, but that some recognition of residual coastal nation enforcement powers will, in all probability, have to be accommodated.

Scientific Research

Debate concerning the conduct of marine scientific research has focused on the economic zone, or special resource zone adjacent to coastal nations. Clearly, each coastal nation has the inherent right to regulate scientific research in its own sovereign waters, including the right to demand that a research vessel obtain prior consent. Just as clearly, present international law places no barriers in the way of marine scientific research upon the high seas beyond national jurisdiction. Some nations are now advocating that, within any special resource zone to be established, a nation wishing to conduct marine scientific research seek prior consent from the adjacent coastal nation. This position is anathema to the conduct of effective research, and is opposed by the United States.

The draft proposal of the United States provides for a set of obligations to be assumed by any vessel conducting marine scientific research in areas of special coastal nation jurisdiction. If these obligations, which include the right of participation, publication of results, protection of the environment, and sharing of results, and others, are met, the vessel is free to carry on with the work. NACOA believes that this is the minimum position that can be accepted without suffering severe consequences concerning the improvement of knowledge of the oceans. If a consent regime results from the negotiations, the impact on the conduct of research will be serious. Experience has shown that costs rise as restrictions increase. Since the funds for research are finite, increased costs result in less research for the dollar. Less research means less knowledge available to all.

CONCLUSION

While the likelihood of total failure of the forthcoming Conference is small, statesmanship will be needed to maximize the beneficial results. The United States, along with the rest of the participating nations, needs a successful Law of the Sea treaty to provide the framework within which the body of law and the associated body of scientific knowledge can evolve. Successful negotiation is necessary to establish workable dividing lines between management responsibilities of the coastal nation on the one hand, and the international community on the other. Ambiguities presently are so severe as to retard the beneficial uses of the oceans.

There is, of course, always the possibility that the Conference will come to no conclusion. Recognizing this fact, NACOA feels the United States would be remiss if it were not well prepared for that contingency. This could best be accomplished by planning now for legislation and/or other appropriate action which could be rapidly implemented to protect the legitimate interests of the United States in the oceans.

NACOA reiterates its position taken in its first Annual Report: "It is possible that there will be a considerable lapse of time before international

agreement on Law of the Sea is attained. NACOA recognizes that economic and other pressures may develop to such an extent that individual nations including the United States will take unilateral actions, especially with respect to resource exploitation. NACOA, therefore, urges consideration by the U.S. Government of suitable interim arrangements that will allow development of these resources to proceed, but at the same time will offer reasonable probability of meshing with eventual international agreements."

We advocate patience, especially in the matter of fisheries rights and jurisdictions, but not beyond 1975 if no international agreement is reached by then. This does not preclude negotiation or even appropriate legislation to relieve the pressure on species now being overfished.

Comments On Programs and Studies

In this chapter NACOA notes, and in some instances discusses in detail:

- The need for modification and improvements in the National Coastal Zone Management Act of 1972;
- The National Fisheries Plan;
- Weather modification and food;
- Studies of capital structure for R&D in oceanic and atmospheric programs;
- The Ocean Engineering Study;
- The need of the Coast Guard for additional support so that it can fulfill its rapidly expanding statutory and executive assignments; and
- The unfortunate slackening of the Navy's vital role in oceanographic research.

In the thirty-odd months of our existence we have made recommendations in several critical areas of oceanic and atmospheric affairs. Outstanding among our interests has been the coastal zone. As stated below, we find that progress is being made in improved coastal zone management, though we have further suggestions—and make them. A second area of major interest to us has been the condition of U.S. fisheries. In this instance we note merely the status of a comprehensive National Fisheries Plan now under development. Weather modification is the third subject we have treated in each of our reports. We comment briefly on its connection with food production.

More recently, NACOA stimulated studies on the health of the capital programs for oceanic and atmospheric science and engineering, and on national needs for ocean engineering and the relative roles government and industry should play in such undertakings. We note that comprehensive reviews of capital structure are being undertaken by the Federal

Council for Science and Technology through ICMSE and ICAS* and that an Ocean Engineering Study is being undertaken by a panel of NACOA. We look forward to their completion in good order soon.

