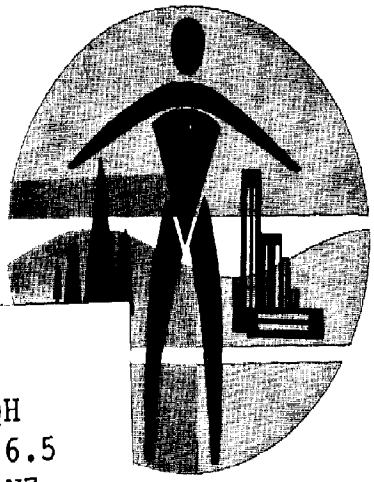
COASTAL ZONE INFORMATION CENTER

Total Management for Resource Values of Long Island's Tidal Wetlands



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Long Island's tidal wetlands can best be described in terms of the three different zones they occupy:

1) the intertidal zone: that area covered by normal high tide and exposed at low tide including the tidal flats and cordgrass marshes of *Spartina alterniflora*.
2) the salt meadows: that area between normal high tide and peak lunar or storm tides; the upper edge of the marine flood plain usually covered with salt hay, *Spartina patens* and associated plants that have significant salt tolerance.
3) the shallow water zone: that area from mean low tide to six foot depths at low tide, including tidal creeks and shallow bay bottoms.

The natural values of marine or tidal wetlands have been documented in a number of publications, including the June-July 1967 issue of The Conservationist magazine. Most recently, they have been spelled out in the preamble of New York's recently passed tidal wetlands legislation as follows:

- marine food production
- wildlife habitat
- flood and storm control
- recreation
- treating pollution
- sedimentation
- education and research
- open space and aesthetics

Wetlands are usually managed in ways that satisfy the owners, but it is often difficult to determine who the rightful owners are. The Algonquins managed wetlands for their natural values and capitalized on the bountiful crops of

fish, shellfish and wildlife. The early European colonists on Long Island, mostly English on the east end and Dutch on the west, claimed jurisdiction over all uplands and underwater lands as a consequence of the explorations of John Cabot and Henry Hudson.

The English overpowered the Dutch and the Indians early in the competition for development rights and charters were given by various ruling monarchs to townships as they formed. The most substantial charters (patents), issued by Governor Dongan in the 1680's, authorized the annual election of trustees for the "Freeholders and Commonalty" and entrusted them with unappropriated lands including marshes, beaches, harbors, inlets, creeks, etc. to be held, "for the use, benefit and behoof" (advantage and profit) for the beneficiaries of the trust (residents and taxpayers), their heirs, successors and assigns. Clearly, the trustees were responsible to maintain the public trust rather than to enhance their private profit. The powers and proprietary rights of the English kings were transferred to the State of New York after the Revolutionary War.

For a long time, there has been considerable debate relative to how public lands should best be managed for the "use, benefit and behoof" of the people. To what degree should inlets be stabilized, and navigation channels developed? Should riparian owners be given the right to bulkhead within the intertidal zone and then develop solid docks or piers into the public waters? What are reasonable management and development criteria? Can the trustees sell land without a public referendum? What are private rights versus public rights?

A general concept of English common law, which was incorporated in the New York State Constitution under Article 35 in 1778, held that no person could run a dock, pier, fishing weir, etc. into the foreshore or navigable waters without permission from the king–New York State. Unfortunately, the concept benefiting the public interest appears to be gradually eroding through various court decisions which seem to be more concerned with improving private riparian benefits rather than the public's. To uphold the public benefit, the courts must revert to the original,

more conservative doctrine. At the same time, local zoning must also uphold the public interest rather than continue to regard the marine edge as primarily a substrate ripe for private development and profit. Furthermore, any disposition of public lands by town trustees without a public referendum approved by the residents and taxpayers is contrary to the original trust doctrine.

It should be obvious to everyone that the development and use of our outstanding marine environment must be accomplished in deference to the greater long range public good rather than to the short term private gain. Nevertheless, through a better understanding of the nature of the marine environment and a willingness to compromise, much that can be done for private advantage can also benefit the public.

