PRACTICAL ISSUES RELATED TO CLIMATE CHANGE IN FLORIDA: A WORKSHOP ON NEEDS ASSESSMENT AND RESPONSES

January 12-13, 2006
Palm Beach Gardens, Florida

SUMMARY REPORT

Florida Center for Environmental Studies
www.ces.fau.edu

WHAT SHOULD FLORIDA DO NOW TO PREPARE FOR THE IMPACT OF CLIMATE CHANGE?

Executive Summary

Climatic change in Florida today is a combination of cyclic fluctuations, primarily natural in origin, and long-term trends responding to human-induced changes in the atmosphere. Notwithstanding the ongoing debate about causes, Florida is impacted by climatic change and needs to address current and future impacts in many sectors of government and the economy. On January 12-13, 2006 a workshop was convened to begin to address these issues and determine appropriate actions. This report summarizes its findings.

While many impacts of climate change were discussed, the following were determined to be the most important:

- Sea level change, current and projected
- Parallel changes in storm surge
- Precipitation changes
- Increased climate extremes (hurricanes, flood, drought)
- Water supply and water quality changes
- Temperature changes, particularly winter changes in central and northern Florida
- Impacts on agriculture
- Impacts on health
- Impacts on coastal communities

Each of the above potentially poses a major impact on the economy and people of Florida.

The workshop also emphasized the differing priorities and impacts across the state. On a statewide basis the exacerbation of storm surge and flooding due to sea level rise and extreme weather events, as well as the trend toward more intense hurricanes are critical issues, which will impact comprehensive planning and hazard mitigation planning. In northern Florida issues of interstate water management, storm surges on the gulf coast and the need for faunal adaptive management were important. In central Florida, lake hydrology and productivity, tourism, changes in agriculture and disease patterns and sea level rise on the coast were highlighted issues. In southern Florida the impacts of sea-level rise are very important with implications for coastal transportation, insurance, tourism and water management.

While climate change will impact the entire state, this clear regional differentiation led to the recognition of the need for diverse regional task forces to better define and address these issues. Workshop follow up will be directed toward a wider dissemination of its findings, more in-depth analysis of the issues and a major conference on the issues in 2007. It is also proposed that the governor establish regional task forces.

WHAT SHOULD FLORIDA DO NOW TO PREPARE FOR THE IMPACT OF CLIMATE CHANGE?

Introduction

The title above expresses the main focus of a two day workshop, hosted by the Florida Center for Environmental Studies January 12-13, 2006, in Palm Beach Gardens, Florida. The workshop brought together 46 professionals, including members of three water management districts, government departments of environment, agriculture, wildlife, health and transportation; regional planning councils; the USGS, USDA, and NGO's, (including The Nature Conservancy, National Wildlife Federation and the Natural Resources Defense Council); several state universities; and the private sector (including FPL) and a small number of invited authorities from outside the state. The participants were chosen to provide expertise on natural systems, agriculture, human systems (including economy, health, education, employment and social services) and the built environment (roads, housing, utilities, canals, water control structures and the like).

As debate about the extent and underlying causes of climatic change continues, there is general agreement that changes are occurring. While some decision makers in other states are incorporating the potential impacts of climatic change into their plans and decisions, there is little public evidence that this is taking place in Florida.

The goals of the workshop were to produce:

- An understanding of Florida's current status regarding planning for climate change.
- An agenda for further analysis and discussion.
- Identification of priority areas for which current planning should include consideration of climatic change impacts over the near (current-10 years), medium (10-20 years) and long-term (20-50 years).
- Findings that will be used to develop a larger conference on this topic in early 2007.

The workshop consisted of five plenary presentations, three discussion groups and a final plenary group presentation and discussion. Because it was recognized by the workshop planning committee that the impacts of climate change are different in northern, central and southern Florida, breakout discussion groups were organized on this regional basis. (Annex 1 lists the participants, the workshop agenda and the questions the breakout groups were asked to address).

While the workshop directed most attention to Florida's need to plan for and respond to climate change impacts, it was also recognized that the State also had a responsibility to more effectively mitigate its own impact on the global change picture.

Key Workshop Findings

- Climatic change is already impacting several different sectors of Florida's environment, economy, water quality and supply, agriculture and coastal management and will inevitably have a continuing, and in some cases, growing impact in the future.

