CHAPTER 5

TOWARDS A STRATEGIC PLAN: A PROPOSED STUDY

The Need To Examine the Big Picture

Coastal scientists and government officials have known for several decades that human activities could destroy the bulk of coastal Louisiana's wetlands, and the way of life for the people who depend on them. Since the 1970s, scientists and officials have been aware that such a rapid destruction is, in fact, taking place. In 1981, the Louisiana Legislature created a $35 million trust fund to research, develop, and demonstrate methods to curtail land loss.

Since then, many possible solutions to wetland loss have been identified, and major projects have been planned. Nevertheless, the currently authorized projects are not expected to slow the statewide rate of wetland loss by more than 10-20 percent. Yet each major construction action to date has been hard fought and provides limited protection. The "big picture" of all possible actions, costs, and benefits is missing. To gain this view, a strategic plan will be required that places each action to be taken in a context that addresses the entire problem. To a large extent, such plans can be developed for particular hydrologic units. Nevertheless, some options would affect more than one unit, particularly freshwater and sediment diversion. Thus, a comprehensive plan must look at all the wetlands of the Mississippi deltaic plain.

It is now evident that a program to save a major fraction of Louisiana's wetlands would cost two or more orders of magnitude more than the resources currently allocated to the problem. Moreover, it would require federal government and private-sector interests to cooperate in state initiatives, which may imply restraints or major modifications of their policies and activities.

The political process must resolve whether these costs are justified by the protection of America's largest coastal wetland ecosystem. A political solution, however, will require scientists and analysts to provide policy makers with one or more comprehensive plans for addressing the issue. Thus far, professionals have developed numerous options that could slow wetland loss. But they have not yet provided policy makers with a map of what coastal Louisiana will be like thirty to one hundred years hence for each of the possible options. People have tended to focus on specific projects rather than on determining what must be done to achieve the desired level of wetland protection.

This panel was convened to chart a course for removing this impediment to the planning process. Although much research is still necessary, we believe that the information base is now sufficient to make first-order assessments. Below we outline a study to synthesize available information to evaluate the likely consequences of twenty alternative plans of action.

We do not dismiss the concern of many that after years of research, the time for studies has passed and it is now time for action. But we doubt that sufficient action can take place without a clear picture of the likely economic and social consequences of taking or not taking the necessary measures. This is especially true because many of the parties that must ultimately play a role in the eventual solution are largely unaware of the problem or are not yet convinced that the problem warrants their attention.

In the study we envision, a wide variety of wetland protection options will be considered. For each option or combinations of options, a map of future wetland loss will be developed, along with a cost estimate. When this study is complete, it will be possible for policy makers to say: "If we want to have 50 percent of our wetlands by 2100, it will cost this much; if we want to retain 10 or 25 percent, it will cost this much. In each case, here is what a map of Louisiana would look like." It will also enable policy makers to assess the economic and social costs of losing the land (with no protective efforts) and to compare these long-term revenue losses with shorter-term restoration expenditures.

This information will not guarantee adoption of major actions to protect Louisiana's wetlands. But without such information, implementation of the necessary measures will be extremely unlikely.

Table 5 illustrates the major steps of the proposed study, which can be divided into two parts: (1) Estimating the cost of particular levels of wetland preservation, and (2) evaluating the benefits of various levels of wetland protection and the long-term costs of the no-action alternative. In the first phase, the study will project statewide land loss in the next century for a variety of remedial measures and estimate the cost of implementing those options, for three scenarios of future sea level: current trends, a medium scenario, and a high scenario. It is particularly important that this study consider scenarios of accelerated sea level rise because the many studies conducted by the Corps of Engineers have only used historical trends, which may provide misleading results regarding the relative merits and cost/benefit ratios of various projects. The second phase will consider benefits such as reduced flooding and flood mitigation costs, greater seafood harvests, increased hunting and trapping, and achievement of the nation's environmental goals.

Table 5
Outline of Proposed Study

Phase 1: Strategies for Achieving Particular Levels of Wetland Protection

1. Use existing data to project wetland loss through the year 2100, assuming current trends and two scenarios of accelerated sea level rise, if no additional mitigation measures are taken.
2. Estimate the loss of wetlands likely to result for each of the mitigation measures listed in Table 6 for each of three scenarios of relative sea level rise.
3. Estimate the costs of implementing each of the options in Table 6. Cost estimates include capital and operating costs.
4. Develop maps to show future shoreline.
5. For each of the major uncertainties in projecting wetland loss, base estimates on high and low values that bound the uncertainties.

