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Tri-state Transport. Co.

Managing The Natural Environment (CT, NJ, NY)

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MANAGING THE NATURAL ENVIRONMENT

a regional plan for water, sewage, air and refuse

Tri - State Transportation Commission

MARCH 1970

CONNECTICUT • NEW JERSEY • NEW YORK

MANAGING THE NATURAL ENVIRONMENT

a regional plan for water, sewage, air and refuse

Photo Credit: New York State Department of Commerce

TRI-STATE TRANSPORTATION COMMISSION

The Tri-State Transportation Commission, an interstate planning agency, defines and seeks solutions to immediate and long-range transportation, land-use and comprehensive planning problems of the New York metropolitan region covering 22 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 1965, the Commission succeeds the Tri-State Transportation Committee formed by the governors of these states in 1961.

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 planning and mass transportation 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.

The Commission Members Are:

Charles J. Urstadt, Chairman, *Commissioner, Division of Housing and Community Renewal, State of New York*
Frank M. Reinhold, Vice-Chairman, *Chairman, Connecticut Transportation Authority*
Donald H. Elliott, Secretary, *Chairman, New York City Planning Commission*
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TRI-STATE TRANSPORTATION COMMISSION
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CONNECTICUT

NEW JERSEY

NEW YORK

TRI-STATE TRANSPORTATION COMMISSION

100 CHURCH STREET NEW YORK, N.Y. 10007 ● TELEPHONE 433-4200 AREA CODE 212

Honorable John N. Dempsey, Governor of Connecticut
Honorable William T. Cahill, Governor of New Jersey
Honorable Nelson A. Rockefeller, Governor of New York

Your Excellencies:

I have the honor to transmit the report entitled *Managing the Natural Environment.*

This report is concerned with the pollution of air and water, with the search for enlarged water supplies and with the accelerating problems of solid-waste disposal. This provides a look at the status and the needs of "regional housekeeping" both now and in the future.

We find that in spite of heroic efforts in the clean-waters programs, and in new and stronger enforcement on the part of the three states, there is still a huge task ahead if we are to reverse the accumulated pollution we have today and also deal with ever-growing waste volumes.

Specifically, this report recommends that:

1. The states accept responsibility for assuring water supplies consistent with present and future needs, and that such a program be self-supporting.

2. Existing plans for enlarged and improved sewage treatment be accelerated, and that federal assistance sufficient to match 55 percent of construction costs be available.

3. State leadership establish a regional pattern of solid-waste disposal. Whereas collection can be local, the problem of disposal is a regional one and is becoming more critical each day.

4. There be a regional monitoring system to evaluate air and water pollutants, and there be established a uniform detection and enforcement system for all of the Region's points of discharge including uniform vehicle-emission standards and inspection for autos and trucks.

We have had the utmost cooperation from state and federal agencies in carrying out this study. We believe the level of regional housekeeping can be raised to the point where existing pollution is rolled back and this Region will thereby become a cleaner and healthier place, even though it gains some 4 million more residents in the next 15 years.

