

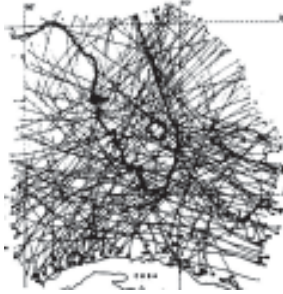
Biourbanism: Ecological Models & Urban and Regional Design

Daniel Williams FAIA, dwarchitect@msn.com

Principal, Daniel Williams ARCHITECT, Seattle, Washington dwarchitect@msn.com

SB **05**
TOKYO

Abstract Defining the Problem



Solar based planning and design is a significant step towards sustainable planning and design. This planning approach starts by studying the natural processes within the region, its biology and systems, and incorporating that knowledge into the urban design - *biourbanism*.

In the aftermath of Hurricane Andrew in 1992, south Florida stood at the precarious position of rebuilding yet more energy consuming sprawl and paving over the last 100 square miles of the regional recharge area for drinking water.

Solar based design of the urban and regional watershed is a nationally overlooked problem. To complicate matters there are no agencies that approach complex systems problems. Regional design and planning for smart growth resolves this problem

The Solar Urban and Regional Watershed Plan

The goal was to develop, through a regional and community design process, a *vision* for the future of south Dade County that:

- 1.) establishes solar based planning and design criteria
- 2.) provides for sustainable clean potable water and
- 3.) develops the incremental steps to achieving that vision.

Within that vision is the ability to house an additional 700,000 people while providing:

- use the “solar engine” for green infrastructure
- smart growth - livable communities
- local and regional recharge parks with sewage reclamation
- energy conscious orientation in urban planning and design
- transit-oriented development.

Size and Scale of Project:

The initial project size was 160 square miles and expanded to 500 square miles to include the entire geo-hydrological system.

In projects of this scale it is essential to look at the natural resources within the “system larger”.

Conclusions:

The objective of designing a solar based regional plan, including “green infrastructure”, is an essential element to sustainable planning and design. The designation of regional parks solve the immediate problems of flooding and water supply while promoting connectivity of urban and regional design with the natural resource systems.

This project cost is estimated to be 7-8 billion dollars over the next 20 years. This investment provides for a sustainable water supply for all systems - natural, agricultural and urban - within the entire region for the next several hundred years and creates neighborhood amenities and habitat.

As a cost vs price comparison, this plan will be accomplished at less of a price than typical technological engineered solutions such as pumping and desalinization and a much lower “cost” to the whole system.

Sustainable Planning and Design



How much of this solar based region must remain undeveloped to supply the users with water and a good quality of life?



GIS map showing buildable areas and recharge zones



This town plan is laid out to maximize passive cooling, solar access and view corridors. Simple orientation in town planning can reduce energy cost by 40%.



“Hydric Parks” urban design solutions to regional water problems and neighborhood micro-climates

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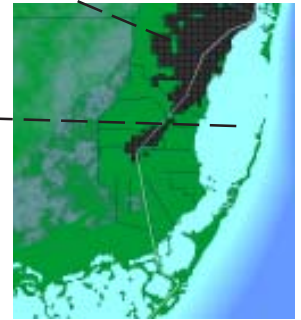
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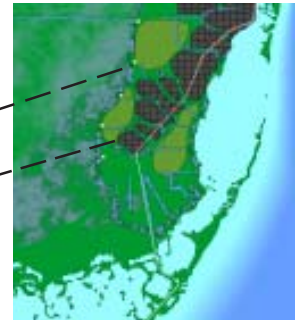
This GIS map (right) illustrates the historic conditions and natural systems features that existed 100 years ago. Shown are areas along the coastal ridge above 8 feet in elevation (dark areas), the Everglades (left), and the coastal waters along Biscayne Bay. The transverse glades, meandering through the coastal ridge, were the historic hydrological connection between Biscayne Bay and the Everglades. These transverse glades historically received and distributed rainfall - insulating the region from draught and flooding.



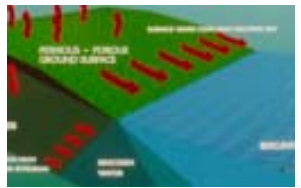
The current conditions are shown (right) - developed urban areas (dark), the Everglades, canals (dark lines), and highway US 1 (white line) - are depicted. Drainage for urban development has severely reduced the transverse glades connections between the Bay and the Everglades. In their place, 200 miles of ditches now remove water - this water, critical to recharge, is permanently lost to tide within 24 hours of the rain event.



New development - smart growth - should occur as urban infill within areas such as the coastal ridge. Agriculture and historic wetland connections will be reestablished on the lower ground levels, while lineal urban connections are made with an integrated transit/water distribution system.

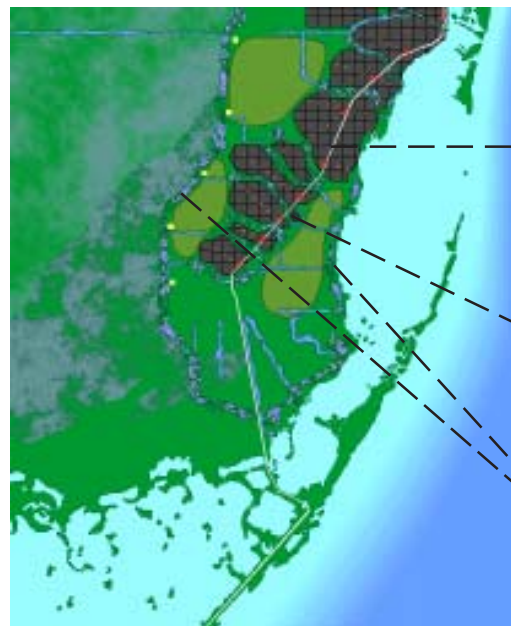


Sewage treatment plants are strategically located to recycle/reuse water and nutrients while creating additional storage under the coastal ridge. This approach maximizes gravity fed storage. Regional storage and distribution of water occurs within lineal parks that have their genesis within neighborhoods.



above- historically, rainfall seeped into the ground providing storage and use for all.

below, not only has the region been drained but the surface - now impervious - eliminates recharge.