Phase 2: The Desired Level of Wetland Protection

6. Project values through 2100 for flood damages, navigation, resource production, and all of the other factors that depend on Louisiana's wetlands (listed in Table 7 assuming no additional loss of wetlands.
7. Estimate the value through 2100 of each of the factors listed in Table 7, for each of the scenarios of wetland loss considered in task 2, above.

Phase I: Strategies for Achieving Particular Levels of Wetland Protection

The first step is to project the likely loss of wetlands if current conditions continue. The ongoing study of future coastal conditions by the Louisiana Geological Survey will provide estimates of future conversion of wetland to open water. The conversion to dry land for building sites will also be considered in this base line.

As described in the previous chapter, this panel has reviewed a wide variety of measures for slowing the rate of wetland loss. Those measures can be broadly classified into (1) diverting the Mississippi River in directions that would better enable marsh creation; (2) reducing the number of canals; (3) barriers to prevent flooding and/or intrusion of saltwater into the wetlands; and (4) modifying land-use and land-creation practices.

One of the most difficult challenges facing us has been to pare down the list of options to a manageable set for purposes of a comprehensive analysis. We have used two main criteria: (1) likelihood of implementation; (2) degree of wetland protection offered. Table 6 lists options that we believe should be assessed. Of those measures, we believe that carrying out planned and authorized projects (option 2), construction of additional diversion structures (option 5), a 50 percent reduction in canal dredging (option 6), and marsh management (option 11) are all reasonably likely to occur. Unfortunately, there is little reason to believe that these measures will reduce the loss of wetlands in the next fifty years by as much as 50 percent, particularly if sea level rise accelerates.

Table 6
Wetland Protection Options

Baseline

1. No action.
2. Currently authorized and planned projects.

Diversion

3. Increase the share of the Mississippi River water flowing down Atchafalaya River from 30 percent today to 70 percent over the forty-year period 1990-2030.
4. Free the natural processes of the active delta by constructing locks and canals from the Mississippi River to adjacent open waters, and abandon artificial channels, levees, and bank maintenance projects along the river below the canals.
5. Construct twice as many diversion structures as have been currently planned.

Canals

6. Slow the projected rate of net canal dredging by one-half.
7. Fill existing canals at the same rate that new canals are created, importing material where necessary. Fill existing canals for a net reduction of 1 percent per year for the next fifty years.

Land Use

8. Restore one-half of wetlands that have been diked and/or drained for conversion to pasture or cropland.
9. Wetland creation and maintenance to offset conversion of wetlands for development.
10.

Other

11. Marsh management (weirs, floodgates, restricting marsh buggy traffic)
12. Hurricane levee/saltwater intrusion barrier parallel to Gulf shore.

Combinations

A. Options 2, 5, 6, 11	E. Options 2, 5, 8, 11
B. Options 2, 3, 6, 11	F. Options 2, 4, 7, 11
C. Options 2, 3, 7, 11	G. Options 2, 4, 8, 11
D. Options 2, 3, 8, 11	H. Options 2, 5, 6, 11, 12

To save a substantial fraction of Louisiana's wetlands in perpetuity would require implementing more costly measures. Allowing the river to divert its flow to the Atchafalaya has long been proposed, and would enable a substantial acceleration of marsh creation to take place at this emerging active delta;

option 3 proposes to increase the Atchafalaya share by 1 percent per year for the next forty years. (This option would not necessarily imply a uniform increase for all parts of the year. Diversion of the excess during late winter and early spring would be likely to provide greater sediment with fewer adverse impacts on navigation.) Separating navigation from the natural processes of the active delta through construction of bypass canals and locks from the river above the delta to nearby open waters (option 4) would make it possible for natural deltaic processes to return to the current active delta. Each of these measures ould be expensive. However, they would protect a larger fraction of the wetlands even if sea level rise accelerates.

Filling canals would decrease the loss of wetlands from saltwater intrusion and wave action. Option 7 requires no new net canal formation, while option 8 requires a net reduction in canals of 1 percent per year for the next 50 years. Converting areas that once were wetlands back to wetland (option 9) would offer a one-time opportunity to increase the area of marsh. Hurricane levees with pumping systems (option 12) would be mainly designed for flood protection, but might also slow the loss of wetlands by preventing saltwater intrusion and the drowning of wetlands provided that no development were allowed within the new levees. As discussed above, such areas would no longer serve as nurseries for estuarine fish unless special exchange structures were built to enable fish to cross the levees.

