

November 15, 2002

Admiral James D. Watkins, USN (Ret.)  
Chairman  
United States Commission on Ocean Policy  
1120 20th Street, NW  
Suite 200 North  
Washington, D.C. 20036

Dear Admiral Watkins:

On behalf of CORE, I want to express our admiration for the hard work of you, your fellow commissioners and the commission staff on preparing your upcoming report. We appreciate the complex issues before the commission and we at CORE and the Board of Governors wish you the best as you labor to complete your difficult task.

As your hearing schedule draws to an end and you begin to consider recommendations for inclusion in the report, we want to provide you with CORE's views on what would constitute an effective research strategy. I hope that our input is beneficial. Naturally, we are available for any questions or discussion you may have, should clarification be necessary.

Please be assured that CORE and its member institutions stand ready to provide whatever assistance the Commission requires.

Thank you again for your consideration.

Sincerely,

/s/

R. D. West  
Rear Admiral, U.S. Navy (Retired)  
President

Enclosure



## **Ocean Science and Policy for the Next Decade**

*"What we know is a drop, what we don't know is an ocean." -- Sir Isaac Newton*

Earth is the only known living planet, and its life is derived in large measure from its oceans. Oceanographic research to date has revealed that the seas play a critical role in regulating Earth's weather and climate, replenishing and maintaining the viability of our atmosphere, housing extraordinarily diverse forms of life, and significantly influencing the creation and ever-changing appearance of our coastlines.

The oceans play an essential role in our economy and quality of life. International trade volume is expected to triple by 2020, and 90 percent of this cargo will be transported over the seas, with the United States' share exceeding more than one billion metric tons annually. The outer continental shelf provides 18 percent of the oil, and 27 percent of the natural gas powering our economy and our homes. One out of every six jobs in the U.S. is marine related, one-third of our GNP is produced in coastal areas, and over half of our population lives and works next to the Atlantic and Pacific Oceans, the Gulf of Mexico, and the Great Lakes. Yet today, we paddle at the surface of this immense resource. It is a powerful reality that knowledge of the oceans, their resources and their relationship to human activities is vital to our society's—and our world's—existence.

A comprehensive national ocean policy must speak to numerous pressing national needs. Among the most immediate are understanding global climate change, sustaining the marine environment, managing living and nonliving marine resources, preserving our coastal areas, and enhancing our national defense at sea are among the most immediate. Effective and enduring solutions to these issues require a renewed and strengthened commitment to oceanographic research.

Much progress has been made over the decades in understanding our ocean environment. While this work has illuminated thousands of discoveries, more work is necessary to characterize accurately the ocean-related problems and opportunities before our nation. Policymakers need reliable information to craft informed and effective solutions to pressing national and multinational needs. Robust research in critical areas over the next decade will build the scientific foundation needed to create good policy, make sound management decisions, and realize the new discoveries that benefit society and enhance our quality of life.

It is time to embark on a long-term and sustained investment in the marine sciences – an International Oceans Decade. By aggressively and immediately attacking the scientific

uncertainties underlying the important marine science questions of our day, we can develop the answers our decisionmakers need to respond to the many pressing problems and uncertainties facing our nation today.

## **THE CHALLENGES**

### **PREDICTING GLOBAL CLIMATE CHANGE**

Oceans cover more than 70 per cent of the planet. The top one hundred meters of the ocean store one thousand times more heat and fifty times more carbon dioxide than the entire atmosphere. In spite of this, the nation's climate research program insufficiently emphasizes the role the ocean plays in contributing or mediating global climate change. More accurate predictive models are within reach, but we need comprehensive observation, examination, and knowledge of the processes affecting our planet, including the ocean and atmosphere interaction.

### **UNDERSTANDING THE OCEAN PLANET**

The truth is that our planet remains largely unexplored. While we have mapped the surface of Mars, Venus and the Moon, we have charted only a small fraction of the Earth's vast seafloor with comparable accuracy. Yet at the same time, our most pressing economic and environmental decisions depend on understanding the inner workings of the oceans.

Expanding this understanding is essential to making progress on the great questions of the day and providing benefit to society. For example, the more we know about the ocean, the better models become for predicting environmental changes that have enormous consequences for our society and economy.

### **EFFECTIVELY MANAGING LIVING MARINE RESOURCES**

Marine resources are crucial to the economic welfare and well being of all Americans. Our nation has some of the most abundant fisheries in the world, yet many stocks suffer from over-harvesting, ocean regime shifts we are just beginning to understand, and changing ocean chemistry through the input of pollutants from an industrial society. Stock assessment models are clearly inadequate, and more research is required to predict the effects of environmental inputs on the health of fishery stocks and their recruitment levels. In addition, there are thousands of organisms about which we know very little, requiring a coordinated and concerted effort to explain the diversity, distribution, and abundance.

