

Efficiency measures will be evaluated through computer modeling techniques. The models will permit users to ask "what if" type questions. The models will permit evaluation of capital and operating costs measures of improvements as well as short-term and long-term alternatives. Although these models will be used as a test case to evaluate efficiency measures on the Upper Mississippi, they also will be adaptable to other waterway regions.

Efficiency measures will include those that can be implemented by private or public (state, federal or local) organizations. Acceptable efficiency measures must meet the following tests:

- o be low cost and practical;
- o have barriers that can be addressed and eliminated;
- o have practical funding alternatives from federal, local, quasi-governmental, or private sources;
- o be environmentally acceptable;
- o be consistent with multi-purpose use of the waterway; and
- o have a positive benefit/cost ratio.

We must maximize the economic efficiency of the existing waterway system, evaluating all possible measures which require little additional investment. These measures will "buy time" for the inland waterway system, while longer range structural improvements are being justified, designed and funded. A prerequisite for future structural improvements may be to demonstrate that all feasible nonstructural improvements have been exhausted and that further transportation savings can only result from new capital investments.

Reducing Environmental and Economic Costs  
of Inland Waterway Operation and Maintenance  
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The U.S. Army Corps of Engineers spends nearly \$700 million per year to build, operate, and maintain over 25,000 miles of inland waterways. Several of these waterways carry little traffic and if left to market forces, would close down.

The construction, operation, and maintenance of inland waterways result in the destruction of riverine and riparian habitats. The fish, wildlife, and other natural resources sustained by these ecosystems are of great value. This paper discusses the environment degradation caused by expanding or maintaining several low use inland waterways. It also suggests that the users should pay for the construction, operation, and maintenance costs on the system to ensure that only efficient waterways remain open.

Riparian Habitats

Riparian communities are those forests and wetlands that depend for their existence on the dynamics of a river. The vegetation in riparian zones is

"phreatophytic or a water-loving, and is typically more diverse, dense and digestible than upland vegetation. Large game animals, such as deer, elk, and turkey use riparian areas extensively as migration corridors and winter range. Water dependent wildlife, including waterfowl, aquatic furbearers (mink, river otter, raccoon, muskrat and beaver, for example), and amphibians must have riparian or similar habitat available to survive. Because of their floral and structural diversity, riparian habitats support the most dense and diverse bird populations of any habitat type.

Riparian communities maybe eliminated by the straightening, deepening, widening, and disposing of excavated material from our inland waterways.

#### Environmental Degradation on Low Use/High Cost Waterways

Several waterways carry traffic at a cost much higher than the national average. The south central and southeastern states contain most of these low use waterways; these states also contain some of the nation's most valuable riparian and endangered communities, including bottomland hardwood forests and coastal wetlands.

The Apalachicola-Chattahoochee-Flint waterway in 1983 carried only 690,000 tons of commerce; less than one-tenth of one percent of the national total of a cost of \$5.67 million to maintain it or 70 mills per ton. This is nearly 70 times the national average expense. The Corps plans to intensify operation and maintenance activities in hopes that the waterway will capture traffic now moving overland.<sup>1</sup> A new navigation maintenance plan would increase the available 9-foot deep channel for 90 percent of the year, rather than the current 78 percent. The Corps has asked Congress for \$4.5 million in 1987 to operate and maintain the tri-river system.<sup>2</sup>

Since 1958, the Corps has removed an average of over a million cubic yards of river bed annually from the Apalachicola to improve navigability. Within the past 35 years, the Corps has constructed two bendway easings. The material removed during these operations often ended up on top of valuable wildlife habitat and caused the loss of most plants within the deposition area.<sup>3</sup>

Spoil deposited to a depth of 2 to 6 inches around the base of a tree decreases the vigor of tree growth. Deposition of 3 or more inches of silt or sand may seal the soil and smother tree roots. The depth of deposition on the areas invested was sufficient to kill virtually all of the trees within the disposal area.

