Benefits and Costs of Surface Water Quality Programs

2008 Texas Water Quality Inventory and 303(d) List
(March 19, 2008)

Section 305(b) of the Clean Water Act calls for Texas to prepare estimates of the economic and social costs necessary to implement of the Act. The extent of the economic costs and benefits associated with water quality improvement is for the most part a local issue. For example, benefits may be realized at the local level by the immediate improvement of the water in the locality which usually signifies increased recreational use of that water. There is currently no effective way to measure benefits of biodiversity or the value of the oxygen produced by a healthy ecosystem.

Framework for Consideration of Economic and Social Benefits and Costs

The framework used here for considering benefits and costs of water quality protection and enhancement strategy is centered on organizing data that exists in different forms. The framework avoids the arduous task of placing all benefits and costs into a common numerical measurement system such as dollars. Some benefits have no specific numerical dollar value. For example, a dollar amount cannot be placed on an increase in dissolved oxygen content in a certain water body. Instead, the framework presents different types of information and attributes – biological, economic, social, and others.

Table 1 presents a summary of cost-benefit information available. Texas' current total economic income Gross State Product is also included for comparison to other economic data. Generally, there is not very much data regarding the economic benefits of protecting aquatic uses and other water quality characteristics. However, the framework developed for the report can be further enhanced over time with additional data and studies so that more comprehensive information can be made available.

Texas' Gross State Product for 2007 is estimated to be near $800 billion. According to *Water for Texas 2007* released in January 2007, $170.9 billion dollars will need to be spent by regional and local water supply entities and the private sector between 2007 and 2060 in order to fully implement the 2007 State Water Plan. This amount takes into account the increase in population which is expected to double between 2000 and 2060 from 21 million to 46 million. The amount needed also incorporates the expected increase in water usage. The demand for water will increase from 17 million acre-feet in 2000 to 21.6 million acre-feet in 2060.

The total capital costs of the 2007 State Water Plan is $30.7 billion. If Texas does not implement the state water plan, water shortages during drought could cost businesses and workers in the state $9.8 billion per year by 2010 and $98.4 billion per year by 2060. As

such, water is a resource that should not be squandered and a resource that needs to be protected.

Texas has about 200,000 miles of streams and rivers, and nearly 1.7 million acres of reservoirs, that provide habitat diverse fish and wildlife. Protection of these water bodies has been shown to provide income for local towns and cities. Fishing and boating, according to Texas Parks and Wildlife, are the main recreational uses of reservoirs. According to the 2001 National Survey of Fishing, Hunting and Wildlife Associated Recreation, an estimated 2.4 million anglers fish in Texas each year and spend more than $2.7 billion for fishing-related goods and services. On the coast, commercial fishing and recreational anglers generate more than $2 billion in economic output per year. Similarly, according to the United States fish and Wildlife Service's National Fishing License Report, in 2007 in Texas there are 1,565,384 fishing license holders creating an income of $48 million.

One factor that would be detrimental to citizens, parks, and local entities is the loss of recreational income due to water quality degradation. From data presented by the Texas Parks and Wildlife in 2001, 68 Texas parks featured water based activities as a main attraction for visitors. There were over 12 million visitors that visited these state parks.

One study suggests that, in 1987 dollars, $357 million would be lost annually. This $357 million represents a lower boundary of the current estimate of lost income. This lower estimate was calculated in a 1995 study by Sokulsky and Amaya and is a function of the following factors:

- Total number of water bodies not meeting or only partially meeting water quality standards as of 1994. In 1994, 83 water bodies were placed on the 303(d) List. However, this number of water bodies with threatened or impaired designated beneficial uses has grown to 386 for the year 2008.

- Estimated average number of people that may visit any one given water body in Texas: 229,767 persons, according to the 1987 survey. Economic income derived from each visitor:
  $18.47 (day visit) to $21.29 (overnight visit), according to a 1987 survey. Upon calculating for inflation* for 2006 this amount increases to $32.78 (day visit) to $37.78 (overnight visit).

Based on the data from the study by Sokulsky and Amaya, the potential recreational income loss associated with water quality degradation to be about $357 million annually. When this amount is adjusted for recent inflation the total approaches $630 million. However, this recalculation does not account for a larger Texas population or growing incomes.

