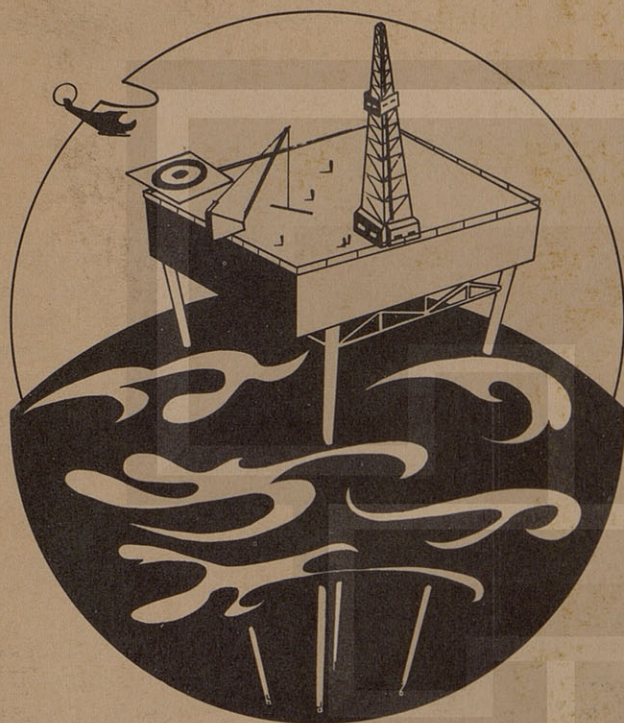


News Report

NATIONAL ACADEMY OF SCIENCES • NATIONAL ACADEMY OF ENGINEERING
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Seafloor Engineering: Assessing Capabilities and Needs

BYOND THE REACH of man or machine, large portions of the world's resources lie on and beneath the ocean floor. Current offshore mining and production of oil and gas mark only the beginning of efforts to tap those resources. Future efforts will be directed beyond the relatively shallow waters of continental shelves, extending to the deeper waters along the slope of the continental margin and to the more hostile regions of the Arctic. Such efforts will require advances in both engineering practice and basic knowledge of the ocean environment. The goals and rationale for a U.S. program of seafloor-engineering research are contained in the report of a committee of the National Research Council.

Seafloor engineering is still in early stages of development. It concerns broadly the discovery and extraction of mineral resources, laying of underwater pipelines and cables, construction of ocean platforms and artificial islands, and development of new materials for marine use. Like any infant technical enterprise, it abounds with needs for research in each of these areas, and the report enumerates them.

But the report cites several factors that lend urgency to the need to advance the state of seafloor engineering. The United States is vulnerable, for example, to its increasing dependence on imported oil as well as cer-

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In International Science

SCIENTISTS from many nations will gather in Washington, D.C., October 10-16, to participate in the XVI General Assembly of the International Council of Scientific Unions. To mark the U.S. Bicentennial, the National Academy of Sciences, host to the assembly, will conduct a special symposium entitled "Science: A Resource for Humankind."

The general assembly is the principal governing meeting of the international council and is held every two years. Delegates to the assembly will represent the 17 international scientific unions and most of the more than 60 national academies of science, research councils, and other scientific organizations that compose the International Council of Scientific Unions. The general assembly was last held in the United States in 1958. Current president of the council is Harrison Brown, of the California Institute of Technology, and formerly foreign secretary of the National Academy of Sciences.

The bicentennial symposium, chaired by Thomas F. Malone, director of the Holcomb Research Institute, Butler University, will address three topics. First is the relationship between science and society in countries representing differing problems and socioeconomic conditions. Symposium participants will explore the topic through case histories from both developed and developing countries.

The second session concerns selected environmental problems and the social and economic contexts in which they now exist and may exist in the future. The topic includes in particular the adequacy of scientific knowledge as one of the bases of social decisions concerning these environmental problems.

The third will predict future interactions of science and technology with such problems as world food supply; the nutrition, health, and size of human populations; use and adequacy of natural resources; social and economic development; and improvements in the quality of the environment. The objective of discussions here will be to identify necessary directions for research during the balance of this century.

In addition to the principal discussants in the three topic areas of the symposium, the audience will consist of representatives of certain U.S. government agencies and private corporations, as well as other invited participants.

Does Noise Affect Health?

NOISE is inescapable in the daily lives of most people. At moderate levels it may either annoy or go unnoticed. At higher levels it may be as much a characteristic of some workplaces as the existence of dust or potentially harmful chemicals in the air. But aside from loss of hearing due to exposure to high noise levels, the effects of noise on human health are largely unknown.

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News Report is a register of activities of the National Academy of Sciences, National Academy of Engineering, Institute of Medicine, and National Research Council.

