June 2007

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INTRODUCTION

We are pleased to present you with *Sustainability at the National Academies*, a monthly update highlighting activities related to sustainable development from throughout the National Academies. Additional information on these and other activities is also available at http://www7.nationalacademies.org/sustainabilityroundtable/

The Roundtable on Science and Technology for Sustainability provides a unique forum for sharing views, information, and analyses related to sustainability. The goal for the Roundtable is to mobilize, encourage, and use scientific knowledge and technology to help achieve sustainability goals and to support the implementation of sustainability practices. Through its activities, the Roundtable identifies new ways in which science and technology can contribute to sustainability. What follows is a brief summary of sustainability-related activities being conducted throughout The National Academies.

You are receiving this update based on your participation in ongoing or past activities of the Roundtable. If you would prefer not to receive future monthly updates or would like to be added to the recipient list, please contact Kathleen McAllister at 202-334-2047 or Sustainability@nas.edu

SCIENCE ACADEMIES ISSUE STATEMENTS ON ENERGY EFFICIENCY, INNOVATION

On May 16, 2007 the U.S. National Academy of Sciences joined 12 other national science academies in calling on world leaders -- particularly G8 leaders who met in June -- to address global climate change and energy-access issues by promoting low carbon-emission energy systems and more efficient use of energy. The academies also urged leaders to facilitate scientific and technical innovation, and to simplify and enforce a balanced intellectual property regime.

For more information, please visit The National Academies website:

http://www.nationalacademies.org/includes/G8Statement_Innovation_07_May.pdf

http://www.nationalacademies.org/includes/G8Statement_Energy_07_May.pdf

NEW REPORTS

Coal: Research and Development to Support National Energy Policy

Coal provides nearly a quarter of U.S. energy supplies and is used to generate more than half of the nation's electricity. Although future use of coal may be impacted by regulation of carbon dioxide emissions, coal demand is expected to increase over the next 10-15 years. At the request of Congress, the National Research Council conducted a study to examine R&D funding needs to support such "upstream" aspects of coal mining as worker safety, environmental protection and reclamation, coal reserve assessments, and mining productivity. The report concludes that an increased R&D investment is needed in these areas and recommends that an additional $144 million should be allocated. This R&D effort should be coordinated through stronger partnerships among federal agencies, with involvement of states and industry.

http://books.nap.edu/catalog.php?record_id=11977

National Land Parcel Data: A Vision for the Future

Land parcel data (also known as cadastral data) provides geographically-referenced information about the rights, interests, and ownership of land and are an important part of the financial, legal and real estate systems of society. The data are used by governments to make decisions about land development, business activities, regulatory compliance, emergency response, and law enforcement. In 1980, a National Research Council report called for nationally-integrated land parcel data, but despite major progress in development of land parcel databases in many local jurisdictions, little progress has been made towards a national system. Therefore, this National Research Council report was sponsored by the Bureau of Land Management, the Census Bureau, the Federal Geographic Data Committee, the Department of Homeland Security, and Environmental Systems Research Institute, to look at the current status of land parcel data in the United States. This report concludes that nationally-integrated land parcel data is necessary, feasible, and affordable, and provides recommendations for establishing a practical framework for sustained intergovernmental coordination and funding required to overcome the remaining challenges and move forward.

http://books.nap.edu/catalog.php?record_id=11978

Models in Environmental Regulatory Decision Making

Many regulations issued by the U.S. Environmental Protection Agency (EPA) are based on the results of computer models. Models help the EPA explain environmental phenomena in settings where direct observations are limited or unavailable, and anticipate the effects of

agency policies on the environment, human health and the economy. Given the critical role played by models, the EPA asked the National Research Council to assess scientific issues related to the agency's selection and use of models in its decisions. The report recommends a series of guidelines and principles for improving agency models and decision-making processes. The centerpiece of the report's recommended vision is a life-cycle approach to model evaluation which includes peer review, corroboration of results, and other activities. This will enhance the agency's ability to respond to requirements from a 2001 law on information quality and improve policy development and implementation.
http://books.nap.edu/catalog.php?record_id=11972

