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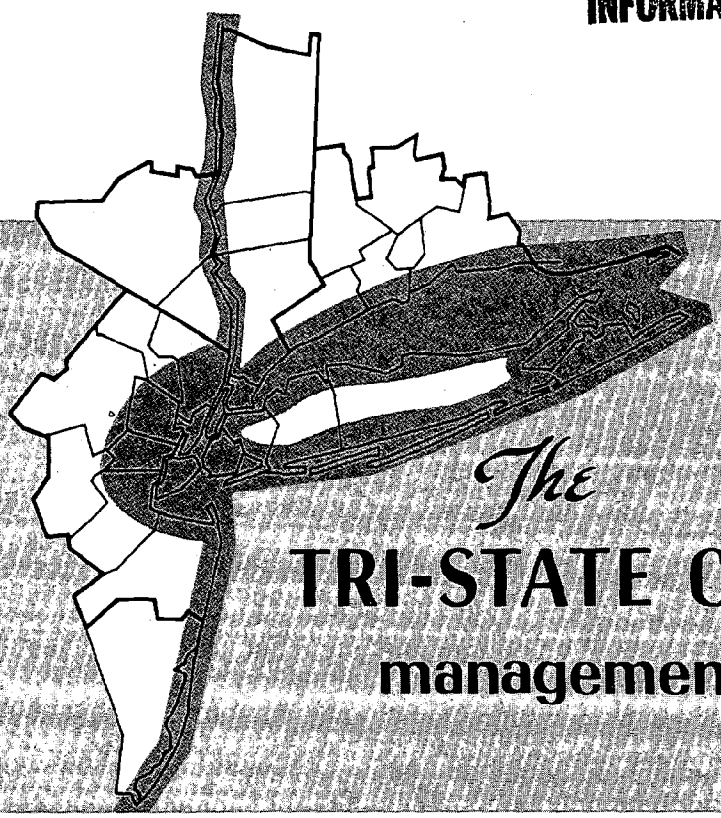

The TRI-STATE COASTAL ZONE
management perspectives

Tri-State Regional Planning Commission
CONNECTICUT • NEW JERSEY • NEW YORK

APRIL 1975

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THE TRI-STATE REGIONAL PLANNING COMMISSION...

...is an interstate agency that defines and seeks solutions to immediate and long-range problems in the development of land, housing, transportation and other public facilities in the New York metropolitan region covering 21 counties in New York and New Jersey and six planning regions in southwest Connecticut.

Established by legislative action of the states of Connecticut, New Jersey and New York in 1971, the Commission succeeds the Tri-State Transportation Commission formed by the legislatures of these states in 1965.

Designated by the federal government as the official planning agency for the Tri-State Region, the Commission is also a central supporting resource for subregional and local planning. It provides assistance in solving problems that spread beyond local jurisdictional control. It also encourages coordination among all agencies charged with an interest in planning or providing transportation and other federally aided facilities within the Tri-State Region.

The three states and the federal government finance the work of the Commission. Federal funds come from highway and mass-transportation planning and testing grants provided by the Department of Transportation, and also from planning grants provided by the Department of Housing and Urban Development.

Commissioners representing the three states are appointed by the governors in accordance with the laws of their respective states. Federal representatives are appointed by the appropriate officer holding such authority within the Executive Branch.

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PREFACE

Eight years ago this Commission (then a Committee) published a report of prospects for new development of released lands called *The Changing Harborfront*. It called for increased recreational and residential usage on both sides of the Hudson River front from the Narrows Bridge to the George Washington Bridge. We noted a number of events already moving in this direction:

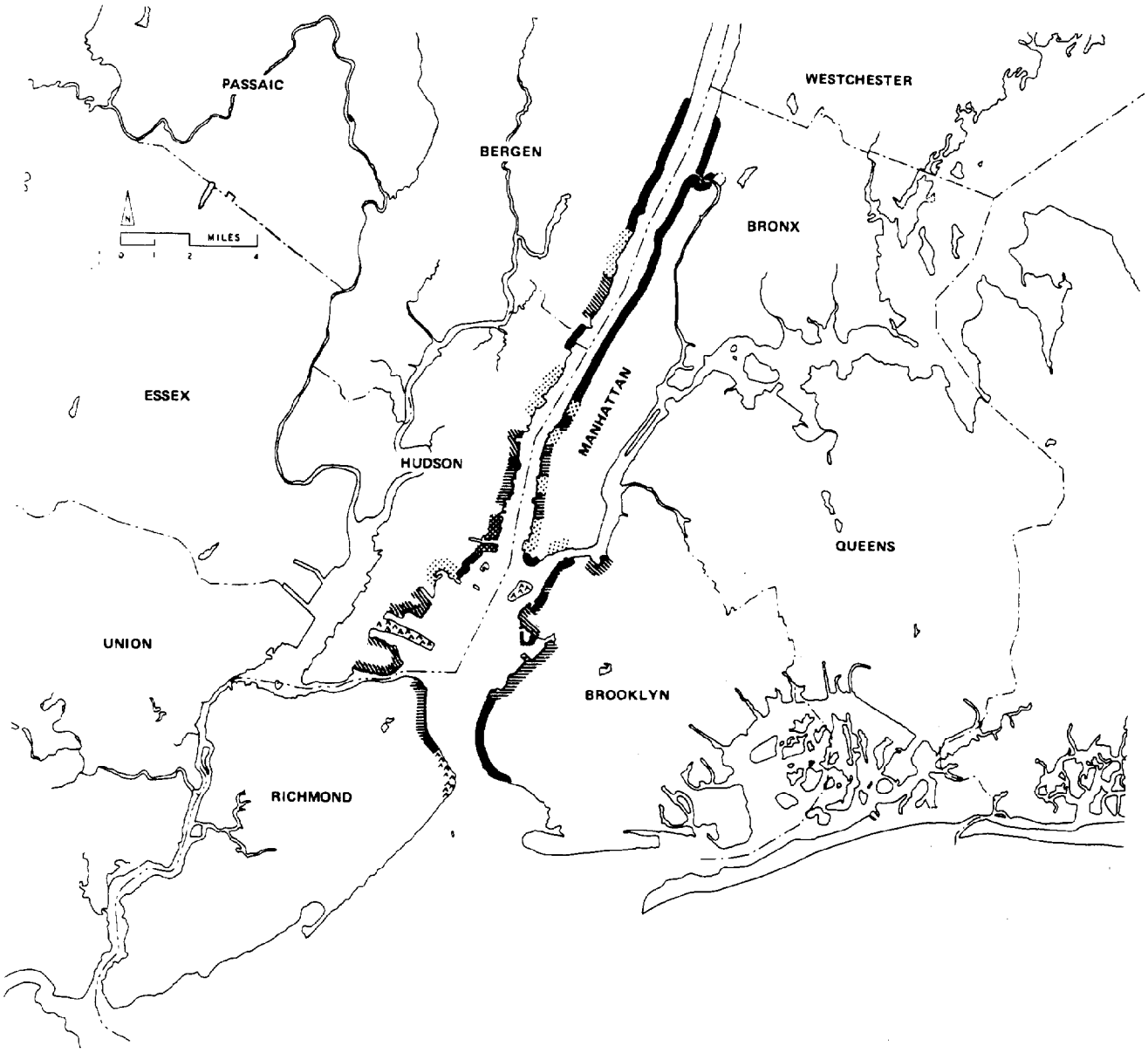
"Railroad systems are merging, military bases are being closed and shipping facilities are conducting their activities on less water frontage. As a result, lands are being released and facilities are being left to rot on both sides of the Hudson waterway from upper Manhattan to the Narrows.

"Redevelopment of these sites for industrial and commercial purposes, which at first seems logical and inevitable in such a central location, has distinct limitations. The congested harborfront sites must compete with the suburb's broad expanses, the Jersey Meadows and industrial parks in Brooklyn and Staten Island. It appears that the harborfront will win out only in cases where an industrial plant requires direct access to the water.

"Thus, the opportunity arises to capitalize on the scenic assets of the port, providing for residential and recreational use of the Palisades with views of the Manhattan skyline, the Statue of Liberty, the great ship movements, and the Hudson itself. The New York City Planning Commission has already recognized this opportunity and recommended substantial new noncommercial development along the shores of Manhattan, concentrating future cargo shipping on the Brooklyn waterfront and passenger shipping on the edge of midtown Manhattan.

"On the New Jersey side an alternating pattern of residential and commercial can be foreseen starting at Edgewater and extending to Bayonne. Two wholly new communities are suggested—one in Weehawken housing 20,000 persons, the other in Jersey City housing 65,000 persons. A vast park overlooking the Statue of Liberty and Ellis Island, previously proposed under New Jersey's Green Acres program, is another element in the evolving concept of opening the harbor to its people."

Now we are extending our studies to the far reaches of shoreline in the Tri-State Region, finding more emphasis on preservation of nature in those less urban places, as discussed in the following pages. However, the Commission maintains its strong interest in the central harborfront that is shaking off its dingy industrial heritage. It now appears that the recommendations of eight years ago might be extended to other waterways in the central area beyond the Hudson River. We hope to pursue this interest in future studies and reports.



CENTRAL WATERFRONT RECOMMENDATIONS

PARK
RESIDENTIAL
INDUSTRY
SHIPPING
RAILROAD
INSTITUTIONAL

1. FINDINGS AND RECOMMENDATIONS

The Zone. Extensive and diverse, the Tri-State coastal shores stretch over 1,200 miles, about twice the airline length. Of this length, oceanfront mainland is 13 percent, barrier beach is 10 percent and bayshores are 19 percent. The rest is sound and river shores. The zone[1/] has significantly more of the Region's residential, nonresidential and recreation uses than its limited area would indicate. Although its proportion of vacant and farm uses is below the Region's, almost 40 percent is still open. Even the central harbor is one-third undeveloped or in transition.

Goal. Accommodate the economic, cultural and leisure needs of the Region's people requiring location in the coastal zone and guard, restore or enhance the natural character and functions of the coastal zone. Economic development and redevelopment necessary to the Region's well-being, through certification by a rational management process, must be accommodated in the coastal zone. This includes shipping and access thereto, fuel importation, power generation and waste disposal. Most, if not all, must be rendered environmentally acceptable as measured against legislated standards.

Strategies. To reach these goals, four strategies are recommended.

1. Establish strict site regulations for activities seeking location in the zone. The conventional forces—easily available parcels and adjacent existing uses—should be reduced in importance. This can be achieved by creating land-trading opportunities and fostering long-range redevelopment plans through special incentives.
2. Designate and reserve certain areas for the heavy uses that will need water-oriented location. Shipping, sewage treatment and power generation and related transport will require positive decisions regarding their presence in the coastal zone's future.
3. Encourage the combination of natural land uses—recreation, open space, scenic amenity—with the necessary economic "heavy" uses. This will require a new design climate among agencies that construct facilities. A coastal zone management agency could couple certification of an economic enterprise with requirements that it provide for public use of waters and shores.
4. Set environmental tolerance standards, based on current ecosystem maintenance, to determine the limits of effluents, recreation development and other effects of human pressure. This requires research.

Administration. The three member states, Connecticut, New Jersey and New York, are each embarked on management development studies financed through the U.S. Office of Coastal Zone Management. A mandated product of these studies is a permanent mechanism for effecting coastal zone plans.

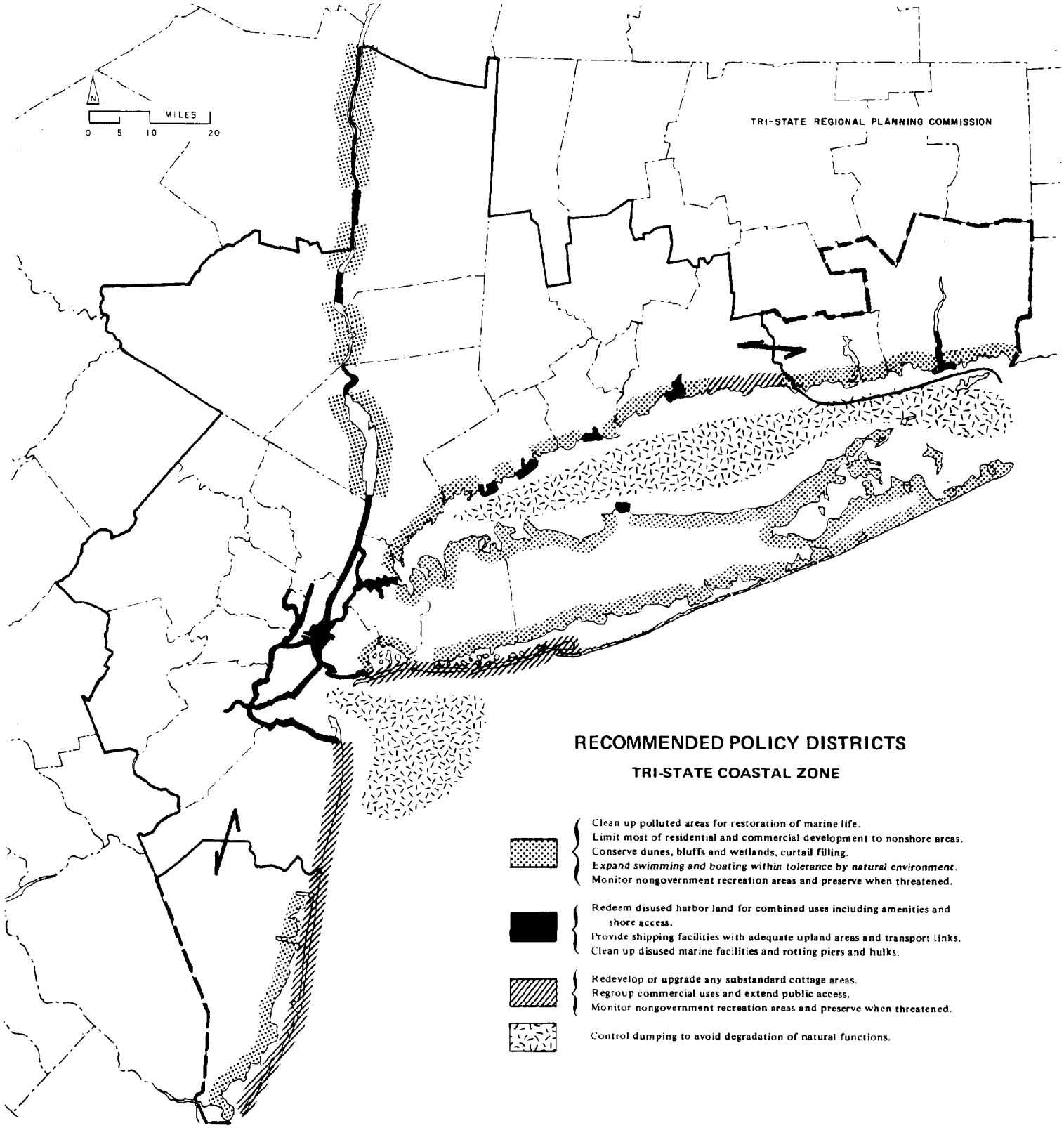
According to federal guidelines, the mechanism should include the capability for administering regulations, controlling development, resolving conflicts and acquiring interests in land and water, by eminent domain if necessary. Also, planning activities must give due consideration to citizen opinion and to social and economic concerns.

In addition, it is recommended that the mechanism also create a climate favorable to multipurpose planning and design, and be coordinated with plans of concerned political units, since natural, social and economic systems are notably independent of political boundaries.

Marine Environment. The objectives should be strict regulation of both filling and development of shores and wetlands and the cleanup of waters even where feasibility is remote. Private wetlands are now under regulation in all three states.

Areas where fishing and swimming and natural ecosystems are still viable, but suffering, should be specifically designated. Overland runoff of pollutants in these areas, usually considered a problem of drainage basin studies, will need attention from the coastal zone management agency.

[1/] Defined on page 8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TRI-STATE REGIONAL PLANNING COMMISSION
RECOMMENDED POLICY DISTRICTS
TRI-STATE COASTAL ZONE
Clean up polluted areas for restoration of marine life.
Limit most of residential and commercial development to nonshore areas.
Conserve dunes, bluffs and wetlands, curtail filling.
Expand swimming and boating within tolerance by natural environment.
Monitor nongovernment recreation areas and preserve when threatened.
Redeem disused harbor land for combined uses including amenities and shore access.
Provide shipping facilities with adequate upland areas and transport links.
Clean up disused marine facilities and rotting piers and hulks.
Redevelop or upgrade any substandard cottage areas.
Regroup commercial uses and extend public access.
Monitor nongovernment recreation areas and preserve when threatened.
Control dumping to avoid degradation of natural functions.

Recreation. In the often overcrowded and environmentally sensitive coastal zone, additional recreation areas should be developed, but only when such are environmentally compatible and easily and equitably accessible. Expansion of sports fishing appears possible as a way of serving needs of urban areas.

Use of prime beaches must be made more equitable by improving accessibility from the Region's central areas. This implies the selected expansion of bus transport, possibly in combination with railroads.

Additional alternatives to seashore recreation should be provided. Part of this can be a stepped-up response to the surge of environmental interest among the younger generation. The ecopark concept—autoless use of certain existing isolated regional parks—is one possibility. A stepped-up federal role, as in the Gateway National Urban Recreation Area, is highly desirable in some areas.

Current nongovernment recreation holdings should be carefully watched to anticipate their possible conversion to more intensive development. Government acquisition may then be desirable.

Power Generation. The coastal zone management agency could provide a badly needed mechanism for deciding new sites for generating plants. Moreover, a quasi-public corporation to build approved power-generating facilities could be the answer to the present stalemate in construction.