Respectfully,

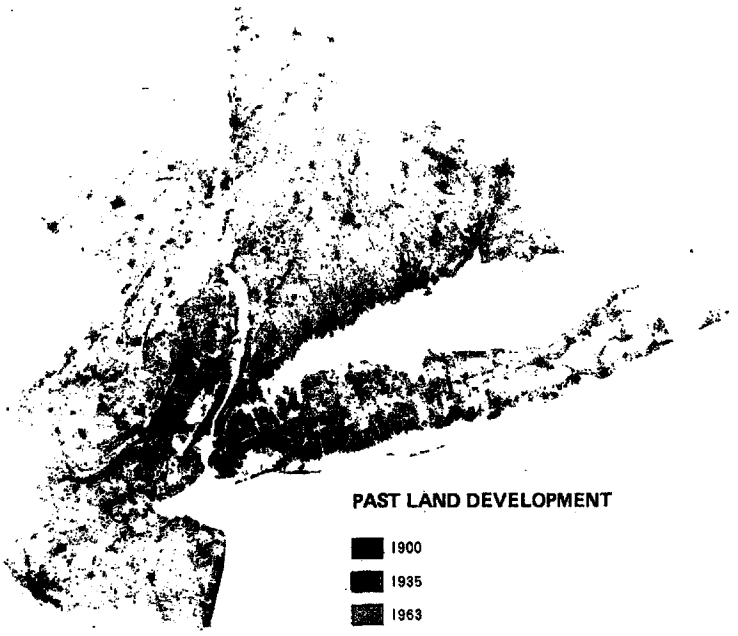
Charles J. Urstadt, Chairman

200 YEARS OF GROWTH

As an absolute essential, people must have food, water and heat to stay alive. Beyond that they need engines to be productive and mobile. Over the decades public consumption of food, water, heat and power has steadily risen with income and prosperity, until today the nation is faced with huge demands for supplying public wants and disposing of left-over waste. The Tri-State Region feels the problems of this growth more than most other regions due to its very large population and its very intensive use of the land.

Natural resources that were once clean and plentiful are becoming polluted and scarce. The problems of pollution have been increasing geometrically. A small population can use the streams, land and air without creating danger for others. Today, however, with more than 19 million people and our history of somewhat prodigal use of our environment, we must take concerted actions to manage our behavior and conserve our resources.

1800 THE PAST 1963



Land Development. What is now the Tri-State Region had 6 million inhabitants in 1900. Development had spread out from New York harbor along rail lines as they were constructed. But daily transport by horse-drawn vehicles required a close arrangement of workplaces and homes. Factories and steamships were intensifying commerce at the harborfront.

By 1935, the population was 13 million, still located along the rail lines and around the city centers of the Nineteenth Century. Motor mass transit allowed most people to live outside central business districts yet work and shop there. Sites along transit lines were soon filled with residences.

From 1935 to 1963 the Region's population increased more slowly – to 18 million – due to 15 years of depression and war. But with resumption of housing construction and the advent of widespread automobile ownership, residences and businesses spread out over formerly inaccessible land between railroad lines.

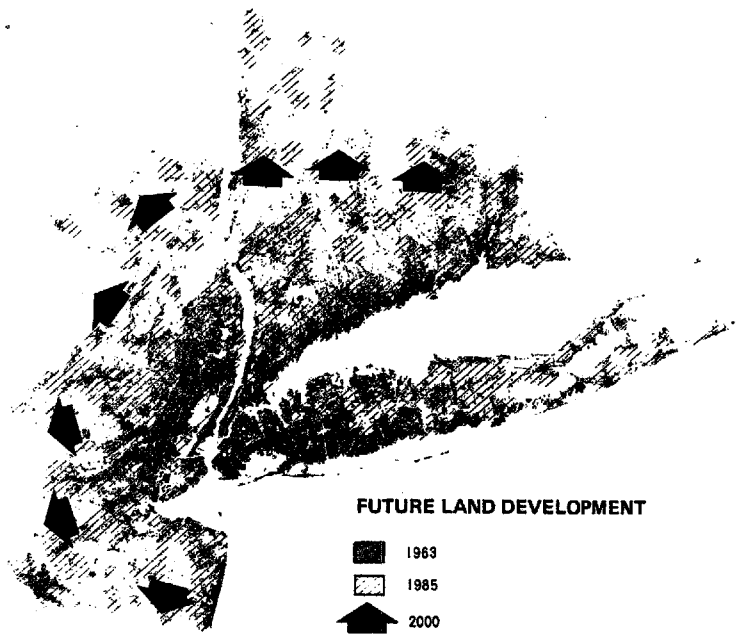
Water Supply. As urbanization began to outstrip the yield of drinking water from local wells, cities responded by reaching farther away for new supplies, a policy that generally still holds. By 1840 New York City was developing reservoirs along the Croton River in Westchester, and by 1890 Newark had tapped the Pequannock in outer Passaic County. By 1935 New York City had reached 50 miles beyond the Croton to the Catskills, while remote reservoirs were developed to serve Bridgeport, New Haven, Jersey City and Hackensack. Later, increased water volumes had to be found at distant locations like Round Valley/Spruce Run in New Jersey and the Upper Delaware in New York.