- Examples of measured changes include:

    - Sea level rise (SLR)
    - Increased winter lake water temperatures with decreased mixing of water
    - Northern movement of sub-tropical species approximately 40Km. for every one degree of temperature increase
    - Increased occurrence of major hurricanes (categories 3 to 5 in the Saffir-Simpson scale) and potential linkage to climate change.

- Other projected changes include changes in the following:

    - Fire regime
    - Volume and intensity of rainfall impacting storage and run-off
    - Fresh water/salt water interface
    - Patterns of health and disease
    - Ecology of watersheds
    - Differences in extreme climatic events, flood and drought

- There is significant research on many (but not all) of these issues. However, there is little communication between researchers on these subjects in Florida, and almost no coordination. A large part of the research effort in the state producing information on climate change data is a by-product of studies addressing other issues.

Projecting Future Climate Change in Florida

Many scientists at the meeting believe that, because of issues relating to geographical definition and time scale, global models of climate change provide only a general basis for projecting Florida's future patterns of climate change. As a result, much more work needs to be done on developing sub-models for Florida. This is certainly possible, especially with the recent improvement of global models. In addition, because Florida is a peninsula, there is a strong oceanic influence on Central and South Florida that contrasts with North Florida's more temperate climate influenced by adjacency to the relatively shallow Gulf of Mexico. This is illustrative of the ecological variability across the state's relatively small change in latitude and the need to recognize regional differences when planning for the impacts of climate change.

Some general projections are sound enough, however, to make it prudent to include them in plans and projects in several different sectors.

These projections include:

- The near inevitability of continuing sea level rise; only the exact rate is uncertain
- New patterns of storm surge
- Continued increase in mean temperatures in central and northern Florida, especially in winter
- Increased variability in precipitation and therefore in stream flow
- More extreme events

All of these have important potential impacts on the economy, agriculture, coastal management, health and environmental management.

Selected Climate Change Planning Activities in the United States

Part of the initiative for this workshop was the realization that other states had taken action on climate change even though some potential impacts were not as great as those facing Florida.

David Major, our invited guest from Columbia University, reported on the work of the New York City Department of Environmental Protection's Climate Change Task Force, begun in 2004. The Task Force, which has representatives (20-25) from all bureaus of the Department of Environmental Protection, engineering firms, and Columbia and other universities, has carried out its work in cooperation with Columbia's Center for Climate Systems Research. Their efforts have been to ensure that New York City's Department of Environmental Protection's strategic and capital planning efficiently take into account the potential risks posed by climate change on the city's water supply and wastewater treatment systems. Those risks include sea level rise, higher temperature, increase in extreme events and changing precipitation patterns.

As precipitation projections vary widely, reservoirs and aqueducts must be built to accommodate both more and less precipitation. Sea level rise includes both subsidence and thermal expansion. Some models project a global increase of almost 1 meter by the end of this century. Sea level rise affects both the design and operation of sea level facilities. The impact of storm surge under a sea level rise scenario showed major utility facility sites with potential flood hazards. In response to this assessment the city is building new design criteria into sewage treatment plants, coastal structures and the like. Long-term plans must be robust as exact future conditions are unknown.

Elsewhere in Florida and the United States there are many examples of state and local initiatives. In Florida, Miami-Dade county has worked for many years under the leadership of Harvey Ruvin on a range of energy saving and environment protection measures. Mayors around the country have set up an association to deal locally with the reduction of emissions and to develop responses to the impacts of climate change. In another example, states in the Northeast have formed a regional green-house gas initiative.

Results of Discussion Group Analysis

Five questions were posed as the focus for breakout groups:

- What are the key elements of potential climatic change?
- What research is being done on the potential effects of climate change and what degree of awareness exists?
- What topics and types of current decisions need to include the prospects of climate change?
- How best to respond to components of climate change? (Mitigation, Minimization, and/or Adaptation?)
- What management entities are most appropriate to address climate change issues?

We will summarize the responses to those questions in four ways: impacts affecting all Florida, North Florida, Central Florida and South Florida respectively.

Climate Change Impacts Across Florida

All of Florida will be impacted by sea level rise, changes in hurricane frequency and intensity, changes in the intensity of flood and drought, and temperature increase. These climate changes are and will cause changes in flora and fauna, agriculture, economy and life-style. Though impact levels vary, all regions of the state will encounter socio-economic changes including:

- Increased housing and insurance costs, especially related to storm events and sea level rise
- Energy consumption and transportation changes
- Cost of infrastructure improvements including roads, sewer systems, waste-water treatment facilities, water control structures and property protection
- Changes in agricultural crops, diseases and practices due to both temperature and rainfall changes
- Health issues including increase in tropical diseases, water quality concerns and increases in harmful algal blooms

The group emphasized the need for a better awareness of these issues at all levels, and for the inclusion of climate change parameters in a number of current decisions which affect the longer term.

