

## New Initiatives at the WSTB

by Laura Ehlers and Jeffrey Jacobs  
Water Science and Technology Board

The Water Science and Technology Board has been developing several new initiatives proposed during and after the September 1997 Board meeting in Woods Hole, MA. Two of these initiatives were recently approved by the Board for commencement as full-scale studies. These projects are representative of the efforts of the WSTB and its staff to tackle current, controversial water quality and quantity issues with broad national significance.

### Assessment and Control of Nonpoint Source Pollution

With the advent of treatment technologies for reducing point source pollution, nonpoint source (NPS) pollution has become the major threat to water quality in the nation's water bodies, both coastal and inland. NPS pollution is associated with a wide variety of human activities that involve changes in vegetative cover, disturbance of soil, or alteration of hydrology. The consequences of NPS pollution range from minor to very severe, depending on the intensity of activity, the vulnerability of the natural systems where the activity occurs, and the technologies that are used to mitigate the adverse effects on water quality and aquatic ecosystems. Degradation of water quality may involve one or more of a wide range of water quality variables, including nutrients, toxic substances, sediment, and potentially pathogenic microorganisms. Nonpoint sources of pollution can originate from agricultural and construction activities, on-site sewage treatment systems, and atmospheric deposition, among other activities.

The Environmental Protection Agency (EPA) provides guidance to the states for reducing NPS pollution via two unrelated regulatory mechanisms. Under the Section 319 of the Clean Water Act, states, territories, and Indian tribes receive grants from the federal government to establish, test, and maintain nonpoint source implementation projects. For the 29 coastal states and territories, however, NPS pollution is regulated through the Coastal Zone Management Act, which *requires* states to develop programs describing

how they will implement NPS pollution controls. For states that are not participating in the Coastal Zone Management Act programs, EPA has limited ability to enforce drafting and implementation of nonpoint source pollution control programs.

Recent lawsuits involving EPA enforcement of the Total Maximum Daily Load (TMDL) program have forced EPA to rethink its position regarding limited involvement in state NPS pollution control programs. TMDL regulations require states to list waterbodies which are not meeting water quality standards set for specific use classifications. For those waterbodies impacted by nonpoint sources, the states must 1) identify these nonpoint sources, 2) quantify their contributions to pollutant loading, and 3) implement best management practices (BMPs) to reduce pollutant loading. Currently, significant gaps in scientific knowledge hamper completion of these tasks. Thus, EPA's mandate to the states to calculate and implement TMDLs for impaired waterbodies within 8-13 years is ahead of current technical capabilities to respond to such regulations.

### 1998 Wolman Lecture

On May 21, WSTB members and staff joined 250 guests to hear the Eighth Abel Wolman Distinguished Lecture delivered by Professor Kader Asmal, MP, Minister of Water Affairs and Forestry for the Republic of South Africa. Prof. Asmal has led his nation's efforts to plan and implement one of the world's most innovative water management regimes.

In his lecture, entitled *Water, Life, and Justice: A Late 20th Century Reflection from the South*, he challenged water policymakers, administrators, and technocrats to find ways to humanize water resources administration. "Water management...needs to become more life-giving than cold and mechanical." He characterized water in South Africa as "an instrument of reconciliation through which we bring renewed life and hope to communities throughout the country."

For a copy of the lecture, contact Anita Hall at (202) 334-3422 or visit our website at <http://www2.nas.edu/wstb>.

## Water Science and Technology Board

The Water Science and Technology Board (WSTB) is a unit of the National Research Council, which serves as an independent advisor to the federal government on scientific and technical questions of national importance. The National Research Council, jointly administered by the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine, brings the resources of the scientific and technical community to bear on national problems through its volunteer advisory committees.

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1) the sufficiency of knowledge about sources of NPS pollution, including land use change and other factors, 2) the state of modeling to predict pollutant loads from these sources, and 3) the effectiveness of regulatory and management approaches in controlling NPS pollution. The study would follow the traditional style of convening an NRC expert committee over a two-year period, and would result in a written report that should have broad appeal to state and federal regulatory agencies.

### El Niño and Water Management in California: Lessons from the 1997-98 Event

The winter of 1997-98 was marked by the global climatic phenomenon known as "El Niño," a warming of ocean surface waters in the eastern Pacific. An El Niño event is typically characterized by a variety of global weather disruptions, and often brings heavy rainfall to much of California. The El Niño of 1982-83, for example, brought tremendous flood-related damages to California. The 1997-98 event proved no exception, as winter precipitation records were broken across the state. Some weather stations—Los Angeles, for example—received more rainfall during January and February than they normally receive during an entire year.

The 1997-1998 El Niño was unusual not only in its strength, but also in the agreement and relative accuracy of its forecasts. Much of the ocean-climate modeling community began warning about the strength of this El Niño event in the summer of 1997. These forecasts also generally gave warning of greater-than-normal winter precipitation events and totals for California.