SEPTEMBER 1976

VOLUME XXVI, NUMBER 11

Economic Development and the Monkeys Of Central and South America

FORESTS of northern Colombia are home to the night monkey (*Aotus trivirgatus*). This monkey is used extensively as a test animal in the study of malaria. Like many other New World monkeys, it is losing its home as forests give way to fields and pastures in the economic development of many Central and South American countries. These countries, as well as the U.S. biomedical research community, are interested in conserving wild primate populations, but so far, lack of information about them has handicapped conservation efforts.

To summarize current information and to illustrate needs for future study, a committee of the National Research Council conducted a symposium in 1972 on the Distribution and Abundance of Neotropical Primates. It was the work of the Committee on Conservation of Nonhuman Primates, of the Institute of Laboratory Animal Resources. The institute is organized within the National Research Council's Assembly of Life Sciences. *Neotropical Primates: Field Studies and Conservation* presents the proceedings of that symposium.

Neotropical Primates: Field Studies and Conservation. Proceedings of a Symposium on the Distribution and Abundance of Neotropical Primates. R. W. Thorington, Jr., and P. G. Heltne, eds. Committee on Conservation of Nonhuman Primates, Institute of Laboratory Animal Resources; Assembly of Life Sciences, National Research Council (National Academy of Sciences, 1976; 135 pp.; ISBN 0-309-02442-0; \$10.25).

Chairman of the committee was Richard W. Thorington, Jr., of the Smithsonian Institution's Primate Biology Program. He and Paul G. Heltne, of the Johns Hopkins University School of Medicine, observed in their introduction to the report that museum collections often are used to

verify information on distribution of primate populations. However, most collections cannot keep pace with changes in the native habitats of monkeys and soon become unreliable for documentation, they said.

More reliable information must come from field trips and the reports of local naturalists. Needed improvements in knowledge about primate populations include better information on density changes and discontinuities in different primate populations in various habitats, Thorington and Heltne said. More must be known about how different populations share available food and other resources in various habitats.

Many of the papers presented at the symposium contribute such census data. They illustrate the complexity of studies requiring extensive knowledge of not only various primate populations but also plant and insect variety in geographic areas where such taxonomic data are incomplete. They illustrate other problems, too. Major problems continue, Thorington and Heltne said, in converting observation data to population densities, testing consistency among observers and techniques, and demonstrating their accuracy.

A common thread through the symposium proceedings is concern over the crises presented by destruction of natural habitats. The Central American squirrel monkey and the cotton-top tamarin are in danger of extinction in large areas of Central America, Heltne and Thorington said in a concluding paper. Other papers presented at the symposium indicate that regional populations of many other species may be similarly threatened. Threats persist.

Late last year, the Committee on the Conservation of Nonhuman Primates conducted field surveys in Guyana and Bolivia under subcontract with the Pan American Health Organization. These studies provide what the committee believes is the first quantitative data on the distribution and abundance of primate populations in the two countries.

"These populations are in some jeopardy in both countries," the committee said in its report *Primate Population Surveys in Guyana and Bolivia*, "from the economic pressures of deforestation, expanded agricultural development, hunting for food and from the lack of wildlife reserves."

Primate Population Surveys in Guyana and Bolivia. Committee on Conservation of Nonhuman Primates, Institute of Laboratory Animal Resources; Assembly of Life Sciences, National Research Council (Institute of Laboratory Animal Resources, April 1976; 5 pp.; available from the institute; supply limited).

The committee recommended continued scientific field studies and continued scientific contact with programs now under way in South and Central America for the conservation, management, and production of primates.

Thorington and Heltne observed in one of their symposium papers that the medical research community in the United States has begun efforts to establish breeding colonies that would meet the most critical research needs for New World primates. But even a series of breeding colonies would not obviate the need for better population-ecology information on which conservation measures depend.

They pointed out "[c]ertain analogies between the crises in primate supply and oil supply." Although primates are a renewable resource, unlike oil, "this ability of primates to reproduce themselves is highly dependent on some very important habitat requirements," they said. "Primates are not only being harvested, but also the very ecological foundations for their capabilities of renewing themselves for further harvest are being destroyed."

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New Projects

The following new projects are announced by the Institute of Medicine and units of the National Research Council.

ASSEMBLY OF BEHAVIORAL AND SOCIAL SCIENCES

- Working Group 81—The Effects of Long-term Exposure to Noise Upon Human Health. Committee on Hearing, Bioacoustics and Biomechanics. Aram Glorig, dean, School of Human Development, University of Texas at Dallas, chairman; Office of Naval Research, sponsor.
- Working Group 82—Electrical Stimulation of the Auditory Nervous System. Committee on Hearing, Bioacoustics and Biomechanics. William D. Neff, director, Center for Neural Sciences, Indiana University, Bloomington, chairman; Office of Naval Research, sponsor.
- Working Group 83—The Effects of Intermittent Noise on Speech Intelligibility Indoors. Committee on Hearing, Bioacoustics and Biomechanics. Office of Naval Research, sponsor.
- Working Group 84—Human Response to Impulse Noise. Committee on Hearing, Bioacoustics and Biomechanics. William Galloway, senior scientist, Bolt Beranek & Newman Inc., Canoga Park, Ca., chairman; Office of Naval Research, sponsor.
- Working Group 85—Effects of Noise Exposure on the Human Fetus. Committee on Hearing, Bioacoustics and Biomechanics. Harlow Ades, professor, Department of Electrical Engineering, University of Illinois, Urbana-Champaign, chairman; Office of Naval Research, sponsor.