Sewers. The first public sewers to replace private cesspools were designed to carry both human waste and rain water into adjacent waterways without treatment. To this day "combined" sewers are prevalent in the older cities. Early in the 1900's primary treatment was instituted, with the further necessity that sanitary sewers be built separate from storm sewers to minimize the expensive treatment process. By the 1960's nearly 85 percent of the Region's sewers were connected to treatment plants, many giving secondary treatment. But new development advanced so rapidly in some communities that they were built without public sewers, leaving a municipal plumbing problem for the future.

Air Pollution. Smoke and soot became common in city air during the 19th century as soft coal-burning engines for factories and railroads multiplied. After the turn of the century air in the cities was still affected by wholesale use of coal, but the introduction of electricity for light and power shifted some coal burning to the generating station. When automobiles became the predominant means of travel, their exhaust became the heaviest component of air pollution. During the same period most buildings converted from coal heat to oil heat, producing a marked reduction in air pollution per dwelling.

Refuse. Open land was close enough at hand in the 1800's to make organized procedures unnecessary for removal of garbage and rubbish. It was simply carted beyond the built-up areas and dumped. By 1900 the extent and density of urban development pushed the open country beyond the reach of many neighborhoods and industrial districts for easy disposal of garbage and junk. Municipalities then provided dumping grounds, even collection service. New York City was dumping garbage at sea. Burning was the next solution, first at open dumps, then at incinerators. By the 1960's open burning was banned, as adjacent sites were used for homes.

1985 THE FUTURE 2000



Land Development. By 1985 the developed region is expected to grow in population from 18 million to 23 million and in land coverage from 3000 to 5000 square miles. Major new development is planned at points of easy transportation access, with the mountains reserved in more natural condition. If this pattern of spaced-out development is achieved, a better balance of development and environmental quality can be attained. Still, problems of waste and water will require more public management.

Population is predicted to reach 27 million by the year 2000. By that distant time new influences may be altering the Region's size and shape – perhaps a national settlement policy diverting metropolitan growth to new cities, perhaps communication and transportation efficient enough to enable many people to live year-round at distant mountains and seashores. A distinct improvement of urban living is desirable and possible, but it is probably too early to be specific.

Water Supply. Rising incomes will bring extensive use of washing machines, lawn sprinklers, car washes and swimming pools. With population increasing and water consumption increasing even faster than population, nearly half again the amount of water used in 1963 will be needed by 1985. Giant new tappings of the Hudson and Delaware rivers are planned to meet these needs. However, in the year 2000, it may be necessary to adopt more radical ideas. If government boundaries were disregarded we could supply most new water to the Region from the Hudson Basin alone. If costs can be reduced, processed seawater might be the answer. If psychological inhibitions can be overcome, water needs could be met by recycling sewer water.

Sewers. The first order of regional priorities is to service those communities that were built without sewers, then to keep pace with new development as it occurs. At the same time, an expensive modernization program is needed to reduce pollution from outmoded sewage treatment plants. In the next century it may be possible to do away with sewers, if waste water can be purified and recycled within each building. Short of this, higher standards of sewage treatment and advanced technologies will be needed to protect our waterways for recreation purposes.