California, like many areas of the western U.S., has seen significant climatic extremes during the past 25 years. In addition to record precipitation and flood-related damages of the El Niños of 1982-83 and 1997-98, California suffered through an extreme drought in the late 1980s and early 1990s. In fact, the years 1987 through 1991 were the five driest years on record for much of the state. However, many observers noted that the state dealt with the drought successfully, through measures like the state's Drought Water Bank. In contrast, the 1997-98 El Niño event resulted in billions of dollars of flood-related damages in California. It appears that California may not be able to cope with extreme flooding events as well as with droughts.

Improved forecasts hold much potential for helping water managers, communities, and individuals cope with floods more effectively. It would be useful to understand how the forecasts for this particular El Niño event, and its associated heavy precipitation, were used (or not used) in decisions about reservoir management and flood preparedness. Thus, the WSTB, along with the Board on Atmospheric Sciences (BASC), has proposed a collaborative study on these topics. An NRC committee would examine how California's water managers used

short- to medium-term climate forecasts before and during the 1997-98 El Niño, and how forecasts might be improved so as to be more useful to water managers. It is hoped that the study's findings would improve the applicability of weather and climate forecasts for water managers in California, as well as other areas faced with the challenge of operating reservoir systems in the face of climatic variability. The study would also potentially help forecasters better tailor their products to their users and improve the level of flood hazard preparedness in California.

For both studies, the search for possible sponsorship is underway. For suggestions and information, contact the WSTB office at (202) 334-3422.

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*Laura Ehlers and Jeffrey Jacobs have been Staff Officers with the Water Science and Technology Board since mid-1997. Ehlers received her Ph.D. in environmental engineering from the Johns Hopkins University, while Jacobs received his Ph.D. in geography from the University of Colorado.*

## UPDATE:

### CURRENT PROJECTS

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#### **Risk-Based Analyses (RBA) for Flood-Damage Reduction Studies**

The WSTB has just received funding for a new study of the use of risk-based analysis (RBA) for flood damage reduction studies. RBA is a relatively new approach to flood risk analysis which allows uncertainties in data to be quantified and explicitly included in the evaluation of project performance. Because there are numerous controversial technical issues associated with implementation of RBA, the U.S. Army Corps of Engineers requested assistance from the NRC in developing and implementing such methods. The study will evaluate the Corps' use of risk-based hydrologic, hydraulic, and economic techniques in planning for and designing water resources projects intended to reduce flood damage. The study will result in recommendations for the improved application of RBA in planning flood-damage reduction projects. Presently, candidates for the study committee are being considered. For information about this study, contact Jeffrey Jacobs at (202) 334-3423 or [jjacobs@nas.edu](mailto:jjacobs@nas.edu).

#### **Eutrophication, Coastal Processes, and Watershed Management**

The WSTB is pleased to announce that the new Committee on Eutrophication, Coastal Processes, and Watershed Management, to be conducted jointly with the Ocean Studies Board, is now underway. Eutrophication is the process by which accumulation of nutrients leads to excessive and sometimes noxious production of algal biomass, fish kills, and other changes in marine biodiversity, increased sedimentation of organic particles, and, ultimately, depletion of dissolved oxygen. Eutrophication has increased in many coastal regions around the world as a result of increasing inputs of nutrients from agriculture, municipal wastewater, and atmospheric deposition of fossil fuel combustion products.

The goals of the joint committee are to 1) assess how coastal and watershed processes affect eutrophication of coastal ecosystems; 2) recommend ways to improve coordination and effectiveness of research, monitoring, and management being conducted at the federal, state, and local levels; and 3) suggest ways to speed the implementation of techniques that will reduce coastal eutrophication. The committee will also evaluate the effectiveness of strategies for monitoring watersheds, atmospheric deposition, and coastal areas. Dr. Robert W. Howarth, Cornell University, chairs the committee. The other committee members are: Donald Anderson, Woods Hole Oceanographic Institution; Thomas M. Church, University of Delaware; Holly Greening, Tampa Bay Estuary Program; Charles S. Hopkins, The Ecosystems Center; Wayne C. Huber, Oregon State University; Nancy Marcus, Florida State University; Robert J. Naiman, University of Washington; David A. Rickert, U.S. Geological Survey (retired); Kathleen Segerson, University of Connecticut; Andrew N. Sharpley, Pasture Systems and Watershed Research Laboratory, and; William J. Wiseman, Louisiana State University. The committee's first meeting will be July 21-22, 1998, in Washington, DC. Sponsors for this activity include NOAA, EPA, USGS, and the Electric Power Research. This activity will be staffed by Dan Walker (OSB) and Chris Elfring (WSTB). For more information, contact the WSTB at (202) 334-3422.

