Selected Findings from
Confronting Climate Change in the Gulf Coast Region

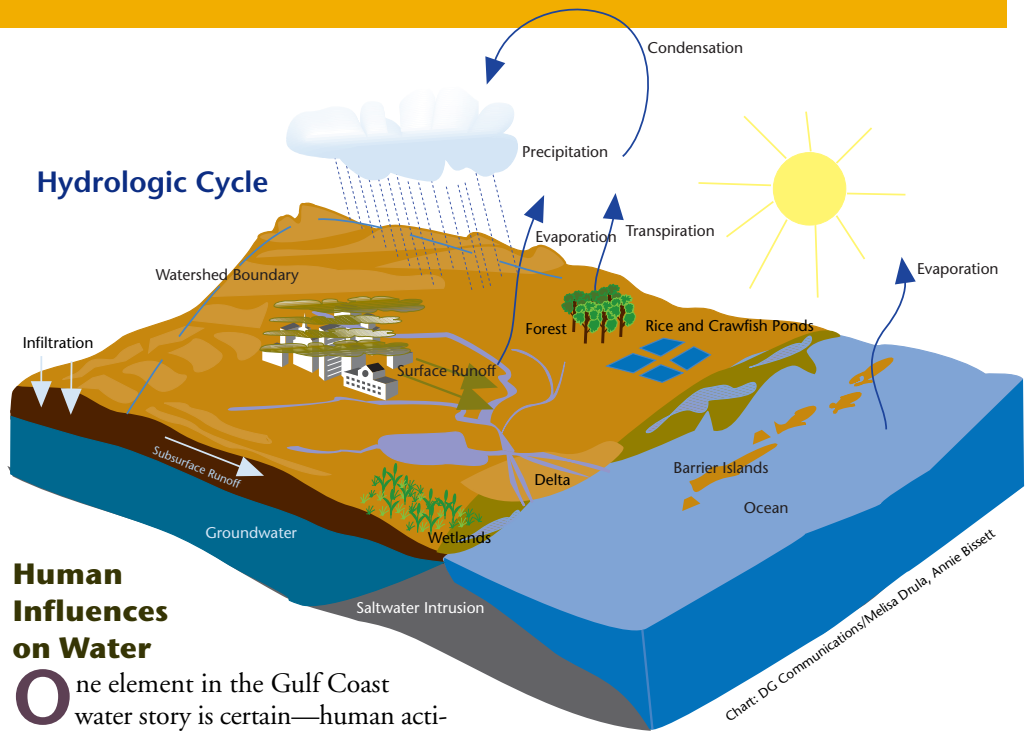
Prospects for Sustaining Our Ecological Heritage

The Gulf Coast's Most Precious Resource: Fresh Water

Gulf Coast ecosystems—including upland loblolly pine forests, freshwater marshes, and coastal wetlands—provide many goods and services to residents and communities in the region. From the uplands to the coast, these ecosystems are dependent on adequate amounts of fresh water, and they are inextricably linked by the flow of water and by the movement of water through the hydrological cycle. Changes in any part of the cycle or the landscape affect the other parts. A rapidly changing climate will undoubtedly alter the flow and availability of the region's fresh water.

Climate Model Projections

Scientists are highly confident about warming temperatures and a faster rising sea level for the region, but it is more difficult to predict changes in water availability and flow. Scientists use state-of-the-art climate models and other scientific methods to project plausible climate futures. For the immediate coastal zone of the southeastern United States, models agree that precipitation will most likely decline. The climate models do not agree, however, on the direction of change in water availability for other parts of the region—generally, one model projects drier and the other projects wetter conditions. Because future trends in rainfall and runoff are critical to human and ecological well-being in the region, the most prudent approach is to assess the potential impacts of both a drier and a wetter scenario. (See diagram on other side.)



Human Influences on Water

One element in the Gulf Coast water story is certain—human activities profoundly affect water flow, availability, and quality. Gulf Coast residents use fresh water for drinking, irrigation, industrial uses, and recreation. Demands on fresh water in the region are projected to rise sharply due to population growth and increased usage for agricultural or industrial processes. In addition, human activities such as dam and levee construction, river diversions, and wetland drainage have dramatically altered and will continue to change natural landscapes, waterways, and basic ecological functions—and, in the process, the water cycle.