NAVIGATIONAL CHANNELS

There exists an obvious need to maintain, and at times to develop, *navigational channels* through productive shallow bay bottoms by removing layers of bottom soils and depositing them somewhere else. Such actions, while benefiting navigation, often accelerate the rate of shoreline erosion, increase turbidity and significantly lower the productivity of the bottom substrate. Also, as water in the embayment is deepened below mean low water, the proportion that will be exchanged between tides is decreased. Furthermore, the dredged soils are often placed on productive wetlands thereby destroying them.

To minimize the negative impact of channelization, the following management objectives should be considered:

1) Maintain channel depth as shallow as possible to favor productivity.
2) Flatten channel slopes to 3:1 or better to improve stability.
3) Retain vegetated flood plain to trap sediments.
4) Keep new channels as far from shores or marsh edges as practical.
5) Control speed of boats in channels where shore erosion occurs.
6) Utilize dredged soils either to nourish beaches or to fill relatively unproductive nuisance shoals (shallow zones that interfere with navigation) from which islands can be developed. Such islands must be stabilized with snow fence and plantings; otherwise, the sand will quickly blow or wash back into the water.

DEVELOPMENT

Associated marinas, docks and piers are usually developed by bulkheading, dredging, and/or filling the littoral zone. Such actions significantly reduce the natural productivity of the wetlands affected, by physically destroying the littoral zone as well as increasing turbidity. Furthermore, increased discharges of such toxic and noxious wastes as paints, solvents, oils, fuels, sewage and litter are associated with such developments. Thus management objectives should be designed to:

1) Confine locations of harbors and marinas to zones declared expendable for natural values (a planned compromise).
2) Permit bulkheading and filling only where some public interest is served.
3) Permit docks and piers when designed to have minimal impact on littoral zone as well as navigation.
4) Control discharge of toxic and noxious substances.

Wetlands are often regarded as nothing more than a handy substrate to be covered over with such developments as housing, industry, airports, landfills and roads. Severe, obvious environmental damage occurs when productive wetlands are covered. Other less obvious damage occurs because of the increased discharge of toxic and noxious wastes into the marine waters. "Fill" materials are often dredged from the immediate vicinity of the site being "improved," creating major pockets of deep water in the borrow pit. Such pockets invariably become stagnant and unproductive as they fill with decaying organic detritus. There is also the probability of potential inundation of the wetlands flood plain during the exceptional storm which, though of low frequency, may strike at anytime. Management objectives to minimize negative impact should:

1) Locate such facilities on wetlands only when the public benefit is clear and necessary and there are no alternatives (planned compromise).
2) Reduce and control discharges of toxic and noxious wastes.
3) Prohibit mining of marine soils in discontinuous deep pockets.
4) Upzone flood plain to significantly reduce vulnerability of potential development.

5) Provide a public flood plain insurance program for such developments that are vulnerable to flood. Reimbursements to property owners suffering damage on the flood plain should be payable only once. After payment, the land area must remain undeveloped except for such projects that are pertinent to the restoration or enhancement of natural values.

6) Cover completed landfills with good soil and stabilize with upland plant communities rather than with a layer of pavement.

7) Reduce output of solid waste through recycling.

MINERAL MINING

Valuable non-renewable *mineral resources* such as sand, gravel and even clay for bricks are often present along the marine edge in commercially exploitable concentrations. They are usually removed by some dredging or digging operation and transported by barge, pipe-line, rail or truck. Often the fine unusable constituents for construction aggregates are screened from the desirable coarser particles by an on-site washing process. The process of washing out the fine particles of sands, silts and clays within the estuarine complex has often resulted in a burden of such fine particles depositing in the shoal zones with subsequent loss of biological and recreational values.

The practice of digging discontinuous deep excavations within a shallow zone creates settling basins for organic detritus which in the process of decomposition invariably demand more oxygen than can be supplied by the consequential reduced water circulation, thereby creating anaerobic, biologically unproductive zones. Excavations may also disrupt impermeable soil horizons which restrain or confine the seaward movement of fresh water originating inland, thereby accelerating the movement and loss of inland freshwater seaward. Highly productive shallow and littoral zones have often been completely obliterated through over zealous marine mining operations which completely disregarded long term public benefits for short term private profits.