### **PROTECTING COASTAL ENVIRONMENTAL QUALITY**

The health of America's coastal community is facing a crisis. Harmful algal blooms are becoming alarmingly common. Toxic run-off is having dramatic impacts on watersheds, estuaries, and coastal waters. Broadening the understanding of our coasts and the processes affecting them will allow the development of better ways to protect and restore coastal environmental quality.

Our coastal regions are complex systems placed under severe stress by an increasing population, agricultural production and runoff, and other anthropogenic inputs. As of 1998, more than half of the population of the planet lives and works in an ocean border just 200 kilometers wide. If we are to mitigate the increased burden placed on oceans, we need to rapidly increase our monitoring capability of the coastal ocean environment. By detecting potential harmful or damaging events earlier, we can craft effective solutions that turn problems into successes.

## **NATIONAL DEFENSE AT SEA**

The Navy operates and fights at sea. The oceans are its safe haven, its highway and its battlespace. The more completely the Navy understands the marine air/sea environment, the safer and more effective a fighting force it will be.

During the Cold War, the oceanographic community proudly worked to mitigate the threat posed by the Soviet Navy. The U.S. Navy provided generous support to basic oceanographic research because of the unique role ocean science and acoustics play in detecting and eliminating submerged threats.

Today, the Navy is increasing its operations in the littoral region. Accurately characterizing the environment closer to shore is extremely difficult relative to that of the blue water environment of the cold war years. Background noise is pronounced, the water is shallow and the seabed greatly complicates acoustic ranging, although new developments such as LIDAR (Light Detection and Ranging) and other types of remote sensing are providing new sorts of data that will assist us in these efforts. Getting a clear picture of this environment is daunting, but absolutely necessary.

## **RESPONDING TO THE CHALLENGE -- THE INTERNATIONAL OCEANS DECADE**

America's oceanographic research community has no peers. Years of federal investment have yielded the finest facilities, the brightest researchers and the boldest vision. With the formidable challenges facing our nation and the ocean environment, now is the time to invest in and reinvigorate this invaluable national resource.

Long-term ocean research infrastructure and programs must be continued and maintained to identify changes and trends in critical indicator parameters. New investments in research, people and programs are essential to carry on our nation's progress and leadership in the marine sciences.

Support is needed for expanding the important partnerships between government, academia and industry that can optimize our capabilities and allow us to improve our ability to deliver answers to many issues facing our country. Investing in the International Ocean Decade would allow us to realize immediate benefits and make great progress toward answering many of the questions before us today. For example, in the near term, we could predict the formation of harmful algal blooms in the coastal zone and to propose remedial and preventive actions to moderate future blooms. Within three to six years, we will be able to predict how changes in the atmosphere will affect the ocean's ability to absorb

carbon dioxide in the Northern Hemisphere, an important climate mediator. By the end of that decade, we should be able to predict climatic shifts in ocean circulation and their impacts on both climate and oceanic ecosystems. These issues move from local to regional to global scales with increasingly complex linkages. In addition, the International Ocean Decade effort will certainly reveal new processes and phenomena not anticipated today.

## **Invest in Scientific Effort**

Much of the great progress made in marine science over the past several decades has been a result of federal investments made during the 1960s and 1970s, under the cloud of the Cold War. Under the model adopted by Vannevar Bush following World War II, the academic researcher, with public support, has been the leader in much of this scientific advancement. This model has led to great discoveries that have changed our lives, such as increased environmental predictive capabilities, a better understanding of the marine ecosystem and marine resource mapping, the ability to remotely sense ocean features from orbit, and national superiority in undersea surveillance and antisubmarine warfare.

Today, great advances in information and communication technology, molecular biology and other disciplines promise astounding returns from investments in ocean research by offering fundamentally new means of analyzing and understanding the biology, chemistry, geology and physics of ocean dynamics and processes. There is great potential to more fully predict the ocean's processes, discover unique capabilities embodied in marine organisms, understand the linkages between human and ocean health, and provide the scientific basis to better utilize and manage ocean resources.

Unfortunately, U.S. funding for basic research in ocean sciences has remained stagnant for nearly two decades, effectively halving its buying power. At the same time, the total federal support of basic research has nearly doubled. While we are faced today with growing problems and opportunities, requiring an increased understanding of the earth's oceans, resources to address them are insufficient. Society's increasing demands on the sea and the growing awareness of the human impact on the environment require ocean sciences to be at the forefront of scientific and social research. This requires a renewed commitment to marine scientific research.

