

PRESIDENT'S REPORT

By Arnold L. Gordon

IN MARCH 1992 I became the second president of The Oceanography Society (TOS), a John Adams to Jim Baker's George Washington. Jim Baker has done a fantastic job getting TOS started. I'm pleased that TOS will continue to have his support and experience as its first Past-President. TOS is providing service to the community with its magazine, with its biennial and special-focus meetings, establishment of recognition awards, and an "electronic-mail" Newsletter to begin in 1993. TOS is still a fledgling organization searching for ways to meet the needs of ocean scientists. We are always open to suggestions of how TOS could better serve, and we particularly appreciate offers to help TOS develop new activities and improve current ones.

During the last year there was a growing perception that "things are a changing". There is increased concern about the benefits of research to the pressing needs of society. The end of the cold war, a global economic recession, an ever increasing concern of society on the quality of our environment, and in the United States a new administration in Washington, all foretell of change in the ways we do business. The ocean sciences with their practical importance are likely to be stressed, but the way and reasons research is funded may change.

Two events in the United States scene are worth noting: the report of the National Science Board's (NSB) Commission on the Future of NSF entitled: "A Foundation for the 21st Century—A Progressive Framework for the National Science Foundation" and the report of the Ocean Studies Board (OSB) of the National Research Council entitled: "Oceanography in the Next Decade: Building New Partnerships" published by the National Academy Press.

The NSB established the Commission

under the chairmanship of W. Danforth and R. Galvin at the request of National Science Foundation director Walter Massey to advise NSF on long range planning. The charge given to the Commission was to examine how NSF can assist in establishing stronger connections between science and technology and to explore new directions for NSF that would benefit the nation while maintaining NSF's unique role of supporting fundamental science and education.

As president of TOS, I was asked for input to the NSB Commission on the Future of NSF, and my response follows.

"NSF is the research funding core for the academic scientific community within the United States. Research is the fountainhead of fundamental knowledge feeding technological development and understanding of our physical and social environment, which foster the well-being of our society. The NSF tie with academic research has served to produce within the United States the highest quality of basic research of any time or nation. To build the nation's awareness of the importance of research, it is essential that our population appreciates the beneficial value of science and engineering research and its potential linkage in advancing our technology and standard of living. We strongly support NSF's dedication to research and its educational mission to improve science education of our population. We also support NSF's desire to better link research results to industrial actions that enhance our economic competitiveness and assessment of the health of our environment. This is a basic aim of research and it is fair to expect an effective bond between research and technology, between academia, industry, and government.

"Application of basic research by in-

dustry is certainly not limited to new products or production techniques. The economic health of our nation also depends on the proper management of our resources and environment. As we live at the edge of resource availability and of the environment's ability to assimilate the products of civilization, we require a more precise view of our Earth.

"The ocean sciences are dedicated to building a quantitative understanding of the ocean environment, a vital concern of our nation. Prediction of climate trends (which are strongly influenced by the ocean) is essential for shaping the organization of food (ocean derived and agricultural), energy, water, and many other critical resources. Assessing the "physical and biological" health and assimilative potential of our coastal and open-ocean environment is needed to preserve our general welfare and viability of coastal cities. Recent estimates indicate that prediction of El Niño could result in several hundred million dollars per year of benefit to the U.S. agricultural sector alone. Similar arguments may be made for study of the forces that determine the distribution of living resources or purity of our coastal waters. Oceanographic and other research provides knowledge upon which informed management plans can be developed. Industry has a stake in basic research, both for product development and management of resources."

About specific questions asked by the Commission, I answered as follows.

