



Concluding Thoughts on Science, Law, Modeling and Water Management

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Take home messages on:

- Models and other tools for decision making
- Water management in South Florida
- Regulation and law for water management
- Managing diverse perspectives
- Facing the challenges of uncertainty
 - ▶ Especially climate change

Models

Many good examples in South Florida

- Regional hydrologic simulation
- Estuarine studies and planning
- Groundwater & water use permits
- Lake Okeechobee and its watershed
- Species and biological communities
- Drought and in emergency operations
- Everglades restoration and planning uncertainty

Some models or other technical products are not on target for their client's needs

■ Some technically wonderful products never get used

■ Why?

- ▶ *Inappropriate scale or level of complexity*
- ▶ *Not practical given available data and computational resources*
- ▶ *Uncertainty too great for intended application*
- ▶ *Not available when needed for decisions*

■ Remember:

- ▶ **The client determines value, not the expert!**
- ▶ **Value is the ability to influence decisions**

Planning for Success

■ Differing views of technical information

Scientists, engineers and lawyers

VS. managers, decision makers and clients

▶ Understand needs first

- *Before engaging in an intensive and expensive effort*

▶ Decision makers want alternatives and relative risks

- *Numbers alone won't work*

▶ Conceptual modeling can help in all fields

- *Processes, effects and valued resources*

Successful Models or Other Products

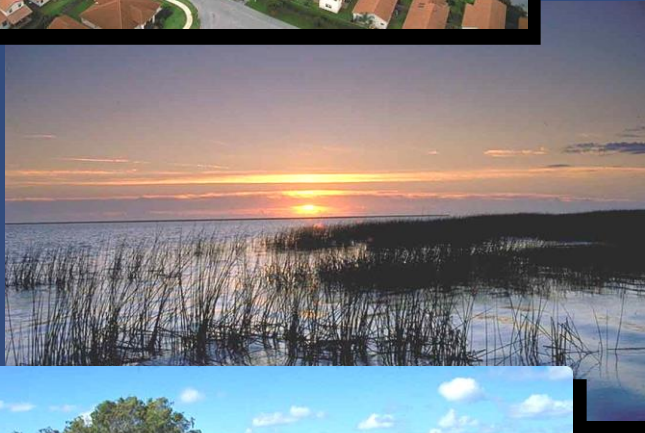
- Effective environmental modeling:
 - ▶ *Addresses critical issues without getting buried*
 - ▶ *Documents structure, assumptions, sensitivity & uncertainty*
 - ▶ *Demonstrate reliability with calibration & validation*

- Complexity and innovation $\neq$ usefulness?

Universal Environmental & Water Management Challenges



Restoration is a moving target
Funding is a huge challenge
Law/policy conflicts slow progress



***Adaptive management
and win-win collaboration
are essential***

***The STA planning process (LTP)
and EFA as a good example***



Challenges of Law & Policy

LEGAL ISSUES

- Competing levels of governmental authority
- Clearly drafted definitions muddy over time
- Litigation as strategic tool; courts do the unexpected
- Hard numbers (and dates) sometimes cannot be met and require flexibility

PRAGMATIC ISSUES

- Value differences among stakeholders
- Today's goal, tomorrow's exception or unintended consequence
- Inadequate funding to achieve goals
- Legal compliance still may not solve problems

Everglades Restoration & Water Management Challenges

Balancing water needs of a region?

- Global challenge
- More difficult with every passing year
- Multi-optimization demands
- Scrutiny of public process

Losing public confidence?

- Law suits & narrow judicial decision-making?
- Special interests & lobbying influence?
- Serious delays
- Financial limits & shifting resource allocation

Water Management Challenges

South Florida is data rich yet information poor

- *In-depth interpretation is often lacking*
- *Too much time on data collection and modeling*
- *More investment is needed on in-depth analysis to extract relevant information*

You should recognize from the lectures that -

- *Better to prevent environmental degradation than to attempt restoration*
- *Better to find some common ground than to demand win-lose confrontations*
- *Climate change and sea level rise creates chaos*

Concluding Thoughts for Your Trips



Ask many questions – anything of interest.

Learn from both successes and failures.

Use *2013 South Florida Environmental Report* as a handy reference

Concluding Thoughts for Your Florida Trip



Thank you and bon Voyage!

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