It must be a priority to at least restore the ocean science portion of the federal basic research budget to its historic level of 7 percent. Remarkable fundamental discoveries about the natural world have opened the way for an even more exciting and productive future. But this future will be unrealized without the wherewithal to support a robust and vigorous research enterprise.

Finally, the ocean plays a role in the mission of many government agencies, presumably requiring a high degree of coordination in allocating limited federal research dollars. In past years, this cooperation has been evident on only the greatest needs and projects, and often provided grudgingly, leaving much of the federal science effort executed in an ad hoc, happenstance way.

In 1992, the National Research Council, in its report *Oceanography in the Next Decade*, pointed out that we need to build new partnerships between government, academic, and private sector research. This proposal led to the creation of *the National Oceanographic Partnership Program (NOPP)*, designed to foster these new cooperative arrangements.

Improved and sustained research partnerships are issues worthy of attention by the U.S. Commission on Ocean Policy. No single government agency is able to unilaterally support modern oceanography. A means for integrating agency contributions to ocean research bridging agency missions and congressional committee responsibilities is essential. The National Oceanographic Partnership Program (NOPP) is one model, but there must be an incentive for agency contributions to and participation in the program – this is the biggest problem facing NOPP today. The health of ocean science and the implementation of a coherent approach as oceanographic science assumes more operational capabilities depend upon a solution.

## **Renew the Academic Research Fleet**

One of the most acute needs of the marine science enterprise is ensuring the future of the academic research fleet. In the coming decade, the capabilities of our seagoing vessels will rapidly deteriorate as many ships in the fleet exceed their design life. Marine science must maintain its access to the ocean in order to make progress on the great questions of the day. Without a dependable means of going to sea, the flexibility and mobility needed to respond to exciting and scientifically interesting phenomena will be eliminated.

Recognizing this fact, the federal government, through the interagency Federal Oceanographic Facilities Council, prepared a course for renewing the fleet in the report *Charting the National Future for the National Academic Research Fleet: A Long-Rang Plan for the Future*. CORE supports the plan, urges that adequate funding be made for its implementation, and recommends its endorsement by the Commission.

## **Develop and Enhance our Ocean Observing Capability**

While ships allow an on-site, mobile, and flexible instrument platform for research and observation, it is clear that long-term, *in situ* observations are critical to understanding ocean processes. Results from activities such as the TAO/TRITON (Tropical Atmosphere Ocean/Triangle Trans-Ocean Buoy Network) Array which monitors of the El Nino Southern Oscillation (ENSO), the Pirata Array in the tropical Atlantic, and the free-drifting ARGO profiling floats are proving the value of long time series observations, and developing the scientific foundation needed to understand better the global climate.

It is critical that we expand the reach of our ocean observing systems throughout the marine environment, including our nation's coastal areas. In addition, we must develop and deploy a robust data integration and management system and enhance our modeling capability to insure full benefit and utilization of the observational product from this system. This must include integration of biological data currently held captive in a variety of agencies.

Moreover, in order to progress and enhance our nation's ocean observing abilities, supporting a strong and vigorous program of research and development is essential. The National Science Foundation is proposing an Ocean Observatories Initiative to push technological boundaries and address of the challenge of placing an observatory in the harsh marine environment. This is an important step in maintaining our ocean science leadership.

The Ocean Drilling Program (ODP) has been another important observing and investigation effort. This program allows researchers to peer into the past to understand the history of the ocean and climatic environment by retrieving and examining core samples from the ocean floor. Features like the North Atlantic Deep Water Formation, a driver of today's ocean-climate engine and the chief mechanism for the distribution of heat throughout the world's oceans, have fluctuated at well-defined intervals during the last fifteen million years. Understanding such features is absolutely essential for comprehending the myriad of forces affecting our world's climate.

The ODP is moving into a new, international, phase. The principal drilling vessel, the *JOIDES Resolution* will be retired in the coming months. For the multi-national Integrated Ocean Drilling Program to be a success, the United States must continue its support of the program, including a replacement for the *Resolution*.

## Conclusion

The U.S. National Commission on Ocean Policy has a difficult task and a historic prospect to affect the course of marine policy for our nation and our world. Today we face daunting decisions on using, caring for, and managing the ocean and its resources. At the same time, there are vast opportunities to reap the great, and sometimes unknown, rewards that come with scientific discovery. Our nation has a long history of boldly delving into the unknown and investing what it takes to gain the knowledge needed to seize the future. Now is not the time to alter that grand tradition.

While the recommendations contained in this paper are certainly not exhaustive, the three fundamental elements outlined above will provide the basis for launching the International Oceans Decade. Through it, we can forge the way for a coherent national ocean science strategy that will serve the nation for decades to come.

We urge the Commission to consider this proposal carefully as deliberations proceed on the final report.

November 15, 2002

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