#### **Estimation of Flood-Flow Frequencies for the American River, California**

On July 12-15, a new WSTB committee will be convening in Sacramento, CA, attempting to improve upon flood frequency relationships for the American River. Such estimates are key to planning by the U.S. Army Corps of Engineers for flood risk reduction efforts for the Sacramento area, perhaps the nation's most at-risk major metropolitan area. As the Corps proceeds with its planning, new events and developments (large recent floods and consideration for the paleohydrologic record and climate change) complicate the underlying

hydrology. The present study is effectively a focused extension of the work of the former Committee on Flood Control Alternatives in the American River Basin, published in the 1995 WSTB report *Flood Risk Management and the American River Basin: An Evaluation*. The study is on a fast track and should be completed with the publication of a report in the fall. The committee is chaired by Kenneth W. Potter, University of Wisconsin, Madison. Other members of the committee include: Sandra Archibald, University of Minnesota; Duane Boes, Colorado State University; Timothy A. Cohn, U.S. Geological Survey, Reston, VA; S. Rocky Durrans, University of Alabama; C. Thomas Haan, Oklahoma State University; Robert D. Jarrett, U.S. Geological Survey, Denver; Upmanu Lall, Utah State University; Kelly T. Redmond, Atmospheric Sciences Center—Desert Research Institute; and Jerry R. Stedinger, Cornell University. For further information, contact WSTB director Stephen Parker at (202) 334-3422 or [sdparker@nas.edu](mailto:sdparker@nas.edu).

#### **Committee on Grand Canyon Monitoring and Research**

The Committee on Grand Canyon Monitoring and Research is reviewing the plans and programs of the Grand Canyon Monitoring and Research Center (GCMRC), established in Flagstaff, AZ by the US Department of Interior in 1995. The GCMRC is responsible for monitoring the Colorado River ecosystem between Glen Canyon Dam and Lake Mead. Monitoring and research information collected by the GCMRC is provided to a range of stakeholders, including Native American tribes, federal and state natural resource managers, conservation groups, and private entities and individuals. The committee is currently focusing their assessment on the GCMRC's Long-Term Monitoring and Research Strategic Plan. The committee's first meeting was held in Flagstaff, AZ on May 1-2 and included a field trip to the Glen Canyon Dam and Colorado River downstream to Lee's Ferry, AZ. James Wescoat of the University of Colorado, Boulder chairs the committee. The committee's second meeting is scheduled for August 20-21 in Flagstaff, AZ. For more information, contact study director Jeffrey Jacobs at (202) 334-3422 or [jjacobs@nas.edu](mailto:jjacobs@nas.edu).

#### **Selection of Drinking Water Contaminants for Monitoring and Regulation**

The joint WSTB/Board on Environmental Studies and Toxicology (BEST) Committee on Drinking Water Contaminants held its first meeting May 28-29 in Washington, DC. The committee's main task is to recommend criteria for prioritizing contaminants recently included on the EPA's 1998 Drinking Water Contaminant

Candidate List for future regulatory action. The committee will advise EPA on establishing a process for determining which contaminants on the list are ready for a rule-making decision, which are ready for guidance development, which need additional occurrence data, and which are a priority for additional health effects, treatment, or analytical methods research.

At its first meeting, the committee heard presentations from EPA representatives and members of the National Drinking Water Advisory Council Working Group on Occurrence and Contaminant Selection, an independent organization that was integral to the development of the current Contaminant Candidate List. Presentations from committee members identified initial study considerations and began deliberations. The committee also developed an outline for its report, which will be completed in September. The second meeting, to be held July 27-29 in Newport, RI, will include a review of the draft report and deliberations on committee recommendations and conclusions. A workshop to advise EPA on emerging drinking water contaminants will be scheduled for late fall 1998. The committee is chaired by Warren Muir of the Hampshire Research Institute. For more information, contact Mark Gibson at (202) 334-3422 or [mgibson@nas.edu](mailto:mgibson@nas.edu).

#### **Environmental Remediation at Naval Facilities**

The Committee on Environmental Remediation at Naval Facilities held its third and fourth meetings on April 16-17 in Newport, RI and on June 18-19 in Washington, DC, respectively. During the first phase of its study, the committee's goal is to assess the use of risk-based methodologies for cleaning up Navy sites, including the recently developed Risk-Based Corrective Action standard (RBCA). At the third meeting, the committee took field trips to two large Naval facilities in Rhode Island. There were also presentations on new risk-based methodologies being developed by the Air Force Center for Environmental Excellence, EPA's Science Advisory Board, and the Rhode Island Department of Environmental Management. Insurance industry representatives discussed methods for calculating risk at military facilities that are being transferred to the private sector. Finally, an EPA representative discussed the multi-agency Environmental Site Closeout Working Group. At the fourth and final meeting, the committee reviewed and refined its draft report. The published report should be available this fall. Edward J. Bouwer of the Johns Hopkins University chairs the committee. For more information, contact study director Laura Ehlers at (202) 334-3422 or [lehlers@nas.edu](mailto:lehlers@nas.edu).