North Florida

Four distinct issues were identified for North Florida each needing current planning and decisions.

- Interstate Water Management
  This issue is currently with the courts based on conflicts between upstream (Alabama and Georgia) and downstream (Florida) water needs. Climate change projections are that

rainfall will be more variable and the recommendation is that any agreement on interstate water allocation should take this projected variability into account

- Coastal Management
  The coast of North Florida is very gently sloping and is currently being rapidly developed with a hardening of the coast by sea walls to protect the new developments. A general coastal management plan taking into account the reality of increased storm surge in this vulnerable area seems an important current response.

- Faunal Adaptive Management
  As climate warms the floral and faunal zones are migrating northward. As the area becomes increasingly densely populated land conservation plans should be modified to allow for northern migration of fauna through conservation pathways.

- In State Water Management
  Because of the coastal nature of much of the region careful monitoring of salt/fresh water boundaries and of the flow of needed fresh water into the estuaries will be important.

Central Florida

The Central Florida group noted that key economic areas of this region would be impacted including:

- Tourism (Disney and other theme parks, coastal beaches, fishing, etc.)
- Agriculture – under changing temperature and rainfall regimes
- Coastal cities and infrastructure susceptible to increased severity of hurricanes (Tampa, Clearwater, Kennedy Space Center)

The group emphasized the need to quantify the economic impacts for the region. Species change and water supply were important concerns in Central Florida. Also mentioned were the health implications of the spread of tropical diseases, water quality issues, and increases in algal blooms and red tides.

There is a lot of diverse research underway in Central Florida including bio fuels, forestry management, best management practices (BMP) and the like. There is a special need for coordination among agencies to deal with climate change and to link academic and engineering initiatives.

The group also emphasized the need to bring a diverse group of stakeholders together including people from tourism, agricultural, urban development and planning, insurance, public health, industry, engineering sectors and, of course, the Water Management Districts. It concluded that there was a need to view the issues holistically and recommended a task force on the impacts of climate change in Florida empowered with real authority.

South Florida

The South Florida group developed an extensive list of climate change impacts building on those provided in the original question, which included watershed changes, sea level rise, etc. The South Florida group emphasized the extensive socioeconomic impacts of climate change and also recognized that some of the impacts that are more significant in South Florida than other parts of the state including:

- Freshwater supply and quality (threat of salt-water intrusion, aquifer impacts, wind stirred turbidity and algal blooms)
- Changes in coastal bays and estuaries
- Coastal development/sea level rise
- Everglades restoration

Much of the research being conducted for the Comprehensive Everglades Restoration Plan is relevant to climate change issues, although the main reason that it is being conducted is to deal with human-related impacts of an increasing population.

The group recognized several key studies dealing specifically with climate change in South Florida, including those focusing on sea level rise:

- Miami-Dade County
- EPA/Regional Planning Councils
- South Florida Water Management District

The group also identified other studies and planning tools, which although not specifically done to address climate change issues may have application in this field. Examples of these are:

- Storm Surge Atlases developed for each county
- State Comprehensive Emergency Management Plan
- State Hazard Mitigation Plan and the Risk Analysis it contains

When considering what kinds of decisions should include climate change factors, the consensus of the group was that all the infrastructure and facilities need to be examined right away, with understanding that certain projects are long-term because they have different life cycles. The group recommended using the following time frames

- Very near term 0 – 10 years (sea level rise issues and hurricane cycle)
- Near term 0-30 years (coastal development based on 30-year coastal erosion)
- Medium term 0-60 years
- Long term 0-100 years (Everglades restoration's need to monitor ecosystem response)

Suggestions for climate change responses included:

- Relocation of coastal structures and reduction of coastal development - to address coastal erosion / sea level rise
- Design/build flood control defenses to protect built-up coastal urban areas against sea level rise and increased storm surge
- Change zoning and purchase areas identified as flood prone to prevent costly flood damage.
- Eliminate federal cost sharing for beach renourishment and insurance subsidies in coastal areas
- Review availability and cost of flood insurance to address flooding
- Institute a rolling easement program and purchase or rezone land to accommodate migration of coastal habitats
- Institute green building standards to reduce energy consumption
- Increase funding for alternative water-supply sources, desalinization, water conservation
- Incorporate sea level rise considerations in water management infrastructure refurbishing
- Institute state and federal legislation that requires incorporation of climate change into all facets of development/construction programs
- Educate public on coastal hazards

The group concluded that a diverse set of stakeholders should be involved in planning for climate change, including federal and state governments, cities and counties, regional planning councils, corporations and associations. They emphasized the importance of communicating opportunities as well as problems.