Toxicity Testing in the Twenty-first Century: A Vision and a Strategy
Advances in molecular biology and toxicology are paving the way for major improvements in the evaluation of the hazards posed by the large number of chemicals found at low levels in the environment. The National Research Council was asked by the U.S. Environmental Protection Agency to review the state of the science and create a far-reaching vision for the future of toxicity testing. The report finds that developing, improving, and validating new laboratory tools based on recent scientific advances could significantly improve our ability to understand the hazards and risks posed by chemicals. This new knowledge would lead to much more informed environmental regulations and dramatically reduce the need for animal testing because the new tests would be based on human cells and cell components. Substantial scientific efforts and resources will be required to leverage these new technologies to realize the vision, but the result will be a more efficient, informative and less costly system for assessing the hazards posed by industrial chemicals and pesticides.
http://books.nap.edu/catalog.php?record_id=11970

Review of the U.S. Climate Science Program's Synthesis and Assessment Product 3.3, "Weather and Climate Extremes in a Changing Climate"
This National Research Council (NRC) report reviews a draft of the U.S. Climate Change Science Program (CCSP) Synthesis and Assessment Product 3.3, Weather and Climate Extremes in a Changing Climate, the 3rd in a series of 21 CCSP products addressing important topics related to climate change. The NRC report finds that the draft provides a good and thorough assessment of the important issues regarding extreme events over North America and how they may change in the context of a changing climate. The continuity and cohesion among the chapters could be improved by greater coordination among the chapter authorship teams, who should also ensure that the tone and scope of the chapters are consistent with the document's Abstract and Executive Summary. The authors should strive to consolidate the sections on tropical cyclones; however, the discussion of drought and ecological impacts could be expanded. Overall, the committee finds that the scope, content, and scientific rigor of the current draft provide a solid basis for the final version of Synthesis and Assessment Product 3.3.
http://books.nap.edu/catalog.php?record_id=11973

The New Science of Metagenomics: Revealing the Secrets of Our Microbial Planet
Although we can't usually see them, microbes are essential for every part of human life -- indeed all life on Earth. The emerging field of metagenomics offers a new way of exploring the microbial world that will transform modern microbiology and lead to practical applications in medicine, agriculture, alternative energy, environmental remediation, and many others areas. Metagenomics allows researchers to look at the genomes of all of the

microbes in an environment at once, providing a "meta" view of the whole microbial community and the complex interactions within it. It's a quantum leap beyond traditional research techniques that rely on studying -- one at a time -- the few microbes that can be grown in the laboratory. At the request of the National Science Foundation, five Institutes of the National Institutes of Health, and the Department of Energy, the National Research Council organized a committee to address the current state of metagenomics and identify obstacles current researchers are facing in order to determine how to best support the field and encourage its success. The report recommends the establishment of a "Global Metagenomics Initiative" comprising a small number of large-scale metagenomics projects as well as many medium- and small-scale projects to advance the technology and develop the standard practices needed to advance the field. The report also addresses database needs, methodological challenges, and the importance of interdisciplinary collaboration in supporting this new field.
http://www.nap.edu/catalog/11902.html

Sediment Dredging at Superfund Megasites: Assessing the Effectiveness
Some of the nation's estuaries, lakes and other water bodies contain contaminated sediments that can adversely affect fish and wildlife and may then find their way into people's diets. Dredging is one of the few options available for attempting to clean up contaminated sediments, but it can uncover and re-suspend buried contaminants, creating additional exposures for wildlife and people. At the request of Congress, EPA asked the National Research Council (NRC) to evaluate dredging as a cleanup technique. The report finds that, based on a review of available evidence, dredging's ability to decrease environmental and health risks is still an open question. Analysis of pre-dredging and post-dredging at about 20 sites found a wide range of outcomes in terms of surface sediment concentrations of contaminants: some sites showed increases, some no change, and some decreases in concentrations. Evaluating the potential long-term benefits of dredging will require that the U.S. Environmental Protection Agency step up monitoring activities before, during and after individual cleanups to determine whether it is working there and what combinations of techniques are most effective.
http://books.nap.edu/catalog.php?record_id=11968