#### **Intrinsic Remediation of Subsurface Contaminants**

The Committee on Intrinsic Remediation held its third meeting June 1-2 in Woods Hole, MA. At the meeting, the committee learned about several different protocols for evaluating the intrinsic remediation (or natural attenuation) potential of contaminated sites. An EPA representative described the EPA's new policy on monitored natural attenuation. Representatives of the American Society for Testing and Materials, Air Force Center for Environmental Excellence, Army Corps of Engineers, and American Petroleum Institute described natural attenuation protocols or guidelines developed by those organizations. A panel of regulators for several states and EPA described regulatory concerns about natural attenuation protocols. A final speaker provided a consultant's perspectives on implementing these protocols.

The committee is now mid-way through its tasks of assessing current scientific understanding of natural processes that can lead to contaminant degradation or immobilization in soil and ground water and of evaluating current protocols for use of intrinsic remediation and natural attenuation. The committee will release a detailed report of its study in the fall of 1999. The committee is chaired by Bruce Rittmann of Northwestern University. For additional information, contact study director Jackie MacDonald at 202-334-3422 or [jmacdona@nas.edu](mailto:jmacdona@nas.edu)

#### **New York City's Watershed Management Strategy**

The Committee to Review the New York City Watershed Management Strategy held its third meeting May 13-16 in Oliverea, NY. This study was requested by the New York City Office of the Comptroller and involves a scientific evaluation of the 1997 New York City Watershed Memorandum of Agreement. This document establishes a comprehensive watershed protection program to protect drinking water reservoirs in the Catskill/Delaware watershed and enable New York City to avoid water filtration. At the third meeting, the committee took two field trips of the watershed region, visiting four reservoirs, a wastewater treatment plant, and a dairy farm. The meeting also included presentations about innovative on-site sewage treatment systems, the Watershed Agricultural Program, research being conducted at Cornell University in support of that program, grassroots educational activities in the Catskills, and the progress of the Watershed Protection and Partnership Programs.

In addition to the third meeting, a Workshop on Microbial Risk Assessment was held in Atlanta on April 14-15. Workshop panelists included Gunther Craun, Gunther Craun Associates; Charles Haas, Drexel University; William MacKenzie, Centers for Disease Control; James Miller, New York City Department of Health; Joan Rose, University of South Florida; and Mark Sobsey, University of North Carolina. The panelists,

committee members, and guests discussed the active disease surveillance conducted in New York City and the merits of conducting microbial risk assessments for the drinking water supply.

The fourth committee meeting, August 31 - September 1 in Washington, DC, will be primarily devoted to in-depth presentations of specific tasks accomplished by the committee. Charles O'Melia of the Johns Hopkins University chairs the committee. For information, contact study director Laura Ehlers at (202) 334-3422 or visit our website at <http://www2.nas.edu/nywtrshd>.

#### **Indicators for Monitoring Aquatic and Terrestrial Environments**

The Committee to Evaluate Indicators for Monitoring Aquatic and Terrestrial Environments is assessing a range of issues surrounding the selection of indicators useful for monitoring ecosystems. The study is sponsored by the EPA. With primary responsibility for protecting the nation's natural resources, the EPA needs accurate information about environmental conditions and trends. The committee is addressing the potential value of biological indicators and indices, key ecosystem properties for establishing indicators, and different sources and methods used in identifying useful indicators. In developing a small number of "national level" indicators, the committee is focusing on the following ecosystem features: ecosystem processes, biological diversity, and matrix condition (biotic and abiotic environments of various ecosystems). The study is managed jointly by WSTB and the Board on Environmental Studies and Toxicology (BEST). The committee held its fifth meeting on May 13-14 in Washington, DC. A sixth meeting has been scheduled for August 31-September 1, location to be determined. Gordon Orians of the University of Washington chairs the committee. For more information, contact David Policansky at (202) 334-2234 or Jeffrey Jacobs at (202) 334-3422.

#### **USGS Water Resources Research**

The Committee on USGS Water Resources Research met on June 22-23 in Denver. The meeting began with an exhausting, but pleasant and informative, Sunday (June 21) afternoon field trip to the Niwot Ridge LTER site west of Boulder. The committee meeting focused on completion of a report, *Assessment of Hydrologic Hazards Programs of the U.S. Geological Survey*, and briefings and planning for the committee's next project concerning regional ground water assessment activities of the USGS. This committee is chaired by Kenneth Bradbury of the Wisconsin Geological and Natural History Survey. The next meeting will be held in the fall

at the Academies' Woods Hole Study Center, when the committee will begin to flesh out pieces of its groundwater assessment report. For information about the work of this committee, contact WSTB director Stephen Parker at (202) 334-3422 or [sdparker@nas.edu](mailto:sdparker@nas.edu).