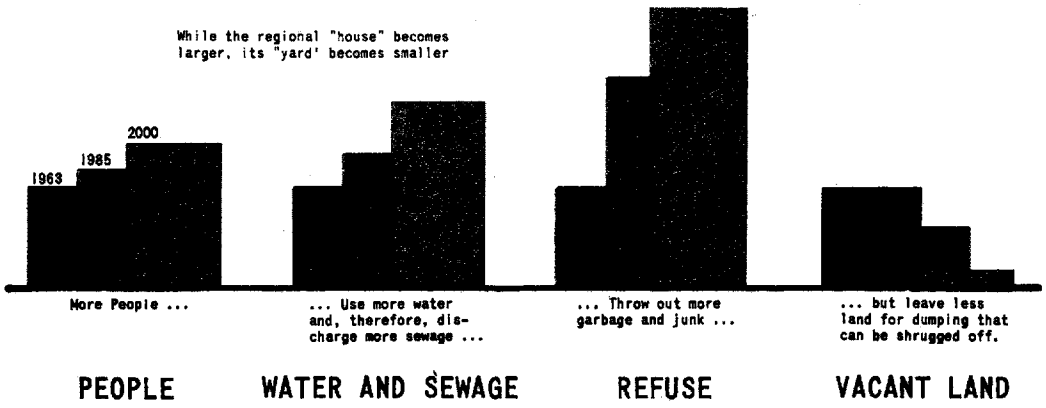
Air Pollution. By 1985 automobiles will be equipped with pollution-control devices. New electric generating stations will be driven by nuclear fuel and natural gas. But whether these advances will be sufficient to improve present air quality is questionable. Further efforts will be needed to offset the normal pollution increase caused by population growth. Gasoline-powered automobiles may be obsolete by the year 2000, supplanted by steam power or electric power. Nuclear energy may be the fuel for all electric power generation, thereby reducing stack exhausts. Conversely, heating of the air (the greenhouse effect) may become the foremost problem.

Refuse. Existing facilities are clearly inadequate to handle a doubling of waste material by 1985. At the minimum, New York City and other central cities must build large, pollution-free incinerators. The suburbs must also turn to incinerators where sanitary landfills are not possible. Technological innovations are likely to change methods of solid-waste disposal by the year 2000. Conventional incinerators will probably be replaced by garbage "blast furnaces." Burning of any kind could be replaced by compaction or recycling of waste products. In any case, service will have to be "regionalized" across municipal boundaries.

It is apparent that environmental pollution is related to the type and density of land development, and that land development is dependent upon population growth, the type of transport and the nature of the economy.

It is equally clear that more people and greater affluence will tend to increase the wastes discharged into the land, air and water of this Region. This will be an increasingly greater public concern. New technologies will be developed and, hopefully, these plus care will prevent further unhealthy pollution of our environment.

For the next few years public concern must bring about governmental responses to overcome the obvious problems that are with us today. This report considers water supply, sewage treatment, control of air pollution and solid-waste disposal. In each of these four aspects of resource management the Commission recommends a strategy for correcting past deficiencies, meeting future problems and doing this in a systematic way within our financial and technical capabilities.



WATER

Water-Supply Goals

This Region must have ever larger and larger volumes of drinkable water to keep itself alive and functioning. There is no choice. If water-supply development ceases, regional growth will stop. The restrictions and emergency measures that were necessary to deal with the drought in 1965 illustrate the dangers and costs of falling behind in this sphere of regional planning.

The Region's water-supply goals may be stated this way:

- Provide sufficient water and improved delivery systems to meet the present and future demands of all developed portions of the Region as they grow, at the most economical cost.
- Prevent waste of collectible fresh water, which is, in the long run, an exhaustible resource. Ground-water sources can only be mined to their capacities, and suitable sites for reservoirs are limited, as is the amount of stream flow.
- Improve the quality of the water delivered to homes and establishments in the Region, as a public health measure and to meet common standards of "good" water.

Necessity for Public Action is Clear

Supplying and distributing water is primarily a public responsibility, although private companies play an important role. About 70 percent of the Region's drinkable water is supplied by municipal systems and 24 percent by investor-owned utilities. Individual wells supply merely 6 percent of total consumption. With local sources, private and municipal, now being tapped to virtually their full potential, the government role is bound to increase.

The Tri-State Region's demand for potable water is expected to increase by 45 percent to 1985 and 90 percent to the year 2000. This will be caused not only by the growth in population but by a continuing rise in personal water use, especially within the household, due to the increasing affluence of society.

