

Lake Worth Lagoon: Defining the Future of an Urban Estuary

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by
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Good morning everyone. Thank you for inviting me to provide the keynote address for this very important Lake Worth Lagoon Symposium. I would like to thank the Palm Beach County Department of Environmental Resources Management and all of the symposium sponsors. Special thanks are due to Ginny Powell, Chair of the Lake Worth Lagoon Symposium Planning Committee, the planning committee members, and all of the volunteers who have made this symposium possible. Also, many thanks to Ginny Powell and Mark Crosley, Assistant Executive Director of the Florida Inland Navigation District, for a great field trip along the Lagoon. I am honored to be your keynote speaker this morning.

This morning, I drove down from Brevard County and remembered my early recollections of this region (which began with childhood visits in the late 50's and early 1960's) and how rapidly Florida has changed over the past four decades. Close your eyes for a moment and imagine what Florida's Atlantic coastal estuaries might have looked like to the native Indian tribes of east Florida – Timucuan, Ais, Jeaga and Tequesta.

Now consider the individual and collective ecological and economic attributes of these systems that supported these tribes and our communities today: the Guana River, Tolomato River, Matanzas River, the Mosquito Lagoon, Banana River Lagoon, Indian River Lagoon, and Lake Worth Lagoon - all stretching from north to south like a great string of coastal pearls.

It's hard to image what these systems looked like four centuries ago, but we do know what these systems look like today and the value that they contribute to our quality of life. The great lesson of effective estuarine restoration is that it requires a multidisciplinary approach and a unified community vision to achieve desired post-restoration conditions.



The great challenge for 21st century urban estuaries will be to apply responsible policy and stewardship decisions based on the best available scientific information. The decisions we make today will direct the ecological and economic trajectories of these systems for the next decades and beyond – ultimately determining the value of these assets for future generations.

So if you swim, fish, boat, or bird watch...own a house or condo within the region... or just appreciate the scenic views of a healthy coastal ecosystem – you are a stakeholder in the future of the Lake Worth Lagoon. In fact, every citizen of Florida and all of our visitors are stakeholders in the future of the Lake Worth Lagoon. Why? Because the direct and indirect values of this estuary reach beyond the borders of Palm Beach County and Florida.

Today's symposium will provide a great amount of information on the natural and social systems of the Lake Worth Lagoon. The great challenge for all urban centers and urban-natural area transitions is to develop a community vision for a preferred future and to implement strategic actions to achieve that vision.

For Palm Beach County and the Lake Worth Lagoon – the challenge is overcoming more than a century of ecosystem alterations, and in some cases abuse, and to redefine the built environment in context with the historical and natural environment. The bottom line for the Lake Worth Lagoon is that urban renewal and estuary restoration go hand in hand.

The noted tourism writer, Herb Hiller, called Palm Beach “*a county of superlatives and contrasts*”. Google the phrase “*plunge against the grunge*” – and you will be immediately understand what Herb meant. While it's hard to imagine how ecosystem decline can occur with a knowledgeable and caring community. The fact is that these declines are similar to the slow creep of Alzheimer's disease. It's easy to overlook subtle symptoms until a catastrophic health crisis finally occurs. What is encouraging is the public response once risks are identified and a community is mobilized to lead change. Education is critical to sustaining that public recognition and support

In 2005, Herb Hiller referred to Palm Beach County as “*the fight to get Florida right*”. It's a fight that carries a tremendous value and return on your investment. The citizens and communities along the lagoon should be proud of your progress, innovation and commitment to improve the Lake Worth Lagoon.

Several years ago, I had the pleasure of working with Michael Gallis and Associates (Charlotte NC) as a community volunteer for the 7-county “myregion.org” regional visioning process in central Florida. Gallis is recognized nationally as a “guru of metropolitan planning and regional thinking”. Contracted by myregion.org to help establish a framework for regional thinking, Gallis focused on three basic principles: “1. Understand the Forces that Create Change; 2. Recognize the New Global Patterns; and 3. Capture the Opportunity”. He stressed the importance of understanding the social, political, and economic transformations that are reshaping communities throughout the world. I would add that environmental transformations are a critical and often overlooked fourth consideration.



Environmental quality and quality of life considerations are a foundation for planning the future of high quality coastal urban centers and urban estuaries in the 21st century. And in my opinion, Florida's ocean and coastal assets are the primary engine that drives Florida's economy.

Palm Beach County and the coastal cities and towns along the Lake Worth Lagoon are in a great position to become a model for urban estuary stewardship thanks to the pro-active efforts of Palm Beach County ERM, the many partners from both the public and private sectors that developed the Lake Worth Lagoon Management Plan in 1998 and have been dedicated to its implementation.