The incremental steps to this regional plan are graphically illustrated here:

- the regional transportation linkage within the ridge move people and materials through neighborhoods while the
- east-west connection creates lineal parks to do infrastructure functions of flood control,
- clean up and distribution of storm-water.



Sustainable Planning and Design

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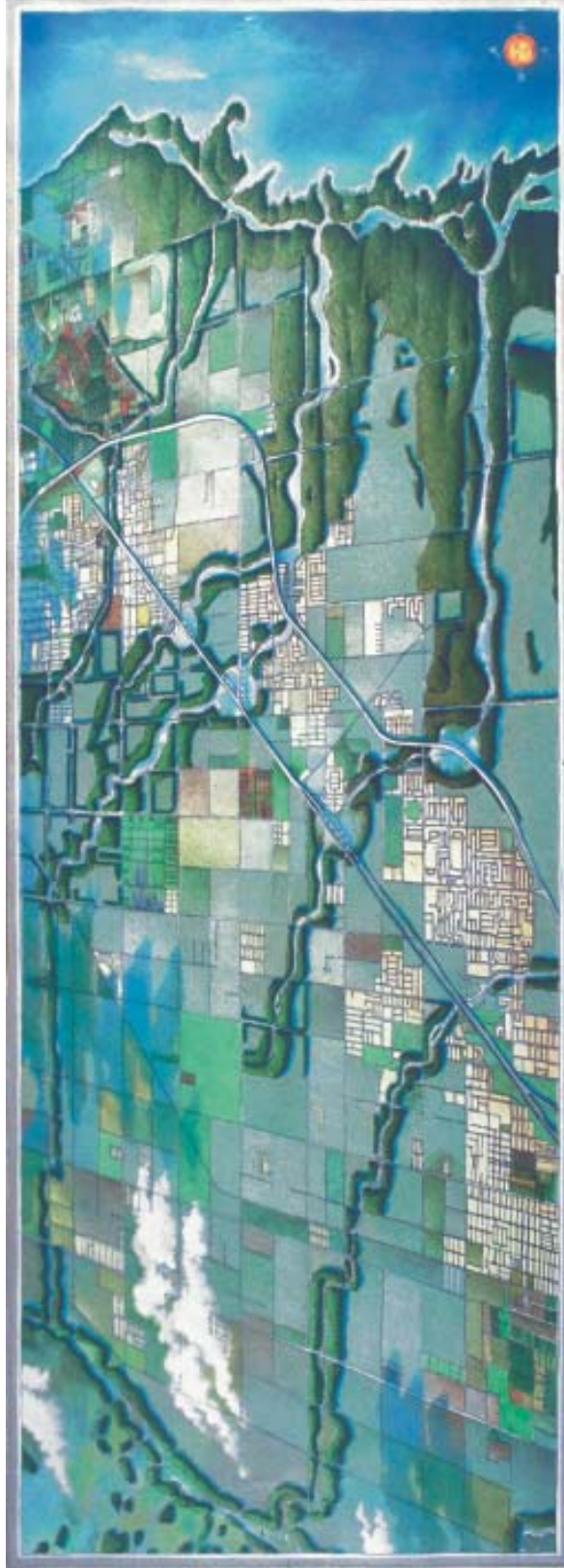
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EVERGLADES-AGRICULTURAL ZONE: a water storage and aquifer recharge area. Locate new sub-regional wastewater treatment plants with 100% reuse. Recharge the aquifer at the "rate of use" creating a sustainable supply of nutrients for the agricultural industry and potable water for Dade County's immediate and future needs.

COASTAL RIDGE DEVELOPMENT ZONE AND TRANSVERSE GLADES: an urban development area. This zone receives the highest amount of rainfall but has the most amount of impervious surface. The collecting, cleaning and distributing of this water and storing it underground will increase the total available supply of water while reducing the losses to evapotranspiration.

BISCAYNE BAY COASTAL ZONE: a coastal resource protection area. Provides a natural buffer from hurricane storm-surge, while enhancing the distribution, timing, quantity, and quality of freshwater flows. Improving the fishing industry while protecting the estuarine values of the Bay, this plan is a win-win for economics and the environment.



Sustainable Planning and Design

Linear "hydric parks" combine the recreational and aesthetic benefits of "greenways and blueways" with water resource objectives. These parks help create strong edges that define neighborhoods and communities while reconnecting habitat and increasing land value.

The greatest potential for additional water storage lies within the coastal ridge. The development of neighborhood "hydric parks" increases local aquifer recharge, reduces and local flooding, and enhances community identity.

Water storage areas, located within communities, will recharge local wellfields, reduce the saltwater intrusion while creating neighborhood parks. The largest new storage of water for regional use would occur here in underground and surface storage.

Mimicing the historic function of the transverse glades - collection, storage and biological clean-up of stormwater - these areas also restore the regions image and identity. This coastal zone stops point source loading into the bay while incorporating the free work of nature.