Forecast of Water Demand

	1965	1985	2000
Total population.....	18,400,000	23,200,000	27,400,000
Population served.....	17,200,000 (94%)	22,000,000 (95%)	26,300,000 (96%)
	Water Volumes in Gallons per Day		
Per capita daily consumption.	140	160	175
Total daily volume.....	2,450,000,000	3,500,000,000	4,600,000,000
Current yield of systems.....	2,900,000,000	2,900,000,000	2,900,000,000
Surplus or deficit.....	+450,000,000 (+18%)	-600,000,000 (-17%)	-1,700,000,000 (-37%)

On a minimum safe-yield basis, which assumes severe drought conditions, the Region now has a surplus of 450 million gallons per day. By 1985 that surplus will become a deficit of 600 million gallons, which will build up to 1.7 billion gallons by 2000, if nothing is done by that time. Also, the present surplus is more apparent than real. There are several areas of water shortage within the Region, and the system lacks sufficient ability to transfer water from areas of surplus to areas of shortage.

Clearly this huge, growing demand, with the demonstrated possibility of water shortages, means that public action is essential to guarantee a doubling of regional water supplies by the year 2000. The only real question is how to bring this about.

Many Possible Sources for Additional Water

This part of the country is abundant in rainfall. The Region has access to several very large rivers, bays and the ocean itself. There is plenty of water all around us, but it must be collected and prepared for public use. Some of it is salty, much of it is dirty, some of it has already been claimed, and in some cases other regions also use the water resource.

Many options for supplying more water to the Region have been weighed for cost, practicality, public acceptance and ecological consequences. Based on current knowledge and technology, the preferred plan is to reach outside the settled area for fresh water in the upland basins of major rivers in each sector of the Region. Alternative plans have been rejected for the present, but further research and development could lead to reconsideration of one or more, such as the following:

- The yield of our current water-supply system could be

stretched somewhat through water conservation practices such as metering water at all points of usage, repair of leakages and regulation of indiscriminate usage. However, the amount that could be saved by these steps is not known, the cost of universal metering is quite high, and the enforcement of usage controls would be difficult and, in some cases, ineffective.

● Desalination is still quite expensive, and there is no real expectation of a major cost breakthrough in the near future. At present, it costs from 30 to 75 cents per 1000 gallons to remove the salt from seawater in a full-scale facility. In this Region water is collected, purified and delivered for a total cost of 25 cents per 1000 gallons. So far, full-scale desalination plants have only been established where water shortages are perennial. Moreover, delivery would require extensive pumping to move the water from sea level to the users.

● Purifying and recirculating sewage water might be economically practical in some parts of the Region. However, there is massive social opposition to this step, and as long as we can reach out for cheap water somewhere else, that will be the preferred course. If, over the years, importing water is found to have limits, then reuse of water already in the system is a very real possibility. Even now water is used more than once as it flows downstream in some river basins.

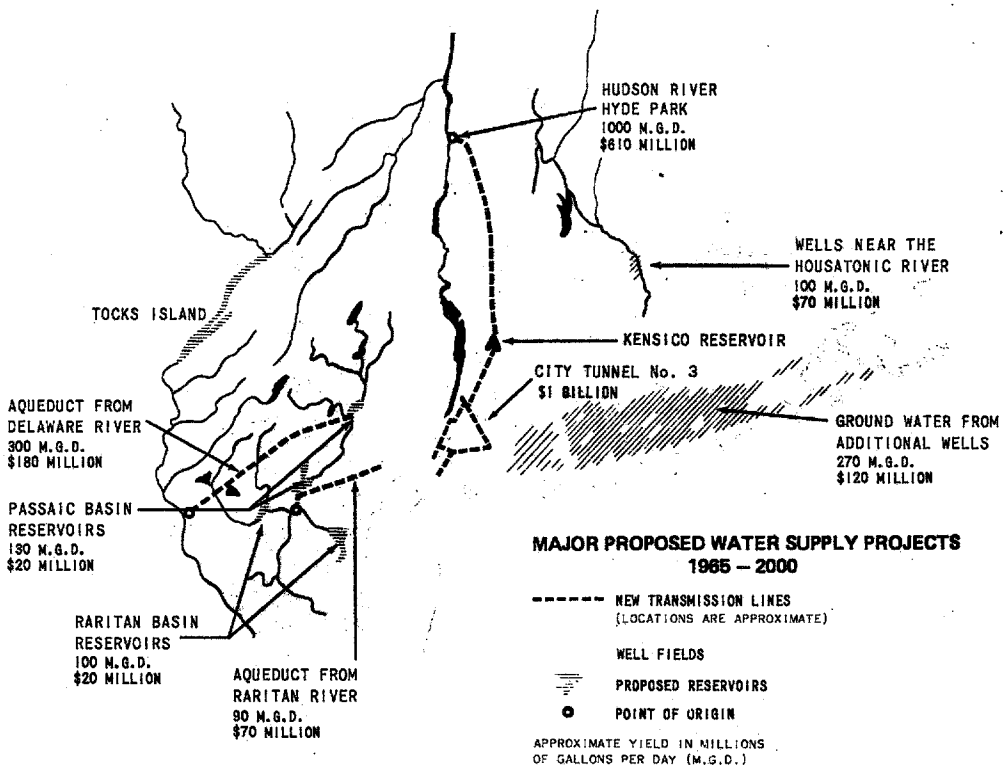
● It has been proposed to dam Long Island sound and turn it into a fresh-water lake. This is intriguing as a one-shot solution. However, (1) experience with smaller bodies of water indicates that it would take years to get the salt water out; (2) the Sound would be shut off to supertankers; (3) the effects on the Region's ecology and on recreational uses are unknown; (4) rivers emptying into the Sound carry many pollutants from upstream communities.