Preparing for Changes in Freshwater Availability

Continued and increasing human influence will coincide with the changes in rainfall, runoff, and soil moisture. Given the currently dominant influence of humans on the availability and quality of fresh water, public and private sector water managers are key players in the region's future. Water managers must increase their flexibility and adaptive capacity to respond quickly and appropriately as water conditions change. They must ensure that:

- water resources and the various needs for this limited resource are fully inventoried, assessed, and monitored;
- water management planning, for both supply and demand, incorporates the immediate as well as the extended future;
- water needs of ecosystems are not neglected in the competition for the available fresh water; and
- scarce water resources are allocated to the highest priority uses, at maximum efficiency, and in a just manner.

Union of Concerned Scientists

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This fact sheet is based on the findings of *Confronting Climate Change in the Gulf Coast Region*, a report published in October 2001 by the Union of Concerned Scientists and the Ecological Society of America. The report was written by 10 regional experts under the leadership of Robert Twilley (University of Louisiana-Lafayette).

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The full report is available from UCS at www.ucsusa.org or call (617) 547-5552.

POTENTIAL IMPACTS OF A DRIER OR WETTER FUTURE FOR THE GULF COAST REGION

PROJECTED CLIMATE CHANGES IN THE GULF COAST REGION OVER THE NEXT FEW DECADES

Warmer: Average temperatures up by 3-5° F in winter and 3-7° F in summer.

Wetter and drier: Drier in coastal zone; wetter or drier in upland regions.

Extreme events: More frequent intense rainfall events, longer dry periods in between. Hurricanes more intense.

Sea-level rise: 13 inch average rise by 2100 in addition to local land sinking.

Climate variability: Continued temperature and precipitation variation, in part related to ENSO cycle.

THE DRIER CLIMATE SCENARIO

IMPLICATIONS

Higher temperatures (leading to increased evaporation) could bring more frequent and intense drought conditions, even if average rainfall remains the same.

Decrease in stream flow and higher water temperatures reduce water quality and impact fish and other aquatic organisms.

Higher risk of wildfires, especially if droughts are more intense and last longer.

More intense and/or frequent rainstorms may not abate drought, but runoff may increase pollution in streams, lakes, coastal water.

Decreased runoff from local rivers and higher ocean temperatures change water salinity and nutrient availability in coastal water.

POSSIBLE SOCIETAL IMPACTS

Crops that require substantial irrigation (cotton, soybeans, sorghum, vegetables, etc.) may become less profitable. Crops sensitive to salinity increases (rice, crawfish) would be vulnerable to SLR and reduced runoff. Higher temperatures and drier conditions favor spread of harmful invasive species.

Changes in aquatic ecosystems (food web, species composition, productivity) would affect commercial and recreational fisheries.

Water shortages drive up water prices and production costs and possibly lead to greater conflicts around water use.

More wildfires would maintain prairies and grasslands, but cause losses to forestry and private homes.

THE WETTER CLIMATE SCENARIO

IMPLICATIONS

More runoff can increase river flooding and severely stress urban sewage systems.

Severe coastal storms and higher sea level increase storm surges, coastal flooding, and beach erosion.

Increased runoff leads to soil erosion and fertility losses in upland areas, while also producing nutrient enrichment in downstream and coastal ecosystems.

Increased runoff into coastal waters could produce problems with toxic organisms and expand the oxygen-poor "dead zone."

More moisture increases the July heat index; also leads to more favorable conditions for agricultural and forest pests.

POSSIBLE SOCIETAL IMPACTS

Flooding and erosion would impact private property and public infrastructure affecting the construction, real estate, tourism, and insurance industries.

Beach loss, and/or closure due to problems with toxic organisms, would affect the important seafood and tourism industries as well as coastal ecosystems.

Soil fertility losses upstream create losses and higher costs for agriculture/forestry as more fertilization is necessary to maintain productivity. Possibly increased cost to maintain water quality.

Additional resources would be required to maintain, repair and expand flood response infrastructure (levees, flood water storage basins, emergency facilities, etc.), to protect shoreline areas, and to replenish beaches.

Increased risk of harmful algae blooms and water-borne and vector-borne diseases (e.g., malaria, dengue fever) would require greater investment in public health.