With this report NACOA reports for the first time on an examination of the assigned responsibilities of the United States Coast Guard primarily in enforcing environmental regulations and the strain on its ability to meet those demanding assignments without a commensurate increase in resources. The Committee also notes the Navy's unfortunately diminished role in oceanographic research vital to that technologically dependent service, as well as to the country at large.

Recommendations are made where we deem it appropriate to do so.

COASTAL ZONE MANAGEMENT

It is widely acknowledged that the Nation's coastal zone is a complex system of great importance under severe and growing pressure. The need for bringing about a more effective system of management is recognized. Because coastal zone environments, resources, problems, and potential are so pervasive, NACOA has had all aspects of coastal zone activity under continuous review during the Committee's three years of existence.

Work on a national coastal zone management system finally started up after a troubled beginning and last year has been one of substantial progress for coastal zone activities. During the period between passage of the National Coastal Zone Management Act of 1972 (P.L. 92-583) and December 1973, at which point funds were first made available, NOAA made significant progress in developing guidelines for the state planning and estuarine sanctuaries grants. The release of funds allowed the program to become active immediately. However, comparison of the specifics of the various sections of the Act with the first two years of experience in its administration disclose the need for certain improvements.

First, research and development vital to improved coastal zone management should receive increased attention in several Federal programs. There is a wide variety of programs concerned with coastal zone activity. The Office of Sea Grant in NOAA, the RANN (Research Applied to National Needs) activity of the National Science Foundation, the Corps of Engineers, the oil and gas resource activity of the Department of the Interior, and the Environmental Protection Agency have reasonably good programs as far as their resources permit. Other agencies are active within their chartered missions.

The tenfold increase in lease sales for oil and gas development on the Outer Continental Shelf proposed by the President make it imperative that adequate R&D be undertaken to produce the data necessary to allow

* Interagency Committee on Marine Science and Engineering, and Interdepartmental Committee for Atmospheric Sciences.

sensible tradeoffs. Environmental baseline data accumulated by the Department of the Interior and NOAA concerning proposed leasing areas on the OCS should be made available to coastal States directly or through the Office of Coastal Zone Management. This data should be provided to the States well in advance of the decision to lease in order to assure adequate time for them to evaluate the effects of the decision and to make comments.

Also, NACOA recommends that the Office of Sea Grant which funds the initial development of many promising research areas and service programs related to the coastal zone and its resources, should be funded to its statutory limit as early as possible, preferably FY 1975. The additional funding should be devoted to activities related to planning and management of coastal zone environments and resources.

Second, the Estuarine Sanctuaries Program provided by Section 312 of the National Coastal Zone Management Act of 1972 should be extended in time, and the funding provided by Section 315 of that Act should be increased to a level sufficient to comply with the clear Congressional intent, namely, at least one estuarine sanctuary in each of the identifiable zoogeographic regions. We note especially that funds are now available on a one-time-only basis for purchase of a limited number of sanctuaries, but no support is available for planning and management of these areas on a continuing basis. It seems obvious that adequate monies to provide support for these Federal/State sanctuaries should also be added in this section. We do not know how much it will take and, hence, must leave it to the legislative amendment process to determine.

Third, NACOA recommends that the level of funding for management in coastal zone areas should be increased for FY '75 to \$20 million and the full annual funding level be made available in FY '76. In addition, we recommend that the allocation restrictions in Section 306 Administrative Grants Program be revised so as to allow more realistic assignment of funds according to need and readiness of individual participating States, especially during the build-up and phase-down periods of program development. With these actions the Coastal Zone Management Program envisioned by the Act will, in our opinion, be well under way.

One area requiring special attention from the Congress remains. There is no clear provision for support of essential research, development, and advisory service programs in the National Coastal Zone Management Act of 1972. For the National Coastal Zone Management Program provided under that Act to be fully productive, NACOA is convinced that adequate scientific data and information and technical support need to be made available to the planners and managers who make the decisions.

Knowledge is the Key in the Coastal Zone

To make effective planning and management of the coastal zone pos-

sible, it is essential to have an adequate fund of scientific, technical, economic, social, and legal information about the resources and environments of the area. It is also important to understand uses and users and their needs and demands. Because the coastal zone is affected by activities in the offshore (e.g., deepwater port engineering and operation, and offshore oil and gas exploration and development), similar knowledge and technical capability concerning the Inner and Outer Continental Shelf regions is also important.