NEW PROJECTS

The Importance of Deep-Time Geologic Records for Understanding Climate Change Impacts
The geologic record contains physical, chemical, and biological indicators of a range of past climate states. As recent changes in atmospheric composition cause earth's climate to change, and amid suggestions that future change may cause the earth to transition to a climatic state that is dramatically different to that of the recent past, there is an increasing focus on the geologic record as a repository of critical information for understanding the likely parameters and impacts of future change. To further our understanding of past climates, their signatures, and key environmental forcing parameters and their impact on ecosystems, an NRC study will: assess the present state of knowledge of earth's deep-time paleoclimate record, with particular emphasis on the transition periods of major paleoclimate change; describe opportunities for high priority research, with particular emphasis on collaborative multidisciplinary activities; and outline the research and data infrastructure that will be required to accomplish the priority research objectives. The report should also

include concepts and suggestions for an effective education and outreach program. For more information on this study, contact: David Feary, dfeary@nas.edu.

Relationships Among Development Patterns, Vehicle Miles Traveled, and Energy Consumption
Consistent with the congressional request in Section 1827 of the Energy Policy Act of 2005, the study will consider the correlation, if any, between land-development patterns and increases in vehicle miles traveled; whether petroleum use in the transportation sector can be reduced through changes in the design of development patterns; and the potential benefits of: Information and education programs for state and local officials (including planning officials) on the potential for energy savings through planning, design, development, and infrastructure decisions; Incorporation of location efficiency models in transportation infrastructure planning and investments; and Transportation policies and strategies to help transportation planners manage the demand for and the number and length of vehicle trips, including trips that increase the viability of other means of travel. The study will also describe development patterns in the context of past trends and projections and the role of factors influencing residential location decisions other than optimizing transportation. In addition, the study will review the institutional mismatches that exist at the state, regional, and local level between agencies responsible for land use decisions and those responsible for transportation investments. Finally, the study will offer estimates of the potential energy conservation benefits of changes in vehicular energy efficiency and land use changes and the likely time period over which they might occur.
http://www8.nationalacademies.org/cp/projectview.aspx?key=48808

UPCOMING MEETINGS

June

Meeting of the Geographic Sciences Committee, June 21-22, 2007
http://dels.nas.edu/besr/gsc_meetings.shtml
Evaluating the Efficiency of Research and Development Programs at the Environmental Protection Agency, June 21-22, 2007
http://www8.nationalacademies.org/cp/meetingview.aspx?meetingid=2071
Assessment of Resource Needs for Development of Fuel Cell and Hydrogen Technology, June 25-26, 2007
http://www8.nationalacademies.org/cp/meetingview.aspx?meetingid=2145
Review of the FreedomCAR and Fuel Research and Development Program, Phase 2, June 26-27, 2007
http://www8.nationalacademies.org/cp/meetingview.aspx?MeetingID=2184&MeetingNo=4
Meeting of the Disasters Roundtable: Creating and Using Multi-Hazards Knowledge and Strategies, June 28, 2007
http://dels.nas.edu/dr/f20.shtml

July

A Study of Technologies to Benefit Farmers in Africa and South Asia, July 6-7, 2007
http://www8.nationalacademies.org/cp/meetingview.aspx?MeetingID=2190&MeetingNo=2