Summary Conclusions of the Workshop

1. Climate change now and in the future is a reality for Florida.

2. The impacts of climate change include rising sea level, more intense hurricanes, bigger storm surges, more variability in seasonal rainfall (droughts and floods), and changes affecting agricultural crops, invasive species, water supply, lakes and public health risks.

3. While some impacts of climate change are projected to occur years in the future, some are occurring right now.

4. Consideration of the diverse impacts of current climate change and projected climate change should be incorporated into many decisions now being made by the public and private sector.

5. Some other states, less vulnerable than Florida, already are beginning to deal with these issues.

6. In Florida, agencies and departments, cities, planning councils and water management districts need now to take these conditions and predictions into account when planning medium to long-term needs (e.g. we cannot realistically project future water supplies based on historic conditions that are fundamentally changing).

7. The Florida Center for Environmental Studies and the University of Florida will set up a planning group for a major conference on these issues in spring 2007.

8. Workshop participants requested that a letter be sent to the Governor of Florida, through the President of Florida Atlantic University, asking the governor to appoint a state task force or regionally-based (north, central, south) task forces to begin to develop a state-wide policy on preparing for and adapting to climate change.

Annex 1.

Climate Change Workshop Participants

Ricardo Alvarez, Florida International University
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James N. Bradner, Department of Environmental Protection
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Annex 1.

Practical Issues Related to Climate Change in Florida: A Workshop on Needs Assessment and Responses

Thursday, January 12, 2006

10:00 - 12:00pm	Welcome and Introduction (Salon A & B) Concept, goals and objectives	Leonard Berry
	Opening Presentations Climate change science: A brief overview What's happening in other states Current climate-related planning & adaptations in Florida Political considerations (opportunities and challenges)	 Tom Crisman David Major Harvey Ruvin Richard Pettigrew
12:00 - 1:15pm	Lunch (Salon A & B)	
1:15 - 5:15pm	Breakout Sessions (Salon C – South / Palm Beach – Central / Juno Beach - North)	
2:45 - 3:00pm	Refreshment Break (Salon A & B)	

Friday, January 13, 2006

9:00 - 9:30am	Opening Presentation (Salon A & B) How to address risk and uncertainty when planning for climate change	Mark Harwell
9:30 - 10:30am	Breakout group reports	Len Berry Susan Glickman Peter Merritt
10:30 – 10:45am	Refreshment Break (Salon A & B)	
10:45 - 1:00pm	Summary, discussion, individual comments	All Participants
12:00 - 1:00pm	Working Lunch (Salon A & B)	

Annex 1.

Climate Change Workshop Questions

1. What are the key elements of potential climatic change in your region (north, central, south Florida)? Parameters – temperature, precipitation, sea level rise, variety and intensity of storms, other. Impacts - watershed change, vegetation change, run off intensity, recurrent drought, sea level change, population increase, other
   Include effects from both climate variability and effects of gradual change.

2. What research is being done on these potential effects from climate change and degree of awareness?

3. What areas of concern and kinds of decisions should include climate change factors? E.g., water management, storm water runoff, sewage systems and wastewater treatment plants, construction, coastal development, power plant construction, crop research, growth management.

   Consider – near (current 10 year), medium (10–20 years) and long-term (20–50 years)

4. Continuing the previous discussion topic, how best to respond to each area:
   a. Mitigation (reduce magnitude of stress)
   b. Minimization (reduce human disturbances, zoning, BMPs, stormwater) and/or
   c. Adaptation (review plans for adaptation/institute adaptive management)

5. What management entities (municipalities, counties, state, companies, agencies, associations and political institutions) and other decision making partners are the most appropriate to address climate change issues. What questions, if any, are these entities addressing?

   Consider near- (current 10 year), medium- (10 – 20 years) and long-term (20-50 years)