Considerable effort has been devoted by several competent committees and individuals in the last decade to establish the scientific and technical needs of management. These efforts* have almost universally concluded that, laid against the backdrop of the real needs of management for detailed, accurate, timely, and useable scientific data and engineering capabilities, existing R&D support capabilities falls short of meeting the needs of planners and managers. Problems present themselves faster than technically sound solutions can be provided. Ever greater detail is required to answer the questions.

To assess the technical service needs of management, one can examine the range of problems and questions presented. In the complex national, political, and socioeconomic realm of the coastal margins with which management must deal, problems take many forms and come in many sizes. For example, one may be dealing with a request for a householder's permit to bulkhead and dredge and fill a small section of marsh, while at the same time be considering a 5,000-acre industrial park and port development. The general problems are the same, the places and magnitudes are not.

There are other illustrations. The gamut of problems involved may run from fishing-stand permits and fishing-limit establishment, through requests for permits to establish or enlarge sewage discharges and major industrial complexes to consideration of the offshore and inshore impacts of Outer Continental Shelf petroleum developments such as the Nation and the States now face. Each is different in nature and size and each demands technical knowledge and advice tailored to the nature of the proposed use, the environment involved, and the socioeconomic situation. Furthermore, site locations and construction are only the beginning. The operations must be monitored and evaluated once construction is complete.

* For example: "Our Nation and the Sea, Report of the Commission on Marine Science, Engineering and Resources" (The Stratton Commission), U.S. Government Printing Office, Washington, D.C., January 1969; "Coastal, Marsh, and Estuary Management," Proceedings of a Symposium at Louisiana State University, July 17, 18, 1972, Division of Continuing Education, Robert H. Shabreck, Ed., 1973; "The Water's Edge: Critical Problems of the Coastal Zone," Edited by Bostwick H. Ketchum, MIT Press, 1972, and so forth.

Coastal zone decision-makers have needs for access on a relevant, timely, and useful basis for: a) scientific data, knowledge, and competence; b) adequate engineering capabilities; c) technical services, such as monitoring of environment, resources and uses, and emergency assistance ("fire-fighting"); and d) continuing technical advice. Involved are many sorts of technical activity ranging from additional fundamental research on phenomena of the environment and resources of the coastal areas and the effects of man-induced changes to baseline research, inventorying, monitoring and recovery.

Obviously then it is necessary to know and understand the environments and resources of the coastal region well in order that critical economic activities can be pursued in the least disturbing manner. With proper knowledge and careful application of such knowledge it should be possible to undertake development which will be compatible with many other uses and which in some instances may enhance the coastal zone. But gaps in knowledge of the hydrography, geology, and biology of coastal waters, shorelines, and wetlands minimize our chances of success in maintaining integrity of the environment while at the same time allowing reasonable and necessary economic uses. Lack of such detailed environmental knowledge makes the tasks of site selection, plant design, and facility construction unnecessarily difficult and costly. As a result, engineering and construction costs for environmental protection may be much higher than they need be, resulting in an economic drain upon facility operators and, in turn, upon consumers. Taken in the large, the cumulative economic effects of many such operations can be considerable. Without the essential data base, the alternative to such wasteful over-design is unnecessary and unacceptable risks of damage to the environment and to coastal resources. Additional fundamental knowledge and baseline information based on well-conceived research into the natural, social, and economic systems of the coastal margins is thus in order.

Effective Coastal Zone Information Transfer and Use

Having adequate baseline and synthesized information on coastal resources and environments is not enough; nor is knowing how to solve an engineering problem. Socioeconomic solutions may be known and available to specialists, but if these data and solutions are not communicated to the decision-makers on a timely and effective basis, then information and technical ability are wasted and management is ineffective.

We find, as did the Coastal Zone Workshop convened at Woods Hole in 1972, that despite the general lack of detail and scope in scientific knowledge and technology, more of each exists even now than is being put to effective use in planning and management. More efficient systems for gathering, analyzing, and disseminating now unused knowledge would greatly

enhance the developing National Coastal Zone Management Program, and we recommend that NOAA and other Federal agencies with responsibilities in the area make a systematic effort toward better information synthesis.