### **U.S. Army Corps of Engineers (USACE) Water Resources Planning**

The Corps is faced with the dual challenge of reducing costs and streamlining its planning process while adequately addressing stakeholder concerns for thoroughness. The Corps will be particularly challenged as it shifts parts of its work program into the relatively new field of environmental restoration. As requested by the Corps, the Committee to Assess the USACE Water Resources Project Planning Procedures is examining the appropriateness and effectiveness of the Corps' planning procedures and decisionmaking criteria. In addition to internal planning processes, the committee is assessing other related issues including ongoing Corps environmental restoration projects (namely Central and South Florida and the Upper Mississippi), the federal Principles and Guidelines (P&G), and the utility of watershed and river basin perspectives in water planning. The committee has found the topic of environmental restoration especially compelling—restoring the functions of damaged aquatic ecosystems is one of the nation's great water resource needs. The committee has noted, however, that key federal legislation and analytical techniques need to be updated and improved in order to optimize the Corps' restoration efforts. The committee held its fifth and final meeting on May 18-19 in Washington, DC. A draft report has been prepared and will soon go to review. David Moreau of the University of North Carolina, Chapel Hill, chairs the committee. For more information, contact study director Jeffrey Jacobs at (202) 334-3422 or [jjacobs@nas.edu](mailto:jjacobs@nas.edu).

### **Sustainable Water Supplies for the Middle East**

The Committee on Sustainable Water Supplies for the Middle East is assessing opportunities for enhancement of water supplies. It has focused on methods developed in the Middle East and elsewhere for avoiding over-exploitation of water resources, and it has explored relationships between water supply enhancement and preservation of environmental quality, especially water quality.

The committee's draft report was sent to official outside review at the beginning of May. Staff will be responding to reviewer comments in consultation with committee members over the next six to eight weeks. A prepublication copy should be available this summer with a final published version available in late summer. The final report is intended to assist the academies of sciences

of the Middle East region in their roles as technical and policy advisors to their governments. Gilbert F. White, University of Colorado, chairs the committee. For information, contact study director, David Policansky at (202) 334-2234 or [dpolican@nas.edu](mailto:dpolican@nas.edu).

### **Committee on Watershed Management**

Management of water and related resources based on a regional perspective is not a new concept, but as the 21st century approaches, this kind of broad thinking has taken on added importance for America's watersheds. If we are to realize progress in both economic development and environmental restoration and preservation, we will need effective watershed management strategies. During its two-year tenure, the Committee on Watershed Management has explored the opportunities and constraints associated with watershed-scale management and considered how to better integrate the ecological, social, and economic dimensions of such approaches. It has looked in particular at the relationships and relative roles of local, state, regional, and federal interests and agencies. The committee's final report, *New Strategies for America's Watersheds*, is in the final phase of response to review and limited prepublication copies will be available this summer, followed in the fall by the published volume. The conclusions address general principles to support implementation of watershed science; objectives in maintaining and restoring watersheds; reauthorization of the Clean Water Act; and steps necessary to improve watershed management, research, and communication of scientific information to decision-makers. More detail about the study's contents will appear in the next newsletter. For information, contact Chris Elfring, study director at (202) 334-3422 or [celfring@nas.edu](mailto:celfring@nas.edu).

### **Site (Seeing Into the Earth)**

A committee overseen by the Board on Earth Sciences and Resources, with assistance from the WSTB, should soon be completing a two-year study of noninvasive methods for characterizing the shallow subsurface of the earth. The ability to characterize the shallow subsurface is essential for many environmental and engineering concerns. The committee is evaluating new and improved noninvasive characterization methods as well as addressing technical and institutional barriers to implementing new methods. A published report is expected to be available late in 1998. Phillip Romig of the Colorado School of Mines chairs the committee. For information, contact study director Thomas Usselman at (202) 334-2744.

### **PREVIEW:**

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## FUTURE PROJECTS

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### **Bioavailability of Contaminants in Soil and Ground Water**

Plans are under way for a new WSTB study of methods for assessing bioavailability of contaminants in soil and ground water. Lack of information about the biological availability of soil and ground water contaminants to human and ecological receptors poses a major impediment to the development of rational goals for the cleanup of contaminated sites. The WSTB will convene a one-day workshop in late fall at which participants will identify critical issues for a two-year WSTB study of contaminant bioavailability assessment techniques.

For information about this project or to provide suggestions for potential funders or information sources, contact WSTB associate director Jackie MacDonald at (202) 334-3422 or [jmacdona@nas.edu](mailto:jmacdona@nas.edu).

