



SYSTEMS THINKING ON WATER

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SYSTEMS THINKING

The business community, as well as local South Florida government, worries and talks about topics that need our attention, and water has been one of these lately, thanks to King Tides and hurricane flooding. We love to talk about, work on, and improve “things” like our water problem. This process and thinking works well for discrete items that need doing, issues that need resolving, or broken things that need fixing. But it doesn’t work for dealing with larger systems.

By definition, a system is a collection of things related to each other and that interact with one another to produce an outcome. The world is full of different systems – nervous systems, transportation systems, communication systems, and the topic of this blog – ECOSYSTEMS. Working in or on a system requires “system thinking,” and knowledge of how the different elements in the system interact with one another. This includes knowing how the entire system will respond to any perturbation or outside influence, as well as recognizing the various constraints within the system.

The first rule of system thinking is: disturb, change, remove, or add

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something to a system and you will affect all the other elements of the system. Add lion fish to the Atlantic and Caribbean, for example, or a python to the Everglades, and with no natural predators, hell breaks loose and the flora and fauna are affected.

The second rule of system thinking is: tinkering with, working one-step-at-a-time on, or working in a haphazard or non-prioritized manner, creates chaos; this is anathema to any system. Understanding a system’s causes and effects, as well as the points of constraint, are needed to prevent further harm being done to the system while working on it.

THE WORLD IS
FULL OF
DIFFERENT
SYSTEMS...
ECOSYSTEMS.

In our South Florida ecosystem, the water “thing”, which we all have knowledge of, is Sea Level Rise, aptly described in the SoFlo newspaper series, “The Invading Sea.” King Tides, Cloudless Floods, inundated roads and infrastructure, and eroded beaches need to be fixed. There’s an overall drive to “pump the water out” and “keep the water out.” But it’s not that simple because water is part of a system, not a discreet “thing.”

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What's in the overall water system?

The various elements and stages we've discovered about water, so far, include:

- Fresh water
- Salt water; and its intrusion to the aquifer, drinking water
- Storm water/ run off
- Waste water (treatment and disposition)
- Contaminated water from pollutants and chemicals (creating algal blooms and killing wildlife)
- Sea level
- Water temperature
- Water table
- Aquifer dynamics
- Forces of nature creating storm surges and increasing rainfall
- The natural flow (or disruption of the flow) of water through the Everglades

For example: increasing the height of sea walls is something that needs to be done to prevent flooding. They might keep the water from getting where it doesn't belong, but it's a beginning, not the end because it will take care of one 'thing' while effecting others. Fixing the water

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ecosystem is a long-term proposition for all of us, at the local, state, and federal levels.

Money and Funding

Did you see the article: "\$328M to prevent flooding leaves Delray Beach Reeling", in the South Florida Sun-Sentinel on February 13, 2019? That is one 'thing' in one city, which begins to put a price tag on the size of the issue, especially dealing with it in a piecemeal fashion.

One thing at a time always cost more than properly planning and executing the whole job. Critically important is making a

FIXING THE WATER ECOSYSTEM IS A LONG-TERM PROPOSITION

projection regarding total amounts required, over a defined timeframe of operations, and figuring out exactly how the work will be staged. Systems thinking is necessary when planning expenditures, allocating, and scheduling all the necessary resources to get the job done.

In "Miami Battles Rising Seas" in the New York Times on February 20, 2019, co-authored by Ban Ki-moon and Francis Suarez, they outline the current situation in Miami and South Florida, highlighting their assessment that:

- effective adaptation is a collective endeavors

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- more investment is needed to build resilience, especially to protect the world's coastal cities and regions.
- a \$400 million bond issue to finance those projects

The article is well written and focused on the systems issue; readers' comments below it are almost as fascinating as the article itself.

The water topic has an additional element present in some, but not all, system level projects: sources of funding from local, state, and federal levels. This is way too critical a topic for expanding here – it's one that needs its own treatise.

Planning

The water problem demands strategic planning and the underlying agreement and assumption that it needs to be handled as a systems problem (solved by systems thinking and planning). Money needs to be appropriated and resources allocated (and scheduled) for effective and efficient execution. Metrics for success and follow-up reviews need to be established to ensure that what is implemented is functioning as intended.

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"We have to start somewhere..."

But where do we start? Here are some suggestions:

- All new capital projects should be reviewed for impacts to sea level rise and water control.
- Sea walls, flood control valves, pumping stations are part of the solution.

But which part? Who determines the priorities for issues competing for money and other resources? This is where it's important to look outside of our region to gain insight and clarity, as well as vision.

WE CAN LEARN
FROM OTHERS.

Learn from others

There are other successfully planned projects and implementations, such as Boston parks and green space planning. There are systems planners and thinkers who can help to frame what the problem is, so that we can begin to solve it in a way that helps, rather than exacerbates it. There are results we can see from smaller, planned experiments; we can learn from our own mistakes and make corrections going forward. Any systems level project can benefit from a coordinated and centralized "center" for planning as well as lessons learned, so that organizational knowledge can accrue through the process.

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Most importantly, systems engineers will tell you to eschew half-baked ideas and special interests, because you don't learn anything. Data-driven actions keep you on the right track. Thinking and jargon such as, "I have a hunch," sneaking suspicions, spit-balling, and gut-feels will derail systems level projects and should have no place in the dialog, nor should they be part of planning systems changes and implementations.

Many years ago, a friend and mentor correctly characterized the four stages of system change as follows:

- Grousing because of dissatisfaction with the status quo
- Tinkering with system elements (especially those related to costs)
- Cutting the Gordian Knot, and getting on with it
- Embracing the change

We have been 'tinkering' with this system for too long. We need to become more resilient to the forces affecting our water systems. The clock is ticking.

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We can argue and debate what's causing our water issues but we can't debate that the water is rising, and turning funny colors.

If we keep doing what we have been, 2030 will soon be here and we'll still be splashing around on the streets.

THE CLOCK IS
TICKING.