NACOA, however, concludes that present knowledge and technology base and existing facilities and systems for providing assistance to coastal zone planners and managers are inadequate. We have examined existing Federal and (to the extent possible) State programs concerned with R&D and advisory activities related to coastal areas and found them to require bolstering. As mentioned earlier, there is a wide variety, such as the Office of Sea Grant in NOAA, the RANN and other activities in the National Science Foundation, the research and engineering program of the Corps of Engineers, the U.S. Geological Survey, and the Environmental Protection Agency. Most have reasonably good programs, as far as their resources have allowed them to go. But more is needed, and we recommend that additional coastal-related research and development effort be mounted by each. In the case of the Sea Grant Program, the single act of immediately raising the funding to its authorized level with the commitment that it be applied to coastal zone activities would be of considerable assistance.

The most significant improvement along these lines can be made if the National Coastal Zone Management Act of 1972 is revised to include a new section directed toward the support of relevant R&D and technical communications activities. Following the pattern established for development and administration in the rest of the Act, the States should be given the option of deciding, within appropriately established Federal guidelines, on the form and extent of their research, development, and advisory services programs. Federal monies, supplied on the existing matching basis (2:1) should be made available. The sum of \$20 to \$30 million (which would bring the total support for a complete National Coastal Zone Management Program to the approximate levels considered necessary before the Act was actually passed) would seem to allow a reasonable level of activity in development of appropriate research, technology development, and advisory services for the program. It is important to note here that NACOA is not recommending scientific and technology development programs for the sake of science but as a *vital input* to and an integral part of an effective coastal zone management system. This is a critical point which should not be overlooked.

While the above recommendations for specific additions of relevant research and technology development to the National Coastal Zone Management Act of 1972 relate primarily to added capabilities at the State level, the Federal effort, too, can be improved. Certain redefinition of objectives and focusing of programs within these same agencies would also help.

It would seem possible for Federal agencies with laboratories and other in-house and out-of-house programs in coastally-related research, develop-

ment, and technological assistance to reorient their work so as to buttress the activities and programs mentioned above, and we recommend that systematic effort be expended in an attempt to do so.

THE NATIONAL FISHERIES PLAN

NACOA urged, in its first two annual reports, that a comprehensive plan for development and conduct of fisheries efforts in the United States be generated. The Eastland Resolution (S. Res. 92-184) expressed these same needs. We are gratified that such a plan is now being developed by NOAA.

WEATHER MODIFICATION AND FOOD

There now exists marginal capability in some types of weather control, but steady improvement or more than marginal operational usefulness is by no means automatic. It was to this, the necessary sharpening of effort, that we addressed our attention in previous years by stressing:

- the need to overcome the existing fragmentation of Federal programs in weather modification now scattered amongst numerous Federal agencies;
- the need for greater emphasis on research in the physics of cloud formation and on the science and technology of rainfall augmentation;
- and
- the need to confront legislative and public policy issues governing the proper use of a new technological capability which has the potential of doing harm as well as good.

In light of the current need to increase world-wide agricultural productivity, the effect of the increase in market value of food on the benefit-cost ratio of weather modification could be sufficient to encourage the operational use of modification techniques whether we are ready for it or not. The evidence suggests, although it is not conclusive, that a one- or two-inch increase in rainfall could be stimulated during the growing season in certain areas of the central plains. South Dakota, for example, is now preparing to carry out rainfall augmentation operations over 60% of its area this summer with the goal of increasing rainfall by one or two inches and decreasing the occurrence of damaging hail. About \$1 million will go into this effort (about 75% State, 25% county funding) with a target benefit-to-cost ratio of ten to one.

In the last two years NACOA has made numerous recommendations having to do with weather modification. While there has been progress in some areas, others, we regret to say, have shown little change. And also, the failure to establish Federal regulations and procedures to minimize conflict and litigation arising from planned and actually performed weather modification operations is paralleled by our failure to take the initiative in estab-

lishing international agreement on a mechanism to insure that all modification efforts be devoted to peaceful and mutually beneficial purposes.

CAPITAL STRUCTURE FOR OCEANOGRAPHIC AND ATMOSPHERIC RESEARCH

In our introduction to the second Annual Report, we expressed concern with the impact of the mid-FY '73 budget cuts on essential oceanic and atmospheric programs. Carefully as they appeared to have been negotiated to minimize effects, we felt they nevertheless might have created a distorting and smothering effect on the future. We were particularly concerned with cutbacks in planned capital expenditures and summed up our concern by saying, "Underinvestment in the capital structure needed for marine and atmospheric research of the next decade could mean losing ground which would be costly to regain in later years."

