Collier Soil and Water Conservation District

Gazetteer **February 2012**

Gravity

What is it? You can't see it. You can't smell it. You can't touch it. But, it's there.

In fact it's everywhere. We are familiar with gravity because we live with its effects every day.

We know that when we drop an object, it falls to the floor, and we know gravity is the reason. While the force of gravity is weak compared with other forces in nature, such as electricity and magnetism, its effects are the most far-reaching and dramatic.

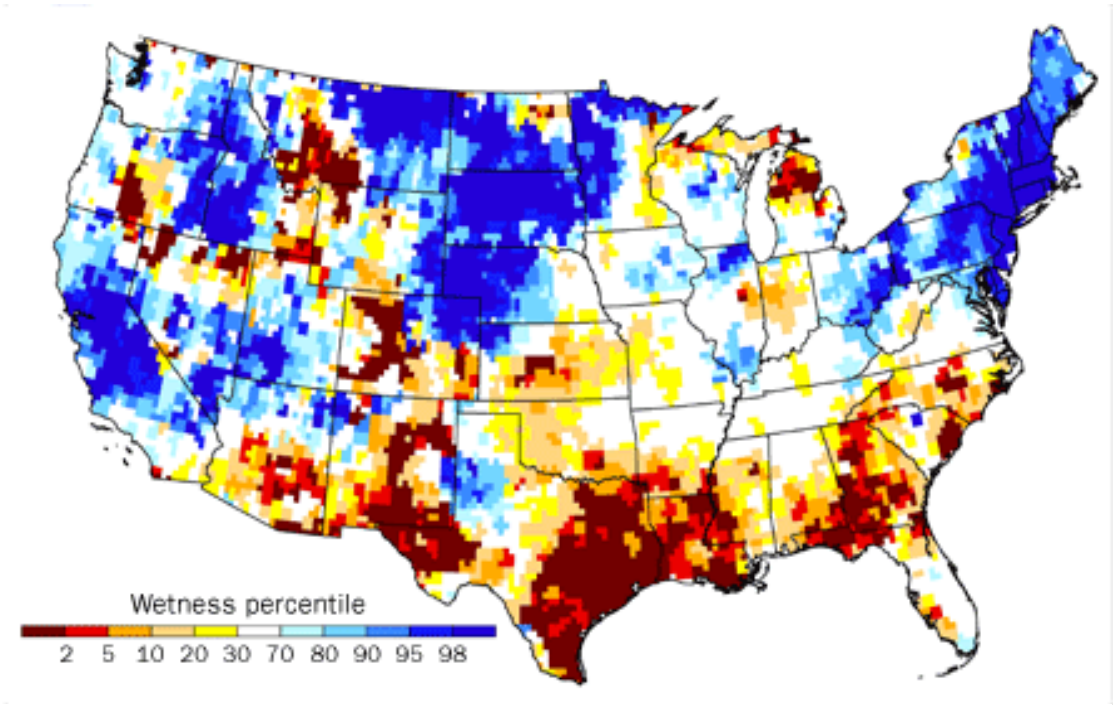
Gravity controls everything from the motion of the ocean tides to the expansion of the entire universe.

GRACE, launched from Plesetsk Cosmodrome in Russia on March 17, 2002, is revealing more detail about the gravity field than has ever been available before.

Data provided by GRACE are substantially improving our knowledge of Earth's gravity and of a number of important aspects of global change.

How does GRACE really work? How is it possible for a satellite in space to make such a precise measurement of gravity from so far away?

Are we drying out?



This image is a simulation based on data from the Gravity Recovery and Climate Experiment (GRACE) satellites and historical weather records, revealing the effects of this year's drought in Texas (driest conditions shown in dark red). A new analysis of data from the GRACE satellites reveals worldwide changes in groundwater. Credit: NASA/National Drought Mitigation Center at the University of Nebraska-Lincoln

For at least two decades newspaper articles and books have been written about Florida's water problems. Many have told us that excessive pumping of our aquifers created an environmental catastrophe known to only a few scientists, a handful of water management experts and those unfortunate enough to have suffered the direct consequences. Innocently begun with the intent of utilizing an untouched source, we have since learned that our water supply is not limitless. Groundwater is part of a hydrologic cycle that provides freshwater to lakes, rivers and streams.