Shipping. Two major shipping issues are related to coastal zone management:

1. In the central port area the shift to containers has been rapid. Terminals, by 1990, may require as many as 900 or more acres than the 1,200 now used. However, current proposals for Brooklyn, Bronx, Staten Island and New Jersey locations are sufficient to meet this need. Impact on residential communities and access to highway and rail networks are major criteria in locating new terminals or expanding existing ones.
2. Fuel imports, consisting mostly of petroleum, could pose environmental hazards. For example, not only the terminals themselves, but also storage (onshore or inland?) and distribution (pipeline or truck?) require coordinated management. For the future, port consolidation, and increased pipeline distribution, are recommended. A public-private construction body may be useful in effecting plans.

Waste Disposal. Water quality is improving in only some of the coastal zone water bodies. Federally imposed targets aimed at achieving this goal are stringent. For instance, all water bodies "where possible" are required to be swimmable by 1984. Because of the chronic lag in funding waste-disposal operations, however, it may be necessary to concentrate on threatened water bodies. A minimum of 1,300 acres of land will be required along or near shores by new or expanded sewage treatment facilities.

Shore lowlands will continue to be threatened by sanitary landfills of solid waste unless alternatives are provided. Ocean dumping is under intensive study, and dumping at distant ocean sites may be part of the solution to getting solid waste away from the coastal lowlands and preventing deterioration of marine waters.

The federal government recently funded a project for a third aspect of waste disposal in the coastal zone—the cleanup of drift and rot in the central harbor area.

Land Resources. An examination of the land needs of future coast-eligible activities shows no lack of space. Without adhering to the goals and strategies mentioned earlier, however, development of these lands will remain chaotic. Private shore holdings (particularly recreational and resort uses) should be surveyed to anticipate changes. Legal definitions of public rights along the shore need broadening beyond the present inadequate riparian rights.

2. THE COASTAL ZONE NOW

As the effects of increased population with a machine style of life strain the resources of our continent, unwelcome effects are nowhere more apparent than in the coastal zone. Competition between profitable market uses and public purposes goes largely uncontrolled. The odds are usually in favor of the more profitable developments.

Now there is a new imperative. Natural balances –from local to planetary–are in danger of destruction through extensive use of such natural resources as land, water and air. The coastal zone planning approach presented in this report springs in large part from this new concern. Our work is only one of many responses to this continuing exploitation of natural assets.

The three states of the Tri-State area, all with restructured administrative agencies, are becoming increasingly involved in wetlands preservation, in water and air resources planning and control and in regulated utilization of shore areas. As an agent of the states, the Tri-State Regional Planning Commission has drawn up this guide for the following three purposes:

1. To present findings and recommendations for consideration by the state, federal and local agencies involved in coastal zone planning and management.
2. To serve as an assessment of the impact of the Commission's plans on the coastal zone.
3. To furnish details of the Commission's *Regional Development Guide* for application in the highly sensitive coastal areas of the Tri-State Region.

By request of participating agencies, areas beyond the official Tri-State Region were included for study purposes. The elements studied include conservation and restoration, power generation, shipping and fuel receipt, waste disposal and land development.

COASTAL ZONE CHALLENGES

Among the issues in the coastal zone are

- As a matter of simple preservation, what is required to reduce damage on the coastal areas from flooding during storms and the beaches and dunes from erosion?
- How can laws be administered to stop unwise modification of wetlands and guard or restore their invaluable contributions to the welfare of the Region and the Atlantic seaboard?
- In what order, and to what extent, should we continue improving the water quality of the estuaries, bays and oceanfront?
- How can the responsible agencies upgrade, convert or replace substandard shore housing and change the uses and activities in obsolete, transition tracts?
- How should future water-to-land goods and fuel handling be designed, and where located?
- How can we maintain or reclaim scenic and leisure areas along the water for use by all the Region's people?

GOAL AND OBJECTIVES

To resolve these issues, we urge the Region to *accommodate the essential economic, cultural and leisure needs of its people in the coastal zone, and guard, restore or enhance the natural character of the coastal zone.*

Pursuit of this goal means we must accomplish the following objectives:

- Manage development so that natural resource opportunities and limitations are meshed with market conditions. When resources can be used by two or more activities, accommodation should take place. In this manner, we can help reconcile current and projected needs with limited resources in socially, environmentally and economically accepted ways.
- Evolve and apply tolerance limits on activity in the coastal zone. Such limits will be related not only to present conditions, but also to potential restoration or enhancement. These limits may mean either the displacement of traditional uses from the zone or the development of new technologies with modified impacts, or both.

DELINEATION OF THE COASTAL ZONE

Since delineations may vary with purpose, there are three approaches to defining a costal zone.

1. Definition by natural functions. This defines an area affected by estuarine or marine ecological process, or characterized by such land forms as dunes, floodplains or wetlands.
2. Definition by human functions. In settled territory, coastal areas are marked by activities related to the sea and estuaries—shipping, recreation, waste disposal and others.
3. Definition by existing administrative units. This approach uses government divisions (towns, counties), visible edges provided by highways, railways or other linear elements, or merely a suitable standard distance.

The present study has dealt with a "maritime edge." But owing to data limitations, the definition of the strip is based on lines of land-use change, linear elements and, in some segments, an arbitrary distance. This relatively narrow zone was justified because of the prior existence of comprehensive and functional plans for the Region as a whole.

The New Jersey Coastal Area Facility Review Act (CAFRA) has defined its administrative territory mainly by major roads and rail lines modified by estuarine districts and other water-related functions like resort areas.

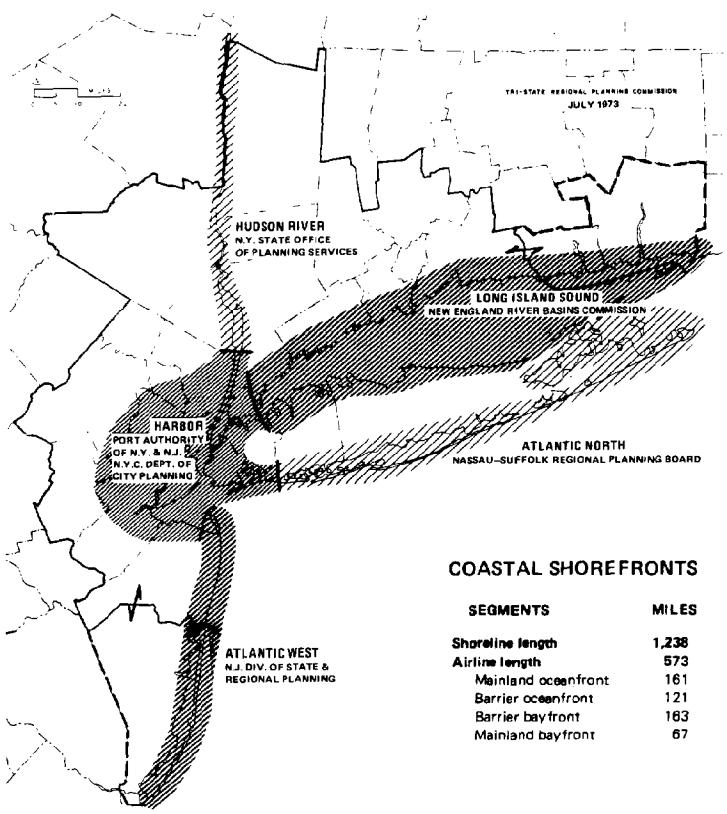
In its interim recommendations, the Long Island coastal zone study has defined the coastal zone as that area extending 500 feet inland from the mean high water mark or to the ten-foot elevation, whichever encompasses a larger area of land.

In Maine, all municipalities touching the sea or estuaries were included in the administrative zone. In California, a complex approach based on ecological factors and physiographic features was evolved.

It is likely that all definitions will be eclectic, but, for administrative purposes, it is important that all areas of natural functions be included.

THE FIVE COASTAL SUBZONES AND AGENCIES RESPONSIBLE IN THE TRI-STATE STUDY

See pages 45 & 46 for current planning activities



COASTAL SHOREFRONTS

SEGMENTS	MILES
Shoreline length	**1,238**
Airline length	**573**
Mainland oceanfront	161
Barrier oceanfront	121
Barrier bayfront	163
Mainland bayfront	67

ZONE COMPLEXITY

The five subzones are not only convenient study units but also have their distinct traditions, ambience and problems. The following descriptions, including the results of the land-use mapping and quantification project of the coastal zone task force coordinated by Tri-State in 1972, show the range and diversity among the subzones.

HUDSON ESTUARY (NEW YORK PORTION)

In this "oscillating lake," tides carry salt water a long way up and a narrow mouth impedes flushing to the bays and oceans. Although apparently sparsely developed, this subzone contains scattered industrial areas, resulting in a substantial 18 percent nonresidential use. There are also large stretches of residential development, mostly of low and medium density.[2/]

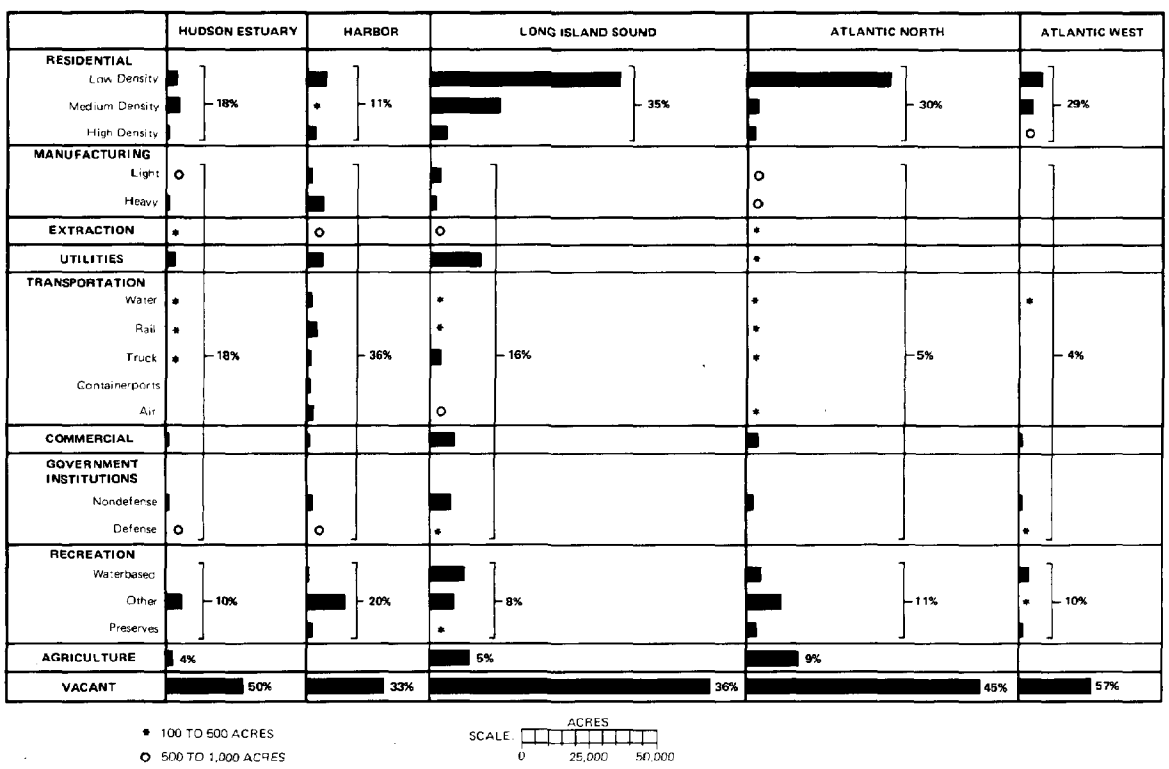
[2/] Low density is fewer than two dwelling units per acre; medium is two to eight dwelling units per acre; high is more than eight dwelling units per acre.

Older centers usually have waterfront areas under redevelopment. There are railroads on most of both banks, a few parks (10 percent of land) fronting the river, a lively history and satisfying, sometimes spectacular, scenery. About half the measured study area is vacant or undeveloped.

Shoreline Length: 195 miles
Airline Length: 142 miles

Activities	Acres	Percent	
Residential	9,900	18	7 Low density 9 Medium density 2 High density
Nonresidential	9,960	18	3 Manufacturing 1 Extraction 5 Utilities 2 Transportation 3 Commercial 4 Institutions
Recreation	5,780	10	
Agriculture	2,410	4	
Vacant/ Undeveloped	27,940	50	
Total	55,990	100	

LAND USES IN THE COASTAL ZONE



THE HARBOR

The harbor comprises the mouths of the Hudson, Hackensack, Passaic and Raritan rivers, various creeks and canals, and a semi-strait (the East River). It is both symbol and foundation for the Tri-State Region's economic wealth and influence. But large sectors of its shore are unprofitable or archaic. A tremendous rail system still carries large volumes to, from and within the port but much of it is obsolete or underused. Intra-harbor transport has traditionally been difficult; railroad transfers are slow or unavailable, and freeway connections are incomplete or overtaxed. Thorough renewal and realignment are necessary. A surprisingly large portion—one-third—of the study area turns out to be vacant or undeveloped, representing a promising resource. Additional areas are ripe for changed use.

Those living or working in high buildings enjoy priceless views of the rivers. But the rest are hard put to enjoy them, since much wateredge is cut off by roads and piers. The fascinating traffic on the river is largely hidden from view except from skyscrapers or the Staten Island Ferry.

Shoreline Length: 256 miles

Activities	Acres	Percent	
Residential	10,380	11	8 Low density 3 High density
Nonresidential	31,260	36	2 Light mfg. 7 Heavy mfg. 1 Extraction 7 Utilities 14 Transportation 1 Commercial 4 Institutions
Recreation	16,940	20	
Undeveloped	28,560	33	
Total	87,140	100	

LONG ISLAND SOUND

Concerns with the proper use and enhancement of marine resources have turned this large water body into a single planning unit. Nonresidential land uses are a surprisingly large share (16 percent), contributed mainly by the urban western Connecticut shore. Utility uses alone account for 6 percent of the sound's coastal strip. The Long Island and eastern Connecticut shores have small harbors used primarily for recreational boating and secondarily for handling fuel, sand and gravel, and a few other commodities. These shores also have stretches of largely natural wateredge. Wetlands are an important resource in the sound, and boating and swimming potentials are enormous.

Shoreline Length: Connecticut 150 miles
New York 125 miles
Airline Length: 110 miles

Activities	Acres	Percent	
Residential	103,320	35	24 Low density 9 Medium density 2 High density
Nonresidential	48,315	16	2 Mfg. and Extr. 6 Utilities 2 Transportation 3 Commercial 3 Institutions
Recreation	21,890	8	
Agriculture	14,970	5	
Vacant/ Undeveloped	105,230	36	
Total	293,725	100	

ATLANTIC NORTH

The Long Island oceanfront, its barrier islands and the great bays have little market uses, only 5 percent. They are devoted mainly to leisure and residential uses. Agriculture, at 9 percent, appears significant. The wetlands and rich bay bottoms form part of the eastern seaboard ecosystems, wild fowl migration refuges and commercial shellfish beds. The coastal bays are a priceless resource for boating and fishing and the ocean beaches are matchless for outings. However, both are threatened, the first by the pollutants of encroaching urbanization and the second by storm and wave erosion.

Shoreline Length: 300 miles (oceanfront mainland 137, barrier oceanfront 72, barrier bayfront 91)
Airline length: 115 miles

Activities	Acres	Percent	
Residential	59,235	30	27.0 Low density 1.8 Medium density 1.2 High density
Nonresidential	9,248	5	.8 Industrial .2 Utilities .2 Transportation 2.4 Commercial 1.4 Institution
Recreation	21,691	11	
Agriculture	18,833	9	
Vacant	86,082	45	
Total	195,089	100	

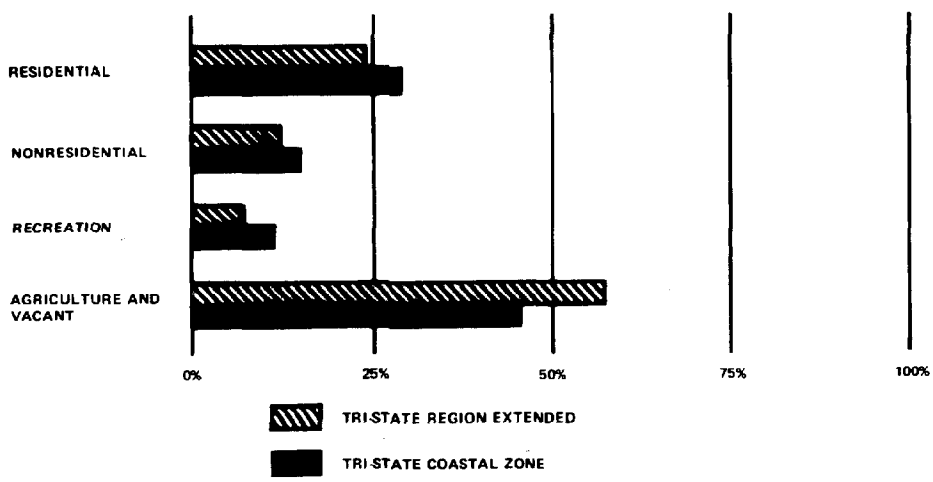
ATLANTIC WEST

Ocean County, with its barrier islands and extensive bays, is similar to the Nassau-Suffolk coast. But the Monmouth County frontage in large part is a solid band of seasonal housing (being converted to year-round use) with commercial centers. The area serves as vacationland for many families from the Region's central areas as well as from the Philadelphia and Trenton sectors. Probably much of the measured undeveloped area (57 percent of the subzone study area) lies around the bays.