Studies of the capital structure for both atmospheric and oceanic agency-approved research programs seem well under way, with completion dates before the end of calendar 1974. In view of the extensive leadtimes for acquiring ships, to say nothing of their long service lifetimes after acquisition, NACOA reiterates its hope that the study can contribute to consideration of research program options beyond the margin of mere extension of what is currently being done.

OCEAN ENGINEERING STUDY

Last year NACOA recommended, as an interim measure, that the Oceanographer of the Navy be designated Federal Coordinator for Marine Technology Development. The Secretary of Commerce suggested instead that NACOA first define what the civilian ocean needs are and what should be the appropriate roles for government and industry. The Committee designated a panel to do so.

This panel has found itself able to take advantage of a vast amount of work already performed. It is clear to the Committee that there is general need for research and development leading to techniques and equipment to accomplish various tasks in the oceans. Agreement on specific needs, however, is not apparent. Our panel is charged with examining the need and developing those specifics. When its work is done, we plan to issue a special report.

THE COAST GUARD: ENFORCEMENT AT SEA

Most of the areas treated in this chapter impinge directly on the Coast Guard. R&D in the coastal zone could involve pollution standards and estuarine problems which require Coast Guard patrol and enforcement. The fisheries plan could involve heavy enforcement duties as part of conservation measures. The capital structure study might produce outcroppings

of responsibility in environmental monitoring. Our ocean engineering panel could recommend additional duties for the Coast Guard in the application of safety standards and regulation to ocean structures and operation.

NACOA is concerned that we not go on loading the Coast Guard with things to do, but not giving to it the means to do them well.

We have made a careful assessment of the matter. The recent passage of significant environmental legislation impacts the USCG to the point that the laws may not be adequately enforced or enforceable because of the limited manpower and material to do the job.

The environmental legislation which has had the most impact on the Coast Guard at the operating level is the Federal Water Pollution Control Act, particularly the amendments of 1972 (P.L. 92-500), the Marine Protection Research and Sanctuaries Act of 1972 (P.L. 92-532), and the Ports and Waterways Safety Act of 1972 (P.L. 92-340). The mission performance standards which have been issued by the Coast Guard Headquarters to implement their responsibility under these laws imply that resources are being provided to monitor 25% of in-port oil transfer operations involving vessels having a tank capacity of 10,000 gallons or more; to board 5% of all tank ships and 20% of all tank barges to insure compliance with oil and hazardous substance discharge prevention regulations. During a series of visits to District Headquarters of the USCG, we learned that additional personnel and resources are needed to accomplish even the current restricted activity which has been estimated to be about 50% of that required by the standards.

We have not assessed the resource requirement which would be involved if the U.S. extends its fisheries jurisdiction and the Coast Guard is called upon to police this extended area. Recent successes in apprehending foreign vessels illegally fishing in U.S. waters, indicates that policing an extended zone is primarily a matter of more manpower, more ships, more aircraft, and the continued imposition of heavy penalties.

We summarize here the major problems of which we have become aware. The Coast Guard, while not yet fully implementing its present Congressional mandate through the Marine Environmental Protection Program which it has developed, will need to expand in the near term because additional environmental tasks continue to be assigned to the Coast Guard. These near term expansion requirements include:

- the need to conduct discharge investigations and the consequent enforcement proceedings under the broader definition of navigable waters, contained in P.L. 92-500, where such are not already being done by other Federal agencies, by the States or localities;
- the need to expand aerial surveillance within its jurisdictional area to detect, quantify, and map oil discharges and gather the necessary evidence;

- a need to increase capability to perform the Coast Guard oil spill or discharge prevention responsibility in connection with vessel and facility transfer operations; and
- the need to meet Coast Guard surveillance and enforcement responsibilities in connection with ocean dumping and the inspection of the transportation and the handling of hazardous material.

