Next Century Forecasted Sea Level Rise:
What Does It Mean for Houston?

April 9, 2008 · Baker Hall, Rice University

about the event

The Intergovernmental Panel on Climate Change (IPCC) has concluded that the global mean sea level has risen at an average rate of 1 millimeter (mm) to 2 mm per year during the 20th century through thermal expansion of seawater and widespread loss of land ice. Moreover, satellite observations in the last decade show that since 1993, the rate of sea level rise has increased to 3.3±0.4 mm/yr. Global mean sea level is projected by the IPCC to rise between another 100 mm to 220 mm (3.9 inches to 8.6 inches) by 2050. Dynamical instabilities in response to climate warming may cause faster ice-mass loss. Recent scientific publications (2007) indicate that sea level measurements are tracking at the high end of the IPCC estimates and conclude that 80 centimeters (cm) (32 inches), and perhaps greater than 1 meter (m) (40 inches), is the most likely global rise by the year 2100, raising the risks to life and property of those living in coastal areas.

According to the U.S. Environmental Protection Agency, the rising sea level affects wetlands and other low-lying habitats. It erodes beaches, can increase flooding risks and may increase the salinity of rivers, bays and groundwater tables. Populations that inhabit small islands or low-lying coastal areas are "at particular risk of severe social and economic effects from sea level rise and storm surges," according to the IPCC. Sea level rise will present a challenge to coastal areas and infrastructure. Nearly two-thirds of humanity lives within 90 miles of coastal waters. One-tenth of the global population and 13 percent of the world's urban population live in coastal areas that lie within 10 m above sea level (the low elevation coastal zone, or LECZ), which covers only 2 percent of the world's land area. In the United States, more than 50 percent of Americans live in 772 coastal counties. By 2025, nearly 75 percent of Americans are projected to be living near a coast, with population density doubling in some areas such as Florida and California. An increase in extreme weather events is likely to exacerbate existing water management and control problems in low-lying coastal areas such as the U.S. Gulf Coast, where coastal agriculture, petrochemical plants, oil refineries and potable water systems could be threatened in the future.

"Next Century Forecasted Sea Level Rise: What Does It Mean for Houston?" brings together climate science and environmental experts who will discuss these issues and the implications for Houston.

agenda

Wednesday, April 9, 2008
Kelly International Conference Facility
6:30 pm

Welcome

Amy Myers Jaffe
Wallace S. Wilson Fellow in Energy Studies, James A. Baker III Institute for Public Policy, and Associate Director, Rice University Energy Program

Introductory Remarks

André W. Droxler, Ph.D.
Professor, Department of Earth Science, and Director, Center for the Study of Environment and Society, Rice University

Seminar Speakers

Present-Day Sea Level Rise: Current Understanding and Major Uncertainties

Anny Cazenave, Ph.D.
Senior Scientist, Laboratoire d'Etudes en Géophysique et Océanographie Spatiales (LEGOS), and Member, French Academy of Sciences

Climate Change and its Potential Impacts on Severe Storms, Flooding, and Water Supplies

Philip B. Bedient, Ph.D.
Herman Brown Professor of Engineering, Department of Civil and Environmental Engineering, Rice University

Birnur Buzcu-Guven, Ph.D.
Postdoctoral Research Associate, Department of Civil and Environmental Engineering, Rice University

Getting Prepared: Policy Implications for Houston in Transportation and Other Related Issues

Alan C. Clark
Director, Transportation and Air Quality Programs, and Director, Metropolitan Planning Organization, Houston-Galveston Area Council (H-GAC)

Question and Answer Session

program participants

Philip B. Bedient, Ph.D., is the Herman Brown Professor of Engineering in the Department of Civil and Environmental Engineering at Rice University. He teaches and conducts research in surface and ground water hydrology and flood prediction systems. He served as chair of environmental engineering from 1992 to 1999. He has directed 50 research projects over the past 28 years and has written more than 180 articles in journals and conference proceedings. He is lead author of "Hydrology and Floodplain Analysis" (Prentice Hall, 3rd ed., 2002), used in more than 70 universities across the United States. Bedient received the Shell Distinguished Chair in Environmental Science (1988 to 1993) and recently received the Herman Brown Endowed Chair of Engineering at Rice University. He has been a fellow of the American Society of Civil Engineers (ASCE) since 2006.

