FLORIDA'S WATER QUALITY: PROGRESS BEING MADE...BILL TO COME

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Much of Florida's allure is associated with the state's plentiful water bodies. The lakes, rivers and estuaries not only provide beautiful and relaxing landscapes, they also are widely used for fishing and recreational activities. At the heart of it, though, these water bodies are a key component of the state ecosystem that is increasingly bearing the burden of a growing state. As the population grows along with the concomitant increase in commercial and industrial activity, the water environment is showing signs of fatigue. Nutrient loading is a significant form of contamination that results from a wide variety of human activities and contributes to eutrophication of water bodies. This results in a decrease in water clarity, increase in algae growth and reduction in diversity of the fish population.

Control of nutrient loading is a complex undertaking. Federal and state regulations in the past have focused almost exclusively on managing water quality parameters of discharges from wastewater treatment facilities. This was a logical first step because wastewater systems present a concentrated waste stream and, left untreated, pose a significant environmental and public health hazard. While these regulations were a necessary action, it has been long recognized that wastewater sources comprise only a portion of the nutrient load. Wastewater plants are commonly referred to as “point sources” because they collect water and characteristically discharge out of a pipe (point) when treatment is complete. Many studies, though, have shown that non-point sources can contribute more nutrients than point sources. The term “non-point” source is used to indicate that the discharge event is not collected through a single pipe or point, but rather enters that water course through overland flow or a diffuse network of independent sources. Specific instances of this type of source loading could be from agricultural runoff, municipal stormwater systems, irrigation of residential lawns, ranchland runoff and the like. This makes management, treatment and regulation challenging.

Nonetheless, when Congress enacted the Clean Water Act amendments in 1987 and 1990, it mandated that the United States Environmental Protection Agency (EPA) promulgate regulations to address the issue of non-point sources. Incremental progress has been made over the years, but the fact that it has taken almost 20 years to develop the framework and approach to address the problem is a testament to its complexity. A major hurdle in developing practicable regulations is that very few low-cost options exist to remedy the situation. Given the pervasiveness of the issue, the cost (and thus the implementation) of many institutional options are not particularly palatable.

As a side note, this is another example of the “Tragedy of the Commons” as outlined by Professor Garrett Hardin in a 1968 paper published in Science magazine. Briefly, this influential paper identified an economic tendency for multiple individual entities, acting in their own self-interest, to over-utilize the carrying capacity of common (public) resources to the point that the resources are eventually being depleted or degraded even though it is clearly not in anyone’s long-term best interest for this to occur. This analogy is applicable here in the sense that, as community growth increased, the resulting wastewater and stormwater depended on the assimilative capacity of our water bodies to allow lower treatment levels and thus reduce community infrastructure costs. Each water body has a finite assimilative capacity to absorb nitrogen or other pollutants without causing significant degradation. Contributors discharge the stormwater, wastewater and even air deposition to the water body without fully bearing the cost of cleaning the water because the water body can assimilate it. However, once the assimilative capacity is reached or exceeded, the formerly unrecognized cost of treatment must be imposed if the water is to recover. It is almost always more expensive and difficult to retrofit a solution than to construct it initially.

Currently, the regulatory framework in Florida is addressing the issue through the Water Management Districts (WMD) and the Florida Department of Environmental Protection (FDEP). While the WMDs are directed to focus on non-point sources (stormwater issues), the FDEP is directed to consider point source contributors (which can include stormwater as well as wastewater). This results in an overlap of agency review with the FDEP having a broader scope to manage.

The focus of the WMDs with regard to the stormwater effects on water quality is stipulated in Chapter 62-40.431 FAC. This establishes the goal of the WMDs to reduce unacceptable pollutant loadings from stormwater managements systems. In order to accomplish this, the WMDs were directed to develop Pollutant Load Reduction Goals (PLRG) for Surface Water Improvement and Management (SWIM) designated water bodies. The SWIM program was established by the state back in 1987 to restore and protect threatened surface water bodies. The PLRGs focus on pollutant loads in stormwater but they need to estimate the assimilative capacity in order to determine the reduction needed. Assimilative capacity means the capacity of a body of water or soil-plant system to receive wastewater effluents or sludges without violating the provisions of the state’s water quality criteria. If a surface water body meets all the stipulated parameters, it is classified as a “preservation water” and the PLRG is zero.

