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**“Waiting On Warming”**

***Scientists Publish Details of New Texas Climate Change Research***

AUSTIN, Texas. (Jan. 28, 2009) – A new book by a group of leading Texas scientists offers the most comprehensive information to date on how climate change is expected to affect the day-to-day lives of Texans over the next 40 years.

The book, *The Impact of Global Warming on Texas, 2<sup>nd</sup> Edition*, will be published later this year by the University of Texas Press. An online preview of the book will be made available to the public on Jan. 29 at <http://www.texasclimate.org/Home/ImpactofGlobalWarmingonTexas/tabid/481/Default.aspx>.

This new edition looks at the threats climate change will pose to Texas through the year 2050.

Larry Faulkner, president of Houston Endowment, Inc., a non-profit foundation which provided funding for the book, hailed the new edition as a valuable update on how climate change will affect Texans’ daily lives.

“Long-term predictions of climate change in Texas are important and useful, but what most people really want to know is, how will climate change affect them. Most Texans want to know what will happen in their lifetimes,” he said.

Researchers from Texas A&M University, the University of Texas at Austin, the Houston Advanced Research Center, and other scientific institutions across Texas, say global warming poses a credible threat to our way of life in Texas unless it is dealt with immediately.

“Climate change is not just an environmental issue. It's a jobs issue, a national security issue and an issue important to our children and grandchildren. It's time to take it seriously,” said Jurgen Schmandt, distinguished fellow at the Houston Advanced Research Center, one of the

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book's principal authors.

"We should not be fooled into thinking the threat of climate change isn't real," said Gerald R. North, distinguished professor of Atmospheric Sciences and Oceanography at Texas A&M University in College Station, another contributor to the research effort.

Among the key findings in the book:

- **Climate Science and Climate Change:** Climate science has evolved over the last thirty-five years to a point where predictions by climate models can be considered to have significant information content. The greenhouse effect has clearly established itself as a driver of climate change and the main agent is the continuing increase in the concentration of carbon dioxide in the atmosphere. There are several ways of assessing the status of climate change research, the most recent and comprehensive is from the Intergovernmental Panel on Climate Change: *Fourth Assessment Report*, released in 2007. According to this report greenhouse gases are expected to cause global temperatures to rise 5.4° F (plus or minus 1.8°F) by the end of the century. Temperature changes in Texas are expected to be comparable. A notable feature of the predictions is the expansion of the tropical zone, familiar in summer for Texans, to include more of the spring and fall. This could lead to less rainfall especially in regions that are already dry. Other important effects include possible changes in El Niño (climate variability) and hurricane behaviors; further research will more accurately specify these and other effects.
- **The Changing Climate of Texas:** Texas temperatures increase from south to north, whereas precipitation increases dramatically from west to east. The seasonal patterns of precipitation also vary greatly across the state (e.g., dry winters in the west, more even distribution in the east). Texas also experiences a variety of severe weather such as tropical storms, tornadoes, drought and flooding. The wide variations in weather and climate across Texas imply a broad range of vulnerabilities to climate change. Averaging over Texas the temperature over the last few decades has been increasing. Precipitation has also steadily increased over the past century, but with variation among the different regions. In the future, Texas temperatures are likely to continue rising. Precipitation changes are much less clear, with most models projecting a decrease. Even if precipitation were to remain stable, rising temperatures would increase evaporation and dryness. The expected changes in temperature and precipitation will have an impact on other sectors of the state's resources as discussed below.
- **Water Resources:** Taking flows to the coast as a measure of river-basin impact, we calculate how flows will change by mid-century as a result of demographic and climate changes. Considering only population growth and the resulting increased water demand flows will be reduced by about 25 percent under normal conditions

and by 42 percent under drought conditions. When also considering climate change (assuming a 3.6 degrees F increase in air temperature and a 5 percent decrease in precipitation) 2050 projected flows to the coast are 70 percent of the 2000 values under normal conditions and 15 percent of 2000 normal under drought conditions.

- **Coastal Zone:** There are two direct effects, which are already observable, in the instrumental record: rapid sea-level rise and rising sea temperatures. The sea-level rise rates are especially high in Texas because of the added effect of land subsidence, which is caused by oil and groundwater extraction. The increasing temperatures are already manifesting indirect changes in habitats and water quality.
- **Biodiversity:** Climate is a key determinant of species distribution. As the earth warms, species tend to shift to northern latitudes and higher altitudes. But climate change represents just one of a set of stressors. Other changes challenging fauna and flora are due to land development, habitat fragmentation, invasive species, chemical stressors, and direct exploitation. Comprehensive assessments in each of Texas' ecological regions—coastal marshes, forests, deserts, prairies and western mountains—are needed to develop science-based management practices for wildlife and plant communities.
- **Agriculture:** Agriculture in the U.S. and Texas is sensitive in terms of land and water usages, as well as crop and livestock production. However, in terms of agricultural-based economic welfare, the simulated effects of climate change are not large. We find that under the climate change conditions simulated herein that statewide Texas cropped acreage declines by about 20 percent.
- **Cities:** Coastal population centers, from Houston to the Lower Rio Grande Valley, are vulnerable to sea level rise, increased storm intensity and accompanying flooding. All major Texas cities face the possibility of impacts on air quality, energy, health and other temperature related effects. All major cities face the prospect of declining water resources within the timeframe examined here.
- **Greenhouse Gas Emissions:** Only 12 states had more GHG emissions per unit of gross state product (GSP) than Texas in 2001. Due to its large population and energy-intensive economy, Texas leads the nation in energy consumption, accounting for more than one-tenth of total U.S. energy use. Energy-intensive industries in Texas include aluminum, chemicals, forest products, glass and petroleum refining. Texas' petroleum

refineries can process more than 4.6 million barrels of crude oil per day, and they account for more than a quarter of total U.S. refining capacity. In 2005, Texas was responsible for 11 percent of US greenhouse gas emissions.

- **Economy:** Looking to mid-century, it is clear that the cost to Texas of a national cap and trade policy would likely exceed any possible measurable benefit in terms of avoided damages. But over a longer time frame, if the harmful impacts of climate damage continue to increase the cost-benefit balance might shift. But time is not on our side. Texas would benefit economically by taking stronger actions today to address climate change impacts at the State level, and by supporting the adoption of cost-effective, equitable policies at the national level to limit GHG emissions and encourage the use of non-fossil fuel alternatives.
- **Policy:** Texas is a leader in the gradual shift to renewable energy. Energy and water conservation are also priorities, mostly at the community level. The driving forces of these policy initiatives are energy efficiency, resource conservation, and the income and jobs associated with industries developing alternative energy sources. These measures help to reduce greenhouse gas emissions. Thirty states have joined regional climate change alliances. Texas has not done so. We recommend that Texas develop a comprehensive climate change policy to serve the goals of reducing greenhouse gas emissions, increasing energy independence, ensuring regional security, and improving management of water, air, land and wildlife.

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### **About the Houston Advanced Research Center**

Founded in 1982, HARC is a nonprofit organization based in The Woodlands, Texas, dedicated to improving human and ecosystem well-being through the application of sustainability science and principles of sustainable development. HARC is a leader in moving knowledge to action to improve human well-being and protect the environment. Major program themes include natural ecosystems, water resources, air and climate, environmental health, clean energy and the built environment. For more information, visit [www.harc.edu](http://www.harc.edu).