ASSEMBLY OF MATHEMATICAL AND PHYSICAL SCIENCES

- Scientific Review of the Atmospheric Research and Development Programs of the National Oceanic and Atmospheric Administration. Committee on Atmospheric Sciences. Louis J. Battan, director, Institute of Atmospheric Physics, University of Arizona, chairman; U.S. Department of Commerce, sponsor.

COMMISSION ON INTERNATIONAL RELATIONS

- Leucaena latisiliqua*: New Multipurpose Tree Crop for the Tropics. Ad hoc panel of the Advisory Committee on Technology Innovation, Board on Science and Technology for International Development. James L. Brewbaker, Department of Horticulture, University of Hawaii at Manoa, chairman; U.S. Agency for International Development, sponsor.
- Neglected Tropical Legumes. Ad hoc panel of the Advisory Committee on Technology Innovation, Board on Science and Technology for International Development. Kenneth O. Rachie, associate director general for research, Centro Internacional de Agricultura Tropical, Cali, Colombia, chairman; U.S. Agency for International Development, sponsor.

COMMISSION ON SOCIOTECHNICAL SYSTEMS

- Dynamic Response of Materials Subjected to High Strain Rate Loading. National Materials Advisory Board. Richard Schapery, director, Mechanical and Materials Research Center, Department of Civil Engineering, Texas A&M University, chairman; U.S. Department of Defense and National Aeronautics and Space Administration, sponsors.
- Potentially Critical Materials. National Materials Advisory Board. Milton E. Wadsworth, professor and chairman, Department of Mining, Metallurgical and Fuels Engineering, University of Utah, chairman; U.S. General Services Administration and U.S. Bureau of Mines, sponsor.
- Program of Studies on International Disaster Assistance. Committee on International Disaster Assistance. Russell R. Dynes, co-director, Disaster Research Center, Ohio State University, chairman; U.S. Agency for International Development, sponsor.

Noise

(continued from page 1)

The Committee on Hearing, Bioacoustics and Biomechanics, of the National Research Council's Assembly of Behavioral and Social Sciences, has established working groups to examine several aspects of the influence of noise on health.

A Working Group on the Effects of Long-term Exposure to Noise Upon Human Health will review information on exposures to high noise levels, such as those encountered in some industrial jobs, and the moderate levels experienced by most people every day. Chaired by Aram Glorig, of the University of Texas at Dallas, the group will examine health records of workers exposed to noise. After eliminating such variables as age and exposure to air pollutants, the objective will be to compare the records of people who have had different exposures to noise and examine differences in the incidence of gastric ulcers, cardiovascular diseases, or other health problems.

The study will follow several lines of evidence that such effects may exist. These include the existence of immediate but transitory physiologic effects of noise on humans and certain stress-related effects of long-term exposures in animal studies.

Harlow Ades, of the University of Illinois, Urbana-Champaign, heads a study by the Working Group on

Effects of Noise Exposure on the Human Fetus. It will assess the potential hazard to the human fetus resulting from the exposure of pregnant women to noise. Like the previous study, it will also seek to identify limiting noise levels or conditions and recommend specific research needs.

Other new working groups within the committee will study different topics. The Working Group on the Effects of Intermittent Noise on Speech Intelligibility Indoors will look especially at effects on the learning process. Included in the study will be a review of information from schools located in the flightpaths of aircraft or near airports.

The Working Group on Human Response to Impulse Noise will look at problems of annoyance and sleep interference from impulse noise, such as sonic boom, blasting of explosives, and artillery fire. William Galloway, of Bolt Beranek & Newman Inc., Canoga Park, Ca., will chair the study.

The Working Group on Electrical Stimulation of the Auditory Nervous System will examine current knowledge concerning direct stimulation of the cochlea as a possible technique for bypassing the outer and middle ear. Chairman of the study is William D. Neff, of Indiana University, Bloomington.

All these studies are supported with funds provided by a consortium of Federal agencies through a contract with the Office of Naval Research.

Seafloor Engineering

(continued from page 1)

tain minerals. Supplies of some mineral resources are shrinking both on land and in shallow coastal waters. The greater costs of extraction offshore contribute an added pressure to the national economy. Municipal and industrial wastes present a growing problem, ever more difficult to manage on land. Increasing use of the oceans for transportation, communication, and extraction of resources places increasing burdens on the coastal environment.