The environmental impact of mineral mining has been mostly negative even though it could be mostly positive if the following management objectives were pursued:

1) In many bays, especially on Long Island's south shore, ecologically desirable variations to the wetlands plain can be provided along with significant navigational benefits by controlling the depth, width and direction of dredging operations.
2) Controlled mineral mining should be used to offset the cost of developing marinas and mooring areas, as well as removing relatively unproductive nuisance shoals which interfere with navigation or recreation.
3) When the mining of marine deposited minerals is done without any obvious public benefit, the charge for such materials should be high enough to pay for supervision, control and possible mitigating benefits.
4) The practice of washing and screening must be confined to areas that will not be significantly degraded by the addition of such sediments.

During the prolonged geologic era of rising sea levels, as the barrier beaches become overtopped periodically they shift and move landward. Furthermore, their stability as a persistent coastal front is consistent with their being flexibly unstable at any point along the front, as sections of the coast line erode in one place but reform at another place. Thus, at best, beaches can be only temporarily stabilized through the installation of groins, jetties and sand replenishment.

Temporarily displaced sand from one part of a beach is often mechanically replaced with sand dredged from shallow inland coastal waters. Also, groins have been traditionally used to restrict the lateral movement of sand along the beach. Sometimes groins are supplemented with mechanically transported sand. While groins will catch sand on one side until they are filled, they will prevent the caught sand from replacing that which has moved from the other side. From an engineering point of view, it's "cheaper" and safer to mine sand from shallow estuaries than from the open sea. However, should the sand mining result in losses to biologically productive bay bottoms, as is often the case, then the biological costs to the public at large can be significant.

The negative aspects resulting from beach nourishment can be minimized in proportion to the consideration given to the following management objectives:

1) Promote only that kind of beach use and development which is compatible with the dynamic nature of the shore. Such perspective necessitates the gradual elimination of expensive developments which cannot be amortized over some rational period such as 10 years or so.
2) On the south shore if groins are installed, start groin programs from the west at an inlet and work east, rather than vice versa.
3) On other shores if groins are installed, start groins at an inlet or some neutral zone and continue additional structures in the direction from which the drift is coming.
4) Mine sand from those coastal waters which are not biologically productive due to their instability and ideally where navigation can be enhanced.
5) Develop reasonable offshore sand mining technology.
6) Implement sand bypass systems at major inlets.
7) Control those excessive human activities which cause damage to dune vegetation.

NUISANCE INSECTS

Since the 1930's, considerable effort has been directed toward *controlling nuisance insects* on Long Island's coastal edges. Control measures have been directed primarily at the salt marsh mosquito, which lays its eggs on the salt meadow flood plain. The ditching of salt meadows, pools and even marshes has been uniformly accomplished throughout the island. Chemical treatment for many years relied on extensive DDT applications, but it is now generally restricted to two rapidly decomposable organophosphates, Abate (larvicide) and Malathion (adulticide) as well as Flit MLO (an oil larvicide).

Since pesticides generally are non-selective they affect more than the target organisms. Long Island was the first area in the nation where the use of DDT was successfully challenged by environmentalists and subsequently barred from public nuisance insect control programs. Fortunately, the highly miscible Flit MLO appears to be quite target selective to mosquito larvae.

Many arguments have been raised concerning the broad environmental effects of ditching. Ditching is generally negative when permanent fresh water pools are drained and the fresh water table lowered. It is biologically beneficial where it cuts through marshes and meadows creating fingers of permanent water (which support predaceous insects and fish which eat mosquito larvae). Many mosquito breeding areas have been filled to accommodate various developments. As a consequence, in western Long Island, most natural mosquito breeding areas have been demolished, but domestic mosquitos which breed in the backyard pools and rubble are replacing the wild species as nuisance insects controlled through public funds. The negative effects of nuisance insect control can be minimized through adherence to the following procedures:

1) Restore or develop fresh water ponds wherever feasible on the nuisance temporary wet spots, not only to control mosquitos but also to enhance fish and wildlife populations and improve the fresh ground water supply.
2) Eliminate use of hard pesticides. Restrict use to those pesticides that are rapidly degradable and which are least damaging to non-target species.
3) Encourage the stocking of mosquito-larva eating fish in those small bodies of water such as backyard pools and recharge basins which may lack them.
4) Continue to use ditching where the procedure is not significantly damaging to fresh water resources. In fact, broad ditches seem more desirable than narrow ones. Not only do ditches help control mosquitos, but also they often enhance overall fish and wildlife habitat by providing significant edge and habitat interspersion. Ideally, ditching spoil should be spread rather than bermed to maintain unimpeded tidal flow.

HABITAT ENHANCEMENT

The marine edge is also managed for fish, wildlife and related aesthetic and educational values. Such management includes wildlife habitat enhancement, shellfish culture, management and development of fishing piers and fishing zones, fish and wildlife stocking, development of trails, blinds, access roads, observation towers, parking areas and buildings.

Habitat enhancement includes: 1) the stabilization of raw soils with plantings and snow fence, 2) introducing plant variety, such as autumn olive, rugosa rose and millets, 3) erection of tree swallow nesting boxes, 4) channel clearing and 5) pond development. Shellfish culture includes installation of racks and rafts in the water column, "cultivation" of the bay bottom, and chemical treatment of marine predators, drills and starfish. Fishing facilities include development of shore-based piers and underwater reefs.

Fish and wildlife stocking has restored fish, amphibian and reptile populations to those areas where fresh water ponds had been drained or filled and subsequently restored.

Physical developments such as roads, parking areas, trails and blinds to facilitate visitor use on publicly owned coastal areas do have an impact, of course, which must be critically evaluated in terms of cost/benefit. The impact can be minimized through judicious use of materials and continued maintenance, that is, blinds made from burlap and *Phragmites*, roads blue-stoned rather than paved, parking areas kept small and landscaped. The chemical treatment of marine predators has potential for environmental damage and requires careful application.

The coastal zone is also subject to various kinds of *plant management*. For hundreds of years the salt meadows were used as pastures, grazed as well as mowed. In recent years such salt hay has been used more for packing, mulching and insulation material than for fodder. Current uses of salt hay grasses are non-commercial in nature and mostly for such things as duck blinds and mulching. Thatch, the intertidal salt marsh cordgrass, was used for thatching roofs many years ago but now also is relegated to duck blind and mulch use. None of the uses seem to have any negative effects on the stability of the marsh-meadow complex.

Eelgrass, while desirable biologically as long as it is growing, can be environmentally degrading after the top strands break off and float in thick rotting masses. When the masses enter lagoons or channels they become especially annoying in two ways. First, they interfere with navigation and recreational uses of the water. Second, the

masses decompose anaerobically generating quantities of hydrogen sulfide which not only smells bad, but also can change the color of lead paints on houses from white to black as the sulfur reacts with the lead. Eelgrass when piled in great masses on beaches, can make the beach less desirable for recreation while improving its stability.

A reasonable procedure for eelgrass management is to collect the floating masses in amphibious vehicles and either stockpile the grass upland where it can be recycled for mulch (an outstanding material for mulching purposes) or confine it on the bay in "pens," where it can be prevented from moving about while it slowly decomposes out of the way of boats and fishermen.

To prevent eelgrass and other floating nuisance vegetation from entering channels and lagoons, a boom of restraining materials can be placed across channel entrances in a pattern that capitalizes on prevailing summer winds to capture the floating plants, while making provision for reasonable navigation.

There are a number of algae such as *Cladophora, Codium, Ulva* and *Nanochloris* which at times become a serious nuisance interfering either with biological productivity (*Nanochloris* suffocating clams) or with recreational activities (*Cladophora* plugging outboard engines and fouling fishing gear). At such times, various physical and chemical "solutions" to the problem are offered, but it has been our experience that the "solutions" are potentially more dangerous than the "problem." Problem "blooms" often dissipate as environmental conditions change. To date, we know of no good chemical solution to resolving marine plant problems. Philosophically speaking, we are better off with a marine environment that occasionally produces plant crops in nuisance abundance than with an environment too toxic to produce much of anything.