Currently about 61 percent of streams and rivers in Texas meet the federal water quality standards (Table 1). One possible interpretation of these datum vis a vis the financial costs spent to date, is that from 1972 to 2000 Texas, spent approximately $5.2 billion in public monies to provide the benefit that 61 percent of the streams and rivers meet

standards. However, this $5.2 billion excludes state regulatory and non-point source program costs. Industrial private sector costs are not available but certainly contribute to meeting water quality standards. Currently, the estimated average annual investment – $3.9 billion – is relatively small, representing less than 1 percent of the State's Gross Product. That is, on an average annual basis only a very small amount of public money is invested in meeting water quality goals; hence, public investment in water quality protection does not appear to represent very high opportunity costs.

The economic benefit of clean water outweighs the investment of businesses for the construction of new facilities in the eyes of the public. Consequently, the need for more data on private sector investments is a major planning issue.

Additionally, Table 1 identifies other important attributes associated with clean water. Case studies included instances where expenditures resulted in increased water-based recreational activities, and improvement in commercial and sports fisheries, recovered damaged aquatic environments, reduced costs of water treatment and reduced medical costs due to improved water quality for recreation. Texas routinely discusses the costs and benefits of water quality achievements for programs and specific documented sites. In the future, more extensive documentation, especially addressing wastewater problems, will improve the needs' estimation for a broader range of programs and projects. Texas will encourage solutions that figure in drought and flood conditions as they relate to wastewater treatment facilities to be constructed.

*All inflation calculations are concurrent with the United States Department of Labor Bureau: Labor Statistics.

Table 1. The Framework for Considering Benefits and Costs of Texas Surface Water Quality Programs Pursuant to Section 305(b)(1)(D), Federal Clean Water Act

Attribute	Benefits	Costs
Biological and Physical Attributes of water bodies found on the 2008 Section 303(d) List		
Percent of streams assessed meeting/not meeting standards	61%	39%
Percent of reservoirs assessed meeting/not meeting standards	63%	37%
Percent of estuaries assessed meeting/not meeting standards	69%	31%
Percent of ocean waters assessed meeting/not meeting standards	0%	100%
Economic Attributes		
Estimated Annual Total Cost of TCEQ Clean Water Act Program Costs		$11,000,000
Estimated Municipal Capital Investment, 1972-2000		$5,200,000,000
Projected Total Municipal Capital Investment, 2007-2050		$170,900,000,000
Annual Average Municipal Capital Cost, 2007-2050		$3,974,418,605
Projected Annual Average Municipal Cost as percentage of Texas Gross State Product ($748 billion)		<1 %
Estimated Annual Sport Fishing Income (Expenditures)	$2,700,000,000	
Estimated Annual Commercial Fishing Income from the Coast	$2,000,000,000	
Estimated Annual Income for Contact Recreation (e.g., swimming and wading)	Not Available	
Estimated Annual Income from Shoreline Activities (e.g., birdwatching, beach combing)	Not Available	
Estimated Annual State Sales Tax Revenue from Fishing Expenditures	$298,000,000	
Estimated Minimum Lost Recreation Income due to Waters Not Meeting Water Quality Standards		$630,000,000 (adjusted for inflation)
Social Attributes		
Number of Fish Consumption Advisories and Aquatic Life Closures		20

References:

(1)Sokulsky, K. and S. Amaya *An estimation of the economic impacts of surface water quality degradation*. Presented at Water for Texas. January 1995.
(2) Texas Commission on Environmental Quality. *Summary of 2004 Texas Water Quality Inventory*. May 13, 2006.
(3) Texas Department of State Health Services. *Seafood and Aquatic Life Group: Survey Information*. Updated March 2007.
(4) Texas Parks and Wildlife Department. *Land and Water Resources Conservation and Recreation Plan*. January 2005.
(5) Texas Parks and Wildlife Department. *The Economic Benefit of Wildlife Watching in Texas*. Accessed June 2007.
(6) Texas Parks and Wildlife Department. *The 1987 Annual Economic Impact of Texas State Park Visitors on Gross Business Receipts in Dollars.* 1988.
(7) Texas Water Development Board. *State Water Plan, Water for Texas 2002.* October 2001.
(8) United States Fish and Wildlife Service. *National Fishing License Report: Calculation for 2007*. January 10, 2007.