Shoreline Length: 212 miles (oceanfront mainland 24, mainland bay 67, barrier oceanfront 49, barrier bayfront 72)
Airline Length: 106 miles

Activities	Acres	Percent	
Residential	13,580	29	17 Low density 10 Medium density 2 High density
Nonresidential	2,150	4	2 Commercial 2 Institution
Recreation	4,890	10	
Undeveloped	27,020	57	
Total	47,640	100	

REGIONAL AND COASTAL ZONE LAND-USE PROPORTIONS



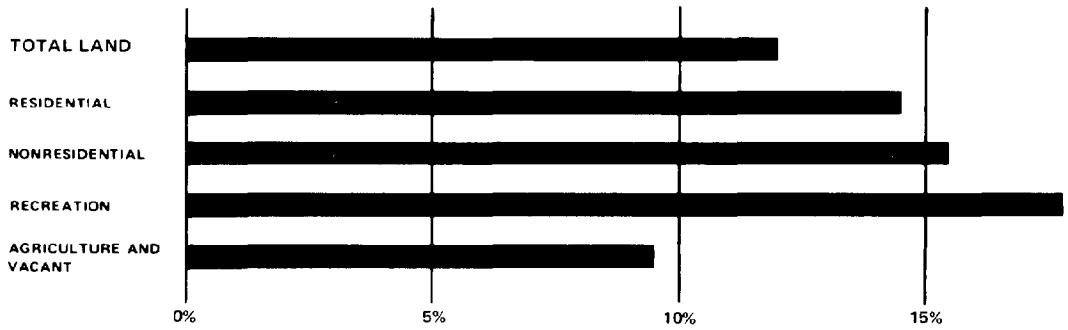
See map on page 8 for definitions of Region and Coastal Zone.

COASTAL ZONE COMPARED TO REGION

The coastal zone has a higher proportion of residential, nonresidential and recreational land uses than the extended Tri-State Region. These differences are moderate, with the spread consisting of no more than five points. However, the differences suggest that for the zone as a whole, extra pressures for coastal land from the residential, nonresidential and recreation sectors have been in operation. Conversely, the proportion of open land in the zone is considerably lower than the Region's.

The entire zone makes up about 12 percent of the Region. The variations and specialties of the subzones are generally reliable, although proportions are sometimes distorted by the way the zone was delineated. But the summaries given here are backed by other tools—principally maps at a large scale (1" = 2000') and a computerized inventory of characteristics by square-mile units. These tools are ready for use as further coastal zone studies are required.

SHARES OF REGION'S LAND IN THE COASTAL ZONE



3. THE MARINE COMPLEX:

nature working in the coastal zone

The new ecological era has made us painfully aware that shores, marshes and shallows where fresh-water meets salt are both productive and unusually sensitive to human impact. Also significant are the deeper areas of the bays, the central waters of the sound and the New York Bight—important to the food chain and sport and commercial fishing activity, notably the shellfish industry. A third natural feature is the ocean strip with its beaches, the dunes and the barrier islands—all vital, irreplaceable assets. Linking these elements is the water itself, the quality of which affects the ecosystem, including human activities.

WETLANDS

For wetlands, the objective is clear: Disturb or degrate no more shores, marshes and shallows except for imperative purposes. This objective springs from a spreading realization that these areas are valuable for five reasons:

1. nutrient recycling, as a basis for a complex food web;
2. nursery for the survival and rapid growth of the fry of species important to the food supply of man;
3. wildlife habitat for waterfowl and mammals of economic and recreational benefit to man;
4. upland protection, by buffering storm waves and absorbing large volumes of water; and
5. erosion control, through accumulating silts and stabilizing watercourse banks.

Regarding the second and third reasons, the high proportion of the estuarine-related fish catch to the total in all three states is an indication of the importance of estuarine areas.

Marine marshes and meadows—preferably including the offshore shallows—are now protected by each of the three member states. Although the laws differ in detail and emphasis, all regulate, through permits, significant proposals affecting the legally defined wetlands.

Thus, the first skirmish in the battle for wetlands may have been won by protective interests. However, we now enter a difficult era of testing and determining impact limits. Court tests will ensue; many areas will need acquisition; certainly a stepping-up of fiscal commitments by the federal government, the states, the counties, the localities and private groups will be essential.

Federal coastal zone legislation has already addressed this problem, providing management guidelines and funds and a program for establishing marine sanctuaries. The progress of the various clean water programs will also determine the ultimate fate of wetlands.

ESTUARINE-RELATED FISH CATCH

Shares of dockside value of 1968 commercial fish catch

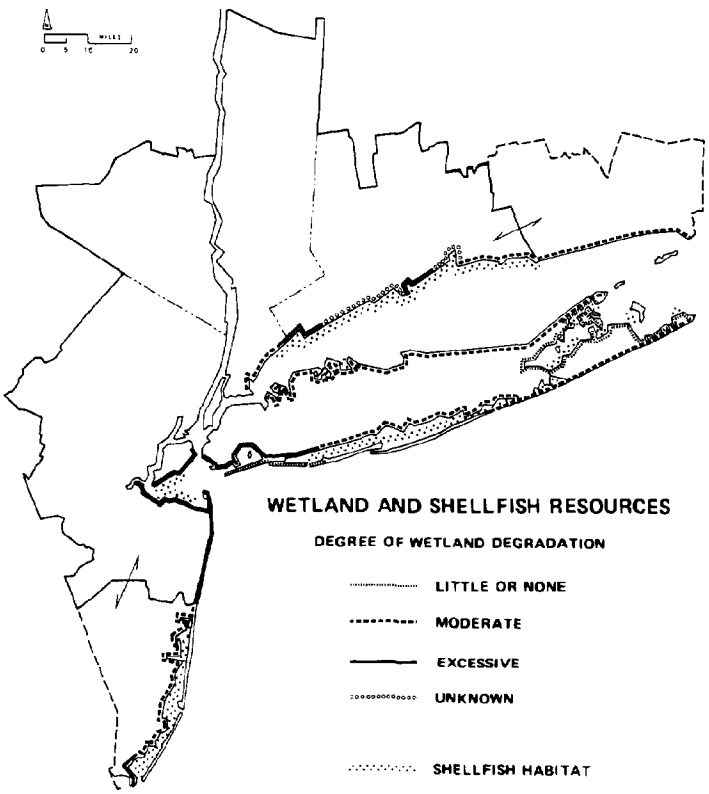
STATE	FINFISH	SHELLFISH	TOTAL
Connecticut	71%	31%	40%
New Jersey	87	78	85
New York	81	75	74

Source: Appendix U, Coastal and Estuarine Areas, North Atlantic Regional Water Resources Study, p. 47.

WETLANDS OF THE TRI-STATE COASTAL ZONE

SUBZONE	ACRES	MAJOR AREAS	ACRES LOST	PROBLEMS CITED
Hudson River	**1,050+**	**7**	**2,180 (12.8%) (1953-64)**	**Dumping** **Fill for industry, roads** **Thermal pollution**
Harbor	20,000+	3	20,000+	Water pollution
Long Island Sound				
Connecticut shore (1959)	5 760 (fresh) 15,500 (saline) 14,750	being inventoried under wetlands law		Pollution Landfill
Long Island Shore (1971) (intertidal and meadow)	2,145			
Nassau County	355		33% of Nassau County's, 40% of Suffolk's: 1954-68	28% in private ownership 72% in unprotected municipal ownership
Suffolk County	1,790			
		44		
Atlantic North (1971)	**18,000**			
Nassau County	9,130		25% of Suffolk's, 1% of Nassau's: 1964-71	Duckfarm wastes Thermal pollution Landfill
Suffolk County	8,870			
Atlantic West				
Middlesex, Monmouth, Ocean counties	30,000*	N.A.	N.A.	
(N.J. State)	(232,650)	N.A.	24,600:1954-64	Poisoned shellfish beds Filling "Canal communities"

* under Wetlands Act of 1970.
N.A.: not available.



Source: National Estuary Study, Vol. 1. Jan. 1970.

CENTRAL WETLANDS

HUDSON RIVER

Several major areas, totaling about 1,050 acres, present a variety of plant and animal habitats, wildfowl flyway points and estuarine ecosystems. Cruger and Constitution islands and the Piermont marshes are notable among the seven. In addition to smaller scattered marshes, there are 1,500 acres of shallows with submerged rooted vegetation.

Losses in the recent past have not been tabulated, but all areas have had dumping operations, some of which are continuing. At Haverstraw, about 200 acres have been filled. At Tarrytown, a large factory was built on filled marsh. Croton Point in Westchester County and other large marshes north of Kingston are currently receiving extensive fill.

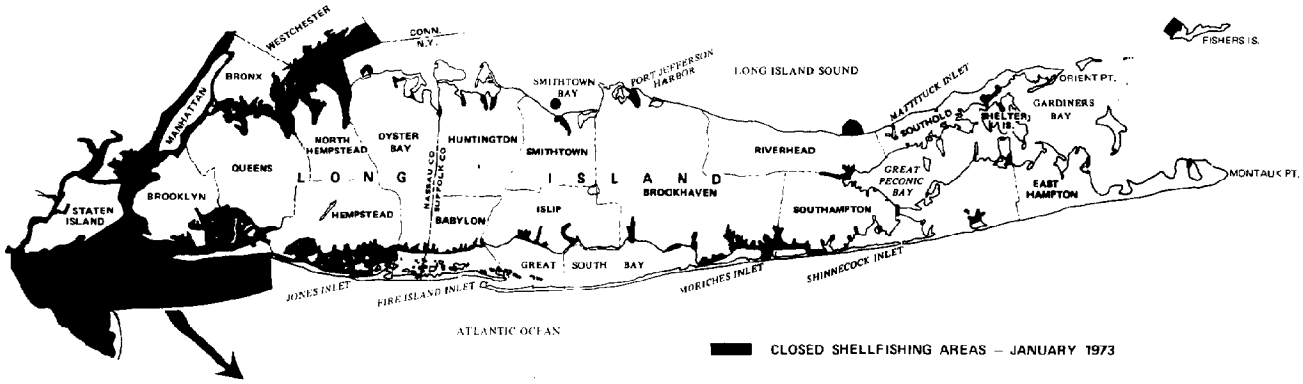
The river, as a spawning ground, habitat and migration swimway for sport and commercial fish, is widely believed to be threatened by thermal pollution and fishkills at the water intakes of power-generating plants. Mechanical solutions will prevent most fishkills; undesirable warming of the water may be avoided by locating plants or discharge pipes where heat will be dispersed. (See Chapter 5.)

THE HARBOR

Wetlands of the Harbor subzone are a forgotten realm because of their relative scarcity and severe water pollution, which has led everyone to consider them ruined and irredeemable. But four large marsh areas persist in the backwaters of the Harbor.

1. The Hackensack Meadowlands support four forms of marsh life in some abundance—waterfowl, muskrat, killifish and plumegrass—and are worthy of preservation in certain areas. The Hackensack Meadowlands development plan sets aside 2,740 acres of the marsh for these natural life forms and others that may be restored as pollution is curbed.
2. A second large wetland area is in western Staten Island. Here, small portions are preserved in the city's Springville and Latourette parks. Most of the area is city-owned and is slated for sanitary landfill.
3. In Raritan Bay, about 1,000 acres of saltmarsh maintain a higher level of tidewater ecosystem than the Hackensack and Staten Island areas and are important to migrating waterfowl. New Jersey's Cheesequake State Park is a large estuarine preserve.
4. Jamaica Bay, a vast 13,000-acre estuary, now only about half its size of a century ago, is by no means the "open sewer" of popular opinion. In its central marshlands, 4,000 acres are still largely intact. The Bay is at the confluence of two principal waterfowl flyways and is still a major breeding ground for marine life. Current water improvement programs, while delayed by inadequate financing, will eventually improve the water so that swimming can occur on the periphery. If wastes from industries around Jamaica Bay and storm runoffs from Kennedy Airport can be further controlled, and deep dredged pits filled, estuarine life will multiply in response. Current studies underway by The Port Authority of New York and New Jersey to control the waste content of runoffs from the airport should aid in achieving this objective. A report by the National Academy of Sciences and the National Academy of Engineering stresses that further fill, dredging, diking, channeling or storm protection structures should be put off until the estuarine potentials are fully in focus. The targeted uses of this great resource, within an hour's ride of millions of people, should be swimming, fishing, nature enjoyment and education, boating, and the estuarine complex on which several human activities depend. Its inclusion in the Gateway National Urban Recreation Area has gone a long way toward assuring these uses.

CLOSED SHELLFISHING AREAS
JANUARY 1973
NEW YORK MARINE DISTRICT



Federally prohibited waters outside the three mile limit are in a circular area with dumping grounds in the bight as center and a radius of six miles.

Source: N.Y. State Department of Environmental Conservation.

COMMERCIAL FISHING

Supplying fresh seafood for the Region's tables was an important coastal tradition. The closing of most oyster and clam beds for reasons of virus and bacterial contamination is a result of the glaring misuse of coastal resources. However, commercial fishing continues as a significant activity in the zone.

New York figures on catches typically show increases from 1970 to 1971. This difference may be unreliable as a trend. Deepwater fishing, in contrast, is reported to be declining. Fishing boats are forced to go farther for their finfish and lobster catches. Fishermen cite two problems: dumping of sewage sludge and other wastes in the bight and overfishing by foreign fleets.

We already have a partial solution to the second difficulty—a treaty with the Soviet Union preventing fishing from January to April. In response to recent legislation, alternatives to and regulations and standards for ocean dumping are being investigated.

CONNECTICUT

Connecticut's shellfisheries consist of approximately 64,000 acres, generally located from Greenwich to Branford. Total product value in 1964 was estimated at $2.5 million. About 35 percent of these grounds have been closed by the state department of health because of poor water quality. The clean water task force concluded in 1966 that the major estuaries could never be reclaimed for direct-market shellfishing, and stressed that guarding the remaining clean waters and restoring the marginal ones was therefore especially critical. The task force also noted that a prosperous commercial and sport finfishery has been largely lost. But a variety of sports fish and a fairly rich food chain for sustaining them make recreational fishing still important.

Among shellfish, lobsters are the most important catch and the only one that shows recent growth. In the ten years from 1958 to 1968, commercial lobstermen increased almost fivefold from 176 to 695, and in 1970 the catch was valued at about $1 million annually. Catches of clams, scallops and mussels are minimal. In 1970, the hard clam harvest was valued at $250,000. Scallops were valued at more than $500,000 in 1953, but catches are now insignificant. However, in the seventies, the oyster harvests have increased dramatically. From an annual average of only 250,000 pounds in the sixties, the catch is now 5 million pounds, almost up to the 1930's level. The main strategy has been to increase transplantation of Connecticut-grown seed oysters to clean waters on both sides of the sound. The potential catch is unknown, but continued cooperation among the industry and state and federal agencies will bring further increases.

NEW YORK MARINE DISTRICT

For the ocean and tidal waters of New York up to the Tappan Zee Bridge, the finfish and shellfish landings for 1970 and 1971 are surprisingly large in view of the prevalent belief that fishing has been almost ruined. From the 100 square miles of Great South Bay alone came 45 percent of the nation's 1970 production of hard clams. In spite of reported water quality improvement, more shellfishing territory is being added to the uncertified class. In fact, out of 67 areas in the New York Marine District, nine show significant increases in the proportion uncertified. Only one shows a portion recertified. Thirteen are 100 percent uncertified and three others are more than 50 percent uncertified.

ATLANTIC WEST

Almost all the stream estuaries and inner bay shores of the New Jersey maritime counties have seen their shellfishing activities cut by pollution.

As for finfishing, New Jersey as a whole was fourth in the nation in weight of catch and eleventh in value (almost $10 million). About 90 percent of the value comes from menhaden, a low-value fish important as a source of industrial oils and fish meal.

FISHERY LANDINGS IN THE NEW YORK MARINE DISTRICT

	1970		1971	
	POUNDS	DOLLARS	POUNDS	DOLLARS
Finfish				
Mainly flounder, porgy, whiting, and stripers	**16,439,020**	**$ 2,380,433**	**20,067,422**	**$ 2,552,933**
Shellfish				
Lobsters	1,647,267	1,846,887	1,790,518	2,053,784
Hard clam meats	7,905,552	8,976,947	8,549,196	10,756,939
Oyster meats	519,181	1,074,870	778,464	1,681,811
Others	5,804,380	1,811,124	5,057,972	1,498,966
Total	**15,876,380**	**$13,709,828**	**16,176,150**	**$15,991,500**

Source: New York State Department of Environmental Conservation.

THE HARBOR

Over the decades, shellfish beds were gradually closed as health authorities linked hepatitis with contaminated clams. Raritan Bay, except for a small area behind Sandy Hook, was the last closed in 1961. Jamaica Bay has been closed for decades. Poaching, resulting in a health hazard, persists even though discouraged by patrols. For a radius of six miles around the dumping grounds in the New York Bight, shellfishing is prohibited. Raritan Bay's poisoned clambeds, if cleaned, would have an annual value of more than $3 million. Finfishing continues in Raritan Bay and the lower bays, but at a reduced rate. It is valued at $200,000—versus a potential of $3–4 million.

THE FUTURE

Fin and shellfish problems are the subjects of active research, and various solutions have been developed: chemical control of predators, cleansing of shellfish from moderately polluted waters and artificial spawning. But controlling water quality is still an essential ingredient in any program aimed at significant restoration of the zone's recreational and commercial fisheries.