To gain an understanding of the usefulness of the measures at our disposal, it will be necessary to examine various combinations of these measures, also shown in Table 6. All of the combinations we suggest would include currently planned and authorized projects, including the restoration and maintenance of barrier island chains, and enhanced marsh management. In addition to those measures, Combination A would involve a doubling of the construction of river diversion projects and a 50 percent reduction in the rate of canal dredging. Combination B would be similar except that instead of additional diversion structures, we would stop preventing the natural tendency of the Mississippi River to switch to the Atchafalaya channel by allowing increased flow to the Atchafalaya to take place at a rate of 1 percent per year for the next 40 years.

Combinations C and D would be similar to B, except that C would also require no net increase in canals while D would require enough filling of canals to reduce the area of canals by 1 percent per year for the next 50 years. Combination E would also incorporate the drastic reduction in canals dictated by option D, but would only require a doubling of planned diversion structures instead of the major diversion to the Atchafalaya River.

Combinations F and G would employ a different diversion scheme: restoring the natural deltaic processes of the lower Mississippi River by separating navigation from river flow. If shipping were restricted to canals with locks, say, near the existing Mississippi River Gulf Outlet, it would no longer be necessary to maintain river banks and channels downstream of Venice, and sediment could be diverted into shallow water instead of continuing to wash off the edge of the continental shelf. Combination F assumes that this "rediversion" scheme is employed, along with no net increase in canals. Combination G adds the 50 percent reduction in canals to this diversion scheme. Finally, option H offers a completely different combined strategy of slowing the rate of canalization, doubling the number of diversion structures, and employing hurricane levees as barriers to saltwater intrusion.

This list of combinations is not exhaustive. However, by analyzing these combinations it should be possible to better understand the extent to which various strategies complement one another. Options 9 and 10 could also be employed along with these combinations; we left them out of the list only because their contributions could reasonably be expected to be independent of the other options employed.

Projecting wetland loss for these options would be an ambitious task. The many uncertainties suggest that precise estimates will not be possible. Nevertheless, it should be possible to bound the uncertainty limits to provide decision makers with a clearer picture of the likely outcomes of various strategies.

The study we propose would be based on existing information; it would not undertake additional basic research to answer questions that are still hotly debated, although such research should be continued to improve the existing data base. For example, some people may believe that canals are responsible for 25 percent of wetland loss while others believe that they are responsible for 75 percent. Regardless of the relative blame, filling of canals alone would not save the wetlands if the sea level rises rapidly in the future; irrespective of the relative blame, saltwater intrusion resulting from canals can be curtailed either by closing off the canals or by introducing additional freshwater to inland wetlands. In cases where uncertainties about particular processes impede projections of the impacts of particular options, the study will make projections assuming high and low limits to these process contributions, in a manner similar to that employed by the Environmental Protection Agency report Projecting Future Sea Level Rise.

Phase II: The Benefits of Wetland Protection

Phase I will make it possible to provide maps depicting coastal Louisiana as it will appear in the future to the public and to policy makers. This information may be sufficient for some people to decide the level of effort appropriate for protecting Louisiana's wetlands. However, others may require assessments of the implications of various levels of protection.

Table 7 lists the more important impacts that we believe should be estimated. Increased flood damages and the costs of preventing flood damages could be very important to many coastal parishes and, eventually, the City of New Orleans. The impact of such increases on flood insurance rates and claims could be important to the federal government, particularly the Federal Emergency Management Agency, which manages the National Flood Insurance Program. In addition to flood damages, the value of land and structures lost to erosion should also be considered, including infrastructure financed by the federal, state, and local governments.

Table 7

Impacts of Wetland Loss (units in parentheses)

1. Flood Damages (probability of storm equal to current 100-year storm, number of residences lost per decade, dollars)
2. Flood Control Costs (dollars)
3. Flood Insurance Claims and Rates (dollars)
4. Lost Infrastructure (type, quantity, dollars)
5. Private Land and Structures (number of residences, businesses, acreage, dollars)
6. Commercial Seafood Production (pounds, dollars)
7. Commercial Hunting and Trapping (catch, dollars)
8. Recreational hunting and fishing (recreation days, dollars)
9. Other Recreation and Tourism (recreation days, dollars)
10. Shipping (tonnage, costs per ton)
11. Channel and River Maintenance Costs
12. Drinking Water (costs, health effects)
13. Cost to protect hurricane, navigational and flood protection levees from storm waves as protective marsh and barrier islands disappear. (dollars)
14. Employment (jobs, dollars)
15. Water quality improvements (cancers prevented, increased yields)

The value of lost seafood, hunting, fishing, and trapping will also be important. The dollar value will have significance to the local economies; moreover, the resulting drop in nationwide seafood production will be important to a variety of national constituencies, including the restaurant industry and the general public, and the poultry industry, which relies on Louisiana's menhaden. Adverse impacts on tourism should also be considered. Finally, potential increases in some seafood species must also be considered.