The FDEP was tasked by federal and state legislation to establish Total Maximum Daily Loads (TMDL) for state waters, including bays and estuaries. TMDLs can include such parameters as sediment, pathogens, nutrients, metals, dissolved oxygen, temperature, pH, and pesticides which can inhibit the full functioning of an aquatic ecosystem. The TMDL

considers all of the loads (point and non-point) that enter a water body and determines any limits on these loads due to the assimilative capacity of the water body. The FDEP reviewed the PLRG work performed by the WMDs, with special attention to the assimilative capacity. By and large, they felt that the WMDs had done a good job of developing the assimilative capacities and typically have adopted them as they focused on the TMDL process and the development of Basin Management Action Plans (BMAP) to renew and protect the state waters.

One of the model programs in addressing these issues in a complex water system is the Tampa Bay Estuary Program (TBEP). This organization was one of the 28 estuary programs established by the Clean Water Act and was established in 1991. In 1998 the initial stakeholders included Hillsborough, Pinellas, and Manatee Counties, the cities of Tampa, St. Petersburg and Clearwater, the FDEP, the Southwest Florida WMD and the EPA. These stakeholders signed an interlocal agreement pledging to achieve the goals outlined in the conservation and management plan. As the research and programs of the TBEP have proceeded, many of the issues that affect the bay have been identified. One of the key programs that TBEP has developed is the Nitrogen Management Consortium (NMC).

When TBEP research revealed that the Tampa Bay ecosystem health could be related to seagrass acreage and that nitrogen was a significant contaminant factor, efforts were made to form a group to address the sources of nitrogen contribution. In addition to the initial stakeholders, the NMC includes other local governments, electric utilities, agricultural interests and local phosphate firms. This group began operating in 1998 and collectively accepts responsibility for meeting nitrogen reduction goals.

Over the years the sources and loads have been monitored and modeled going upstream. A system for establishing the allocations of both point and non-point sources has been developed and thoroughly discussed from a technical, regulatory and legal perspective. The NMC is entering the final phase of their deliberations in July of this year and it will be interesting to see if all of the stakeholders officially agree to the allocation and monitoring process. If so, each entity's FDEP permit will be correlated to the TBEP allocation criteria for nitrogen. At stake will be the potential for significant structural or operational changes to comply with the various limits. This could include such things as water conservation programs, stormwater treatment systems, wastewater treatment upgrades and subsequent reuse, wetlands management areas and the like.

The federally-recognized nitrogen load limits for the Tampa Bay estuary are dependent upon the location in the bay. The four main bay segments of Tampa Bay include Old Tampa Bay, Hillsborough Bay, Middle Tampa Bay, and Lower Tampa Bay. The nitrogen load limits vary from about 350 tons per year in Lower Tampa Bay to 1450 tons per year in Hillsborough Bay. These were established as the nitrogen loads to maintain appropriate light conditions in each bay segment for seagrass.

Some progress has already been made through improvements made by some of the stakeholders. Significant water quality problems existed in the 1970s and, through a host of pollution reduction projects, regulations, and financial commitments, the Tampa Bay estuary water quality has improved. As a result of improving water quality, the seagrasses seem to be responding. Acreage estimates of seagrass have steadily increased since the 1980s and Tampa Bay has been slowly approaching its goal of restoring seagrass growth to their 1950s extent. This improvement has occurred despite the continuing increases in population within the watershed surrounding Tampa Bay. Tampa Bay is one of the few places in the world where this has occurred.

Healthy Florida seagrass—public domain photo by Heather Dine | NOAA Image Library

With significant deliberation, cooperation and risk analysis, this program has moved to the approval phase. If it all of the constituents approve the agreement, this could become a model for others to follow to protect Florida's waters in a negotiated framework as opposed to a strict regulatory system. Of course, in either case, the next task will be to identify the projects to meet the criteria and then how to pay for them.

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