THE PHYSICAL SHORELINE

The physical structure of the shoreline varies widely in the Tri-State area. We are able to note the following types of waterfrontage:

- the palisades structure of much of the Hudson River shore;
- the flatter shores of rivers, bays and estuaries, often with marshes;
- the bluff areas of the north shore on Long Island, mainly unstable sand with narrow beaches; and
- the barrier islands and peninsulas with their beaches and dunes. Some dunes are also found on the mainland, as in Monmouth County.

A complete coastal zone management program would assess the potential and limitations of these types of shores for natural processes and recreational and water-oriented development. Wetlands, as noted above, are receiving special attention. However, the vulnerability of the bluff and barrier structures to tidal currents and storm erosion gives cause for particular concern.

Breaching of the barrier islands during storms will cause flooding of development both on the islands and along the mainland bay shores. Recreational beaches will often be narrowed or wiped out. At the same time, natural restorative action by littoral drift may, in some areas, be hampered by the very means (groins, embankments) taken to prevent erosion.

Since two-thirds of the shoreline is at present devoted to recreation, with an even higher proportion in critically eroding segments, the future of a great recreational resource is highly uncertain. Coastal flood

SHORELINE CONDITIONS
(IN MILES)

	NEW JERSEY					NEW YORK							
	Atlantic Coast Manasquan-Cape May*	Atlantic Bays*	Atlantic Coast: Sandy Hk-Manas.	Raritan & Sandy Hook Bays	Sub-total	Staten I. Lower Bay	Coney Island	Rock-away Beach	Nassau & Suffolk: Atlantic Coast	Bays: Oyster to Moriches	Long Island Eastern Forks	Suffolk: North Shore	Nassau: North Shore
Physical Character													
Beach	97	35	27	19	178	12	3	10	108	7	88	80	10
Other	0	205	0	1	206	1	2	0	0	165	80	7	6
Stability													
Critical erosion	74	10	27	6	117	7	3	10	108	0	75	87	9
Noncritical erosion	12	63	0	9	84	6	2	0	0	172	93	0	7
Noneroding	11	167	0	5	183	0	0	0	0	0	0	0	0
Ownership													
Federal	8	30	6	0	44	0	0	1	14	15	4	0	0
Other Government	66	27	11	7	111	9	3	7	36	67	40	16	4
Nongovernment	23	183	10	13	229	4	2	2	58	90	124	71	12
Use													
Recreation (government)	88	119	14	8	229	7	3	7	50	77	32	16	3
Recreation (nongoverment)	0	23	10	2	35	1	1	2	8	25	9	16	0
Other Use	0	1	0	9	10	5	1	1	33	26	94	44	10
Undeveloped	9	97	3	1	110	0	0	0	17	44	33	11	3
Length of Shore	**97**	**240**	**27**	**20**	**384**	**13**	**5**	**10**	**108**	**172**	**168**	**87**	**16**
Recommended by National Shoreline Study	Sandfill Bulk-heading Groins	Sandfill Bulk-heading Revetments	Sandfill Bulk-heading	Sandfill Bulk-heading	Sandfill	Sandfill	Sandfill	Sandfill	Sandfill	not given	Sandfill	Sandfill	Sandfill
Initial Costs (millions)	**$84.0**	**$4.3**	**$49.0**	**$2.3**	**$139.6**	**$3.0**	**$1.4**	**$5.3**	**$156.8**	not given	**$59.4**	**$91.8**	**$10.7**

*Includes segments from Cape May to Great Bay on southern New Jersey coast outside the study area.

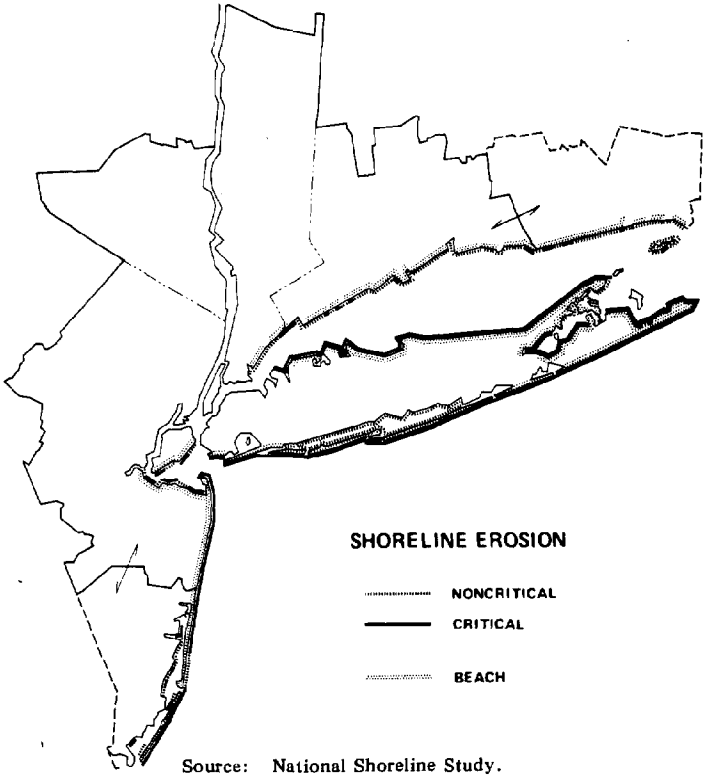
Source: National Shoreline Study Regional Inventory Report, North Atlantic Region, Corps of Engineers, Vol. 1.

STATE PARTICIPATION IN BEACH-EROSION CONTROL

STATE	IN REMAINING SHARE OF FEDERAL PROJECTS	IN OTHER PROJECTS
Connecticut	50%	67% (publicly owned) 33 (privately owned)
New Jersey	75	75
New York	70	70

Source: National Shoreline Study Regional Inventory Report, North Atlantic Region, Vol. 1.

NYC:			CONNECTICUT	TRI-STATE REGION	
Throgs Neck to Westch.	Westch. Shore	Sub-total	Connecticut Incl. Fishers I.	Regional Total*	
9	4	331	145	654	51%
9	37	307	125	638	49
0	0	299	25	441	34%
18	41	339	240	663	51
0	0	0	5	188	15
0	0	34	5	83	6%
11	9	202	50	363	28
7	32	402	215	846	66
7	8	210	30	469	36%
2	6	70	225	330	26
9	27	250	15	275	21
0	0	108	0	218	17
18	**41**	**638**	**270**	**1,292**	**100%**
not given	not given		Sandfill		
			Bulk-heading		
			Revetments		
not given	not given	$328.4	$35.0	$503.0	



Source: National Shoreline Study.

protection and the integrity of the bay ecosystems are also at stake. But under existing federal laws, beach erosion-control projects constructed with federal assistance are, with certain exceptions, limited to shores in public ownership and public use. State participation in funding beach protection works has been extensive. A great deal of the critically eroding shoreline is presumably included in authorized federal and state-supported projects. The costs cited above are assumed to be in addition to current appropriations.

Further attention should be given the problem of beach erosion.

1. Determine the probable future fiscal resources available for beach protection.
2. If the resources are expected to be inadequate, set up a priority system with attention given in somewhat the following order:

- Existing close-in beach developments accessible to the Region's urban population.
- Potential beach development accessible to the centers of urban population.
- Beaches where storm breakthroughs affecting the bays might occur.
- Other critical situations to be defined.

3. Assure that human activities no longer increase erosion or damage the remaining integrity of the barrier beach system. Wetlands legislation does not cover development on the barrier islands nor the bay foreshore. This means that these critical areas are protected only by local zoning. It is recommended that shore protection monies be linked to proper beach and dune zoning, either under local jurisdiction or under a broader mechanism for controlling coastal zone uses. (See Chapter 9.)

4. RECREATION

Of all human activities along the coast, recreation is most compatible with the marine environment. However, certain recreational activities or their accessory needs present serious environmental hazards and must be planned within strict tolerance limits.

Without the Region's extensive saltwater shores, our population would be deprived of much of its present opportunities for swimming, fishing and boating. Recreation takes up about 10 percent of the study area land, ranging from 20 percent in the Harbor subzone to 5 percent in Atlantic North.

Our goal is to increase leisure use of the coastal zone by reclaiming derelict and wasted portions to permit additional development for recreation. To preclude overloading, we must plan acceptable alternates to coastal locations. These might include more inland parks and pools and high-intensity leisure complexes in population centers.

This study has not attempted to predict demand. Instead, it has focused on the suitability of shores and waters for swimming, boating and fishing and on the environmental concerns arising from incomplete recreational planning. It is assumed that if coastal integrity is strained by these facilities, recreational demand must be satisfied by alternate means elsewhere.

SWIMMING

Since the existing stock, resources, characteristics and potential for swimming vary among the subzones, it will be instructive to consider them separately or in pairs.

HUDSON RIVER–HARBOR SUBZONES

A century ago, river swimming was important. But with preemption of the harbor area by economic activities, railroad construction up the valley, steadily mounting pollution and increasingly stringent safety and health regulations, swimming virtually disappeared. In the relatively unpolluted reach from Yonkers to Poughkeepsie, there are two popular river beaches–Westchester County's St. George's Island and Croton Point–but they are alone.

If pollution can be abated, the potential demand for river swimming in the Hudson and Harbor subzones is strong. Swimming facilities of all sizes would be limited not by demand or site availability, but by monies for acquisition, development and operation. However, certain requirements are important, for example:

- protection from dangerous currents. Swimming sites will be limited to protected coves, lakes behind railroad embankments or new, protected facilities combined with other developments;
- gradually sloping bottom or susceptibility to filling at reasonable cost;
- sufficient upland for beach area, services, game areas and parking; and
- adequate access, without disturbing adjacent neighborhoods.

Natural swimming spots, properly sited and developed, should not be ignored, since they may be less expensive to build and maintain and have a "feel" about them that pools cannot provide.

The only natural swimming beaches currently programmed in the Hudson and Harbor areas are at Eastchester Bay, actually part of Long Island Sound, and Breezy Point and Sandy Hook as part of the Gateway National Urban Recreation Area.

As a future compromise between the sand beach and the pool, floating frames may be utilized. This device will be especially suitable in urban areas where development has pinched the shore.

LONG ISLAND SOUND

Although the sound waters lack the excitement of the ocean surf, they offer a splendid swimming resource. Large state parks are found on both the Connecticut and the Long Island shores. Many municipalities also maintain beaches, sometimes restricting their use to residents, a policy that obviously needs reassessment.

On the Connecticut shore, sandfill is usually necessary to prepare the sunning and rest areas and the swimming shelf. The westward section of the Island's north shore is also inclined to be swampy and muddy, but the eastward portion has sand beaches. As mentioned earlier, water pollution in and around the harbor has deprived urban areas of swimming opportunities, and restoration is a vital part of water-quality programming.

New swimming sites are needed on the sound. Among these should be large regional coastal parks accessible from the Region's center. Tentative recommendations by the Long Island Sound Study include a Long Island Sound trust to purchase, with 75 percent federal assistance, key parcels of shore land to be managed as part of the state park systems. The study

also envisions islands constructed from solid wastes as additional recreation facilities.

The State of Connecticut has recommended an additional swimming capacity for 50,000 persons on its sound shore, with enough for 45,000 more in the western sector. The South Central Connecticut Planning Region recommends an eventual capacity for 108,500 beach users for its westerly shoreline. For the easterly sector, an eventual capacity of 105,000 units is recommended. At present only 3.6 percent of this shoreline sector is government-owned.

The Greater Bridgeport Planning Region recommends 1.24 acres of public beach per 1,000 persons including parking space. Sixty additional beach acres are required to meet this standard.

ATLANTIC OCEANFRONT (TWO SUBZONES)

All ocean beaches should be allocated to recreation and eventually opened to the public. Measures to safeguard the environment, however, must not mean that only the privileged few who live in adjacent areas will be allowed to enjoy them.

To insure this equality of access, two planning policies are required:

1. Regional beaches on barrier islands should be served mainly by buses from urban areas or staging points rather than by land-consuming automobiles. This will result in less parking space in presently undeveloped areas and less parking congestion in urban foreshores.

2. Although many municipally owned and controlled beaches will and should exist, municipalities should not preempt the oceanfront. This may mean that municipalities with beachfronts more than adequate for their own residents should open them up to the public or transfer the administration of portions to the state for regional use. (The Long Island Sound Study recommends tenatively that state and federal agencies assist in maintaining underutilized municipal beaches allowing public access.

Possible parking congestion on streets upland from beaches is another reason for considering more beach busing. Staging points for bus shuttles are compromises with auto access. They require the availability of vacant land away from the shore. Floyd Bennett Field as a staging area for Breezy Point buses is desirable for the short term. A long-range solution may be the development of light rail transit to existing shore communities on Rockaway Peninsula and to the Gateway recreation developments at Riis Park, Fort Tilden and Breezy Point.

The State of New Jersey recommends a fivefold increase in beach acreage in Monmouth and Ocean counties. The New York State Office of Planning Services recommends the acquisition of waterfront sites, specifically beach parcels from Shinnecock to Montauk and at Montauk Point.

BOATING

Resources for boating, including moorings, launching ramps, repair and services, are more numerous than those for swimming.

Connecticut. Recent studies show about 130,000 registered boats on the sound. In addition, approximately 50 party boats and charter boats were operational.

New Jersey. In recreation study regions bordering the coastal zone, New Jersey has upwards of 15,000 berths at 275 private club commercial facilities, in addition to an unspecified number of municipal moorings. The state itself maintains 90 access points and there are other nongovernment ramps.

New York. New York City has about 9,000 moorings, 7,000 of them at piers. Jamaica Bay accommodates 60 percent of the city's boating facilities. In the Hudson subzone, there are about 4,400, with 3,400 at piers. The New York portions of Long Island Sound have 12,500, with 8,000 at piers. Along the South Shore of Long Island, there are 19,000 moorings, almost all at piers. The New York total is 45,000 with more than 80 percent at piers.

THE FUTURE

The future of boating promises a substantial, although not spectacular, increase in demand. This demand will probably express itself at all income levels—from the casual renting of boats to the ownership of cruisers and yachts. Unless definite action is taken, opportunities will remain scarce near the center of the Region. It is in the central waterbodies, where environmental impacts would be minimal, that large new supplies of boating facilities would seem most suitable. In the outlying reaches, the environmental impact of new boating facilities will be critical. Although we need additional facilities there, they must be planned strictly within the environment's tolerance of them.

The State of Connecticut has recommended approximately 200 additional boating facilities in the western sector of its sound coast. In the eastern sector, it foresees a need for 210 private exclusive boating facilities. The Long Island Sound Study has tenatively recommended 14 public sail and small powerboard rental facilities at urban places around the sound.

The State of New Jersey recommends an additional 13,000 berths (above the present 12,000) in Monmouth and Ocean counties.

Among subareas, the South Central Connecticut Regional Planning Agency recommends 1,600 additional slips in its western sector and 3,900 in the eastern sector. No other cities or subareas have proposed additional boating facilities in their recreation programs. One reason for this deficiency may be the expectation of eventual boating facilities combined with waterfront parks and residential developments.

In addition to the marina facilities, embarkation points for groups will be needed—fish charters and special services to Gateway beaches, for instance.

BOATING ISSUES

Several obstacles to boating occur in the central waterbodies. Filled-out shores offer little protection against storms. Urban waterfronts offer slight scenic satisfaction, although the Manhattan skyline is an exception. Floating debris can be dangerous to the speedier craft. Tidal currents and wakes from large ships are often hazardous. Air and water pollution are also deterrents, although if problems of access and construction could be solved, these deterrents would not be overriding.

The accessory uses required by boating activities —principally parking and feeder roads—may distress surrounding residents. This aspect must, of course, be considered in locating boating facilities.

Another issue is the problem of effluent from boats: raw sewage and garbage as well as debris from the storage, repair and disposal of obsolete craft. The first is of major concern in the Harbor area. The pollution of certain constricted bays and estuaries by careless boaters is a problem in the other subzones.

The Long Island Sound Study, in its draft recommendations, asks that the U.S. EPA set and enforce interim standards for holding tanks and that states provide portable pumpout facilities immediately.

FISHING

Fishing is a recreational pursuit that holds considerable promise. Even now, there are more than 1.6 million saltwater anglers in New York waters, and an increase of 7 percent annually is predicted. Demand from Westchester County and the north shore of Long Island is estimated at about 475,000 anglers. Connecticut reports more than 340,000 saltwater fishermen. In the Northeast Atlantic, the recreational catch is as much as 40 percent of the commercial finfish harvest.

Fishing near the shore depends mainly on water quality. In the Harbor subzone, fishing will be minimal, because of the slowness of water cleanup. In the other subzones, environmental tolerance of the necessary moorings, parking, channel dredging, boat effluents and noise will set the limit. On the positive side, the construction of artificial fishing reefs from nonpolluting solid wastes has been successful in generating fishing "hot spots" along the Long Island coast.

Fishing is largely a matter of boating. Bank, pier and surf fishing persist, however, particularly at populous urban beaches like Coney Island and Asbury Park. Jetties along the beach are also used for night fishing. The significance of and potential for nonboat fishing, mainly in the Harbor subzone, is uncertain, but is worthy of investigation. This potential is intimately connected to water cleanup.

EXTANT PLANS

Connecticut's plans call for a nonboat fishing capacity for 1 percent of the population. Much of this capacity would be saltwater. New Jersey is calling for a twelvefold increase in fishing facilities in Ocean and Monmouth counties and even higher increases in the districts bordering the Hudson and Harbor subzones. The New York Office for Planning Services advises early development of fishing and other facilities at state-owned parks.