PRESERVING PRODUCTIVITY

One of the best ways to preserve the productivity of the coastal zone is either to place it within the public domain or to obtain the development rights through a public or even private agency. As a result of the passage last November of the 1972 Environmental Quality Bond Act,

the New York State Department of Environmental Conservation is now in a strong position to preserve privately owned wetlands in perpetuity. Such preservation can be accomplished in any of the following ways depending on the interests of the landowner as well as the overall public interest:

1) The land can be given to a tax free private or public corporation such as the Nature Conservancy, Village or Town Conservation Advisory Council or DEC. The owner can be compensated in terms of removal of the tax burden. Also, he will be able to take advantage of his gift through income tax benefits. The Nature Conservancy is an expert in describing this procedure. While the public loses some tax revenues, it gains far more value from the continuing productivity of fish and wildlife which belong to all.

2) The owner may wish to retain title to his property while at the same time securing its preservation. Under such circumstances he may give (with similar advantages as in item number one) or sell the development rights in perpetuity through a restrictive covenant or conservation easement. The Department can arrange to purchase such covenants (after a proper appraisal) where it is in the public interest to do so. The advantage to the owner is that he still enjoys the pride of ownership and control of trespass. Also, he may want to negotiate a significant reduction in assessed value and subsequent taxes in accordance with Section 247 of the Municipal Law. The advantage to the public is that the wetlands will continue to produce crops of fish and wildlife for the overall public benefit at low public cost.

3) The owner may be willing to sell his wetlands outright to the state for preservation purposes for an amount determined by a responsible appraisal. The Department would negotiate terms and taking lines and eventually pay the appraised value provided, of course, that the title is clear and that the owner is willing to accept the offer. The benefit to the landowner is primarily monetary although there can be satisfaction in negotiating a mutually acceptable taking line. The value to the public is the same as listed in items one and two. Also, the public may benefit from additional values in terms of some controlled public use, such as hunting, hiking and nature trails, depending on the nature of the terrain acquired and the control necessary to preserve the basic productive potential of the wetlands.

4) The owner may be unwilling either to negotiate a taking line or to accept the appraised value. In this case, if it appears that the public interest can best be served by state

acquisition, then the state will have to initiate condemnation proceedings. If after condemnation or appropriation, the owner and the state still cannot agree as to value, then the owner has the right to take his case to the Court of Claims. In this instance, the owner can receive 100 percent of the state's appraisal while waiting for the court to determine value.

5) Another preservation method is to have the property owner determine "development yield" based on the current zoning. The yield could then be clustered (under Section 181 of the Village Law or Section 281 of the Town Law) on the uplands portion of the parcel and the undeveloped wetlands given to a tax free shelter as listed in item one.

The advantages to the property owner are significant in terms of savings in development costs and possible tax benefits as a result of the gift. The advantages to the public are also great in terms of preservation in perpetuity without a direct exchange of money.

It would be naive to presume that where the marine edge is preserved in a physical sense, that it is then safe from degradation. The entire wetlands complex is constantly threatened and degraded also from a variety of liquid effluents that pour into it from a number of sources. The obvious ones result from industry and domestic sewage. Less obvious but no less degrading are the effluents resulting from pavement run-off (which is generally toxic in proportion to the percentage of the watershed that is paved), solid-waste leachates originating from landfills, and pesticide and fertilizer leachates originating from farm, garden, lawn and golf course management.

We are a long way from resolving or even minimizing the above problems which are more likely to worsen rather than improve inasmuch as technological improvements and legal constraints cannot easily compensate for the noxious "residues of civilization" which leach out in direct proportion to rapidly increasing population density. However, environmental problems like all other problems cannot be solved until they are first identified and then analyzed so that rational courses of action can be pursued. Hopefully, now that we are beginning to officially recognize the seriousness of our environmental problems through significant legislation–the New York State Wetlands Act and the federal Coastal Zone Management Act–we are in a good position to solve them with growing expertise and determination.

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