

South Texas Climate 2100: Reflections, Prospects, Prescriptions

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“In this world nothing is certain except death and taxes.” Ben Franklin (attributed)

Doomsday Reconsidered

In January 2007, the *Bulletin of the Atomic Scientists* advanced the “Doomsday Clock” on its cover from seven to five minutes to midnight, noting “the deteriorating state of global affairs.” The increased accessibility of nuclear weapons to desperate and irresponsible people, emerging biotechnologies and nanotechnologies that have highly uncertain benefits and costs, and the scientific consensus that global warming could lead to intolerable impacts on human well-being are noted with great concern in essays by highly respected experts in science, engineering, and public policy. The common theme across these essays was that future generations will be living in an increasingly complicated and more perilous world.

On the other hand, other respected scholars see ample cause for optimism about the future. As Flynn (2007) states, “Building a resilient society is not about caving in to our fears. Instead, it is about inventorying what is truly precious and ensuring its durability so that we can remain true to our ideals no matter what tempest the future may bring.” Human societies, writ large, have exhibited remarkable resilience at the edge of disaster, exhibiting considerable capacity for coping with changing environments and threats to survival. In this chapter, we highlight some of the ingredients that might imbue us with the sense of local and regional purpose necessary to creating more adaptive, resilient, and sustainable futures for people and nature in South Texas.

Creating Adaptive, Resilient, and Sustainable Futures in South Texas

“The flight into tradition, out of a combination of humility and presumption, can bring about nothing in itself other than self-deception and blindness in relation to the historical moment.” M. Heidegger

The previous chapters of this book have provided a scientific and engineering assessment of possible environmental impacts and consequences of the projected twenty-first century global warming likely to emerge across our South Texas landscape. There is little doubt that our current “problem climate” may become evermore problematic as a result of environmental changes described in the scenarios discussed in this book. If present and future generations of South Texan’s are to avoid the most serious threats posed by global warming and influence the future for the better, we need to have understandable and justifiable stories of where we may be headed and how we

might change course. The art and science of building a more adaptive, resilient, and sustainable South Texas future will be, in most instances, best understood in our particular local and regional, social, and ecological contexts; where complexity is comprehensible; where consensus is most likely; and where most decisions relevant to our region will originate.

While there are well described examples of past societies that collapsed due to a lack of capacity for adapting to environmental change (Diamond 2005), humanity has also demonstrated an amazing range of adaptations that enabled expansion to every continent except Antarctica. For the current circumstances and global warming impact scenarios discussed in this book, we conclude that adaptive strategies that enhance resilience and sustainability are urgently needed to cope with the threats of both current weather extremes and the projected global warming scenarios. Our strategy has three areas of focus:

- 1) protecting our most vulnerable people;
- 2) protecting unique public and cultural resources; and
- 3) insuring policy integration at the regional scale where social, economic, political, and environmental connections and coordination are most essential to making progress towards more adaptive, resilient, and sustainable futures.

Steps to a More Adaptive, Resilient, and Sustainable South Texas

“Will transformation. O be inspired for the flame in which a thing eludes you, resplendent with change. For the spirit of creativity, which masters what is earthly, loves in the figure’s swing nothing more than the turning point.”
Rainer Maria Rilke

The previous chapters of this book have focused specifically on how global warming will grow in importance as a threat to the existence of our coastal and interior ecosystems and to the water resources that are crucial to the sustainability of our communities and commerce in South Texas. The past history of weather and climate impacts on loss of lives and property supports our notion that Texans are seldom adequately resilient or adaptive to occurrences of severe drought, flooding, windstorms, heat waves, and other hazardous weather and climate events (Bomar 1983). In fact, the entire State of Texas has a long record of leading the nation in disaster losses, presidential disaster declarations, and other metrics used to measure societal vulnerability to impacts of weather and climate (e.g., Cutter 2001, 2006; Social Vulnerability Index for the United States 2007).

The aftermath of the devastation wrought by Hurricane’s Katrina and Rita on the coasts of Texas, Louisiana, and Mississippi pointed to the familiar characteristics that lead to catastrophic disasters. First, coastal and floodplain landscapes are being developed in a manner that increasingly places more lives and property at risk to threats from hurricanes, floods, droughts, and other environmental hazards. For example, unfettered growth in South Texas and adjacent areas of Northern Mexico is increasing the number of people and value of property at risk to threats of hurricanes, storm surge, flooding, water shortages, sea level rise, and other related weather and climate hazards described in the previous chapters of this book. Second, natural ecosystems and physical infrastructures that are crucial to community resilience and quality of life are deteriorating. The Texas Section of the American Society of Civil Engineers has detailed the serious nature of degraded and failing bridges, dams, roads, and other infrastructure throughout the state, including South Texas (TS-ASCE 2004). Third, Hurricane Katrina demonstrated that we have been unwilling at all levels of government to invest in the people and organizational capabilities necessary to mitigate or adapt to the impacts associated with extreme weather and climate events. Fourth, one of the lessons learned from previous disasters in South Texas, and elsewhere, is that within months, after the media attention goes away, we go back to business as usual. We can see all of these factors at work everyday in South Texas, and in our neighboring communities across the Texas-Mexico border.

