FROM DATA TO POLICY: THE CHARLOTTE HARBOR NATIONAL ESTUARY PROGRAM PARTNERSHIP IN ACTION

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Abstract: *The road from data collection to science-based policy determinations is not an easy one. Scientists typically want their efforts to be used to improve society. Elected and appointed officials typically want to have good information to guide their decisions. Data without context mean very little. How do we take scientific information and advise officials with certainty regarding courses of action that they should take? The ingredients include:*

- *Collecting the correct data well before the point that the issue requires policy decisions,*
- *Collecting similar data in different locations to compare and set standards and baselines,*
- *Collecting long-term data so that sufficient data points are available to have near certain conclusions,*
- *Selecting proper analytical methods that are defensible,*
- *Setting objectives and standards so that a context may be provided,*
- *Testing conclusions often at management sites,*
- *Providing the information in ways that are meaningful to citizens, the elected officials' constituents, and*
- *Delivering findings to the officials when they need the information.*

It all begins with the policy decision to fund data collection and analysis in the first place. This process requires a partnership of scientists, citizens, resource managers, and policymakers. It also requires a partnership of local, state, and federal government and private companies and organizations. The Charlotte Harbor National Estuary Program (CHNEP) is an example of this type of partnership in action.

Key Words: Monitoring, watershed planning, environmental policy

The Charlotte Harbor National Estuary Program (CHNEP) is a partnership that highlights science-based decision-making. Citizens, scientists, and resource managers make recommendations directly to elected and appointed officials through its Policy Committee. CHNEP has found that scientists are eager to have their efforts improve the systems they study. By the same token, elected and appointed offices typically want to have the best information at their fingertips in order to improve their decisions. The process of coupling the right information at the time of a decision is not always successful. However, the National Estuary Program, established under section 320 of the Clean Water Act, has developed reliable methods to move monitoring data collection through analyses, and presentation to the decision-makers in order to obtain significant science-based decision-making.

There are many examples of data collection and analysis being used for policy decisions. Examples highlighted in this paper include drainage canal impacts, Nile monitor lizard eradication, minimum flows and levels, water clarity targets, seagrass protection from boat propeller scars, urban stormwater guidance, and historic watershed basins.

Drainage canal impacts—In the 1970s and 1980s, substantial research was completed which detailed the impacts of drainage canals. Efforts such as the Picayune Strand restoration (of the Comprehensive Everglades Restoration Plan) were designed to plug drainage canals to restore the benefits of natural hydrology. These benefits include reduced runoff, improved groundwater levels, improved dissolved oxygen, reduction of exotic species invasion, reduced unnatural wildfire severity, and restoration of wetland functions (Fish and Wildlife Service, 1984). As elected officials are asked to consider proposals to create new drainage canals in the 2000s, these earlier findings were compiled and presented, resulting in non-approval. New techniques and technology improved communication. Older tables and diagrams can be improved with the use of conceptual diagram techniques, made available through the Integration and Application Network of the University of Maryland. In part through the improved communication, this issue was adopted by the Southwest Florida Regional Planning Council (SWFRPC) within its Water Congress recommendations.

Nile monitor lizard eradication—By 1990, a new invasive animal, the Nile monitor lizard (*Varanus niloticus*), was established in the southwestern portion of the City of Cape Coral. The population was estimated to be more than 1000 animals by 2005 (Campbell, 2005). The problem was presented to the CHNEP Policy Committee by CHNEP management conference scientists. With the information, the Policy Committee amended the Comprehensive Conservation and Management Plan (CCMP) to include eradication of nuisance exotic animals and funded a research project to determine population levels, extent, and eradication methods. The study helped support the adoption of a rule by the Florida Fish and Wildlife Commission (FWC) that no person may own a Nile monitor lizard (and four other exotic retile species) without an annual permit. They must also be micro-chipped. The study also led the Sanibel City Council to include Nile monitor lizard eradication in its budget in case the lizard was spotted on the island. Shortly afterward, the funding was used to remove the first lizards spotted on the island. To date, it does not appear as if a population has been able to be established on the island.

Minimum flows and levels—Florida law (373.042, F.S.) requires state water management districts to establish minimum flows and levels to limit withdrawals which would be significantly harmful to natural resources. In Florida, this has been a science-driven process. The law provides for independent scientific peer review by a panel of independent, recognized experts in the fields of hydrology, hydrogeology, limnology, biology, and other scientific disciplines. It also states that "all scientific or technical data, methodologies, and models, including all scientific and technical assumptions employed in each model, used to establish a minimum flow or level shall be subject to independent scientific peer review." Because of the science-based process, optimum flows and maximum flows have been identified to provide information for restoration projects which augment the regulatory minimum flows and levels.