### **Studies in Land-Surface Hydrologic Sciences**

Recently the WSTB submitted a proposal to the federal agencies for support for a program of studies to help guide the hydrologic sciences. This program, to be jointly overseen by WSTB and the Board on Atmospheric Sciences and Climate, will review and provide advice on scientific activities of U.S. federal agencies and U.S. contributions to international programs in hydrologic science including research, observation systems, and data collection. In these studies, the NRC hopes to 1) help assure the best and most appropriate hydrologic input to U.S. and international programs with hydrologic components and 2) guide the proper development of the field of hydrologic science so as to be of maximum value to the national and international scientific enterprise. The initial 18-month phase will likely produce a report that addresses the hydrologic content and research priorities of the U.S. Global Change Research Program (USGCRP). The goals of the report are to help better focus the work of hydrologists and global change researchers to produce maximum value and information to the USGCRP and to help define and foster hydrologic research in universities, agencies, and other institutions. As plans proceed with this effort, information will be provided in subsequent issues of the WSTB Newsletter. For information, contact WSTB director Stephen Parker at (202) 334-3422.

### **Prospects for the Privatization of Water Services in the United States**

The WSTB has approved an initiative that would evaluate the prospects for and likely effects of privatization of water supply and wastewater treatment

systems in the U.S. There are a range of privatization arrangements, ranging from the contracting of some services and repairs to the private sector, to the sales of entire public water systems to a private vendor. Though interest in the theories and practices of privatization of public water utility systems in the U.S. is high, studies of the long-term implications of privatization of these systems have been few. The WSTB study would thus: 1) examine and evaluate the experience with privatization of water services in other countries (the western European experience, where over half of water and sewer services are privately operated, is particularly relevant); 2) evaluate alternative forms of regulation should water supply and wastewater treatment services be privatized; and 3) evaluate the possibility of development of a safe and competitive private sector water services industry in the U.S. The topic of privatization was identified as part of WSTB strategic efforts to pursue significant emerging issues. Funding is being sought from both federal government agencies and private organizations. For further information contact Jeffrey Jacobs at (202) 334-3422.

### **Riparian Zones: Functions and Strategies for Management**

The joint WSTB and BEST study of the functions of riparian zones and strategies for improved management of these areas is almost underway. Unlike wetlands and waterbodies, riparian zones are not specifically regulated. And because they are frequently well-oxygenated, they do not qualify for categorization as wetlands. This study will describe the nature and functions of riparian zones and assess the condition and trends of riparian habitats with respect to water quantity and quality. It will also review criteria for the improved management of riparian lands and for mitigation of impacts on such habitats by identifying conflicting policies or objectives and suggesting methods for resolving them. With funding that has been secured from EPA, USGS, and EPRI, the WSTB and BEST are planning to organize the study around three committee meetings. The first would be a planning session to draft a report outline and identify major issues. The second meeting would feature presentations and written papers from prominent individuals with expertise in riparian zones. The final meeting would synthesize written material from the committee members, workshop presentations, and NRC staff. Nominations are now being gathered for committee membership, and the first meeting is scheduled to be held this fall. To suggest nominations for the committee, contact David Policansky, BEST Associate Director, at (202) 334-2234 or Laura Ehlers, WSTB Staff Officer, at (202) 334-3422.

## WATERMARKS

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### New WSTB Membership

On July 1, the WSTB underwent several membership changes. Four new members - Richelle Allen-King of Washington State University, Gary Logsdon of Black & Veatch, Cincinnati, OH, Philip Palmer of E. I. du Pont de Nemours & Co., Wilmington, DE, and Joan Rose of the University of South Florida - were appointed to three-year terms. John Briscoe of the World Bank, Washington, DC, General John Morris of J. W. Morris Ltd., and Rebecca Parkin of the American Public Health Association, Washington, DC, were reappointed to second three-year terms. Thomas Hellman of Bristol-Myers Squibb Company, New York, NY, and Frank Schwartz of Ohio State University retired from the board. We thank these individuals for their service to the board.

Following is the current WSTB roster:

Henry J. Vaux, Jr., *chair*, Division of Agriculture and Natural Resources, University of California, Oakland  
Carol A. Johnston, *vice-chair*, University of Minnesota, Duluth  
Richelle Allen-King, Washington State University, Pullman  
John S. Boyer, University of Delaware, Lewes  
John Briscoe, The World Bank, Washington, DC  
Denise Fort, University of New Mexico, Albuquerque  
Eville Gorham, University of Minnesota, St. Paul  
Charles D.D. Howard, Charles Howard & Associates, Ltd., Victoria, British Columbia  
William A. Jury, University of California, Riverside  
William M. Lewis, Jr., University of Colorado, Boulder  
Gary S. Logsdon, Black & Veatch, Cincinnati, Ohio  
Richard G. Luthy, Carnegie Mellon University, Pittsburgh, Pennsylvania  
John W. Morris, J.W. Morris Ltd., Arlington, Virginia  
Charles R. O'Melia, Johns Hopkins University, Baltimore, Maryland  
Philip A. Palmer, E. I. du Pont de Nemours & Co., Wilmington, Delaware  
Rebecca T. Parkin, American Public Health Association, Washington, DC  
Joan B. Rose, University of South Florida, St. Petersburg  
Eric F. Wood, Princeton University, Princeton, New Jersey