The Long Island Sound Study has tentatively recommended additional access to existing groins, breakwaters and jetties (including those of utilities) and additional fishing piers, as well as artificial reefs at six points around the sound.

OTHER COASTAL RECREATION

The foregoing has dealt with the three major recreation pursuits carried on in the coastal zone. Naturally, other leisure activities occur there.

NATURE-ORIENTED ACTIVITIES

Nature study and appreciation and photography will never be a mass attraction, but they harmonize well with conservation efforts. Access by rowboats and walkways, as well as sites for potential observation points, labs and instruction and exhibit areas, should be considered.

LEISURE PARKS

Leisure parks on the waterfront have an ambiance arising from the meeting of land with the expanse of sky and water and views beyond. Preferably, they would include historic or geologic features and some degree of elevation. Views of shipping and other economic activities would also lend interest.

Active recreation, naturally, can be included in these parks. Although only indirectly related to the water, they may be necessary to the population of a waterfront park. Almost every kind of land use, if properly designed, can be combined with waterfront parks.

Examples are waterfront development as sketched in the Lower Manhattan development plan, the South Street Seaport complex, the park atop the sewage treatment plant in the Hudson at 125th Street, the new Harlem River Bronx State Park and areas

accompanying housing on Roosevelt Island. In Staten Island, the South Richmond "new community" plans call for waterfront parks. Fort Totten on the sound in Queens is regarded as a potential leisure area.

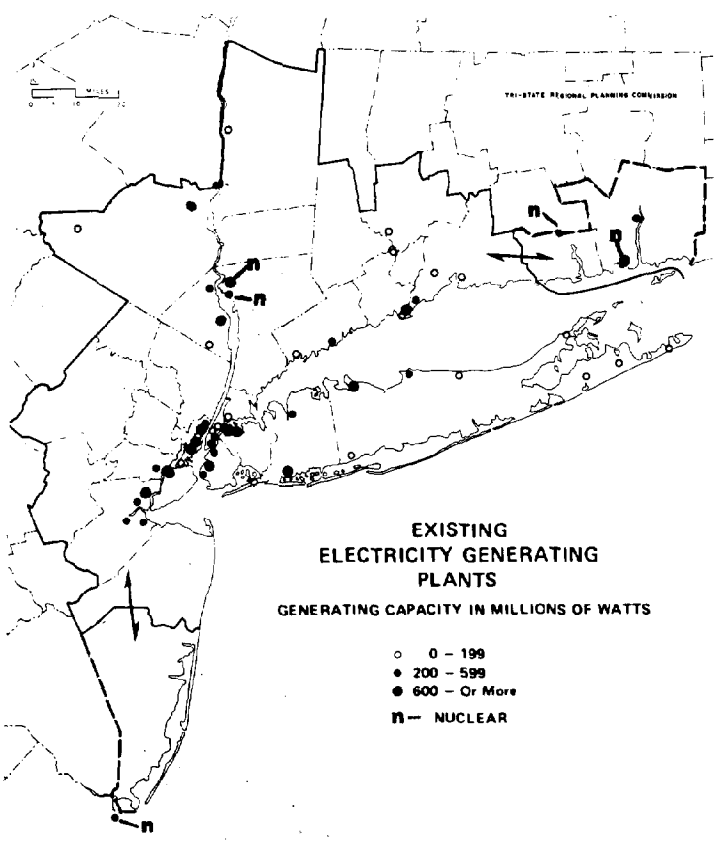
In New Jersey, Liberty State Park has a waterfront orientation, and housing development at Tidewater Basin will have water-related leisure areas. Hudson County has recommended that 146 acres of the Palisades escarpment and part of Constable Hook in Bayonne both be given park status.

Increased federal participation is exemplified in the recent establishment of the Gateway National Urban Recreation Area. For this, certain parks and military bases were transferred to the National Park Service, thus unifying their management and relieving New Jersey and New York City of an administrative and financial burden. The Long Island Sound Study staff has discussed the possibility of special federal funding for the Long Island Sound heritage, a proposed coastal open space network around the sound.

5. POWER GENERATION

The Tri-State Region—like much of the Northeast—is in the grip of an electrical energy shortage. When we experience brownouts or voltage reductions, we blame utility companies for inadequate planning. But in many instances, their proposals are paralyzed by an aroused public concern for environmental protection. Consequently, the lead time for building new plants has been stretched out to a degree that could hardly have been foreseen five years ago.

Because of their need for large quantities of cooling water, most power plants are located in the coastal zone. Their thermal effects are therefore a major issue in coastal zone management. Their often undesirable appearance, their air pollutants (usually caused by burning fossil fuels), and the possibility of accidents at nuclear installations are other significant issues.



SITING ASPECTS

The additional electric generating plants required in the next 20 years to serve the expected demand in the Tri-State Region will use up some 6,500 acres of land, except in cases where they may be located offshore. This does not include hydroelectric plants, nor does it include space for transmission rights-of-way, which may devour as much space as the generating plants themselves.

It is becoming customary for electric utility companies serving the Region to choose generating sites outside the Region, and this trend is expected to intensify as suitable sites within it become scarcer. As much as half of this new capacity may be located outside the Region, although a point will doubtless be reached where people in outlying areas will no longer be willing to accept "exported pollution" from the metropolitan areas.

Utility company forecasts of peak demand in the Tri-State Region are based on an average compounded growth rate of about 7 percent during the period 1970-1990. This in effect assumes continuation of the growth that until recently dominated economic thinking in the United States.

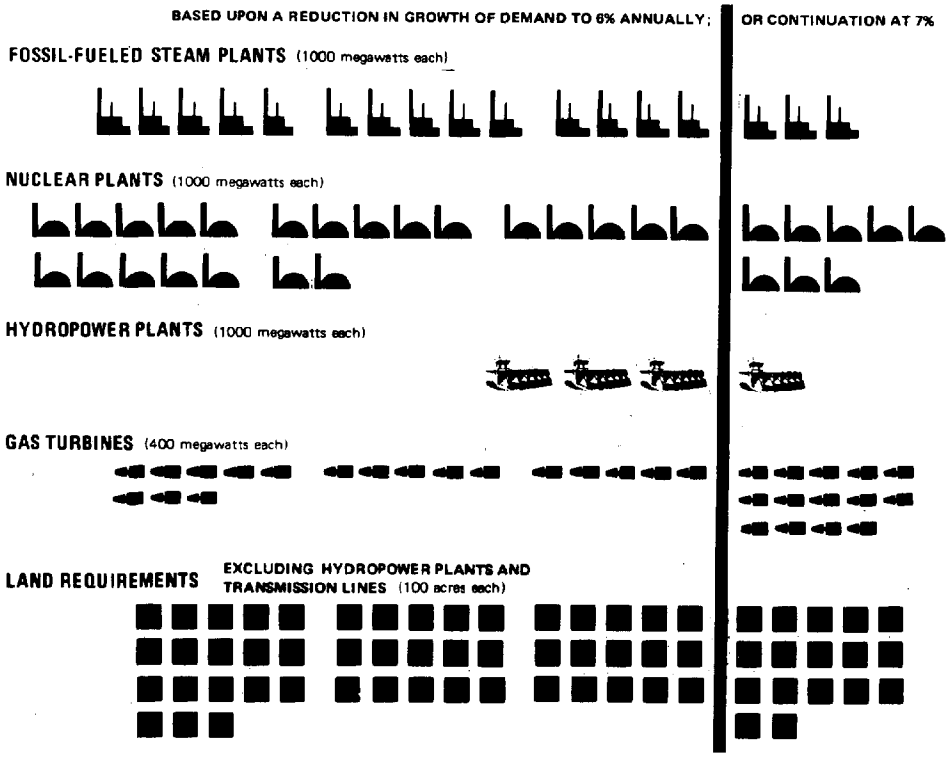
It is possible that this assumption is no longer valid. If this growth rate can be reduced through conservation measures to 6 percent, which is a reasonable objective, the requirements for new generating capacity could be reduced from 65,000 to 46,000 megawatts, and land requirements from 6,500 to 4,800 acres.

Total generating capacity within the Region now stands at 20,500 megawatts. In addition the Region can draw up to 3,400 megawatts from sources outside its borders.

THERMAL POLLUTION

Disposing of waste heat from power-generating plants is not a new problem, nor is it associated only with nuclear plants. Fossil-fuel plants have always discharged heat, though their discharge of waste heat into cooling water per kilowatt-hour generated is only about 60 percent of that from "nukes." There are two reasons for this: first, the nuclear plant is less efficient, requiring about 20 percent more British thermal units of fuel input per KWH; and second, fossil-fuel plants dissipate about 25 percent of this total waste heat in the air vs. about 7 percent for nuclear plants.

IMPLICATIONS OF MEETING THE REGION'S 1990 POWER DEMANDS (AT TWO LEVELS)



Source: Tri-State estimates, with the "mix" of plants based on a 1970 study of the New England Regional Commission. It is likely that much of this additional capacity will be located outside the Tri-State area.

Certain industries, like oil refineries, also use natural waters for cooling, but it is the proposed proliferation of power plants of both kinds on our non-ocean waterbodies that has caused us to focus on the problem. It is said that the power industry alone will circulate more water for cooling than the nation used for all purposes before World War II.

Heated water may have an adverse effect on marine life. Biological processes are speeded up and the dissolved oxygen is reduced. Certain forms of life may disappear; others may be stimulated. Warm water discharges may also contribute to odor problems by increasing aquatic plant growth. Turbidity may also increase, making the waters less suitable for recreational uses.

The capability of specific coastal water bodies to sustain future thermal discharges is not precisely measurable at this time, although a thermal model has been constructed for Long Island Sound. However, Arthur Kill is considered thermally polluted, and the Interstate Sanitation Commission has banned expansion and new construction facilities that will add more heat to the Kill. Cooling heated water in artificial ponds for later reuse may be part of the solution, as is the possibility of using heat for other purposes (heating of buildings, aquaculture, recreation).

CRITERIA

Major traditional criteria for power plant siting include the following:

- adequate supply of cooling water;
- access by rail and water for delivery of heavy equipment and fuel, and preferably expressway access as well;
- a sufficiently large tract of land;
- terrain or meteorological features that do not inhibit the dispersion of emissions;
- protection of scenic or historic values; and
- lack of geologic faults, which could present foundation problems.

It is widely doubted that enough sites can be found in the coastal zone to meet all these criteria. Other solutions are being suggested. The most promising answer to siting problems may well be man-made islands on the continental shelf, where the problems of waste heat disposal would be minimized. Substantial advance engineering studies of this concept have been attacked on environmental grounds—an almost automatic response to any power plant siting pro-

posal. According to available information, however, the concept presents fewer adverse effects on the environment than any land-based location. Serious consideration should be given to making this a priority in siting future plants.

ALTERNATIVES TO CONVENTIONAL POWER GENERATION

There is wide agreement today that we are rapidly approaching the point at which further expansion of fossil-fuel steam and nuclear-generating capacity will impose completely unacceptable thermal and air pollution burdens on our fragile and finite environment. Indeed, a doomsday urgency pervades the need to develop new, nonpolluting energy systems. There are a number of such systems on the horizon; some with apparent real promise for the intermediate term, some still relatively "far-out."

Solar energy for direct heating. The technology is available now, but in this Region, its potential is limited to its role as a supplement to conventional heating systems.

The fuel cell. This is a device that uses natural gas (or hydrogen) as a fuel and produces electric power without combustion. The only by-products are water vapor and carbon dioxide. Experimental units have been in successful operation for some time, and the main problem is to get the cost down to a level that is competitive with conventional generation.

Magnetohydrodynamics is a concept for generating electric current by the passage of a hot ionized gas through a magnetic field. It is reported that MHD plants would result in a dramatic reduction in thermal pollution of water bodies as well as in air pollution. Development work is proceeding, but there are many problems to be worked out. Commercial application is considered a possibility by 2000.

Nuclear fusion. This concept is ideal—a clean, cheap, virtually inexhaustible source of energy. But few researchers are certain that it can be achieved in their lifetimes, and success is believed to be decades and billions of dollars away—anywhere from 20 to 100 years.

Geothermal energy. Although most of the easily accessible steam within the earth is in the western United States, drilling into hot but dry underground regions and circulating water through the hot rock might introduce geothermal power in the East. A report by the National Science Foundation and the University of Alaska estimates that 395,000 megawatts could be generated in the nation by 2000, which is greater than the total generating capacity of the United States today.

Wind power. Windmills have been used for hundreds of years in applications that were interruptible in periods of calm. But there are proponents of a new system, which uses an ocean-based wind machine to create hydrogen through the electrolysis of sea water. The hydrogen is stored in tanks and reconverted to electricity on demand via fuel cells in mini-substations. On paper, the concept looks uncommonly attractive.

FUTURE CONSIDERATIONS

Although the above methods look like promising alternatives to the conventional electricity generating plant, we cannot hope that they will be ready in time to relieve us of the pressure to build more conventional plants or restrain our demand for electricity, or both.

No matter how one looks at demand vs. supply, at least some additional conventional electrical energy plants will have to be built. As a result, some hard decisions will have to be made on where they will be located: in the coastal zone, inland or offshore. The role of the public sector in this decision-making is carried on by a plethora of agencies—federal and state.

THE PUBLIC SECTOR IN PLANT SITING

Traditionally, the scope of the various state public service commissions has not been broad enough to permit them to deal adequately with rapidly expanding demands for power and the problems implicit in meeting them. Federal intervention in the form of the Federal Power Commission was complicated by the emergence of the nuclear potential, administered by the Atomic Energy Commission, after World War II. Power pools became enlarged and responsibilities blurred by the importation of power from long distances.

Under the National Environmental Policy Act, the federal power agencies must formally consider the environmental impact of a proposed facility before approving it for construction. Twelve other federal agencies are interested in power projects and, in turn, they circulate the utilities' statements to other subagencies. This system is designed to avoid projects that will have significant, irreversible environmental impacts and to substitute alternates.

Also at the federal level, the administration in February 1974 drafted legislation under which state agencies responsible for developing land-use and coastal zone programs would be required to designate their "fair share" of energy facility sites as determined by the U.S. Department of Interior. Failure to do so would cause the state agency to lose its facility-siting responsibilities to Interior and the Federal Energy

Administration. More recently it is reported that this draft legislation had been scrapped in response to heavy opposition from certain federal departments. New legislation, however, is said to be in preparation to give the Federal Energy Administration authority to override the veto of state-approved energy facility projects by any other federal agency.

It is not likely that the states will be enthusiastic about federal initiatives to take siting control out of their hands. But decision making in this area, with the partial exception of New York State, exists in a sort of vacuum, and there seems to be no limit to the length of time a needed facility can be delayed.

One possible approach could be adaptation of New York State's power agency set-up, with each state designating an agency like New York's Atomic and Space Development Authority. This agency is charged with identifying, assessing and acquiring sites not only for nuclear plants, but also for whatever type of facility is required. A counterpart of New York's board on electric generating siting and the environment could be vested with the final, irreversible decision on sites that had been certified as suitable by the first agency.

Another alternative is suggested by the recently formed Empire State Power Resources, Inc. This is an electric generating company formed as a joint venture by the seven privately owned New York State electric utility companies. It is proposed that the new company build and operate all the new generating facilities expected to be needed by the sponsoring companies during the 1980s. Each of the companies involved will remain independent and continue to be responsible for its own customers.

A third approach could be based on existing power pools. In the case of New York State, the territory served by the New York Power Pool (NYPP) is co-terminous with the state. But New Jersey's counterpart to NYPP is the Pennsylvania-New Jersey-Maryland Interconnection (PJM), and Connecticut is a member of the New England Power Pool (NEPOOL).

The pool grouping approach appears logical since each pool has mechanisms for central dispatching and transmission of bulk power and for dealing continuously with matters of policy, planning, engineering and operations. Joint ownership of bulk-power generating facilities, along the lines of New York's Empire State group, would appear to be a logical extension of the function of either NEPOOL or PJM.

STATE REGULATORY BODIES

All three states have commissions or departments with supervisory and regulatory powers over energy installations and transmissions and environmental planning for gas and electric transmission lines.

Connecticut. Besides its utility commission, Connecticut has set up the Power Facilities Evaluation Council.

New Jersey. As an adjunct to the Department of Public Utilities, New Jersey places decision-making powers with the Board of Public Utility Commissioners (three members).

New York. This state has an unusually strong role in power planning and generation. In addition to its public service commissions, New York has instituted the Atomic and Space Development Authority to encourage the development and use of atomic energy for productive purposes. Another agency is the Power Authority of the State of New York, recently in the news in connection with its takeover of two new generating facilities under construction from the financially troubled Con Edison. Between 15 and 20 percent of all the power currently distributed by upstate New York private utilities is purchased from the Power Authority.

To provide a better coordinated approach, New York State has created a State Board on Electric Generating Siting and the Environment. Its membership includes the chairman of the public service commission, the commissioner of environmental conservation, the commissioners of commerce and health, and a resident of the site area. This new board will be the final administrative arbiter with respect to the siting of major steam-electric generating facilities, including nuclear plants.

OTHER CONSIDERATIONS

The Long Island Sound Study has prepared tentative recommendations for rationalizing the decision structure, for requiring recreation and public access at all sites, and for application of strict criteria for power sites by coastal zone management agencies.

There is a real need for a reliable mechanism for reaching final go or no-go site decisions for power plants within a reasonable time, even if such plants are to be located in the coastal zone. The key word here is *final*. Once a favorable decision on a site has been reached, there should be no grounds on which it can be questioned further, except for new evidence of a previously undisclosed hazard. It will be one of the major tasks of a coastal zone managing agency to coordinate and guide other agencies in scaling demand, and siting and building plants.