Common sense suggests that reducing social and economic vulnerabilities to known risks is an obvious first step to becoming more resilient to future threats posed by the potential impacts of global warming discussed in this book. Poverty, unhealthy living and working conditions, limited access to education and other public services, and related factors are common in the rapidly growing low income segment of the population in South Texas and adjacent areas of Northern Mexico (Murdoch 2003). The unincorporated South Texas “colonias” may be among the

most vulnerable communities in America. Some of the most serious elements of the social vulnerability in these communities have been discussed by Ward (1999).

First steps in a transition to safer and more sustainable South Texas communities will require attention to:

- 1) the **sensitivities** of people and ecosystems to environmental change with special attention to hazards posed by extreme weather and climate events,
- 2) human and ecosystem **adaptability**, which is the coping capacity of people and landscapes mitigate or adjust to weather and climate hazards, and
- 3) the **causal factors** that underlie the social vulnerabilities to disaster.

The findings of this book suggest some urgent next steps:

- 1) conducting a comprehensive study of trends and indicators of disaster resistance and resilience to impacts of weather and climate extremes in South Texas and bordering towns in Mexico, and documenting progress, if any, made towards becoming more a more resilient society,
- 2) a vulnerability mapping program to guide immediate actions that will enhance the resilience and sustainability of our most vulnerable citizens and vital ecosystems, and
- 3) the engagement of our college youth, the next-generation citizens and community leaders of our region, in the design of a long-term sustainability action plan and policy recommendations for implementation.

Previous studies that provide both important insights and integrative methodologies relevant to conducting a socioeconomic assessment include Mazarr (1999), Murdoch et al. (2003), and Sharp (1998) Sharp (1994) and Schmandt et al. (2000). Cash et al. (2006) document the importance of paying close attention to scale and cross-scale dynamics as they influence governance and information relevant to planning for resilience and sustainability. The U.S.-Mexico border may be the most challenging place in North America to enhance resilience and sustainability due to a long history of benign neglect of a plethora of issues related to extreme poverty, poor quality education, and other social and health issues. The width of the Rio Grande, which can shrink physically to scores of yards in some places, might well seem more like hundreds of kilometers politically. Indeed, in some cases, even coordination of activities on just one side of the border is often difficult or nonexistent. In the end, human ties are split by national, state, and local government boundaries. Some commendable efforts to overcome the political boundaries can be seen and applauded, but coordinated regional decision-making about regional problems remains the exception and not the rule (Sharp, 1998).

A historical record documenting the social, economic, political, and environmental evolution of the region and the sectoral impacts and societal/institutional responses to past extreme weather and climate hazards would be important elements for integrating lessons learned about needed coping capacity across the region. Reminding community participants of past experiences with weather and climate disasters is an effective way to gaining their participation in thinking about scenarios of future impacts of climate and weather extremes. Using a forecasting by analogy method, the historical assessment should seek to answer the following questions: How have various segments of each community (schools, industry, residence, etc) adapted (or maladapted) historically to extreme weather and climate events? What lessons, if any, have been learned? What mechanisms of mitigation and/or adaptive response can one design to reduce impacts of future weather and climate events based upon historical experiences? A retrospective analysis is also useful for assessing strategic, legal, and institutional actions that could be crucial to enhancing resilience and sustainability of the South Texas region.*

A social assessment should map patterns of human vulnerability according to residential settlement location, socioeconomic stratification, population migration, and key health indicators and other variables. The social analysis should also involve a longitudinal assessment of population distribution and residential settlement, regional migration patterns (seasonal and inter-annual), and urban and rural growth trends and dynamics. Several key questions to be addressed include: What are the underlying causal factors contributing to socioeconomic vulnerability to extreme weather conditions and climate events?† What is the differential nature of social vulnerability within and between communities? What segments of society,‡ are more vulnerable to weather and

* e.g., land use planning, building codes, insurance, community education, etc

† income, ethnicity, education, residential location, information access

‡ socioeconomic status, ethnicity, age, gender, education

climate hazards than others? What is the potential for disease outbreak and transmission following events like flooding or extreme heat waves, and what are the homeland security implications for our nation? What are the potential areas of conflict that may arise between the US and Mexican governments or commercial interests as the risk of an extreme weather event increases due to global warming? What are the implications of potential changes in access to land and water among competing interest groups[§] during extreme drought conditions that may accompany global warming?