Dredging and snagging operations restricted striped bass from thermal refuges and sturgeon from former ranges, and eliminated the commercial viability of those species on the Apalachicola. The commercial catfish harvest along the river has declined and fish species composition of the river is likely to continue to shift from game species to rough and forage species as a result of these habitat alternations.<sup>4</sup>

Increased navigation on the A-C-F would likely result in increased industrial, agricultural, and municipal development of land adjacent to the river. According to research conducted at the Columbia National Fishery Laboratory in Missouri:

Moderately high residue concentrations of metals, organochloride insecticides, and PCBs were measured in the biota collected from the Apalachicola River in comparison with other systems and criteria for the protection of aquatic life. . . Additional contaminant loading from ongoing activities or future developments in the Apalachicola watershed could pose a serious threat to the environmental quality of this already moderately contaminated system.<sup>5</sup>

The Alabama-Coosa waterway carried 2.61 million tons of commerce in 1983, and cost the taxpayers \$3.62 million to maintain, for an average expenditure of 20.69 mills per ton-mile, or 20 times the national average. The Corps has requested \$4.9 million for operation and maintenance in FY 1987.

The Rivers and Harbors Act of 1945 authorized development of the Alabama and Coosa Rivers for navigation. A restudy of the project in 1977 concluded that the benefit/cost ratio, at an interest rate of 3 1/4 percent, was only .28-to-1 without area redevelopment benefits (regional transfers) and .46-to-1 with area redevelopment benefits.<sup>6</sup> By 1981, the benefit/cost ratio had not changed, but since the project was previously authorized, navigation management may continue and intensify.

The Coosa River is formed by the confluence of the Oostanala and Etowah Rivers near Rome, Georgia. It flows 110 miles westerly and joins the Tallapoosa River to form the Alabama about 18 miles north of Montgomery. The Corps' proposed navigation maintenance plan for the Coosa would provide a 9-by-150 foot navigation channel from Montgomery to Gadseen, a distance of 192 miles. The Fish and Wildlife Service anticipates that up to 3,000 acres of wildlife habitat would be destroyed by development induced by the project.

Three species of sturgeon listed as endangered, threatened, and species of special concern in Alabama may have already disappeared from the Coosa because dams have eliminated their free-flowing habitat.<sup>7</sup>

The Fish and Wildlife Service also anticipates significant declines in several wildlife species if the intensified navigation proposal is implemented. A 48 percent decline in eastern cottontail populations, 41 percent in wild turkey, and 36 percent decline in populations of non-game species such as indigo buntings, green herons, and redtail hawks on the project area are expected.<sup>8</sup>

The Alabama River section of the project was completed in 1972. In 1983, the Corps proposed increasing the 9-foot deep navigation channel on the Alabama. Nearly three quarters of the projected navigation benefits were attributed to future shipments of limestone and clay by the Ideal Cement company, which had never used the waterway before. By 1985, Ideal's Alabama River plant had shut down. The Corps is currently reevaluating the project.

The White River waterway in 1983 carried only half a million tons of commerce and cost \$1.6 million to operate and maintain, for an average cost per ton-mile of 23.1 mills, over 20 times the national average. The Corps' 1987 budget request for White River operation and maintenance is \$1.85 million. The Corps has prepared a plan that would make a 9-foot deep by 200-foot wide navigation channel from Newport, Arkansas to the river's mouth available 95 percent of the time instead of its current 75 percent availability.

Over half of the projected benefits of intensified navigation on the White are attributed to movements of petroleum products that do not currently move on the river.

Alternation of the White for navigation began in 1870, in conjunction with work on the Mississippi River. In 1892, Congress authorized the existing project from the mouth to Batesville. Navigation maintenance of the river was suspended from 1951 to 1961 because of a lack of traffic. The project was reactivated and enlarged by the 1960 River and Harbor Act.

Intensified management under the Corps proposed plan would result in a 16 percent loss of aquatic resources.

The Tennessee-Tombigbee waterway cost \$1.8 billion to construct and, at a length of 234 miles, is larger than the Panama Canal. The Corps predicted that the waterway would carry 27 million tons of commerce in 1985, its first year of operation. Instead, the Tenn-Tom carried only 1.7 million tons, or six percent of the Corps' prediction.<sup>9</sup> The Corps had predicted that soft coal from Kentucky would account for 70 percent of the total Tenn-Tom tonnage; now the corps is predicting that soft coal will make up only 54 percent of the traffic.<sup>10</sup>

The Fish and Wildlife Coordination Act Report for the project predicted that 64 percent of 105,000 acres would suffer habitat losses. Nearly 45,000 acres of bottomland hardwood forests would lose virtually all of their value as habitat for terrestrial species, and 22,500 acres would be degraded by spoil disposal and recreational facilities.<sup>11</sup> Deer, turkey, squirrel, and furbearer populations would all drop below half of their pre-project levels.