6. SHIPPING

Concentration of waterborne commerce in the Region's central harbor subzone has been and will be the most important economic activity of the coastal zone. The Port of New York and New Jersey now handles 80 percent of the Region's total. Outside the port, shipping is limited to oil, coal, stone, sand and gravel, although Connecticut ports handle a small amount of general cargo.

The most dynamic aspect of waterborne commerce is the rapid shift from break-bulk cargo handling to containerization. In 1970, more than one-third of the central harbor's cargo value was handled in containers. Accompanying this movement are secondary trends–some modernization of conventional general cargo facilities, the replacement of several North River passenger piers with a superterminal for cruise ships and remaining trans-Atlantic liners.

CONTAINERPORTS

In 1970, containerized cargo made up 40 percent of the port's general cargo tonnage. But by 1975, it is estimated that containerized cargo will increase to about 50 percent of general cargo. In 1970, container berths handled a total of 8.1 million long tons. By 1975, the volume is expected to be 12.4 million long tons, and by 1990 it may increase to between 18 and 21 million long tons.

LOCATIONAL CRITERIA

It has been suggested that decentralizing containership activity away from the present concentration would help to revive smaller ports in the Tri-State Region. But by all odds, this is simply not feasible. Containerports gather their traffic from a large number of shippers in a large territory and distribute to receivers who are similarly scattered. Thus, the Port of New York, a major rail and highway hub, is an ideal location for this type of operation.

The containership itself is large, fast and efficient; one such vessel is generally believed to do the work of several of the larger conventional freighters. It is also more expensive to build and operate. Thus, speed of loading and unloading is necessary. It needs channels at least 35 feet deep, preferably 40, and at least 700 feet wide for fast turnarounds. Containerports should be near the open sea to minimize pilotage fees and loss of time. Again, the central harbor area is the ideal place within the Region.

FACILITY NEEDS

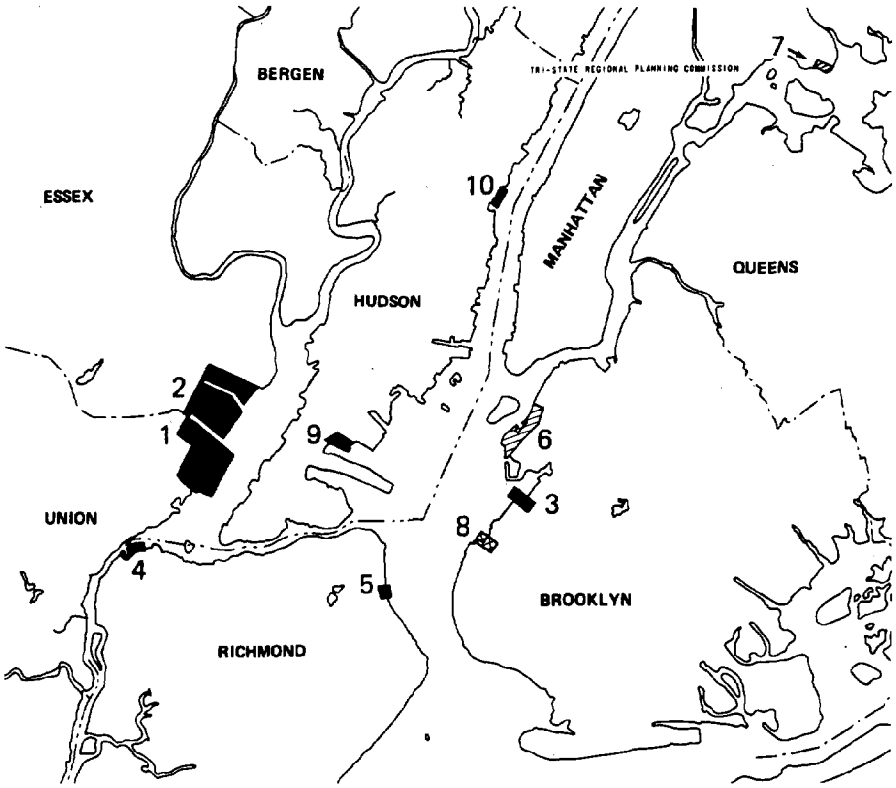
Existing containerports show a high ratio of acreage per berth–about 40 at major installations–to provide for storage, handling of containers and trailers and consolidation of operations. In some facilities containers are stacked to minimize this space requirement, but this increases the cost of handling since it becomes harder to reach a given container. Multilevel facilities have been proposed, but none is known to be in existence or under construction. Thus, surface storage remains the standard method of marshalling and sorting containers. The additional berths and loading and storage areas planned, while flexible in some cases, will increase the average ratio to perhaps 50 acres per berth.

As for the numbers of berths needed in 1990 to handle the up to 21 million tons forecasted, it appears that at 500,000 tons per berth, the need may be about 42 berths. This is slightly less than the total number under consideration. If, as seems likely, containerships increase in average size, and volumes per berth increase proportionally, still fewer berths may be needed.

Proposed sites in New York City typically consist of rebuilt shipping areas, with some redevelopment of upland areas to provide the required backup space. In at least one case (Red Hook, South Brooklyn) clearance of existing housing aroused community opposition, an example for competing forces in the zone. However, housing is not now regarded as actually needing a waterfront location; rather, the issue is one of uprooting, in an era of acute housing shortage, an established community to satisfy a new need for port-oriented land. The solution, of course, is sensitive design or adjusted location coupled with proper relocation strategies.

In the next several years a coordinated plan for containerport facilities should be evolved. Plan criteria should include:

- efficient transportation links at proposed sites. The need for energy conservation may make equipment pooling among carriers more feasible.
- restoration in adjacent areas of spaces related to the water for pleasant shopping, lunch-hour strolling, loafing or recreational and cultural activities.



CONTAINERSHIP FACILITIES, PORT OF NEW YORK AND NEW JERSEY

January, 1975

	EXISTING		ADDITIONAL PLANNED			TOTAL	
Port Authority Terminals	**BERTHS**	**ACRES**	**BERTHS**	**ACRES**	**COMPLETION**	**BERTHS**	**ACRES**
1. Port Elizabeth	17	700	0	0	–	17	700
2. Port Newark	3	200	0	0	–	3	200
New York City Terminals							
3. Northeast Marine Terminals	3	75*	6	165*	1980	9	240*
4. Howland Hook	3	125	3	283	1976	6	408
5. Marine Terminal	2	30	2***	20	1976	2	50
6. Red Hook **	0	0	2	75	1978	2	75
7. Hunts Point	0	0	2	40	1976	2	40
8. Brooklyn Army Terminal	0	0	3	90*	1978	3	90*
Private Operators							
9. Port Jersey	2	97	0	0	–	2	97
10. Port Seatrain	2	40	0	0	–	2	40
Total	**32**	**1,267***	**18**	**673***		**48**	**1,940***

*Including other activities.
**To be operated by the Port Authority of New York and New Jersey.
***Replacements of existing berths.

Source: Port agencies and private operators.

COMPOSITION OF TRAFFIC, PORT OF NEW YORK AND NEW JERSEY

In millions of long tons and billions of dollars, 1970

	TONS	PERCENT	VALUE	PERCENT
General cargo				
Contained	8.1	7%	$ 7.5	36%
Breakbulk	12.6	11	11.7	57
Bulk cargo	**95.9**	**82**	**1.5**	**7**
Total	**116.6**	**100%**	**$20.7**	**100%**

Source: Data from Port Authority of N. Y. & N. J.

OTHER SHIPPING

Other types of waterborne commerce will remain important at the port and at other coastal zone harbors outside the port. Facilities for them are only partially the province of public agencies, but efficiency and concern for the environment require that their planning be considered in relation to the Region's total logistics system.

NONCONTAINERIZED GENERAL CARGO

This harbor activity is expected to be about 45 percent of the general cargo total in 1990. The ongoing shrinkage has already led to the disuse of most of Manhattan's piers and of some other port areas. These piers are generally unadaptable to modern shipping practices because of their lack of upland areas and adequate truck access. They are "up for grabs" and their disposition is one of the major issues of harbor planning.

BULK CARGO

Bulk cargo in the Region consists mainly of petroleum in its various forms (including liquified natural gas), coal, ores and minerals, and sand, gravel and stone. Terminals for such products are traditionally built by the related industries or by railroads. Therefore, projecting needs and planning for such shipping have been done, until now, by separate corporations. However, a degree of coordination under current land and marine controls has taken place through consultations among the Corps of Engineers, the Port Authority, New York City's Department of Ports and Terminals and municipal permit agencies.

Supplying fuel for the Region will require hard decisions about bulk cargo shipping and more public participation in making them. An example of a new concern is the transport and storage of liquified natural gas (LNG), where both tankers and storage facilities may need special safeguards and locational rules beyond those required for conventional petroleum products.

OTHER PORTS IN THE REGION

While containerized and conventional general cargo facilities are infeasible for other ports in the Region, these ports will be important for bulk-cargo activity—both from sources outside the Region and from the Port of New York and New Jersey as transshipped cargo.

For most of these harbors, petroleum is the most important commodity. By 1970, coal had almost disappeared from the list except at Norwalk, where it continued predominant. Sand and gravel made up a third distinctive cargo, being important at Stamford and Hempstead harbors.

For the future, expansion of petroleum transport will be the dominant shipping issue at these harbors. However, if petroleum shortages persist, the return of coal traffic and the liquified natural gas potential may also pose problems.

PETROLEUM

Petroleum receipts, processing and distribution are critical to the continued functioning of the Region. Making significant demands on the coastal zone, the system also has several inconvenient impacts on other areas and therefore will require serious consideration in current and future coastal zone studies.

TANKER TRAFFIC

Although receipts of petroleum and petroleum products have increased at the central port, its share of the Region's total receipts has dropped (from 83 percent in 1963 and 78 percent in 1970), showing that other ports, principally New Haven and Port Jefferson, are increasing their volumes. This has important implications for Long Island Sound.

Tanker size is a related concern in planning for petroleum traffic. Currently, at the port, tankers of more than 30,000 deadweight tons generally unload onto lighters at anchorage, await high tide or enter partially loaded, because of the current 35-foot chan-

HARBORS OUTSIDE THE PORT OF NEW YORK AND NEW JERSEY

Handling more than 1 million short tons annually

	1963							1970						
	THOUSANDS OF TONS			SHARES OF COMMODITIES				THOUSANDS OF TONS			SHARES OF COMMODITIES			
	Rec'd.	Shipped*	Total	Petrol.	Coal	Sand & Gravel	Misc.	Rec'd.	Shipped*	Total	Petrol.	Coal	Sand & Gravel	Misc.
Connecticut **														
New Haven	7,235	1,359	8,594	85%	7%	–	8%	9,715	1,915	11,630	91%	–	–	9%
Bridgeport	2,040	405	2,445	78	10	–	12	3,495	349	3,844	86	–	–	14
Norwalk	1,077	3	1,080	22	69	9%		1,056	2	1,058	20	74%	6%	–
Stamford	–	–	–	–	–	–	–	947	74	1,021	60	–	33	7
New London	816	219	1,035	90	–	–	10	2,447	1,430	3,877	95	–	–	5
New York ***														
Hempstead	1,744	3,183	4,927	21%	–	78%	1%	1,821	2,328	4,149	25%	–	72%	3%
Port Jefferson	1,431	57	1,488	76	3%	21	–	4,157	176	4,333	84	–	16	–
Northville	–	–	–	–	–	–	–	916	308	1,224	100	–	–	–
Northport	–	2,367	2,367	–	–	100	–	1,000	–	1,000	100	–	–	–
Oyster Bay	166	1,060	1,226	14	–	85	1	–	–	–	–	–	–	–
New Jersey														
None														

*Intraport and local traffic are included in "shipped."

**In addition, points on the Connecticut River below Hartford handled 3 million tons in 1963 and 3.814 million tons in 1970.

***In addition to the listed harbors, all on Long Island, points on the Hudson River in the Tri-State Region handled about 13 million tons in 1970.

Source: Waterborne Commerce of the United States, Calendar Years 1963, 1970, Dept. of the Army, Corps of Engineers, and private sources.

nel depth constraint in many of the Harbor's waterways. However, in 1969 about 30 percent of tankers using the port were more than 30,000 deadweight tons.

Tankers up to 80,000 deadweight tons could be accommodated in the deeper 45-foot Hudson River channel extending to roughly 59th Street in Manhattan, if there were terminals accessible from this channel.

For new supertankers in the 250,000-ton range and drawing 70 feet of water, the port will be precluded. Four of ten potential deepwater sites initially listed by the Corps of Engineers lay in the Tri-State zone: the Montauk Point area, Long Island north shore area, Raritan Bay and Long Branch area on the Monmouth County coast in New Jersey. The last two are being more seriously considered but the New Jersey administration is opposed to them. The decision on where to locate the port, the Corps suggests, will depend on: the relative probabilities of oil spills: the potential for environmental damage from spills; and the relative construction and operating costs.

The Federal Maritime Administration is reported to favor construction of the initial supertanker port in the ocean off Delaware Bay.

ENVIRONMENTAL CONCERNS

The above issues, and even conventional proposals like deepening and expanding Port Jefferson, bring into focus at least five impacts on the environment.

1. The possibility of oil spills and subsequent damage to natural and recreational areas of the coastal zone.
2. The need for coastal or inland sites for storage tanks, processing and the extensive petrochemical industries linked to petroleum.
3. Air and visual pollution from refineries.
4. Location of pipelines and oil barge facilities.
5. The impact of tank truck routes on adjacent land uses.

Middlesex County's concern over the impact of a deepwater terminal off Long Branch on the environment led to a special study by the Tri-State Regional Planning Commission. This study showed that:

- Land-use problems would be extensive.
- Air quality would fall below desired levels.
- Freshwater demands in Middlesex County would be about 30 percent above current estimates for the year 2000.
- Effluent loadings from new refineries and petrochemical plants would not tax water quality targets.
- Employment would be increased in a region not yet recovered from the recession of the last few years.

The Nassau-Suffolk Regional Planning Board has responded to the present inefficient, decentralized

situation on Long Island with a plan calling for concentrating receipts at Northville and Port Jefferson, a pipeline distribution from those points to tank farms inland and the extension of an existing pipeline from Kennedy Airport eastward. A consolidated terminal and industrial park at Hempstead Harbor is also recommended. This plan would eliminate barge receipts on the south shore and in some harbors on the north shore, allow increased recreational use of these harbors, safeguard related wetlands and reduce tank truck traffic. This plan should be favored as balancing development with protection of natural resources and consolidating coastal uses for more compactness and efficiency.

Tentative recommendations by the Long Island Sound Study of the New England River Basins Commission include consolidation at five ports of the sound, construction of three offshore terminals, new pipelines and fuller use of existing ones, and relocation of tank farms inland. The study also recommends state authorities to build and lease facilities to distributors.

FUTURE REQUIREMENTS

Continuing diminution in the availability of foreign oil will affect the receipts and distribution of both petroleum and other fuels. The shortage of oil has already brought about permission to use coal as a boiler fuel at three electricity generating plants in the Region, with the possibility of others to follow. If these three plants should continue to burn coal into the forecast target dates, estimates of coal receipts would have to be revised upward by as much as 13 million tons a year.

ESTIMATED RECEIPTS OF PETROLEUM

Millions of short tons in liquid petroleum and products

FACILITY	1970	1985	1990	Percent in 1990
Port of New York				
Unloaded*	50.6	68.3	77.0	46.0%
Locally refined*	16.9	20.0	20.0	12.0
Northville	.9	5.1	5.7	3.5
Other Offshore depots	1.0	5.1	5.7	3.5
Port Jefferson	3.4	12.8	14.2	8.5
New Haven	8.9	8.0	9.8	6.2
Net pipeline	20.0	30.1	34.4	21.0
Total	**101.7**	**149.4**	**166.8**	**100.0%**

*Receipt of crude petroleum processed locally not included.

ESTIMATED RECEIPTS OF NATURAL GAS*

Billions of cubic feet

	1970	1985	1990
Pipeline	617.1	546.5	600.0
Tanker (LNG)		50.0	63.1
Total		**596.5**	**663.1**

*Based on current projections and suggested expansions. Subject to future supply variations and technological changes.

ESTIMATED RECEIPTS OF COAL

Millions of tons

	1970	1985	1990
Waterborne			
Port of New York	0.7	0.2	0.2
Trenton*	1.1	0.1	0.8
Rail	6.0	1.1	0.2
Total	**7.8**	**1.4**	**1.2**

*Not included in Tri-State's region or coastal zone.

7. WASTE DISPOSAL

Certainly the heaviest impact on the natural environment of our metropolitan region and its coastal zone is from waste disposal in its various forms.

- Sewage or its treatment effluent.
- Sewage sludge.
- Filling of marshes by sanitary landfill.
- Shoreline dumps.
- Floating garbage and debris.
- Dumping of dredge spoils.
- Waste heat disposal.

Waste problems are the most stubborn barriers to achieving an acceptable balance between the Region's development and its conservation. Our most expensive and urgent task in managing the environment is solving them.

LIQUID WASTE

In our nation, clean water is currently a very popular goal—perhaps partly because the cost implications are not generally known. At present, we do not know whether our waters—coastal or inland—are becoming cleaner. For instance, certain shellfish beds were recently reopened, but others have been closed. Certain industries have stopped dumping chemical waste into coastal waters, and though programs requiring cessation of specific industrial and municipal pollution are of varying effectiveness, improvement has occurred. But pollution may have remained the same or even increased in other bays or estuaries. State water pollution control agencies, federal agencies and the Interstate Sanitation Commission measure water quality at numerous points in the Region, but the information is not collected, analyzed or disseminated for the Region's waters as a whole.