Against this background, the Marine Board, of the National Research Council's Assembly of Engineering, late in 1973 initiated a study of the future requirements for seafloor engineering. The board formed the Committee on Seafloor Engineering, chaired by Ira Dyer, head of the Department of Ocean Engineering at the Massachusetts Institute of Technology. Funds for the study were provided by the National Science Foundation. The committee's report, *Seafloor Engineering: National Needs and Research Requirements*, has been published.

Seafloor Engineering: National Needs and Research Requirements. Committee on Seafloor Engineering, Marine Board; Assembly of Engineering, National Research Council (Marine Board, 1976; 81 pp., available from National Technical Information Service, Springfield, Va. 22161; PB 254 171; \$5.00 paper, \$2.25 microfiche).

The committee had two objectives: First, to examine present capabilities in seafloor engineering and predict those required to meet future national needs, and second, to identify the research necessary to extend present techniques and recommend procedures for implementing research programs.

National Needs

To begin, the committee identified five areas of national need related to seafloor engineering. They are energy, minerals, waste management, transportation and communication, and national security.

Current energy needs depend heavily on oil and gas. Recent estimates suggest that large amounts exist on the U.S. continental margin. But about two-thirds of the 900,000,000 acres of U.S. continental margin—including much in the Arctic—is not accessible for production and drilling with present techniques, according to the committee.

Members' Notice of Academy Meetings

NATIONAL ACADEMY OF SCIENCES:

Council—October 31, December 12, 1976; January 23, March 6, April 24, June 26, August 8-10, October 30, December 11, 1977

Annual Meeting—April 25-27, 1977

NATIONAL ACADEMY OF ENGINEERING:

Council—September 17, November 17, 1976; February 4, 1977

Autumn Meeting—November 18, 1976

Annual Meeting—April 28-29, 1977

INSTITUTE OF MEDICINE:

Council—September 22, November 17, 1976; January 19, March 23, May 18, July 20, 1977

Annual Meeting—October 26-28, 1976; October 25-27, 1977

NATIONAL RESEARCH COUNCIL:

Governing Board—September 18, October 30, December 11, 1976; January 22, March 5, April 2, May 21, June 25, August 6-7, September 17, October 29, December 10, 1977

The ocean holds "great advantages," however, for renewable sources of energy, including sunlight, waves, tides and currents, the committee said. It looked briefly at the kinds of seafloor engineering needed to support projects aimed at exploiting these resources, should they become economic. In this way, the committee looked specifically at two possible methods of harnessing solar energy. One method would take advantage of the differences in temperature between relatively warm surface waters and the colder water below to operate electric turbines. The other would make use of photosynthesis to grow kelp that can be processed to yield methane and other fuels as well as food for both humans and animals.

Seafloor mining is slow to develop even in relatively shallow waters of the continental shelf in part because so little is known about the location of mineral deposits, the report observes. More must be known about the process of mineral deposition as well as how to locate seafloor deposits. The objective of seafloor mining, like that of offshore oil operations, is to supplement land-based sources and lessen dependence on imports.

To the management of municipal and industrial wastes, seafloor engineering offers two possibilities—disposal and conversion. The seafloor presents many favorable areas for disposal of waste, the report says, and the technological requirements are similar to those for seafloor mining. However, conversion of wastes to useful materials in the ocean is limited primarily to fertilizing kelp beds in solar bioconversion systems, according to the committee.

Ocean transportation and communication depend on ships, pipelines, cables, and port facilities, which may include platforms and artificial islands. Their engineering requirements and those of national security largely coincide with or extend requirements in the other areas of national need, the report says.

Common to each of the five areas of national need is the requirement to surpass present capabilities of seafloor engineering. The committee examined specific areas of engineering practice to learn what advances in fundamental engineering knowledge are required to meet national needs for seafloor engineering.

State of the Art

Seafloor engineering combines and extends several land-based and sea-based engineering disciplines, such as soil mechanics, structures, hydraulics, and naval architecture. Consequently, it is characterized by the accomplishments of each of these fields alone and by large gaps in understanding of the ocean environment where they interact.

The continental shelves have been surveyed more than any other single part of the ocean and hold the greatest potential for exploitation during the next decade, the report says. But even here much remains to be known, including the exact depth and shape of the ocean bottom. Much of the present information of this kind reflects the objectives of past oceanographic studies—to provide data useful for fishing, ship navigation, and certain scientific purposes. Knowledge of specific locations must be extended to provide information directly applicable to the needs of engineering and offshore construction. More detailed bathymetric data also are necessary to define channels for future deep-draft vessels and for towing large prefabricated seafloor structures.

From Academy Reports: New Sources of Natural Gas . . .

IT IS EVIDENT that a large quantity of methane remains in the sedimentary rocks of this country—an amount many times our present reserves. However, total resource figures are highly speculative and much work must be done to produce even marginally acceptable estimates.

. . . This methane will not be cheap nor easy to produce. If it were, energy companies would be producing it in quantity today.