We have also observed that:

- The number of oily discharge civil penalty cases continues to grow along with the number of reported violations of the Federal Water Pollution Control Act. This is no doubt due to increased public awareness of the law itself; however, there is a need for more widespread communication with the general public and particularly with the marine industry regarding the need for pollution prevention requirements, techniques, and equipment to reduce and minimize discharges.
- A National Strike Force has been organized to insure the rapid cleanup of oil spills or discharges. Unfortunately, the Coast Guard currently does not have adequate funds to allow development and acquisition of the techniques and equipment to remove polluting discharges under all reasonable conditions and in all waters. We urge that Coast Guard appropriations in this area be augmented. This monetary support must be sufficient to allow purchase of on-the-shelf techniques, equipment, and research and development to fill existing gaps.
- An almost universal concern among the officers responsible for enforcing the environmental legislation is that the laws are too rigid and do not allow for the application of "common sense" judgement as to whether or not a penalty shall be assessed for each and every violation, no matter what the circumstances. There is no provision for the issuance of warnings in case of minor and accidental violations where there is no negligence involved. We would hope that the Congress would amend the laws to permit the enforcement officers to use judgement in such cases.

We can see some important demands whose impact on the Coast Guard resource requirements cannot be determined precisely but which are nonetheless imminent. Typical of these problems are anticipated Coast Guard responsibilities as a result of sharply increased exploration for petroleum and minerals on the Continental Shelf, the exploitation and shipment of Arctic oil reserves, the development of deepwater ports and offshore-sited power plants, and the ever-increasing size and numbers of both crude oil and liquified gas carriers.

Is Coast Guard growth commensurate with these anticipated requirements? We have not found it to be so. Apparently the Coast Guard begins to get increased resources only after the jobs are levied upon it, which results in a significant lag while adjustments are made to accommodate

these new responsibilities so that they can be adequately discharged. Some missions obviously suffer during the buildup phases, as the available resources are reassigned to the higher priority missions.

NACOA recommends that a better balance between assigned responsibilities of the Coast Guard and the resources to fulfill them be achieved by some combination of increased funding and greater statutory flexibility in enforcement.

RESEARCH WITHIN THE NAVY

NACOA is concerned with the diminished vitality of the ocean science program within the Navy, particularly in basic oceanographic research. The basic oceanographic research program has proven over the years to be invaluable to the Navy and to the Nation at large. Now, under the general pressure to justify research funds on the basis of application to current needs, the formerly steadfast support for basic oceanographic research is weakening here as elsewhere in Government.

The Office of Naval Research, established under P.L. 79-588, has long been a focus for basic oceanographic research. Over the past few years funding for basic oceanographic research has remained essentially constant. At the same time, support has been diverted from it in what can be construed as an overreaction to the Mansfield Amendment, which directed the Department of Defense to make sure that its research programs were directly relevant to defense activities. For example, a planned diversion of some 20% of the basic oceanographic research budget into support of underwater acoustics is causing great disruption in a well-planned and directed long term ocean research program of fundamental importance to the Navy.

This planning, NACOA feels, is shortsighted because while it may produce a marginal gain in one area already relatively well supported, it certainly will cause devastation in the much smaller oceanographic research effort. NACOA realizes the difficulty in defending long term basic research against more easily justified programs. Nonetheless, it is the responsibility of Navy management to recognize that both research programs are essential. One cannot be sacrificed at the expense of the other if the Nation's future is to be fully safeguarded.

Therefore, NACOA recommends that the Navy review its diversion of funds from basic oceanographic research. Further, it recommends that basic ocean research be maintained at a strength sufficient to insure the Navy is able to fulfill its future requirements to the Nation. From NACOA's perspective this cannot be a level-funded or decreasing budget.

Appendix I



Public Law 92-125
92nd Congress, H. R. 2587
August 16, 1971

An Act

85 STAT. 344

To establish the National Advisory Committee on the Oceans and Atmosphere.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, There is hereby established a committee of twenty-five members to be known as the National Advisory Committee on Oceans and Atmosphere (hereafter referred to in this Act as the "Advisory Committee").

National Advisory
Committee on
Oceans and
Atmosphere.
Establishment.

SEC. 2. (a) The members of the Advisory Committee, who may not be full-time officers or employees of the United States, shall be appointed by the President and shall be drawn from State and local government, industry, science, and other appropriate areas.

(b) Except as provided in subsections (c) and (d), members shall be appointed for terms of three years.

(c) Of the members first appointed, as designated by the President at the time of appointment—

- (1) nine shall be appointed for a term of one year,
- (2) eight shall be appointed for a term of two years, and
- (3) eight shall be appointed for a term of three years.