Because wetland loss is caused in part by activities designed to aid navigation, shipping-related costs may increase as a result of measures to curtail wetland loss. River diversion projects would slow the flow of the Mississippi, perhaps necessitating additional dredging. Diversion to the Atchafalaya may require dredging downstream of the Old River control structure, although it might also result in decreased dredging costs in the lower part of the main channel. Separating navigation from river flow with the construction of canals and locks would increase shipping costs by the additional time spent waiting for the use of the locks (however, the shorter route with no downstream current to fight may partially or totally offset waiting periods or delays, and save in fuel costs).

Drinking water would also be affected by wetland loss and proposed mitigation options. Wetland loss and many of its causes are likely to continue to increase the salinity of water supplies. On the other hand, diversion of the Mississippi River to the Atchafalaya would enable saltwater to reach farther up the Mississippi channel and may render existing water intake supplies too salty for use. The costs of developing an alternative water supply for New Orleans would thus have to be considered; because such a supply would most likely be of higher quality than the city's current supply, the reduction in the use of bottled water and increased level of health of the city's population would also have to be factored in. Finally, the negative impacts of wetland loss on employment must be considered.

To a large degree, the decision regarding the appropriate level of wetland protection will depend on the cost of mitigation and the benefits of protecting wetlands. Many of the members of this panel are concerned, however, that an overreliance on conventional cost-benefit analysis may justify a level of wetland protection far less than the public at large would favor. Our concern falls into two categories: (1) cost/benefit analysis only considers readily measured commodities traded in the marketplace, and overlooks nonmarket values of environmental resources and societal goals; and (2) formulas commonly used to estimate the benefits of small wetland protection projects may not be consistent with economic theory when applied to projects to protect all of coastal Louisiana.

There is a national interest in maintaining our cultural heritage and environment for future generations. Methods of estimating the value of an acre of wetlands do not generally consider these latter factors. For example, methods used by the Corps of Engineers to estimate the value of wetland protection in Terrebonne Parish generally conclude that the marsh is worth about $2500-6400 (Costanza and Farber 1985). Yet federal, state, and local governments have often required mitigation for wetland destruction outside of Louisiana at costs of $25,000-$35,000 per acre (OFA 1986). This discrepancy suggests that the actual value to society of maintaining coastal ecosystems is far greater than the current cost/benefit methods would lead one to believe.

Even when a conventional market analysis is employed, the value of the entire ecosystem will be far more than what one would estimate by multiplying the value of one acre by the number of acres. A loss of 10 percent of Louisiana's remaining wetlands would increase the risk of flooding in some areas; but if 60 percent of the wetlands are lost, the last 10 percent could significantly increase the risk of flooding in major urban areas.

Furthermore, an accurate analysis of the value of Louisiana's wetlands should include a sound treatment of what economists call "consumer surplus." The economic cost is reflected not only by current market prices, but by what people would be willing to pay for the resources supplied by wetlands. If shrimp costs $3.00 today but would rise to $6.00 with the loss of Louisiana's wetlands, an economic valuation of lost shrimp production should reflect values of shrimp ranging from $3.00 to $6.00, perhaps for an average value of around $4.50. The same situation applies to residential land values. Although a native of coastal Louisiana may have only paid $50,000 for his house, his heritage and fondness for hunting and fishing may so tie him to the area that it would be worth considerably more to him to stay in coastal Louisiana, as long as the character of the area is maintained.

Finally, the choice of an interest rate by which to "discount" future costs of wetland loss into current values plays a very important role. The use of the high rates that have prevailed during the 1980s can be used to trivialize the distant future. Care must be taken to ensure that the discount rates used in the analysis reflect society's tradeoff between present and future generations.

It is important that assessments of the benefits of protecting wetlands focus not only on "bottom line" dollar estimates, but on the uncertainties in such estimates and on noneconomic ways of viewing these benefits. Although middle-level managers must often make decisions on the basis of quantitative cost/benefit information, the achievement of nonquantitative values and objectives can be equally important to political leaders and the public at large.