Water clarity targets—In 2006, the CHNEP Policy Committee adopted numeric water quality targets for Lemon Bay, Charlotte Harbor, and Estero Bay, Florida (CHNEP, 2006; Corbett and Hale, 2006). In the Charlotte Harbor estuaries, light attenuation to seagrasses is controlled by chlorophyll *a*, turbidity, and colored dissolved organic matter (CDOM). This is in contrast to light attenuation predominately by chlorophyll *a* in Tampa Bay. Water quality monitoring programs operating in Charlotte Harbor include all three parameters through routine data collection and analysis. These programs include the Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Program (CHEVWQMN) and the Coastal Charlotte Harbor Monitoring Network (CCHMN). The approach has been adopted into the Southwest Florida Feasibility Study to determine restoration targets and the Caloosahatchee Total Maximum Daily Load (TMDL) assessments. Analyses of the CHEVWQMN data identified chlorophyll *a* as most problematic for Lemon Bay and Charlotte Harbor, CDOM as most problematic for Matlacha Pass, and turbidity as most problematic for Estero Bay. This approach is critical in order to design and fund meaningful restoration projects.

Mangrove condition—CHNEP management conference scientists identified mangrove condition as a gap in environmental indicators information. The CHNEP Policy Committee authorized funding to develop an innovative project where citizens volunteered to document shoreline condition, including mangrove trimming, damage, and exotic invasion. The funding allowed these data to be coupled with aerial photo interpretation of shoreline condition within a geographic information system geodatabase. Mapped shoreline totaled 2221 miles and 1665 miles (75%) were mangrove shoreline, suggesting nearly a 25% loss of mangrove shoreline. Of the remaining mangrove shoreline, 437 miles (26%) were damaged. Most of the damage was sustained as a result of Hurricane Charley. Armed with these volunteer data, CHNEP, Charlotte SeaGrant, FWC, and FishAmerica tested mangrove shoreline restoration techniques. Hand planting mangrove propagules, launching mangrove propagules on an incoming tide, and establishing control sites were completed on October 13, 2007. The most cost effective of the techniques will be replicated to restore more shoreline.

Seagrass boat propeller scars—Using 1993 aerial photography, FWC mapped boat propeller scar density in seagrasses. Upon recommendation by CHNEP management conference scientists, the Policy Committee authorized funding to replicate the project using 2003 photography to determine trends. Within the ten year period, severely scarred seagrass increased from 1577 acres to 11,255 acres, or more than seven times its original extent (Madley et. al., 2004). It may take more than seven years, if ever, for boat propeller scars in seagrass to heal. The Florida Department of Environmental Protection and Lee County used the CHNEP boat propeller scar density map to help identify potential areas for "No Internal Combustion Engine Motor Zones" to be incorporated into a general permit.

Urban water quality resolutions—The SWFRPC have drafted or adopted a series of five resolutions to provide guidance for local governments regarding five specific issues affecting urban water quality. The resolutions included:

- Fertilizer Application
- Wastewater Treatment Plant standards
- Package Treatment Plant standards
- On-Site Treatment and Disposal System (OSTDS) treatment and management, and
- Stormwater for new development, re-development, and retrofit.

Literature reviews provided the basis for all urban water quality resolutions. To date, seven local governments within the CHNEP area followed recommendations of the fertilizer resolution and adopted ordinances controlling acceptable formulation and placement. These local governments include Sarasota, Charlotte, and Lee Counties, and the Cities of Venice, North Port, Cape Coral, and Sanibel. This probably represents a reduction of fertilizer application totaling hundreds of pounds of nitrogen and phosphorous per year, especially in buffer areas around waterbodies.

Historic hydrologic subbasins map—In the 1800 and 1900s, drainage projects were designed to dry the land in order to make it available for agriculture and urban development. Water was routed through canals to the closest available waterbody. Often, this resulted in water being moved across hydrologic boundaries to different receiving waters. Without a map of historic basins, a full analysis of changes in watershed basins and associated impacts could not be accomplished. The CHNEP Policy Committee authorized mapping of historic watershed basins which was completed in 2008. For example, Cow Pen Canal and Blackburn Canal moved over 45,000 acres of Cow Pen Slough from the Myakka River Basin to the much smaller Dona Bay Watershed, tripling water volumes. By the same token, the Estero Bay Basin lost 40,000 acres to the Orange River Basin, affecting the water budgets of both basins. Restoration projects are being designed to return flows to their original basins.

DISCUSSION—In the right context, monitoring and other forms of data collection can be the foundation for science-based decision-making. Through those listed above, CHNEP found that the following components are essential to improving the road from data collection to science-based policy:

- Collecting the correct data well before the point that the issue requires policy decisions,
- Collecting similar data in different locations to compare and set standards and baselines,
- Collecting long-term data so that sufficient data points are available to have near certain conclusions,
- Selecting proper analytical methods that are both scientifically and legally defensible,
- Setting objectives and standards so that a context may be provided,
- Testing conclusions, often at management sites,
- Providing the information in ways that are meaningful to citizens, the elected officials' constituents, and
- Delivering findings to the officials when they need the information.

One final consideration for you, the reader: How can the following papers translate into future management and policy actions?

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