There is no general agreement on exactly how to clean up waterways. The original timetable, set up by federal programs mainly through the construction of sewage treatment plants, should have been completed by 1972, but federal appropriations fell short of needs. New York, New Jersey and Connecticut provided additional state aid but their supplements could not maintain the original schedule. Under the Federal Water Pollution Control Act, the Tri-State Region is eligible for 55 percent federal aid for sewage-treatment projects, but the actual federal share in 1963-1968 was only about 9 percent. Since 1968 this proportion does not appear to have increased. If we set the cleanup date for 1980, the stretched-out annual capital program for the Tri-State Region would require more than $200 million per year—four times the recent level of investment.

WATER CLEAN-UP PRIORITIES

Ideally, a water quality management agency will do the following:

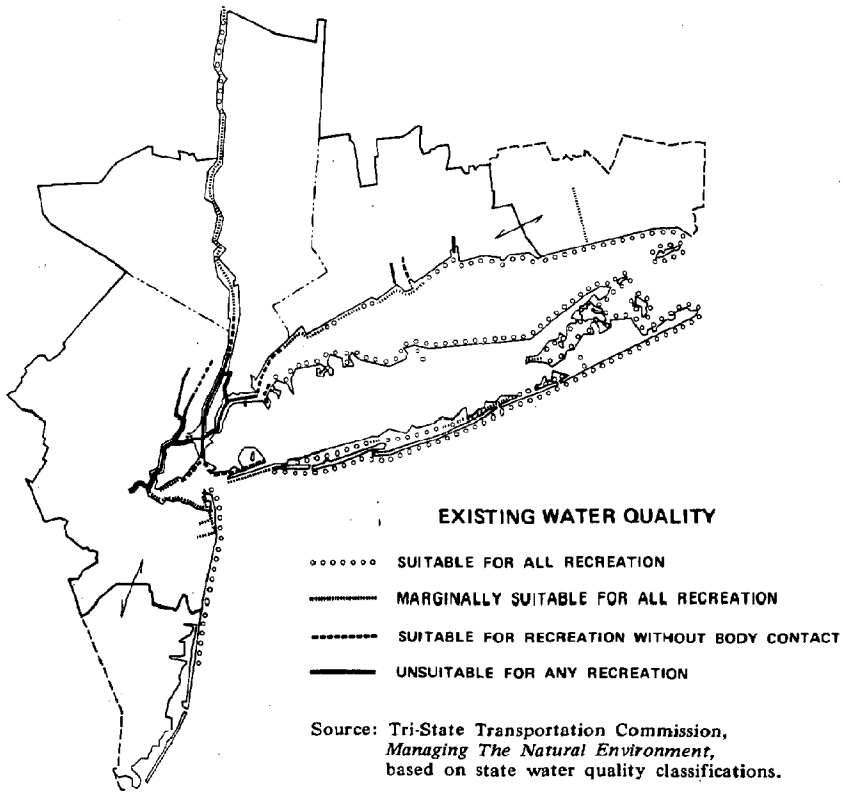
1. *Decide tentatively on the uses we want out of our coastal waterbodies.* Other chapters in this report provide a basis for such a list of uses. These cannot be ranked since they are not a true hierarchy.

As checks on whether a given use is desired, theoretical "needs" for each use can be measured. For instance, the shellfish-harvest potential could be estimated. Boating needs could be calculated by relating populations to various waterbodies by distance. Other checks involve locational criteria, alternative locations available, and of course the characteristics and resource content of the waterbodies themselves.

2. *Define water-quality standards needed for each of the above uses.* Items commonly monitored to determine standards currently include:

- biochemical oxygen demand (BOD);
- coliform count: generally related to body contact and bivalve habitat;
- dissolved oxygen: generally related to wetland ecosystems and fish habitat;
- pH: generally related to wetland ecosystems and fish habitat;
- turbidity: generally related to body contact and esthetic enjoyment;
- trace heavy metals, such as phosphorous and nitrogen; and
- oil and grease.

When uses are compatible with water-quality standards in a systematic way, it is possible that combinations of uses can occur. It is preferable to describe water-quality standards and uses for segments



Source: Tri-State Transportation Commission, *Managing The Natural Environment*, based on state water quality classifications.

of waterbodies, since some have significant variations because of tidal flushing patterns or differences between surface and bottom flows like those in the Hudson estuaries and Long Island Sound. The 13,000 acres of Jamaica Bay have widely differing water characteristics depending on the season, amount of shore runoff, the discharge of industrial wastes and such activities as dredging, filling and diking.

3. *Predict future concentrations of pollutants and required waste load reductions.* Pollutant sources will typically include:

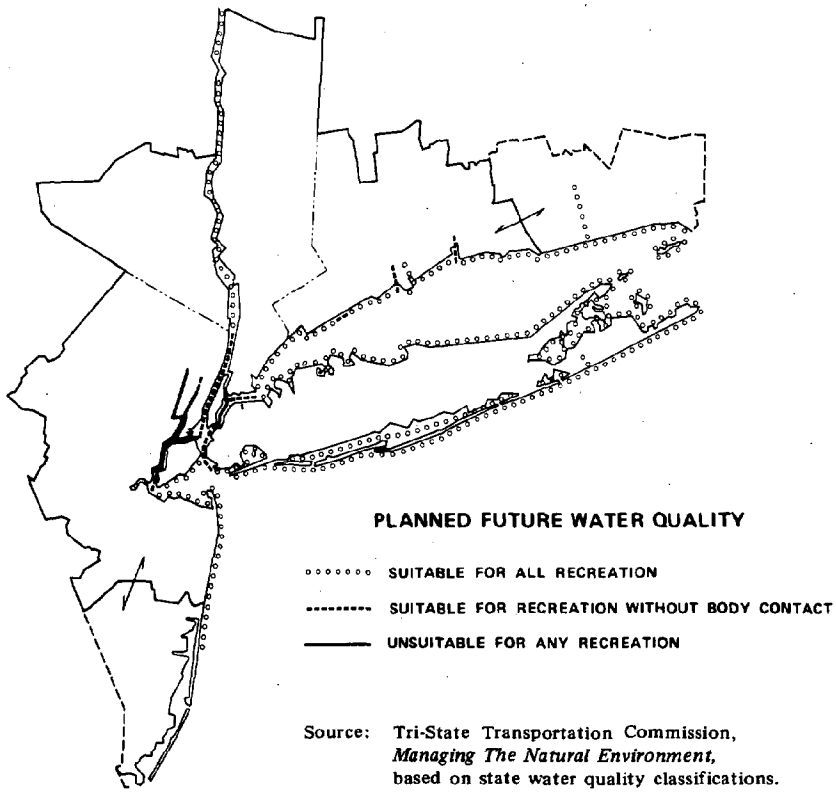
- raw domestic sewage from outfalls;
- primary and secondary effluent from treatment plants;
- industrial wastes;
- stormwater overflow through treatment plants;
- pollution and oil spills from vessels;
- polluted dredge spoils; and
- general development, creating wastes carried by runoff.

Future concentrations and reductions required to reach standards might be estimated by using physical, empirical or properly validated mathematical models.

4. *Develop and select programs through cost-benefit analysis and other considerations.* From an examination of alternatives, formulate tentative programs to render one or more of the water segments fit for one or more of the needs in those segments. Possible techniques include:

- treating wastes at sources, either individually or collectively;
- changing production methods, recovering materials, reclaiming wastewater;
- storing wastes for release at optimum times;
- locating new development where wastes can be accepted by natural water systems; and
- enhancing waterbody capacities to handle wastes, for example, introducing oxygen into waterbodies or finding other places to put wastes, for example, sewage on crop and forest land.

Current administrative mechanisms, data resources and modeling techniques are inadequate to realize such a complex research-management operation for the whole Region. However, prototype studies might be carried out to give a clearer picture of the



Source: Tri-State Transportation Commission, *Managing The Natural Environment,* based on state water quality classifications.

meaning of past decisions and the implications of existing legislation. The Long Island Sound Study, among its tentative recommendations, includes state requirements for land management and soil conservation practices which will gradually end nonpoint sources of pollution.

Money should probably be invested first where pollution is slight but increasing and where wetland ecosystems and swimming are "demands," or where the restoration of water quality will serve several uses. The cleanup of heavily polluted waters might be delayed, since costs related to the scale of demands may prove uneconomical. Future development recommendations, such as those in Tri-State's *Regional Development Guide*, could be used to indicate expected needs and planned uses. The results of alternate development policies could be compared and the scale of the differences judged.

SEWAGE TREATMENT

About 95 percent of the municipal sewage in the Tri-State area is discharged into its coastal waterways. Twenty percent is still discharged as raw sewage. All wastewater (except for the raw sewage) is processed at sewage-treatment plants found on coastal and estuarine land.

Over the years, we will need to expand capacity to about 4,300 million gallons a day (MGD), almost twice the present load of 2,420 MGD. Collectively, the Region's plants now occupy 1,300 acres. In 2000, the land needs will be twice that figure. For detention tanks or basins for storm sewers, additional land will likewise be required. New York City, at present the only locality building retention basins, proposes to construct 29 such facilities.

New plant sites generally require low elevation, acceptable dispersion of effluent, safety from floods, firm subsoil, feasible sludge removal, expansion room and nondegradation of surroundings. Current planning generally observes these criteria, and there is little concern that new sites in outlying areas will be improperly chosen. The main problem will be upgrading present plants in urban areas where land is scarce and expensive, and planning is complicated. Witness the North River project in the Hudson, where a treatment plant with a park on the top level will carry an astronomical price tag.

THE NUTRIENT PROBLEM

The problem of algae and other plant overgrowth caused by excess nutrients, mainly phosphates, in treated effluent is of concern to the Region. The

areas affected are the bays and other constricted segments such as western Long Island Sound where tidal flushing and upriver runoff are insufficient to prevent nutrient buildups. Such buildups are, of course, related to season. And it is likely to become worse as sewage treatment is extended and upgraded.

In the southern bays of Long Island, Atlantic outfalls are already under construction to solve this problem, as in the case of Nassau County Sewer District's No. 3 plant at Wantagh. In Monmouth County, a regional sewer system is being constructed around the Navesink and Shrewsbury estuaries with an outfall to the ocean. Along Raritan Bay, a new outfall parallel to the shore will carry effluent eastward to the ocean below Sandy Hook. Pumping effluent into the ground as a way of filtering and adding it to the ground water supply is being tested in Bay Park in Nassau County.

HARBOR RUINS AND FLOTSAM

Drift from derelict vessels and deteriorated structures is a special waste problem in the central harbor and other coastal zone harbors. Not only are areas made unsightly, but there is also a definite hazard to recreational and commercial vessels. A steady supply of flotsam is fed into the channels, making the need obvious for a sizable effort to collect and transport it to an incinerator. Also, rotting hulls and piers, landings and shacks are fire hazards and provide a habitat for marine borers.

Under the River and Harbors Act of 1974, a Corps of Engineers proposal to clean up the New York-New Jersey Harbor was authorized. The work will include the removal or repair of derelict timbered vessels, deteriorated piers, wharves and other structures, and shore debris.

The federal share will be more than $13 million, 50 percent of the cost. Local governments benefitting from this cleanup will undertake to enact and enforce measures to prevent future drift and debris. Any system set up for the central harbor might be later extended to include the collection and disposal of debris in the smaller harbors of the zone.

POLLUTION FROM VESSELS

Garbage and sewage from vessels of all sizes are a problem in the coastal zone. Regulations requiring onshore dumping of sanitation containers from pleasure craft assume adequate collection facilities at marinas, which in turn are the responsibility of the managers of the marinas. The 1972 Federal Water Quality Act bans the sale of vessels with unacceptable marine sanitation devices. Dumping of garbage in the Lower New York Bay by ocean liners and freighters is a major problem for the Staten Island beaches.

Part of the littering problem is the prevalence of throwaway containers. Another is the lack of equipment and personnel to clean up and dispose of litter and garbage, and to police areas. A part of the solution is increased emphasis on environmental education.

SOLID WASTE

We have only unproven ways—recycling and banning wasteful packaging—to reduce the solid-waste burden on the Region's localities. This burden, already insupportable, will increase. By 1990, the Region's solid waste will have grown to 28.5 million tons per year, about 65 percent over 1970. The 1970-1990 volumes are estimated to require about 30,000 acres for sanitary landfill, even assuming that incineration will increase where landfill sites are scarce.

Criteria for location include:

- capability of being diked to prevent leaching and keep out floods;
- availability of cover material;
- potentiality of twenty-year life span;
- convenient truck access;
- noninterference with neighboring land uses;
- suitability for future use; and
- noninterference with ecosystems.

With such demanding criteria, only a few coastal sites may be found suitable and even then, environmental enthusiasts may protest them successfully. Likewise, it is doubtful that the necessary inland acreage will be available. In the face of this shortage, the response to this regional problem, as expressed in Tri-State's *Managing the Natural Environment*, March 1970, should be as follows:

1. Evaluate both coastal and inland areas for acceptable landfill potential, including costs, and designate suitable ones.
2. If, as expected, these are insufficient, pursue combinations of the following:

- clean, environmentally acceptable incineration facilities effectively sized and distributed;
- development of waste processing for harmless dumping at sea;
- incineration yielding residues suitable for building fill; and
- sorting and recycling processes and regulation of unwanted packaging.

Obviously, this problem is not only a coastal concern and solutions will not be forthcoming from municipal efforts alone. New county, state and federal groupings are needed, including larger disposal dis-

tricts and research and demonstration projects sponsored by higher levels of government. As an example, the Connecticut Resources Recovery Authority expects to build and operate regional solid waste disposal plants and sell recoverable resources. The objective is to reduce solid waste to a 10 percent residue, thus reducing the demand for landfill.

SLUDGE AND DREDGING SPOILS

The disposal of polluted materials in Long Island Sound and in the New York Bight has recently come under close scrutiny for its effects on marine life, especially shellfish. There are two main sources for such polluted material: sewage sludge, expected to increase 1½ times by 1990 and dredging spoils, often heavily polluted.

The Marine Protection, Research, and Sanctuaries Act forbids ocean dumping without permits from whichever of the several federal agencies that have jurisdiction over the particular material being dumped. Permission for interim continuation of dumping in certain situations requires special justification. In 1974, research began on the effects and management of dumping in the New York Bight. An atlas of the bight-related areas is being prepared by the New York Sea Grant Office. A marine ecosystem analysis is going forward under the National Oceanic and Atmospheric Administration, and the U.S. Environmental Protection Agency is sponsoring the design of an information network for the waterbody. The Act envisions five years as the period in which the problems would be cleared up.

The Long Island Sound Study has tentatively recommended immediate feasibility studies on the use of solid waste and dredge spoils to build artificial islands in the sound for recreation and other purposes.

8. LAND DEVELOPMENT IN THE COASTAL ZONE

ZONAL COMPETITION

Although competition among various activities for coastal zone land can be said to be intense, such competition is notably irregular. Demands surge and decline through the decades. Environmental degradation may dampen demands. Changes in ownership are usually slow. Need for ratables may encourage certain demands. Speculation delays site availability and distorts the competitive scene.

These flaws make management complicated, but even more crucial. Management can foresee demands, offer adjudicating principles and give continuity to useful strategies.

In addition to the coastal functions described in the preceding chapters, there are other uses not dependent on a coastal location. The leading example, of course, is housing. No one denies that shorefront housing can be very desirable. But coastal location is not essential. Furthermore, housing can be close to the water and still permit coast-dependent uses along the shore. Among economic uses, the coastal zone supports miscellaneous commercial and industrial activities no longer dependent, if they ever were, on the water.

One of the purposes of coastal zone management will be to define, in a careful but workable way, activities that are acceptable in the zone, in which forms and at which times. A rating system derived from systematic analysis of existing and potential uses could be invaluable in preparing the definitions. The accompanying descriptors could be adapted for such a system.

ESTIMATES OF COASTAL LAND NEEDS

The results of the coastal land survey indicate that activities considered eligible for coastal location are likely to have the additional land they will need. Discussion of specific activities suggests a basis for this conclusion.

Shipping. Needs no additional shoreline, but probably more upland and more roads. These can come mainly through the redevelopment of outdated shipping installations. No net land expansion is foreseen, although some shifting of location will be desirable.

Power Generation. The land needed for a dozen or so power plants is probably available from the zone's stock of vacant land. Were it not for air pollution and nuclear hazards, all of the Region's additional electricity needs could be generated on vacant or redeveloped land in the harbor subzone alone. Thermal pollution, as well as the two other impacts mentioned above, are limitations elsewhere, but the land is available.

Extraction. The need for sand, gravel and stone quarrying near coastal waters could be calculated and the quantity of land to be affected could be obtained. Special studies in some areas—Long Island, for instance—indicated the location of suitable reserves. Regulations for extraction and restoration methods are, of course, necessary. Proposed federal surface mining legislation could be applicable. But again, the *quantity* of land is probably not the issue.

Recreation. As unique recreational lands, all natural beaches should be assigned for recreational use. For other water-oriented recreation activities, long-range demand studies are not useful for coastal zone planning. It would be possible, for instance, to assess how many new boating facilities might be needed within ten years in each of the subzones. But again, the amount of land is not critical in planning for specific recreational activities. Rather, it is access on the one hand and environmental tolerance on the other that should determine the choice among naturally suitable areas and the quantity of development to be placed there.

Agriculture. Efforts to preserve existing farmlands and related land uses should be made, but expansion of such uses is unlikely.