Groundwater pumping disrupts this cycle and causes irreversible environmental damage. As groundwater use has increased, pumping has caused rivers, springs, lakes and wetlands to dry up, ground beneath us to collapse and fish, birds, wildlife, trees and shrubs to die. The GRACE satellites now illustrate the scope of the problem in a concise graphic. What's missing now is a state program to resolve the problem!

Florida water follies are not farce; rather, they are tales of human foibles including greed, stubbornness and, especially, the unlimited human capacity to ignore reality

GRACE mission detects changes in Earth's gravity field by monitoring the changes in distance between two satellites as they orbit Earth.

It seems like something only an expert in gravity studies could understand, and we might think the details are beyond our comprehension.

Perhaps, however, if we take another look at how this familiar force really works, we can begin to better understand how GRACE measures gravity from space.

GRACE provides, for the first time, global coverage of the Earth's gravity field every 30 days from a single source.

GRACE is already able to measure the gravity field with a level of precision that is at least 100 times greater than any existing measurement, and continued improvements are expected as the mission progresses.

This enhanced knowledge should lead to an ability to track the changing distribution of water resources that is critically important to land aquifers and permitting decisions.

Contact Us:
Collier Soil and Water Conservation District
14700 Immokalee RD
Naples FL 34120-1468
Phone: (239) 455-4100
FAX:(239) 455-2693
www.collierswcd.org

written about in *Mirage: Florida and the Vanishing Water of the Eastern U.S.* by Cynthia Barnett who at the time was a *Florida Trend* magazine reporter.

Barnett detailed the long history behind the creation of Florida's mirage beginning with Ponce de Leon's fifteenth-century mythical search for a Fountain of Youth. But our more recent national water supply and management confusion, and Barnett's source for regional differentiation, was traced to John Wesley Powell's 1876 decision to divide the arid American West from the humid East at the 100th meridian—map is at: http://tinyurl.com/75n2438. Powell, and legions of his followers, assumed that the region west of this line would require irrigation to sustain human survival, but the eastern region would not. As a result, historians and casual observers have often told western water history as a story about water scarcity and irrigation delivery, while a southern story like Florida's has often focused on too much water, expedient drainage, and flood control. Barnett goes to great lengths throughout the succeeding chapters to illustrate why this stark distinction has broken down in the late twentieth century.

Twelve short chapters cover many interconnected topics from explosive population growth (Florida increased by one thousand people per day in 2006) to state sponsored marketing campaigns to spur in-migration. Barnett chronicles Florida's legislative attempts to mediate real estate development, environmental damage and water supply to demonstrate why the state is a worthy case study of the eastern United States. Since statehood in 1845, Florida's leaders have given private developers the green light to drain or reclaim the state's extensive wetlands for agricultural and commercial development. These measures began as private endeavors, and, over the course of the twentieth century, became the shared responsibility of real estate developers, federal agencies like the United States Army Corps of Engineers and state water management districts. Barnett linked all these topics and others, including how drainage contributes to Florida's changing climate, to issue a stark warning about the state's precarious water supply. When humans drain wetlands and droughts intensify, consumption demands require sustained aquifer pumping.

But all of this twentieth-century human and environmental activity limits an aquifer's ability to recharge and enables saltwater to seep into areas formerly occupied by fresh water, thus contaminating the source. As a society, we must address the problems of population growth, wasteful water consumption practices and inappropriate agricultural water use. Growth poses the ultimate threat to our springs, streams, rivers, wetlands and estuaries.

As our water use spirals upward, we must begin to rethink the economic structure by which we value (and usually undervalue) our water resources. At the same time, we must act to protect our rivers, springs, wetlands, lakes and estuaries from groundwater pumping.

We have the capacity, if we choose to exercise it, to rise above our basest self-interest and to act for the long-term best interests of generations to come. The predicate for noble sacrifice is knowledge of the consequences of our actions. For groundwater pumping, we have lacked that awareness, for the problem has been, literally, out of sight and out of mind.

Now that we understand how water moves and how groundwater pumping affects the environment, it is time to act. The hidden tragedy has been unmasked by the GRACE satellites and the solution involves charting a new course for the future based on wise policies, then making a commitment to stay the course. It can be done.

100th Meridian Map