### WSTB Member Howard Presented ASCE Hinds Award

Recently, WSTB member Charles D. D. ("Chuck") Howard was presented the 1998 Julian Hinds Award of

the American Society of Civil Engineers, "for his leadership in the development and successful implementation of hydraulic, hydrologic, and decision models for water supply, flood control, hydroelectric, and other water resource systems. Systems developed by Chuck pioneered a path and set a standard for the profession. This award also recognizes his intellectual generosity and years of service to the profession and the Society." Chuck Howard has been a consulting engineer since completing graduate studies at MIT in 1966. His work combines hydrology, hydraulics, and water resources management. He has been a WSTB member for two years and a participant on several WSTB study committees.

### WSTB Committee Member Stedinger Presented ASCE 1997 Research Award

Jery Stedinger, a member of the WSTB Committee on the Estimation of Flood-Flow Frequencies for the American River, was the recipient of the American Society of Civil Engineers 1997 Best Research-Oriented Paper Award. The paper, "Expected Probability and Annual Damage Estimators," was a direct outgrowth of the WSTB study that culminated in the 1995 WSTB report *Flood Risk Management and the American River Basin: An Evaluation*. His paper addresses key issues underlying plans for flood risk reduction for Sacramento, CA. Stedinger, a professor of environmental engineering at Cornell University, is among the leading experts in statistical hydrology and has contributed frequently to the WSTB program for nearly 15 years.

### Ehlers Receives CGER Staff Award

Laura Ehlers, WSTB staff officer, received a 1998 Certificate of Appreciation for Outstanding Service at the CGER awards ceremony on June 26. Having joined the WSTB in June of 1997, she has assumed full leadership of two of the board's important studies: Review of the New York City Watershed Management Strategy and Environmental Remediation at Naval Facilities. In addition to these projects, she is involved in raising funds for the study on riparian zones, and has, on her own initiative, written a proposal for the nonpoint source pollution study described on page 1.

Dr. Ehlers has demonstrated exceptionally leadership abilities both with committees and NRC staff. She received her Ph.D. in environmental engineering from the Johns Hopkins University in May 1997.

## WSTB REPORTS

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### Issues in Potable Reuse: The Viability of Augmenting

### **Drinking Water Supplies With Reclaimed Water**

This newly released report looks at the issues involving the use of reclaimed water to supplement drinking water supplies. It discusses issues of water treatment technology, monitoring, and testing of reclaimed water to ensure public safety. The report is available from the National Academy Press for \$44.95 (*see order form*).

### **Innovations in Ground Water and Soil Cleanup**

This report provides a comprehensive review of the status of innovative technologies for subsurface cleanup. It also recommends strategies for increasing market demand for innovative remediation technologies, standardizing the collection of pilot and field test data on these technologies, and evaluating cost data. Hardbound copy available for \$39.95 (*see order form*).

### **Valuing Ground Water**

This report examines approaches for assessing the economic value of ground water and the costs of contaminating or depleting this resource. It suggests a framework for policymakers and managers to use in evaluating tradeoffs when there are competing uses for ground water. Available for \$37.95 (*see order form*).

### **Hydrologic Science: Taking Stock and Looking Ahead**

Hydrologic science is an important, interdisciplinary science dealing with the occurrence, distribution, and properties of water on Earth. The WSTB used the opportunity of its 1997 Abel Wolman Distinguished Lecture to assess the vitality of the hydrologic sciences by the hydrologic community. *Hydrologic Sciences: Taking Stock and Looking Ahead* is a compilation of the Wolman Lecture and four invited papers, preceded by a summarizing overview. The proceedings stress a number of needs for furtherance of hydrologic science: development of a coherent body of transferable theory and an intellectual center for the science; communication across multiple geological and environmental science disciplines; appropriate measurements and observations; and the provision of central guidance for the field. Available July 1998 from the National Academy Press.

### **Building a Foundation for Environmental Research**

This report outlines a new framework for organizing the research program at EPA's Office of Research and Development (ORD). The report calls for the establishment of two kinds of research at ORD: *problem-driven* research and *core* research. In addition, recommendations are made about how EPA can leverage

its limited resources by working with the other agencies and organizations involved in environmental research. Available for \$29.00 (*see order form*).

### **Watershed Research in the U.S. Geological Survey**

This report is intended to assist the USGS in improving its overall strategy for watershed research. The report identifies opportunities for further scientific research and emphasizes the importance of collaboration with others in maximizing the effectiveness of the agency's research efforts. Available from the WSTB.

### **Alluvial Fan Flooding**

This report provides an updated regulatory definition of alluvial fan flooding, presents criteria for assessing whether an area is or is not subject to such flooding, and provides examples of applying the definition and criteria to real situations. Available for \$39.00 (*see order form*).