The National Plant Genome Initiative: Achievements and Future Directions, July 6-7, 2007
http://www8.nationalacademies.org/cp/meetingview.aspx?MeetingID=2144&MeetingNo=2
2007 Transportation Planning and Air Quality Conference, July 9-11, 2007, Orlando, FL
http://www.ctre.iastate.edu/educweb/transaq/transaq2007.htm
NRC Colloquium on Water Implications of Biofuels, July 12, 2007
http://dels.nas.edu/wstb/biofuels.shtml
Water Resources and the Highway Environment: Impacts and Solutions, July 16-18, 2007, Sanibel Island, Florida
http://waterlearning.org/TRB/TRB_07.htm
Improving Risk Analysis Approaches Used By the U.S. EPA, July 16-17, 2007, Woods Hole, MA.
http://www8.nationalacademies.org/cp/meetingview.aspx?meetingid=1799
Evaluating the Efficiency of Research and Development Programs at the Environmental Protection Agency, July 19-20, 2007
http://www8.nationalacademies.org/cp/meetingview.aspx?meetingid=2072

August

Advancing Desalination Technology, August 8-9, 2007
http://www8.nationalacademies.org/cp/meetingview.aspx?meetingid=2155
Reducing Stormwater Discharge Contributions to Water Pollution, August 21-23, 2007, Seattle, Washington
http://www8.nationalacademies.org/cp/meetingview.aspx?MeetingID=2099&MeetingNo=3

PROJECTS IN DEVELOPMENT

Partnerships for Sustainability
The Roundtable on Science and Technology for Sustainability plans to commission a series of review papers and use a symposium to develop a better understanding of key factors of success (and failure) for partnerships established to promote sustainability. A steering group will be appointed to develop a common framework for the reviews and organize the symposium, planned for fall, 2007. For more information on the Roundtable on Science and Technology for Sustainability, visit:
http://www7.nationalacademies.org/sustainabilityroundtable/Sustainability_Roundtable_Homepage.html

Federal Sustainability Research and Development Forum
The Roundtable on Science and Technology for Sustainability is planning a workshop ("forum") in late 2007 to discuss research gaps, needed analytical tools, and opportunities for collaboration among federal research and development programs focused on selected high priority challenges to sustainability. For more information on the Roundtable on Science and Technology for Sustainability, visit:
http://www7.nationalacademies.org/sustainabilityroundtable/Sustainability_Roundtable_Homepage.html

Pathways to Urban Sustainability Initiative
The National Academies are planning a multi-year, multi-country initiative to address one of the central challenges and opportunities of the 21st century—the use of science and technology to help transform rapidly urbanizing regions of the developing world into "sustainable cities." Over the past year, the Academies launched this ambitious program through on-the-ground planning activities in China, South Africa, Tanzania and Mexico. We are currently raising funds for the next phase of the initiative, which will include an international symposium to examine the major trends, challenges, and potential paths forward to urban sustainability in developing world cities, and a set of on-the-ground projects in China to be carried out in partnership with the Chinese Academies of Science and Engineering and other leading Chinese science and technology institutions. For more information on past urban sustainability activities, visit:
http://www7.nationalacademies.org/sustainabilityroundtable/Urban_Sustainability_Homepage.html

ONGOING ACTIVITIES

Sustainability---The Issue

The Roundtable on Science and Technology for Sustainability
http://www7.nationalacademies.org/sustainabilityroundtable/

People and Their Communities

Public Participation in Environmental Assessment and Decision Making
http://www8.nationalacademies.org/cp/projectview.aspx?key=34
Review and Assessment of the Health and Productivity Benefits of Green Schools
http://www8.nationalacademies.org/cp/projectview.aspx?key=296
The Committee on the Human Dimensions of Global Change
http://www7.nationalacademies.org/hdgc/