"How can NSF maintain and enhance the health of the academic research resource? NSF should continue to maintain a broad spectrum of science and engineering support for academic researchers. Individual investigators, small groups of investigators, and the big sci-

ence projects each provide their own unique blend of information and creativity. Improved linkage of academia with industry would serve as a meaningful "enhancement" of the academic research resource. In this regard, NSF should seek advice from the science and engineering communities as to what research areas must be advanced to improve our nation's well-being and competitiveness. Additionally, there is a rich array of research results produced over the years, much of which can have important applications in today's world. We should make a sincere effort to identify research of the past years that can be applied to advancement of today's technology. In this post-cold-war period, and in this time of economic stress, we must not be short-sighted and withdraw from our strong support of research at academic research facilities. To do so would eventually lead to a "dry well" of ideas, and technological advances of our nation will fall behind.

"How may NSF foster improved links between academia and industry? Basic research leads to state-of-the-art and frontier science that enables industry to move forward technologically. Admittedly the transfer of academic research results to industrial application and improvement of our physical and social environment has been incomplete. We must find a way to improve and speed the "pay-off" by identifying applications of existing research products and encouraging research in potentially productive areas. It is noted that the research going on today is for tomorrow's applications. If government encourages NSF to invest primarily in what industry NOW thinks is important, we are unlikely to make the breakthroughs that will advance our industry in the future. Because the cost of industrial investment is high and can hardly be absorbed even in part by the NSF budget without devastating academic research, direct financial support of industrial development by NSF is impractical and perhaps even

unwise. Instead, NSF, through an appointed team of scientists and engineers drawn from academia and industry, could peruse the results of present and past research and highlight specific industrial application. Links may be fostered between the appropriate academic and industrial scientists and engineers for further development of implementation strategies for specific issues."

The NSB Commission presented their recommendation in their report of 20 November 1992. With the increased emphasis to civilian concerns, the Commission recognizes the opportunity for "... a more receptive adoption and practical application of the knowledge born of research and advanced education." However, they further note that success requires a far-reaching enlightened federal science-and-technology policy. "Redirecting the NSF's activities from research and education would have little or no effect on the United States competitive position in the near term, but would severely restrict prospects for the long term." The recommendations are geared to making stronger the very beneficial nature of NSF concerning fundamental research but also begin the process of reaching out to making more effective the linkage of "education-discovery-development-application-competitiveness-quality of life." The report will no doubt have an effect on NSF and congressional actions regarding NSF's future.

The Ocean Studies Board's "Partnership" report, begun under the Chairmanship of John Sclater and completed with Chairman Carl Wunsch, explores the structure and support of ocean science research in the United States. As mentioned in my letter to the NSB Commission, the Ocean Sciences are relevant to a broad array of societal needs, however, dramatic expansion of the science was an outgrowth of World War II and justified to a large measure by national military security issues.

Things are changing. The justification for ocean science research is moving to "environmental-based security" issues, with de-emphasis of "military-based national security" issues. The effective ocean science research facilities, ranging from conventional university departments to federal laboratories, to huge, nearly "soft-money" research laboratories that have developed over the last decades must now adjust to these new realities.

The Ocean Studies Board notes that the federal agencies supporting the ocean sciences are not just those interested in basic research, as the National Science Foundation and the Office of Naval Research, but also agencies dominated by more mission-oriented applications: NASA, the Department of Energy, NOAA, EPA, the Army Corps of Engineers, and other parts of the Navy.

As OSB Chairman Carl Wunsch states: "Will the mission agencies have the foresight and the flexibility to sustain the funding for basic understanding by scientists in these organizations, although the "pay-back" is possibly many years in the future? Do the existing scientifically oriented, PI-driven laboratories make sense in their present forms, in a situation where required oceanic observations are complex, far-flung and needful of financial support over decades? . . . Where within our system will coherent policies emerge for determining the most appropriate mix of observational facilities, and the basis for their support?"

"Oceanography in the Next Decade: Building New Partnerships" does not provide answers to these and other questions. It provides background to a discussion, and outlines the basis for productive new partnerships between federal and academic institutions and scientists. I recommend it. TOS can help the community find a new coherence in these changing times.

See you at the TOS meeting in Seattle, April 13-16, 1993. □

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