Sewage Treatment Plants. It is estimated that 1,300 more acres will be needed for added sewage-treatment capacity. If detention basins for storm inflows are programmed, still more acreage will be needed. Obviously, vacant or changing land will not be usable everywhere. Since such installations have specific site requirements, a search for suitable areas would be a coastal zone management task.

BALANCING COAST-DEPENDENT ACTIVITIES

The land-use survey of the study area has shown that coastal land has been particularly desirable. But only specific segments will show coast-dependent concentrations—several of the Harbor segments, for instance, or the Atlantic oceanfront beaches.

At the beginning of this chapter, we suggested that the irregular competition at work in the coastal zone requires that management control be exerted not only through project reviews and outlines on maps; goals and locational criteria will also be essential. The following are suggested:

Guard Environmental Resources. Only carefully measured amounts of compatible activity, such as boating activity in viable marshland, wetland and adjacent waters, should be certified. There should be no attempt to compare the costs and benefits of such conservation, since environmental values (food-chain wetlands, for instance) cannot be priced. Under this principle, entirely new nonpolluting techniques will be needed to solve persistent problems, such as dumping polluted dredge spoils or sewage sludge.

Restore Environmental Resources. Related to the above principle is restoring environmental resources. This expensive objective will be feasible only when costs are considered bearable. A sewage-treatment plant costing $800 million to render the lower Hudson River suitable for finfish habitat is not justified under any circumstances, but it is required under a federal law.

Designate Shorefront Areas. For the several important types of facilities that need a water-oriented location, certain parts of the coastal zone will serve their needs relatively well. Among these types are shipping facilities, power generating plants, and sewage treatment plants. The preceding chapters have delineated the locational needs of these activities. These needs could serve as a guide in selecting and designating locations.

Increase Leisure Use of the Shore and Water. Besides adding public open space, multipurpose development offers the best chance for leisure space increments. Some power plants already offer recreation and aquaculture. Shipping facilities and marine terminals, with adequate safeguards, can accommodate ex-

DESCRIPTORS FOR COASTAL ZONE USES

Use	Usual Jurisdiction	Impact on Regional Growth	Pattern	Effect on Ecosystems	Form	Relation to Other Uses	Problems with Environment Occurrence	Problems with Environment Weight	Water Use
Misc. shelter & economic activity	Usually private	Equal	Clustered or intermittent	Irreversible	Combinable	Pre-emptive	Intermittent	Moderate	Nonessential
Shipping	Mixed	Equal	Clustered	Irreversible	Exclusive	Pre-emptive	Intermittent	Moderate	Essential
Liquid waste disposal	Public	Heavier	Intermittent	Reversible with difficulty	Combinable	Tolerant	Frequent	Severe	Essential for effluent
Solid waste disposal	Public	Heavier	Intermittent	Reversible with difficulty	Combinable	Tolerant	Pervasive	Severe	Not eventually essential
Highways	Public	Equal	Linear	Irreversible	Partially combinable	Pre-emptive	Pervasive	Severe	Nonessential
Rail	Mixed	Declining	Linear	Irreversible	Exclusive	Pre-emptive	Pervasive	Moderate	Desirable for grade
Fishing	Mixed	Heavier	Intermittent	Reversible	Combinable	Tolerant	Intermittent	Light	Essential
Swimming	Mixed	Heavier	Linear or intermittent	Reversible	Combinable	Tolerant	Intermittent	Light	Essential
Boating	Mixed	Heavier	Intermittent	Reversible	Combinable	Tolerant	Intermittent	Moderate	Essential
Nature study	Mixed	Heavier	Nature-related	Benign	Combinable	Recessive	–	–	Essential
Wildlife habitat	Public	Heavier	Nature-related	Benign	Partially combinable	Recessive	–	–	Essential
Flood and storm absorption	Mixed	Heavier	Nature-related	Benign	Partially combinable	Recessive	–	–	Natural
Ecosystems	Mixed	Heavier	Nature-related	–	Partially combinable	Recessive	–	–	Natural
Scenic values	Mixed	Heavier	Intermittent	–	Combinable	Recessive	–	–	Essential

CONFLICTS IN COASTAL AREAS

LEGEND

- • Occurrence infrequent or scattered. Usually susceptible to local control or design solutions.
- ● Chronic or emergent serious problem. New measures needed for solution.
- ● *Immediate action needed to prevent further injury or malfunction.*

	MISC. SHELTER & ECONOMIC ACTIVITY	SHIPPING	LIQUID-WASTE DISPOSAL	SOLID-WASTE DISPOSAL	HIGHWAYS	RAIL	FISHING	SWIMMING	BOATING	NATURE STUDY	WILDLIFE HABITAT	FLOOD AND STORM ABSORPTION	ECOSYSTEMS	SCENIC VALUES	REMARKS
MISC. SHELTER & ECONOMIC ACTIVITY		●			•			•	●	●	●	●	●	●	
SHIPPING				●	•				•					•	Pollution effects not included.
LIQUID-WASTE DISPOSAL							●	●	•	●	●		●	•	
SOLID-WASTE DISPOSAL							●	●	●	●	●	●	●	●	Sanitary landfills on wetlands; debris; sludge.
HIGHWAYS									•		●		●	●	
RAIL								•	•						No new lines contemplated.
FISHING								•	•				•		
SWIMMING									•		•				
BOATING											●		●		Marinas, channels and auto parking are problems.
NATURE STUDY											●				
WILDLIFE HABITAT															
FLOOD AND STORM ABSORPTION															
ECOSYSTEMS															
SCENIC VALUES															

cursion boats on weekends or offer outlooks, eateries and industry exhibits. So far, most creative multipurpose design has been suppressed by our traditional zeal for splendid but single-purpose facilities.

Trade for Amenities. This principle would allow "foreign" uses only when dividends are received and no coast-dependent uses are deprived. Miscellaneous shelter and economic uses not needing coastal *location* could probably be allowed where resource land is in good supply and the development will provide amenities and human accessibility to the water. Housing can contribute landscaping, public areas, entertainment space and boating opportunities. Commercial areas or other developments can have terraces, restaurants or aquatic funspots. On the negative side, canal housing is a householder's paradise but a coastal zone disaster. At the very least, a buffer zone can be required between residences and the water.

Time-honored riparian legalism—public ownership of land between the mean high-tide and the mean low-tide lines—means almost nothing in planning for coastal zone use and integrity (except possibly where extensive filling has occurred within such an area). More useful legal delineations of public rights are needed.

SOME DEVELOPMENT ISSUES

As urbanization with its industrial activity and year-round housing increases in Suffolk, Monmouth and Ocean counties, the future of summer cottage areas becomes an issue. Will they be replaced by year-round housing, and if so, at what density?

Another paramount beachfront issue is the future of nongovernment holdings. These consist of:

- private properties, mainly residential, held by single owners. Many of these are summer rental holdings. Some are under speculation.
- club ownership for beach, clubhouse and sometimes golf uses—usually not open to general public.

Measures should be devised to assure that these areas are not subjected to improper redevelopment without reserving suitable amounts of space for recreation compatible with natural systems.

Another issue in this regard is the rights of owners of waterfront, particularly oceanfront, land. Ideally, all shores should have been reserved to government, but shoreline regulation, as in New Jersey's Coastal Area Facility Review Act, may be an adequate solution to this management problem.

9. MANAGING THE COASTAL ZONE

Management, in some contexts, recently replaced planning as the route to rational apportionment and distribution of resources. Some prefer this term because it underscores the need for *implementation* of plans. The Coastal Zone Management Act of 1972 requires, for administrative continuance grants, that an agency or agencies with declared powers be designated by states. These powers (Sec. 306d) are

- to administer land- and water-use regulations, control development in order to insure compliance with the management program and resolve conflicts among competing uses; and
- to acquire fee simple and less than fee simple interests in lands, waters and other property through condemnation or other means when necessary to achieve conformance with the management program.

To embody these requirements, states can choose among three general types.

1. A new agency or agencies. This response would contribute to the proliferation of powers unless drastic reassignments of duties and powers from other agencies could take place. A new agency, however, could perhaps more easily be provided with the interjurisdictional development, redevelopment and fiscal powers not vested in any existing agency.
2. An existing agency with greatly broadened scope. This response would permit the use of an ongoing structure and its experience and expertise. However, the traditional interests of any existing agency may influence its future activities as well as delay the formation of an objective image.
3. A coordinating agency with "teeth," either a new or an expanded existing one. This approach could enlist expertise from all agencies, operate across functional lines with a minimum of disruption of existing government structures and provide a forum for the interchange of ideas.

The New Jersey Coastal Area Facility Review Act (Ch. 185, Public Laws of 1973) appears to have adopted the second alternative. The state commissioner of environmental protection will have the power to reject or approve proposed facilities within the scope of the law, and the department is required to draw up a master plan and final environmental design for the coastal zone within four years.

California has chosen the new agency type. Its Coastal Zone Conservation Act of 1972 (adopted by popular referendum after the state senate proved unwilling to approve it) sets up a state-level commission and six regional commissions. These seven commissions range in size from 12 to 16 members, half of whom are locally elected officials and half public members appointed by state bodies. No commissioners are members of special agencies or interest groups and there are strong conflict-of-interest curbs. These commissions exercise permit controls and formulate and adopt plans.

North Carolina has established a new body, the coastal resources commission, but within the existing department of natural and economic resources. Nine of the members will be chosen by the governor to represent stated interests. A coastal resources advisory council consists of *ex-officio* members: officials of the state, the multicounty planning districts, counties and municipalities.

In its draft recommendations, the Long Island Sound Study proposes state coastal zone management boards with authority to approve or disapprove all proposed development within 500 feet of the water's edge. The boards would require shoreline communities to develop land-use plans consistent with approved standards and guidelines. Proposals of regional significance could be vetoed by the boards, but towns could override by a two-thirds vote. It is put forth as a way to reconcile local land-use determination with regional perspectives.

CURRENT STATE ACTIVITIES

All three member states of the Tri-State Regional Planning Commission are actively engaged in coastal-management program development utilizing federal grants available for this purpose. The content of the respective work programs is generally similar. Variations are most noticeable among the structures they expect to assemble for carrying out the studies. The Coastal Zone Management Act includes a provision (Sec. 305g) permitting states to allocate a portion of the grants to local governments or to areawide, regional or interstate agencies.

New York. The Governor has designated the

office of planning services as the agency responsible for developing the management program. This agency proposes to ask local, county, regional and other state agencies to perform relevant tasks. It will also hold workshop sessions and seek review and comment on draft portions of the program. A citizen advisory committee will function in each of the state's two coastal areas (maritime and Great Lakes).

New Jersey. The department of environmental protection is responsible for administering the Coastal Area Facility Review Act and for making a master plan for coastal areas. Within that department, the division of marine resources will direct the studies, and is now building a coordination structure.

Connecticut. The department of environmental protection has been designated to receive and administer grants. A technical unit within the department receives policy guidance from a board made up of state agency heads and coastal regional planning agency representatives. The planning work will rely strongly upon existing plans, notably the state's proposed plan of conservation and development and the New England River Basins Commission's Long Island Sound Regional Study.

Long Island Sound. Begun in 1972, the Long Island Sound Regional Study of the New England River Basins Commission is probably the first comprehensive, large-scale, coastal zone study in the nation.[1] Participants numbered over 200, representing federal, state, interstate and local officials, planners, scientists and citizens. Due in early 1975, its final recommendations are expected to form a major source of the coastal zone management programs of New York and Connecticut. Emerging findings strongly support the objectives, criteria and strategies of this interim guide and many of the draft recommendations have been included in this text.

Among results were definitive planning studies on Long Island Sound as follows:

Water Quality & Water Supply
Erosion & Sedimentation
Flood Damage Reduction
Land Use
Fish & Wildlife
Minerals
Power & the Environment
Marine Transportation
Recreation
Shoreline Appearance & Design
Socio-economic Perspective
Legal and Institutional
Goals for the Region
Public Workshop Reports

New York City. New York City is conducting public workshops on its portions of the coastal zone. *The New York City Waterfront*, a detailed reconnaissance report with a list of policy options, was issued in July 1974 to serve as a basis for discussion.

Others. The coastal zone task force of the New York State Sea Grant Office sponsors studies on such subjects as the efficacy of existing legislation, enforcement of water quality regulations, environmental decision making and economic impacts of water pollution.

The U.S. Department of Housing and Urban Development has contracted with the Nassau-Suffolk Regional Planning Board to demonstrate how coastal zone planning and management can be integrated with comprehensive area-wide planning.

The Marine Resources Council of the Nassau-Suffolk Regional Planning Board conducts research on Long Island coastal aspects such as water quality, dredging, dumping and fisheries. The council also deals with survey and management techniques.

COASTAL FUNCTIONS AND EXISTING CONTROLS

In evolving efficient management mechanisms, it may be helpful to examine the present scattered picture. The coastal zone, like other sensitive sectors of our geography, is under a variety of controls that are inadequate for two reasons.

1. They are imperfectly related among themselves, although "environmental impact statements" have recently brought a degree of coordination between development and environment.
2. They are not focused on the goal of harmonizing our continued use of coastal resources with the stability and renewal of these resources.

These two points, of course, actually blend into one: Controls are improperly related because combining coastal uses with resource continuance and renewal has not been the guiding aim. Thus, we need a management mechanism that transcends the present unifunctional agencies, commissions and permit-issuing offices while fusing land-use and environmental problems into a single, interrelated concern.

It is fitting that the states are ultimately responsible for the proper management of the coastal zone. The management structures to be invented in the next several years by New York and Connecticut and the possible revisions of the CAFRA mechanisms in New Jersey should coordinate forces and bureaucratic traditions. Beyond the wide responsibilities of the states, the existing scene includes many participants con-

[1] Contact at 230 Orange Street, New Haven, Connecticut 06511.

GOVERNMENTAL CONTROL OF COASTAL ACTIVITIES

	LOCAL	COUNTY	STATE	FEDERAL
Natural processes and ecosystems		X	X	X
Leisure and scenic	X	X	X	X
Waste disposal	X	X	Aid	Aid
Shipping and fuel, including navigation			X	X
Power generation			X	X
Other development	X	X		
Flood and storm protection			X	X

cerned with management mechanisms. A brief list may help to make this concern more specific.

Federal. More than 50 federal agencies have interests in the coastal zone. But the activities and programs having direct effects are performed by four: the departments of interior, commerce, and transportation and the Army Corps of Engineers. Both ownership and regulatory roles are frequent.

Interstate. In the Region, four interstate agencies also have major coastal zone roles: The Port Authority of New York and New Jersey, the Interstate Sanitation Commission, the Tri-State Regional Planning Commission and, for the Long Island Sound subzone, the New England River Basins Commission.

Local and Private. A great deal of regulation is performed at the local level, where much building, digging, dredging and filling is programmed and approved. Action comes mainly from private interests, which enjoy extensive powers through ordinary property rights.

As set forth earlier in this report, the coastal zone contains a complex of significant and essential activities.

- Natural processes and ecosystems.
- Recreation and enjoyment of nature and scenery.
- Waste disposal, with attendant problems of water pollution, past uncontrolled landfill and dumping.
- Shipping and fuel receipt, including terminal facilities and channel dredging.
- Power generation.
- Land development and redevelopment.
- Flood and storm protection.

Relating the four levels of control–local, county, state and federal–to each of the functions brings a measure of insight. A multilevel pattern is revealed for almost every function. This in itself can be a criterion in the design of a management structure for the coastal zone.

ENVIRONMENT AND PEOPLE

During both the planmaking and the later administrative phase of the coastal zone management, the following will be expected:

- Specification of the environmental impacts of recommendations. Environment considerations are, of course, a main focus of the activity, and such matters should be built into the studies.
- Analysis of the social impacts, particularly as recommendations affect the housing, employment and recreation for low-income and low-mobility groups.
- Finally, as a means of obtaining broad public support of recommendations, citizens panels could be established to monitor and review interim findings. The panels could be newly organized, or coastal zone management could call on existing citizen groups sponsored by participating agencies. If the latter course is accepted, the experience of the Long Island Sound Study, which adopted the first alternative, should be instructive. This study used two advisory groups–citizens and scientists–and held meetings in each of the nine districts of the study area to encourage open public comment.

COASTAL ZONE
INFORMATION CENTER

This document is in part a condensation of other reports produced before or during the coastal zone study, as follows:

Studies and Reports Relevant to the Tri-State Coastal Zone Project. October 1970 and Supplement 1, March 1971.

The Tri-State Region's Fuel Needs in 1990. February 1972.

Containership Traffic, Facilities, and Practices in the Tri-State Region and Competing Ports. July 1970.

The Changing Harborfront, a Report of Prospects for New Development of Released Lands. March 1966.

Recreation Measures for the Coastal Zone Study. September 1971.

Survey of Waterborne Container Traffic at the Port of New York. August 1971.

Meeting the Region's Growing Demand for Electric Power. October 1971.

Management Strategies for Tri-State's Coastal Zone. January 1972.

Land and Investment Requirements for Containerports at the Port of New York to 1990. October 1971.

Planning Recreation in the Coastal Zone. June 1972.

Land-Use Area Measurements by Remote Sensing. June 1974.

Sources of specific information, either Tri-State studies or the many other reports examined, are available upon request.

Land-use maps (1" = 2000') of the coastal strip and land-use data printouts, using categories evolved especially for coastal uses, are available from the Tri-State Regional Planning Commission. They are summarized by segment, by county or Connecticut planning region, and by coastal subzone. The maps and data are compatible with other Tri-State reports, plans and data files for the Region as a whole.

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