Life Support Systems: Atmosphere, Water, and Food

Advancing Desalination Technology
http://www8.nationalacademies.org/cp/CommitteeView.aspx?key=48674
Climate Change and U.S. Transportation
http://www8.nationalacademies.org/cp/projectview.aspx?key=186
Committee on Hydrology, Ecology, and Fishes of the Klamath River Basin
http://www8.nationalacademies.org/cp/projectview.aspx?key=216
Emerging Technologies in Agriculture to Benefit Farmers in Africa and South Asia
http://dels.nas.edu/banr/index.shtml
Energy Futures and Air Pollution in Urban China and the United States
http://www8.nationalacademies.org/cp/projectview.aspx?key=131
FEMA Flood Maps: Accuracy Assessment and Cost-Effective Improvements
http://www8.nationalacademies.org/cp/ProjectView.aspx?key=BESR-U-06-06-A
Reducing Stormwater Discharge Contributions to Water Pollution
http://www8.nationalacademies.org/cp/committeeview.aspx?key=48711
Review of Water and Environmental Research Systems (WATERS) Network
http://www8.nationalacademies.org/cp/projectview.aspx?key=48784
Sustainable Underground Storage of Recoverable Water
http://www8.nationalacademies.org/cp/projectview.aspx?key=WSTB-U-04-02-A

Strategic Advice on the U.S. Climate Change Science Program
http://www8.nationalacademies.org/cp/projectview.aspx?key=209
Water Implications of Biofuels Production in the United States
http://dels.nas.edu/dels/sot.php?pin=WSTB-U-06-05-A
Water Resources Activities at the U.S. Geological Survey
http://www8.nationalacademies.org/cp/projectview.aspx?key=48695

Economy and Industry

Assessment of Resource Needs for Development of Fuel Cell and Hydrogen Technology
http://www8.nationalacademies.org/cp/projectview.aspx?key=48717
Critical Mineral Impacts on the U.S. Economy
http://www8.nationalacademies.org/cp/projectview.aspx?key=48725
Development and Implementation of a Cleanup Technology Roadmap for DOE's Office of Environmental Management
http://www8.nationalacademies.org/cp/ProjectView.aspx?key=NRSB-O-06-03-A
National Academies Materials Forum on Corrosion Education for the 21st Century
http://www7.nationalacademies.org/nmab/current_activities.html
Review of the 21st Century Truck Partnership
http://www8.nationalacademies.org/cp/projectview.aspx?key=48722
Review of the FreedomCAR and Fuel Research and Development Program, Phase 2
http://www8.nationalacademies.org/cp/projectview.aspx?key=48724

Natural Systems

Hydrologic Impacts of Forest Management
http://www8.nationalacademies.org/cp/projectview.aspx?key=1935
Independent Scientific Review of Everglades Restoration Progress
http://www8.nationalacademies.org/cp/projectview.aspx?key=WSTB-U-03-04-A
International Capacity Building for the Protection and Sustainable Use of Oceans and Coasts
http://dels.nas.edu/osb/capacity_building/capacity_building.shtml\
The National Plant Genome Initiative: Achievements and Future
http://www8.nationalacademies.org/cp/ProjectView.aspx?key=BLSX-K-07-01-A

Institutions and Indicators

Key National Indicators Initiative (KNII)
Currently, this project is not available on the web. As soon as a web link becomes available, it will be included in this update.

Sustainability Research and Development

Design Issues for the NOAA Sector Applications Research Program
http://webapp.nationalacademies.org/cp/projectview.aspx?key=48688
Evaluating the Efficiency of Research and Development Programs at the Environmental Protection Agency
http://www8.nationalacademies.org/cp/CommitteeView.aspx?key=CSEP-Q-07-01-A
Evaluation of the Research Plan of the Department of Housing and Urban Development

http://www8.nationalacademies.org/cp/projectview.aspx?key=48755

Grand Challenges for Engineering

http://www.engineeringchallenges.org/

Grainger Challenge Prize for Sustainability

http://www.nae.edu/nae/grainger.nsf?OpenDatabase

Review of DOE's Office of Nuclear Energy, Science & Technology Research & Development Program

http://www8.nationalacademies.org/cp/projectview.aspx?key=48668

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