Birnur Buzcu-Guven, Ph.D., is a postdoctoral research associate in the Department of Civil and Environmental Engineering at Rice University. She performs research in surface and ground water hydrology and air quality modeling. Before joining Rice, she was an assistant professor at Michigan State University from 2006 to 2008. Buzcu-Guven earned her doctorate degree in civil and environmental engineering from Rice University and Bachelor of Science in mathematics from Bogazici University, Turkey.

Anny Cazenave, Ph.D., is a senior scientist at the Laboratoire d'Etudes en Géophysique et Océanographie Spatiales (LEGOS) and Centre National d'Etudes Spatiales (CNES) in Toulouse, France. She is a member of the French Academy of Sciences and is also a fellow of the American Geophysical Union. Her research interests include satellite geodesy and space research such as gravity fields, Earth rotation, precise positioning from space, temporal changes in gravity, sea level variations at regional and global scales–observations and climatic causes, and land hydrology from space. Cazenave has more than 155 publications in refereed international journals, has several monograph chapters, and has been editor of five books. She is a member of several committees for research assessment in France. Her international responsibilities include being a member of the Earth sciences assessment panel of the European Research Council, a member of the scientific panel of GGOS (Global Geodetic Observing System), lead author of the IPCC Working Group I for ocean climate and sea level (2004–2007), international secretary of the American Geophysical Union (2002–2006), and president of the geodesy section of the European Geosciences Union (1999–2004). Cazenave has been scientific advisor to 25

Ph.D. theses, the principal investigator of several space missions, and former editor of the journal *Earth and Planetary Science Letters*.

Alan C. Clark is the director of transportation and air quality programs for the Houston-Galveston Area Council (H-GAC). He is also the director for H-GAC's Metropolitan Planning Organization (MPO), which is responsible for development of the region's multimodal transportation plans. The MPO's Transportation Policy Council approves the programming of all federal highway and transit funds in Harris County and the adjacent seven counties. Clark's responsibilities also include coordinating the Houston-Galveston area's response to mandates contained in the Clean Air Act Amendments of 1990. In November 1995, Clark was awarded the Road Hand Award by the Texas Department of Transportation in recognition of his significant contributions toward developing the Statewide Transportation Improvement Program and for his expertise in retooling the transportation planning process. In 1999 and 2000, Clark was appointed to the board of advisors for the Eno Transportation Foundation, an internationally recognized organization promoting transportation research and education. Clark currently serves on the Texas Transportation Institute's advisory board. In 2005, Clark was named a member of the Transportation Research Board's Policy Study Committee on Climate Change in U.S. Transportation. In 2006, Clark was also appointed to the Federal Advisory Committee on Impacts of Climate Variability and Change on Transportation Systems and Infrastructure-Gulf Coast Case Study. Clark has been a transportation planner with H-GAC since 1983 and has managed its transportation and air quality programs since 1986. Clark has served as an adjunct professor with Texas Southern University. Prior to coming to H-GAC, he worked as a transportation planner with the Metropolitan Transit Authority of Harris County and as a traffic engineering consultant. Clark holds master's degrees in civil engineering and city and regional planning from The Ohio State University. He completed his undergraduate degree in business administration from The University of Tennessee in his hometown of Knoxville.

André W. Droxler, Ph.D., is a professor of marine geology in the Department of Earth Science at Rice University and, since 2007, the director of the Center for the Study of Environment and Society (CSES) at Rice. Droxler has been a faculty member at Rice since 1987. He was a postdoctoral research scientist at the University of South Carolina in Columbia from 1985 to 1986. As an oceanographer, his research has focused on carbonate and mixed siliciclastic/carbonate deposits on slopes and basins surrounding carbonate platforms, such as the Bahamas, Belize, the Maldives and the Gulf of Papua, in terms of processes, evolution, paleo-oceanographic and climatic records. He was the senior editor of a 2003 American Geophysical Union (AGU) Monograph

137 on "Earth's Climate and Orbital Eccentricity: The Marine Isotope Stage 11 Question." Droxler received his master's degree equivalent from University of Neuchâtel (Switzerland) and pursued his doctorate degree at the Rosenstiel School of Marine and Atmospheric Science (RSMAS) at the University of Miami (Florida).