The Need for a Focus on the Future

“We walk backwards into the future, our eyes fixed on the past.” Maori proverb

Learning from the history of how South Texan’s have responded to and recovered from past destructive weather and climate events is only one aspect of preparing to be more adaptive, resilient, and sustainable in the coming era of global warming. Forces of social, institutional, political, and technological change will reshape society as the impacts of global warming reshape the environment in which we live. Sustaining a prosperous trajectory for future generations will also require:

- 1) a transition from the current complex and fragmented decision making processes to an integrative regional approach for natural resource and disaster management;
- 2) a much more effective engagement of citizens, and especially youth, in the processes of governance; and
- 3) new metaphors and stories that can stimulate broader public interest in thinking about the long-term sustainability of South Texas and neighboring communities in Mexico.

Cultivating these new foundations of thinking for future generations will require a fundamental restructuring of our educational systems in a manner that inspires confidence in youth that they can successfully solve the challenges of creating better futures. Gardner (2006) has made a compelling case that people will need five cognitive abilities to cope with the complexities of the future—mastery of at least one professional craft; the ability to integrate ideas from different disciplines into a coherent whole and to communicate that integration to others; the capacity to uncover and clarify new problems and phenomena; an awareness of and appreciation for differences among people; and an ethic of one’s responsibility as a worker and citizen. Future citizens with these skills will be prepared to consider a paradigm shift in how our region is viewed, focusing on balance, interdependence, and interactivity within a sustainable whole. Changing our ways of thinking, learning, and decision making is difficult, unsettling, and may require a major change in political power structures. The proposed transformations in our systems of education and governance may happen through reflective analysis of the unsustainable nature of our current lifestyles and environmental trends, or be forced on our region by a crisis that creates a sense of urgency and awareness of the need for fundamental change. One certain conclusion from our assessment is that a “business as usual” approach to the future will endanger the livelihoods and lives of all twenty-first century South Texans.

Why, if preventive measures already exist that would better prepare us both for the next hurricane landfall and for future impacts global warming, has our nation, state, and region not adopted them? What are the obstacles that prevent us from be better prepared and more resilient to the threats posed by extreme weather and global warming? How can we improve our capacity for taking prospective actions on becoming more adaptive and resilient to extreme weather and climate? The answer to these questions may lie, at least partially, in the “soft” nature of the fundamental forces that often influence the attention given to social vulnerability: human needs and values, cultures, political and economic power structures, and access to knowledge. Information on these variables is difficult to collect, interpret, and find consensus on. The science and engineering analysis of climate impact analysis is much more robust than the “art” of enhancing the future resilience and sustainability of the South Texas region. We recognize that the art of sustaining our South Texas region will require a clarion call based on an understanding of what drives motivation, aspiration, and will among our citizens and decision makers. It will value the diverse people

[§] commercial, environmental, agricultural, maritime, recreation

and cultures of our region and neighboring regions. It will recognize the power of intangibles like history, identity, desire, and their influence on perceptions of what is most important.

The authors of this book cannot predict exactly how global warming will change human lives and landscapes in South Texas during this century. However, this impact assessment does provide a range of plausible information on the trends, extremes, and consequences that may be associated with global warming. Because scenarios of the future do become more uncertain the further into the future the prediction, the state of our understanding must be revisited every five to ten years. As the power of computers increases, our understanding of how changes in human activities and ecosystems influence each other through “feedback” processes will improve and our capabilities for prediction will become more robust.

Measuring Progress

“Without contraries is no progression.” William Blake

South Texas is currently a catastrophe waiting to happen. We know that hurricanes, droughts, heat waves, sea level rise, and other weather and climate extremes will intersect with our social vulnerability and fragile ecologies to create future megadisasters. Sadly, leaders and institutions at all levels of governance are underestimating the growing fragility of our region and failing to tap known strategies for enhancing regional resilience and sustainability. Creating a safer and more sustainable future for South Texas is something citizens, the business community, and our elected officials must embrace. It is time to negotiate our fears, mediate what sustainability means to each of us, and to begin organizing for better futures. As Marcel Proust wrote, “The real voyage of discovery consists not in seeking new lands, but in seeking with new eyes.” The first step to creating more sustainable futures for South Texas is changing minds, not making more plans.

Progress on achieving a more resilient and sustainable South Texas economy and ecology will occur in small steps. Significant progress on creating a more resilient and sustainable South Texas will require:

- enhancing the safety and resilience of our most vulnerable people in South Texas and adjacent cross-border communities;
- maintaining and enhancing community prosperity and economic resilience in the face of global warming and other threats to sustainable development;
- conserving and giving value to natural ecosystems and cultural heritage; and
- achieving progress on the design and implementation of effective regional policies and financial initiatives dedicated to sustainable development.

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