### **Safe Water from Every Tap: Improving Water Service to Small Communities**

This report assesses the quality of drinking water in small communities and recommends a three-part strategy for improving it. Available for \$39.95 (*see order form*).

### **Freshwater Ecosystems: Revitalizing Educational Programs in Limnology**

This report provides an overview of the status of inland waters, reviews the history of limnology, describes the key future problems that may face water resource managers, and recommends changes in limnology education and research funding to meet the needs of water resource management. Available for \$49.95 (*see order form*).

### **A New Era for Irrigation**

This report explores the impacts of changing supply and demand conditions, assesses current and potential technologies that might help water users adapt to changing conditions, and considers how to mitigate short- and long-term problems associated with irrigation. Available for \$39.95 (*see order form*).

### **Hazardous Materials in the Hydrologic Environment: The Role of the U.S. Geological Survey**

This report attempts to help shape the overall framework of the U.S. Geological Survey's research in hazardous materials science and technology and identifies general areas of scientific opportunity. Available from the WSTB.

### **River Resource Management in the Grand Canyon**

This report assesses the achievements and shortcomings of the Bureau of Reclamation's Glen Canyon Environmental Studies and reviews the final research done under the program. Available for \$35.00 (*see order form*).

### **Use of Reclaimed Water and Sludge in Food Crop Production**

This report reviews the current state-of-the-practice, public health concerns, existing guidelines and regulations, and implementations issues of using municipal wastewater and sludge in food crop production. Available for \$29.00 (*see order form*).

### **Wetlands: Characteristics and Boundaries**

This report analyzes present regulatory practice related to wetlands delineation and recommends changes that should bolster the objectivity and scientific validity of wetlands delineation and identification. Available for \$37.95 (*see order form*).

### **Flood Risk Management and the American River Basin: An Evaluation**

This book reviews the U.S. Army Corps of Engineers' investigations of flood control options for the American River basin and evaluates flood control feasibility studies for the watershed. Available for \$29.00 (*see order form*).

### **Mexico City's Water Supply: Improving the Outlook for Sustainability**

This bilingual report addresses the technical, health, regulatory, and social aspects of ground water withdrawals, water use, and water quality in the Mexico City metropolitan area and recommends ways to improve the balance of water supply, demand, and conservation. Available for \$30.00 (*see order form*).

### **Review of EPA's Environmental Monitoring and Assessment Program: Overall Evaluation**

This final review of EPA's Environmental Monitoring and Assessment Program (EMAP) evaluates whether EMAP's goals of assessing the status of and trends in the nation's ecosystems are achievable, given the difficult scientific, practical, and management challenges of implementing them. Available for \$35.00 (*see order form*).

### **Alternatives for Ground Water Cleanup**

This report provides guidance on how the nation can balance public health and technological realities when addressing ground water contamination. Included is a listing of nearly 80 contaminated sites that the committee reviewed and detailed case studies for several of the sites. Available for \$39.95 (*see order form*).

### **Ground Water Recharge: Using Waters of Impaired Quality**

This report examines the use of waters of less-than-ideal quality, such as treated municipal wastewater and urban stormwater runoff, as sources for artificial ground water recharge projects. Available for \$39.00 (*see order form*).

### **Managing Wastewater in Coastal Urban Areas**

This report examines the problems of wastewater and stormwater management in coastal urban settings, recommending a system of integrated coastal management. Available for \$49.95 (*see order form*).

### **In Situ Bioremediation: When Does It Work?**

This report provides direction for decision-makers and offers detailed explanations of the processes involved in *in situ* bioremediation, circumstances in which it is best used, and methods for evaluating the results of bioremediation projects. Available for \$29.95 (*see order form*).

## **NATIONAL RESEARCH COUNCIL MEETINGS**

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**July 12 - 15, 1998** Committee on American River Flood Frequencies, Sacramento, C.A.

**July 21 - 22, 1998** Committee on Eutrophication, Coastal Processes, and Watershed Management, Washington, D.C.

**July 27 - 29, 1998** Committee for Selection of Drinking Water Contaminants for Monitoring and Regulation, Washington, D.C.

**August 21 - 22, 1998** Grand Canyon Monitoring and Research Committee, Flagstaff, A.Z.

**August 31 - September 1, 1998** Committee to Evaluate Indicators for Monitoring Aquatic and Terrestrial Environments, TBA

**August 31 - September 1, 1998** Committee to Review the New York City Watershed Management Strategy, Washington, D.C.

**September 9 - 11, 1998** Committee on Intrinsic Remediation of Subsurface Contaminants, Washington, D.C.

**October 2 - 3, 1998** Water Science and Technology Board Meeting, Woods Hole, M.A.

**November 2-3, 1998** Committee on USGS Water Resources Research, Woods Hole, M.A.