#### Restructuring Federal Spending For Inland Waterway Operation and Maintenance

There are several economic reasons why waterway users should bear more of the costs of maintaining inland waterways. If shippers and barge companies had to pay for operation and maintenance, they would no longer press for maintenance of underused waterways.

If shippers had to pay the full costs of moving their goods, they would be encouraged to use the most efficient mode of transportation. The total cost of shipping goods by waterway (including the average Federal construction and O&M subsidy of 25 percent of the total costs) is not currently factored into shippers' decisions.

The 1985 omnibus funding legislation for the Corps of Engineers contains provisions for using the Inland Waterways Trust Fund to help finance new construction on the waterways. The provisions should be expanded to include operation and maintenance.

Compared with other modes of freight transportation, inland waterways are heavily subsidized and will continue to be so even with the cost sharing provisions for new construction. According to the Congressional Budget Office, in 1982, domestic inland waterway transportation received subsidies of 3.3 mills per ton-mile, compared to 1.4 mills by railroads, 1.3 mills by trucks, and nothing by pipelines. Waterway subsidies are particularly large relative to total costs of operations. The Congressional Budget Office calculated that

in 1982, Federal subsidies covered more than 28 percent of all waterway shipping costs, as compared to 4.2 percent for railroad shipping costs, and less than 1 percent for truck shipping costs.<sup>12</sup> Over 11 percent of the annual inland waterways operations and maintenance expenditures go to channels that collectively carry less than 1 percent of the traffic.

An inland waterway system financed partially or entirely by users would improve equity among users, promote more efficient use and maintenance of the system, conserve environmental resources of value to the general public, and help reduce federal deficits.

<sup>1</sup>U.S. House of Representatives, 1985. Energy and Water Development Appropriations for 1986. Hearings before the Committee on Appropriations, Subcommittee on Energy and Water Development.

<sup>2</sup>U.S. Army Corps of Engineers, 1986. Fiscal Year 1987 Civil Works Budget Request. Office of the Chief of Engineers, Washington, D.C.

<sup>3</sup>Eicholz, N.F., D.B. Bailey, and A.V. McGehee, 1979. Investigation of Dredged Material Disposal Sites on the Lower Apalachicola River. Florida Game and Fresh Water Fish Commission. Tallahassee, FL. 115pp.

<sup>4</sup>Livingston, R.J., 1984. The Ecology of the Apalachicola Bay System: An Estuarine Profile. U.S. Fish and Wildlife Service. FWA/OBS-82-05. 148 pp.

<sup>5</sup>Wenger, P.V., C. Sieckman, T.W. May and W.W. Johnson, 1984. Residues of Organochlorine Insecticides, Polychlorinated Biphenols, and Heavy Metals in Biota from the Apalachicola River, Florida, J. Off. Anal. Chem. 67(2). pp. 325-353.

<sup>6</sup>U.S. Army Corps of Engineers, 1977. Restudy on the Coosa River Navigation Project, Alabama-Georgia. Mobile District, Mobile, AL.

<sup>7</sup>U.S. Army Corps of Engineers, 1982. Montgomery to Gadsden Coosa River Channel: Alabama. Design Memorandum No. 1, Vol. 1. Mobile District, Mobile, AL.

<sup>8</sup>U.S. Fish and Wildlife Service, 1982, Op sit.

<sup>9</sup>Schmidt, W.E. Tombigee Waterway Use Falls Short of Forecasts. New York Times. Feb. 16, 1986

<sup>10</sup>Martz, R. Small towns see big bucks flowing down the Tenn-Tom. The Atlantic Journal. Juen 2, 1985

<sup>11</sup>U.S. Fish and Wildlife Service, 1981. Fish and Wildlife Coordination Act Report, Tennessee-Tombigbee Waterway, Arkansas and Mississippi. Prepared by: Field Office, Div. of Ecological Services, Decatur, AL.

<sup>12</sup>Congressional Budget Office, 1982. Charging for Federal Services. Congress of the United States, Washington, D.C. 105 pp.