The Management Plan represents a strong foundation for decision making, restoration, and leading change. However, after almost ten years, it's time to re-look at this document, update sections that need revisions, reconsider priority actions based on progress over the past decade, and identify emerging issues and new opportunities.

It is important to recognize that the original 3 goals of the Plan remain as valid today as they were in 1998: Attain and maintain...

1. Water and sediment quality
2. Biological integrity
3. Heightened public awareness and education to accomplish the plan's mission statement.

It's also important to recognize that to develop and attain a unified community vision for the Lake Worth Lagoon, you must understand that the Lake Worth Lagoon is an estuary in transition...a transition that began 130 years ago when its waters were connected to the sea.

Our scientific knowledge and technology capabilities have advanced over the years to enable better understanding of the physical, chemical and biological conditions and processes essential to sustain a healthy estuary. Central to this understanding is investment in scientific research. This includes the "3-M's" – Mapping, Monitoring and Modeling, 3 priorities established by the Florida Oceans and Coastal Resources Council (2006).

As a community, you have made important progress and have much to be proud of, but we have many gaps in scientific knowledge as our understanding evolves from descriptive-level to process-level considerations at a variety of spatial and temporal scales.

Last year (2006), I proposed 4 questions for the scientific community at the 25th anniversary of the First Indian River Lagoon Science Symposium. I believe that those questions are worth restating here:

- Do we have the intellectual capacity and infrastructure within the region to advance our understanding of Lake Worth Lagoon ecosystem processes and to apply this

knowledge to address immediate problems and guide long-term stewardship strategies?

- As a scientific community, are we focusing our scientific inquiries and available funding on the right scientific questions, addressed at the appropriate spatial and temporal scales (and the integration of scales)?
- Are we applying available state-of-the art technologies, methodologies, new emerging concepts, and coordinated long-term inter-disciplinary research to fuel innovations in thought and discovery?
- Are we communicating our scientific knowledge and discoveries in a factual, objective, honest and accountable way to generate public interest, support and trust? Do we communicate this knowledge effectively to all stakeholders and all citizens?

On a national level, there is an emerging understanding of ocean and coastal issues that should have every citizen both excited, as well as concerned. At no time in the past 3 decades has public awareness and interest in ocean and coastal issues been greater. Unfortunately, this public awareness has emerged as a result of a suite of emerging ecological threats that challenge the sustainability of coastal resources at both local and global scales.

These ecological “threats” and the need for scientific research have been documented in a number of historic reports: Pew Ocean Commission (2003); U.S. Commission on Ocean Policy (2004); Defying the Ocean’s End Conference (Glover and Earle, 2004); the ocean research priorities plan and implementation strategy of the National Science and Technology Council Joint Subcommittee on Science and Technology (NSTC JSOST, 2007); and the Intergovernmental Panel on Climate Change report (2007).

For the Lake Worth Lagoon emerging issues for concern that are not adequately addressed in the 1998 management plan include (but are not limited to):

- Impact of global climate change on weather patterns, sea surface temperatures, sea level, and ocean-atmosphere carbon cycling.
- Emergence of infectious diseases in marine species.
- Impacts of invasive exotic species.
- Physiological adaptations and limitations of marine and estuarine species to changes in critical habitats (including water column quality).
- Understanding how plants and animals respond to changes in physical, chemical and biological conditions.

The noted scientist, E.O. Wilson (1998) said: “*We are drowning in information while starving for wisdom*”. Who in this room hasn’t read conflicting scientific papers or recent news about environmental issues? Who hasn’t been confused about how to identify high quality science?

It is important to understand that the Lake Worth Lagoon is a complex ecosystem. It has, and will continue, to challenge our full understanding. More importantly, marine and estuarine systems are functionally coupled to the land, must be considered as an integrated coastal landscape unit, but may be substantially different from terrestrial systems (Granek, 2005).

Central to protecting the Lake Worth Lagoon is understanding the complex physical, chemical and biological processes that define a functional estuarine ecosystem. Sadly, there are emerging ecological “red flags” for concern in all ocean and coastal ecosystems. These issues span the scale from local impacts to global ocean change. The combined spectrum of change presents profound implications for coastal communities and urban centers as they plan for the future.

More importantly, it is critical that we use common sense in our approach to ecosystem stewardship. If you look at the primary pressures most often cited by coastal resources managers you will see three dominant themes:

1. Growth and associated land use changes;
2. Habitat alteration and loss; and
3. Water quality.

What concerns me as a scientist today is a trend towards oversimplifying an ecosystem as a social marketing approach to discuss ecosystem management.