. . . Perhaps because they are familiar with the necessary technology, petroleum companies have apparently given primary attention to the tight sands of the Rocky Mountains and elsewhere.

. . . In comparison with the economic importance of solving our energy problems, the level of funding devoted

to investigating new sources of methane has been minuscule, with the greater part of the work dependent upon private-sector funds and motivation.

. . . Knowledge of the geology, possible production technology, and extent of resources is fragmentary.

. . . Efforts to develop cheap effective means for producing gas from these presently underdeveloped resources should be encouraged and imaginative ideas subsidized.

—*Natural Gas from Unconventional Geologic Sources*. Board on Mineral Resources; Commission on Natural Resources, National Research Council (Board on Mineral Resources, 1976; 245 pp.; available from National Technical Information Service, Springfield, Va. 22161; FE 2271-1; \$8.00 paper, \$2.25 microfiche).

Gaps in engineering knowledge exist concerning the composition, hardness, stability, and bearing strength of marine sediments. More must be known about the characteristics of different soils and their effects on the stability of structures subjected to the forces of waves and currents. More must be known about the behavior of prestressed concrete, steel alloys, and other construction materials in the ocean environment. The objective here is to be able to predict the behavior of materials and structures without extensive measurements before preparation of each structural design and to ensure safety while avoiding the costs of "over-design," the report says.

Effects of random environmental conditions, such as high wind and waves, earthquakes, ice movements, and submarine landslides, also figure in the design of structures. Predicting the frequency and magnitude of such events depends heavily on historical data. Instrumented structures and pipelines also can provide the short-term measurements necessary to calibrate mathematical models.

More study also is required on the design, installation, and maintenance of pipelines and cables. The ability to splice electrical cables underwater, for example, would reduce the time and expense now involved in making repairs on the surface. Many deep-water operations also will require anchors with better holding abilities than are now available. Present studies on navigation and positioning are aimed toward improving the ability to locate and return to specific geographic locations on the ocean floor, but much work remains.

The report also outlines needs for engineering research directed to understanding environmental and ecological changes resulting from seafloor engineering. The value of a seafloor project usually is expressed in economic terms, whereas the cost or benefit of any resulting change in the environment usually is measured by the public response to that change, the report says. Appropriate physical, chemical, and biological research could provide information useful in both engineering work and public discussion.

Research Programs

The committee recommended a two-part plan for research to provide the necessary advances in seafloor engineering. A "core program" presents research objectives of the highest priority. They are:

- Studies of the interaction between structures, foundations, soils, and the ocean environment.

- High-resolution bathymetry and soil surveys on the continental margin.

- Improvement in engineering methodology for incorporating environmental impact studies in the design of seafloor projects.

- Engineering research on pipelines and cables.

An "auxiliary program" includes studies on materials, standards for concrete structures, and instruments for navigation and positioning.

The committee also made some non-technical recommendations for implementing the research program. First, the Government agencies that now carry out "applications-oriented" research should continue to do so. But for the more basic seafloor-engineering research applicable to the goals of many agencies, the committee recommended creation of a research program that draws on the resources of academia, industry, and the Government. Because each of these three groups is often unaware of the problems and progress of the other two, the committee recommended greater interaction among the professional societies involved in seafloor engineering.

The report is a step in increasing general awareness of the complex objectives the nation faces in seafloor engineering and in achieving benefits the sea yet withholds.

—H. DALE LANGFORD

Deaths

Edwin B. Astwood, 75, endocrinologist; emeritus professor of medicine, Tufts University School of Medicine; elected to the National Academy of Sciences in 1957; died February 17, 1976.

Clarence F. Kelly, 69, agricultural engineer; emeritus professor of agricultural engineering, University of California at Davis, and former director, California Agricultural Experiment Station, Berkeley; elected to the National Academy of Engineering in 1968; died May 5, 1976.

Jerome Vinograd, 63, geneticist and biochemist; Ethel Wilson Bowles and Robert Bowles professor of chemical biology, California Institute of Technology; elected to the National Academy of Sciences in 1968; died July 3, 1976.

Achieving Equal Opportunity

In Graduate Education

EQUALITY OF OPPORTUNITY in education is a societal goal not yet achieved in the United States by blacks, Chicanos, Puerto Ricans and American Indians, especially at the graduate level. The barriers they face are many. The Federal government clearly has responsibilities in eliminating those barriers. But the nature of the barriers requires that responsibilities for removing them extend also to the states, colleges and universities, professional societies, foundations, business, and industry.

This is the assessment of the Board on Graduate Education in its report, *Minority Group Participation in Graduate Education*. It is the last report of the board, which was created in 1971 by the Conference Board of Associated Research Councils. The conference board is made up of the American Council on Education, the Social Science Research Council, the American Council of Learned Societies, and the National Research Council. The Board on Graduate Education was chaired by David D. Henry, president emeritus of the University of Illinois.