Amy Myers Jaffe is the Wallace S. Wilson Fellow in Energy Studies at the James A. Baker III Institute for Public Policy and associate director of the Rice University energy program. Her research focuses on the subject of oil geopolitics, strategic energy policy including energy science policy, and energy economics. Jaffe is widely published in academic journals and numerous book volumes and served as co-editor of "Energy in the Caspian Region: Present and Future" (Palgrave, 2002) and "Natural Gas and Geopolitics: From 1970 to 2040" (Cambridge University Press, 2006). She served as a member of the reconstruction and economy working group of the Baker/Hamilton Iraq Study Group and as project director for the Baker Institute/Council on Foreign Relations Task Force on Strategic Energy Policy. She was among *Esquire* magazine's 100 Best and Brightest honorees in the contribution to society category in 2005. Prior to joining the Baker Institute, Jaffe was the senior editor and Middle East analyst for *Petroleum Intelligence Weekly*, a respected oil journal. She received her bachelor's degree in Arabic studies from Princeton University.

organizing partners

The Baker Institute Energy Forum

Located in Houston, Texas, the energy capital of the world, the James A. Baker III Institute for Public Policy has created a multifaceted program designed to promote original, forward-looking discussion and research on the energy-related challenges facing our society in the 21st century. The mission of the Energy Forum is to shed light on important trends — both regional and global — that shape the nature of global energy markets and influence the quantity and security of vital supplies needed to fuel world economic growth and prosperity. The choice of the word "forum" is deliberate. It reflects the group's goal to serve as a focal point for the exchange of ideas on how to improve understanding of the complex political, cultural, religious, economic and social forces that influence open access to energy resources and their equitable distribution.

The Center for the Study of Environment and Society

The Center for the Study of Environment and Society (CSES) at Rice University seeks to promote a deeper and broader understanding of environmental issues through interdisciplinary discussions both in and out of the classroom, as well as project-based courses that seek to increase the sustainability of the Rice campus and community. CSES hosts the environmental studies program (B.A. in environmental science) in addition to offering several core interdisciplinary environmental studies courses for students interested in broadening their understanding of environmental issues. The center also organizes the Environmental Reading Group (EREAD), a weekly faculty/staff/student lunch group for cross-disciplinary conversation about contemporary environmental writings. CSES hosts periodic lectures on environmental topics of broad interest.

The Shell Center for Sustainability

The Shell Center for Sustainability at Rice University supports faculty research in a broad area of sustainable development, with special emphasis on the Houston area and in the state of Texas. It supports the creation of interdisciplinary programs, outreach and education to address actions to ensure the sustainable development of living standards measured broadly to encompass all factors affecting quality of life, including environmental resources. The center's work joins the Rice University School of Social Sciences with researchers in engineering, natural sciences, architecture, humanities and management within the Rice University community as well as with other institutions and partners. To date, the center's efforts have fostered nascent research that has grown into greater work benefiting Houston and reaching the international community.

James A. Baker III Institute for Public Policy
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The mission of the Baker Institute is to help bridge the gap between the theory and practice of public policy by drawing together experts from academia, government, media, business and nongovernmental organizations. By involving policymakers and scholars, as well as students (tomorrow's policymakers and scholars), the institute seeks to improve the debate on selected public policy issues and to make a difference in the formulation, implementation and evaluation of public policy, both domestic and international. The Baker Institute is an integral part of Rice University, one of the nation's most distinguished institutions of higher education. The efforts of Baker Institute fellows and affiliated Rice faculty focus on several ongoing research projects, details of which can be found on the institute's Web site, http://bakerinstitute.org.

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