Like most urban estuaries, the Lake Worth Lagoon has already been impacted by significant human-induced transformations that began over 100 years ago. The relevant question today is not how do we restore it back to its natural freshwater condition? Nor is it an arbitrary ecological condition of some long past point in history. The relevant question is what do we need to do today to ensure that the lake Worth Lagoon’s current and future ecological, economic and quality of life value is sustained and possibly improved for future generations?

Trust me, it’s not just about urban stormwater runoff, or agricultural runoff, or atmospheric deposition, or climate change, or litter, or identifying some “species de jour” to crown as the ecological indicator of lagoon health. The real challenges is to integrate all of the physical, chemical and biological attributes of the lagoon at a process level of understanding, to understand the spatial and temporal scale of ecosystem stressors, and to develop predictive models for ecosystem change.

A recent scientific publication proposing a Lake Worth Lagoon Conceptual Ecological Model by Dianne Crigger, Greg Graves and Dana Fike published in the scientific journal, *Wetlands* (2005) is a good starting point for that scientific discussion. But we need to develop both qualitative and quantitative predictive models as an ultimate goal. We also need to integrate the economic, social and political factors that influence use of the Lake Worth Lagoon.

How do we define the future of the Lake Worth Lagoon? I have several recommendations to think about:

- Identify a compelling community vision for the Lake Worth Lagoon as an ecological and economic asset that unifies the region and creates a strong sense of place.

- Understand the role and value of science to resource management and policy. Create a management structure that forces an on-going dialogue between scientists, resource managers, policy makers and the public.

“Managers of coastal and marine resources face the challenge of balancing conservation and development objectives in the context of the inherent uncertainty of natural systems and the political and social pressures of human systems. In order to make the wise decisions necessary to achieve this balance, decisions on commercial or recreational use of these resources must be coupled with an increasingly comprehensive understanding of the marine environment and of the socio-economic factors that influence use of that environment. In this complex undertaking, research no longer simply seeks to understand nature and its interactions, but plays a critical role in finding answers to pressing questions that managers and public policy makers have in their efforts to achieve a balance between sustainable use and conservation of Florida's natural resources.”
(Florida Oceans and Coastal Resources Council, 2006).
- Understand the complex physical, chemical, biological processes that combine to form the basis of a functional and healthy Lake Worth Lagoon. Scientific data suggest that for the Lake Worth Lagoon, water quality (including salinity, nutrient loads, pollutant loads, total suspended solids and hydrodynamic flow) continues to be one of the most significant factors in lagoon health. To understand this complex hydrodynamic system you will have to look upstream and offshore. We need predictive models. We need a better understanding of the basic biology and physiology of the plants and animals response to water quality changes. We need permanent monitoring platforms and long-term funding to monitor ecosystem attributes and trends (see FL COOS at <http://www.marine.usf.edu/flcoos/>).
- Consider the ecological attributes of the Lake Worth Lagoon as an integral component of smart growth, land-use planning and urban design.
- Quantify the economic value of the Lake Worth Lagoon and integrate those natural resource values and economic sector considerations with economic development and diversification in the region. The public will support scientific research and restoration if they understand the true economic value of the Lake Worth Lagoon estuarine economy.
- Recognize that the public well-being rests on a foundation of three interdependent and equally important pillars which are the core responsibility of society (Holdren, 2007):
 - Environmental conditions and processes
 - Sociopolitical conditions and processes
 - Economic conditions and processes

- Think regionally and super-regionally. This is especially important as Florida coastal communities leverage available funds and address the challenges and opportunities of climate change.
- Trust in your community capacity to create positive change. Identify and cultivate community leadership. Be inclusive.
- Take action for positive change. Build on the past success of habitat restoration (i.e. Munyon Island, Peanut Island, Snook Island, Ocean Ridge Natural Area, *et al.*). Continue to focus on the significant water quality benefits from the C-51 and S-155 control structure projects.

I hope that these thoughts provide a background for the excellent presentations to follow today. You have everything to gain by setting what author Jim Collins called in his book, Good to Great, the BHAG (“big hairy audacious goal”) for the Lake Worth Lagoon... and having the community work together to achieve a unified community vision.

Science and technology can give you the knowledge base and technology tools, but public awareness, empowerment and action will get you there. Great urban centers are defined by sustainable urban design. For Palm Beach County and the Lake Worth Lagoon sustainable urban design is a combination of the infrastructure assets, human assets and environmental assets that combine to create lasting economic, social and environmental value today and for future generations.

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