Minority Group Participation in Graduate Education (Report Number 5). National Board on Graduate Education, Conference Board of Associated Research Councils (National Academy of Sciences, June 1976; 273 pp.; ISBN 0-309-02502-8; \$7.00).

Blacks, Chicanos, Puerto Ricans, and American Indians make up more than 16 percent of the total U.S. population, but less than 6 percent of students enrolled in master's and doctorate programs in U.S. colleges and universities, the board said. In 1973-74 students from these minority groups received less than 5 percent of the doctorates awarded to native-born citizens, the report says. Today, less than 1.4 percent of U.S. scientists and engineers holding doctoral degrees are represented by these minorities.

Such figures indicate that barriers "specific to minority students in graduate education" prevent their fuller participation in graduate studies, the board said.

"To many, attainment of a bachelor's degree signifies that, at last, socioeconomic, educational, and cultural disparities among persons of various income, racial, and ethnic backgrounds have been overcome," the board said. "We believe, however, that many minority men and women still face special handicaps that disadvantage them relative to nonminority students. All students may be affected by individual circumstances, such as financial constraints, family obligations, and poor undergraduate preparation that prevent graduate school attendance, but for minorities such handicaps are more frequent and mutually reinforcing."

The extent to which these barriers prevent participation by minorities in graduate study is difficult to assess. The board found available data by which to measure participation "at best, incomplete and often no more than gross estimates." One problem is a lack of common definitions for minority groups.

The board supported current efforts by some Federal agencies to develop common definitions for racial and ethnic groups for use in collecting and reporting data. The board further recommended that nongovernmental organizations use common definitions in their collection and use

of data on minorities.

"The pessimistic outlook for the academic labor market and uncertainties in the nonacademic sector have caused many to question the wisdom of encouraging minority students to pursue doctoral study," the board said. "In our view, employment uncertainties should not serve as a rationale for limiting efforts to increase minority participation."

One reason is that employment opportunities for minority graduates in certain professions, especially education, arise from manpower needs of the minority community. But careful counseling is essential to inform both minority and nonminority students of realistic career opportunities, the board said.

The board supported efforts of the Federal government to increase the opportunity of minorities for employment in higher education. Executive Order 11246 requires colleges and universities holding Federal contracts to take "affirmative action" to ensure that they do not discriminate in employment practices on the basis of race, color, religion, sex, or national origin. However, "the requirements of the Executive Order are premised on a static concept; the employment targets for minority faculty are derived from the available supply of qualified candidates," the report says. Government and institutions must share responsibilities for increasing the number of minority graduates.

The board recommended several actions by the Federal government. For example, the U.S. Office of Education should start a program of competitive grants for institutions. The grants would support a range of activities aimed at increasing minority participation in graduate education by providing for student stipends, support services, administrative costs, and other needs.

"We believe it fundamental to the national interest to encourage the development and involvement of underutilized minority talent in scientific and research activities," the board said. Among efforts to achieve this goal, Federal mission agencies should provide additional funds to graduate schools for the purpose of reimbursing principal investigators who employ minority students on research grants. However:

"Graduate institutions have the primary responsibility," the board said, "for encouraging and assisting minority students in attaining a high-quality graduate education. . . . While government and other organizations must provide assistance, such support should be viewed as a complement, not a substitute, to existing institutional activities."

The board directed other general recommendations to the states, professional societies, foundations, and business. In all, the board favored programs "targeted" to the needs of minorities. Many such programs already exist, but others have been inhibited, the board said, by controversy over the legality of any program not strictly neutral with regard to race. "As long as such legal uncertainties exist, initiation of special programs for minority students will continue to be inhibited; but, on the other hand, sincere, thoughtful efforts need not be precluded," the board said.

Awareness of the conditions that limit minority participation in graduate education has increased in recent years, yet current efforts remain "fragmented and inadequate." The end to which the board addressed its recommendations for future efforts is "a self-sustaining process wherein minority participation in the mainstream of graduate education and research is the accepted norm rather than the result of special effort."

New Publications*

Documents marked with an asterisk () are available from the Printing & Publishing Office, National Academy of Sciences, 2101 Constitution Avenue N.W., Washington, D.C. 20418. Other documents are available from other sources as noted. For Transportation Research Board documents, write to the Transportation Research Board, National Research Council, 2101 Constitution Avenue N.W., Washington, D.C. 20418. For NTIS documents, write to the National Technical Information Service, Springfield, Va. 22161. Prices and availability are subject to change.

Annual Report: Fiscal Year 1974-75. National Academy of Sciences, National Academy of Engineering, Institute of Medicine, and National Research Council (U.S. Government Printing Office, 1976; 477 pp.; available from Office of Information, National Academy of Sciences; supply limited).

Application of Fracture Mechanics Analysis Techniques in High Performance Marine Systems (NMAB 327). Committee on Application of Fracture Mechanics Analysis Techniques to Marine Systems, National Materials Advisory Board; Commission on Sociotechnical Systems, National Research Council (National Materials Advisory Board, 1976; 15 pp.; available from NTIS; AD/A-025 148; \$4.00 paper, \$2.25 microfiche).