(d) Any member appointed to fill a vacancy occurring prior to the expiration of the term for which his predecessor was appointed shall be appointed only for the remainder of such term. A member may serve after the expiration of his term until his successor has taken office.

(e) The President shall designate one of the members of the Advisory Committee as the Chairman and one of the members as the Vice Chairman. The Vice Chairman shall act as Chairman in the absence or incapacity of, or in the event of a vacancy in the office of, the Chairman.

Chairman and
Vice Chairman

Sec. 3. Each department and agency of the Federal Government concerned with marine and atmospheric matters shall designate a senior policy official, senior policy official to participate as observer in the work of the Advisory Committee and to offer necessary assistance.

Sec. 4. The Advisory Committee shall (1) undertake a continuing review of the progress of the marine and atmospheric science and service programs of the United States, and (2) advise the Secretary of Commerce with respect to the carrying out of the purposes of the National Oceanic and Atmospheric Administration. The Advisory Committee shall submit a comprehensive annual report to the President and to the Congress setting forth an overall assessment of the status of the Nation's marine and atmospheric activities and shall submit such other reports as may from time to time be requested by the President. Each such report shall be submitted to the Secretary of Commerce who shall, within 90 days after receipt thereof, transmit copies to the President and to the Congress, with his comments and recommendations. The comprehensive annual report required herein shall be submitted on or before June 30 of each year, beginning June 30, 1972.

Sec. 5. Members of the Advisory Committee shall, while serving on business of the Committee, be entitled to receive compensation at rates not to exceed \$100 per diem, including traveltime, and while so serving away from their homes or regular places of business they may be allowed travel expenses, including per diem in lieu of subsistence, in the same manner as the expenses authorized by section 5703(b) of title 5, United States Code, for persons in Government service employed intermittently.

Sec. 6. The Secretary of Commerce shall make available to the Advisory Committee such staff, information, personnel and administrative services and assistance as it may reasonably require to carry out its activities. The Advisory Committee is authorized to request from any department, agency, or independent instrumentality of the Federal Government any information and assistance it deems necessary to carry out its functions under this Act; and each such department, agency, and instrumentality is authorized to cooperate with the Advisory Committee and, to the extent permitted by law, to furnish such information and assistance to the Advisory Committee upon request made by its Chairman, without reimbursement for such services and assistance.

Sec. 7. There is hereby authorized to be appropriated to the Secretary of Commerce \$200,000 for the fiscal year ending June 30, 1972, and each succeeding fiscal year to carry out the purposes of this Act.

Approved August 16, 1971.

LEGISLATIVE HISTORY:

HOUSE REPORT No. 92-201 (Comm. on Merchant Marine and Fisheries).

SENATE REPORT No. 92-333 (Comm. on Commerce).

CONGRESSIONAL RECORD, Vol. 117 (1971):

May 17, considered and passed House.

Aug. 2, considered and passed Senate, amended.

Aug. 5, House concurred in Senate amendments.



Public Law 92-567
92nd Congress, H. R. 15280
October 25, 1972

An Act

86 STAT. 1181

To amend the Act of August 16, 1971, which established the National Advisory Committee on Oceans and Atmosphere, to increase the appropriation authorization thereunder.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 7 of the Act of August 16, 1971 (Public Law 92-125; 85 Stat. 344), is amended to read as follows: "There are hereby authorized to be appropriated to the Secretary of Commerce, for the fiscal year ending June 30, 1973, and for each of the two fiscal years immediately thereafter, such sums, not to exceed \$400,000, as may be necessary for expenses incident to the administration of this Act, and for succeeding fiscal years only such sums as may be authorized by law."

National Advisory Committee on Oceans and Atmosphere. Appropriation authorization increase. 33 USC 857-12.

Approved October 25, 1972.

LEGISLATIVE HISTORY:

HOUSE REPORT No. 92-1467 (Comm. on Merchant Marine and Fisheries).
CONGRESSIONAL RECORD, Vol. 118 (1972):

Oct. 11, considered and passed House.
Oct. 13, considered and passed Senate.

WEEKLY COMPILATION OF PRESIDENTIAL DOCUMENTS, Vol. 8, No. 44:
Oct. 28, Presidential statement.

**COASTAL ZONE
INFORMATION CENTER**