Background Papers on Seafloor Engineering. Volume I: National Needs in Seafloor Engineering; Volume II: State-of-the-Art in Seafloor Engineering. Prepared for the Committee on Seafloor Engineering, Marine Board; Assembly of Engineering, National Research Council (Marine Board, 1975, 636 pp. in 2 volumes; available from NTIS; Vol. 1, PB 249 110, \$10.50 paper, \$2.25 microfiche; Vol. 2, PB 249 111, \$9.25 paper, \$2.25 microfiche; set, PB 249 109, \$19.00 paper only).

Catalog of Selected NMAB Reports (NMAB 6-C). National Materials Advisory Board; Commission on Sociotechnical Systems, National Research Council (National Materials Advisory Board, 1976; 42 pp., available from the board; supply limited).

An Evaluation of the International Biological Program. Committee to Evaluate the International Biological Program; Division of Biological Sciences, Assembly of Life Sciences, National Research Council (Division of Biological Sciences, December 1975; 81 pp.; available from NTIS; PB 253 158; \$5.00 paper, \$2.25 microfiche).

An Evaluative Report on the Institute for Computer Sciences and Technology: National Bureau of Standards—Fiscal Year 1975. Evaluation Panels for the National Bureau of Standards; Assembly of Mathematical and Physical Sciences, National Research Council (Evaluation Panels for the National Bureau of Standards, 1976; 11 pp.; available from the panels).

Fuels and Fuel Additives for Highway Vehicles and Their Combustion Products: A Guide to Evaluation of Their Potential Effects on Health. Committee on Toxicology; Assembly of Life Sciences, National Research Council (Committee on Toxicology, 1976; 43 pp.; available from NTIS; PB 254 088; \$4.50 paper, \$2.25 microfiche).

* **Genetic Improvement of Seed Proteins.** Proceedings of a workshop, Washington, D.C., March 18-20, 1974. Board on Agriculture and Renewable Resources; Commission on Natural Resources, National Research Council (National Academy of Sciences, 1976; 394 pp.; ISBN 0-309-02421-8; \$15.25).

Long-Term Holding of Laboratory Rodents. Committee on Long-Term Holding of Laboratory Rodents, Institute of Laboratory Animal Resources; Assembly of Life Sciences, National Research Council. *ILAR* [Institute of Laboratory Animal Resources] *News*, Summer 1976; reprints available from the institute).

* **Minority Group Participation in Graduate Education (Report Number 5).** National Board on Graduate Education, Conference Board of Associated Research Councils (National Academy of Sciences, June 1976; 273 pp.; ISBN 0-309-02502-8; \$7.00).

* **Neotropical Primates: Field Studies and Conservation.** Proceedings of a Symposium on the Distribution and Abundance of Neotropical Primates. R. W. Thorington, Jr., and P. G.

Heltne, eds. Committee on Conservation of Nonhuman Primates, Institute of Laboratory Animal Resources; Assembly of Life Sciences, National Research Council (National Academy of Sciences, 1976; 135 pp.; ISBN 0-309-02442-0; \$10.25).

Personnel Needs and Training for Biomedical and Behavioral Research. The 1976 report of the Committee on a Study of National Needs for Biomedical and Behavioral Research Personnel; Commission on Human Resources, National Research Council (Commission on Human Resources, 1976; 225 pp.; available from the commission).

Perspectives on the Control of Viral Hepatitis, Type B. A joint statement by the Committee on Viral Hepatitis, Division of Medical Sciences, [Assembly of Life Sciences], National Research Council; and the Public Health Service Advisory Committee on Immunization Practices, U.S. Department of Health, Education, and Welfare. U.S. Public Health Service Center for Disease Control *Morbidity and Mortality Weekly Report*, May 7, 1976, supplement.

Primate Population Surveys in Guyana and Bolivia. Committee on Conservation of Nonhuman Primates, Institute of Laboratory Animal Resources; Assembly of Life Sciences, National Research Council (Institute of Laboratory Animal Resources, April 1976; 5 pp.; available from the institute; supply limited).

Seafloor Engineering: National Needs and Research Requirements. Committee on Seafloor Engineering, Marine Board; Assembly of Engineering, National Research Council (Marine Board, 1976; 81 pp.; available from NTIS; PB 254 171; \$5.00 paper, \$2.25 microfiche).

Summary Report 1975: Doctorate Recipients from United States Universities. Board on Human-Resource Data and Analyses; Commission on Human Resources, National Research Council (Board on Human-Resource Data and Analyses, May 1976; 27 pp.; available from the board; supply limited).

Transition to Decentralized Manpower Programs. Eight Area Studies: An Interim Report. Prepared for the Committee on Evaluation of Employment and Training Programs; Assembly of Behavioral and Social Sciences, National Research Council. William Mirengoff, ed. (Committee on Evaluation of Employment and Training Programs, 1976; 184 pp.; available from the committee; supply limited).

TRANSPORTATION RESEARCH BOARD

Design and Control of Freeway Off-Ramp Terminals (National Cooperative Highway Research Program Synthesis of Highway Practice 35). Transportation Research Board; Commission on Sociotechnical Systems, National Research Council (Transportation Research Board, 1976; 65 pp.; ISBN 0-309-02431-5; \$4.40).

Fatigue Strength of High-Yield Reinforcing Bars (National Cooperative Highway Research Program Report 164). Transportation Research Board; Commission on Sociotechnical Systems, National Research Council (Transportation Research Board, 1976; 90 pp.; ISBN 0-309-02430-7; \$5.60).

Policies for Accommodation of Utilities on Highway Rights-of-Way (National Cooperative Highway Research Program Synthesis of Highway Practice 34). Transportation Research Board; Commission on Sociotechnical Systems, National Research Council (Transportation Research Board, 1976; 26 pp.; ISBN 0-309-02429-3; \$3.20).

Public Transportation Planning (Transportation Research Record 563). Transportation Research Board; Commission on Sociotechnical Systems, National Research Council (Transportation Research Board, 1976; 96 pp.; ISBN 0-309-02473-0; \$8.00).

Swelling Soils (Transportation Research Record 568). Transportation Research Board; Commission on Sociotechnical Systems, National Research Council (Transportation Research Board, 1976; 48 pp.; ISBN 0-309-02481-1; \$4.00).

Vehicle Barrier Systems (Transportation Research Record 566). Transportation Research Board; Commission on Sociotechnical Systems, National Research Council (Transportation Research Board, 1976; 80 pp.; ISBN 0-309-02476-5; \$6.00).

News Report

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Meetings, Special Announcements

The following schedule lists public meetings and includes other special announcements of units of the National Academy of Sciences, National Academy of Engineering, Institute of Medicine, and National Research Council. The schedule is prepared early, and details are subject to change and should be checked directly with project offices as noted below. Any written submission should be sent directly to the listed unit at 2101 Constitution Avenue N.W., Washington, D.C. 20418.

	(exchange program)	Advisory Committee on the U.S.S.R. and Eastern Europe, Commission on International Relations, is accepting requests for applications for participation in the 1977-78 exchange programs with the Soviet Union and Eastern Europe. For further information: L. Mitchell, 202/389-6616 or 202/389-6228.
	(call for information)	The Assembly of Life Sciences is forming a Committee on Aerobiology. Work of the committee will include review of current efforts in sampling and global monitoring, airborne plague forecasting, standards for aeroallergens, data storage, and training of aerobiologists. The committee seeks any information relevant to the subject of the study. For further information: H. E. Sheppard, 202/389-6437.
	(call for information)	The Assembly of Life Sciences is forming a Committee on Germplasm Resources. It will review activities concerned with germplasm resources and examine current experience in the maintenance and dissemination of information about germplasm resources. The committee seeks any information relevant to the study. For further information: V. I. Pye, 202/389-6201.
Sept. 22-23, 1976	Hunt Valley Inn, Hunt Valley, Md.	Symposium on Laboratory Animal Housing, Institute of Laboratory Animal Resources, Assembly of Life Sciences. (<i>News Report</i> formerly carried incorrect meeting dates.) Meeting to update information concerning criteria for various facets of laboratory-animal housing. Preregistration is advised. For further information: E. Grogan, 202/389-6692.
Nov. 4, 1976	(call for statements)	Committee on a Study of National Needs for Biomedical and Behavioral Research Personnel, Commission on Human Resources. Meeting in Washington, D.C., to receive comments on its 1976 report, <i>Personnel Needs and Training for Biomedical and Behavioral Research</i> , and suggestions for the committee's future work; committee invites written statements, to be received by October 15, as well as comments from the floor. For further information: R. G. Snyder, 202/389-6656.

Late Notices

	(call for information)	The National Research Council Assembly of Behavioral and Social Sciences, in cooperation with the National Academy of Education, Stanford, Ca., has organized a Committee on Fundamental Research Relevant to Education. The committee will assess the influence of research in the natural, social, and behavioral sciences on educational policy and practice. The committee also will examine responsibilities of the National Institute of Education and other Federal agencies in supporting research. The committee invites public comments and suggestions relevant to the subject of the study. For further information: S. B. Kiesler, 202/389-6145.
Sept. 28-30, 1976	National Academy of Sciences Washington, D.C.	International Symposium on Water Supply and Drainage for Buildings. U.S. National Committee for the International Council for Building Research, Studies and Documentation; Building Research Advisory Board, Commission on Sociotechnical Systems. Symposium topics will include water supply and conservation, waste-water drainage, and performance of water supply and drainage systems in buildings. \$60 registration fee. For further information: J. D. Finch, 202/389-6541.