● A barrier dam across the Hudson has been proposed to hold back the intrusion of salt water. This would have effects on the shores and ecology and usage of the river that are currently unacceptable. However, if the rate of water usage increases well beyond our present forecasts, this may later prove to be economically feasible.

Major Proposals

The various water-resource agencies throughout the Region have proposed several large-scale projects that, in combination, would be sufficient to meet most of the Region's water-supply needs through the year 2000. Some of these projects are expected to be completed in the 1970's, others not until the 1990's. A few of them will serve recreational and conservation purposes as well as water needs.

For New York City and Adjacent Counties. The largest



project in the Region entails tapping the Hudson River at Hyde Park in Dutchess County and constructing an aqueduct southward to the Kensico Reservoir. This water would serve New York City's added needs and would also supplement local sources in Dutchess, Putnam, Westchester and Nassau counties. It also has the potential to serve adjacent areas in northeastern New Jersey, southwestern Connecticut, and other New York counties. In periods of low stream flow there would be a danger of salt water coming north to the intake. Reservoirs that would release water during such periods would be needed in the upper reaches of the Hudson River basin to compensate for the withdrawals at Hyde Park. Because such a system would affect many New York communities beyond the Region's limits, careful state planning will be required to coordinate competing interests before this engineering proposal can become a scheduled project.

For Long Island, use of ground water sources can be expanded, particularly in the eastern portion as urban development moves outward. However, protective measures, such as expanding sewer systems and recharging underground water supplies with rainwater and purified sewage effluent, must be extended.

New Jersey's northeasternmost counties now rely heavily on the Passaic and Hackensack river basins. Some increase in supply is available from the Passaic, but virtually none from the Hackensack. The major project for this part of New Jersey is to develop the now underutilized potential of the Raritan basin and also the mid-section of the Delaware River. These additional sources will allow transfer of water to the northeasternmost counties. At the same time these sources will provide for the needs of the rapidly growing central New Jersey area, where ground water supplies cannot be greatly expanded. The utilization of Delaware River water in large volumes will be possible after the forthcoming Tocks Island dam is constructed. Monmouth can meet future needs by tapping local river basins and ground water from New Jersey's coastal plain.

For Southwestern Connecticut, continued reliance on water resources in the Bridgeport and New Haven areas will cover most of the needs over the next two decades. The private companies in these places have substantial reserve capacity now, and they can further increase the use of these watersheds. As projected growth exceeds these capacities, wells near the Housatonic River and local ground water can be tapped. Beyond this it is possible to reach further out to the Connecticut River for additional water if necessary.

Other Projects and Improvements. In addition to these major water-supply-project proposals, these are many others of smaller scope, as well as plans for transmission lines and interconnections.

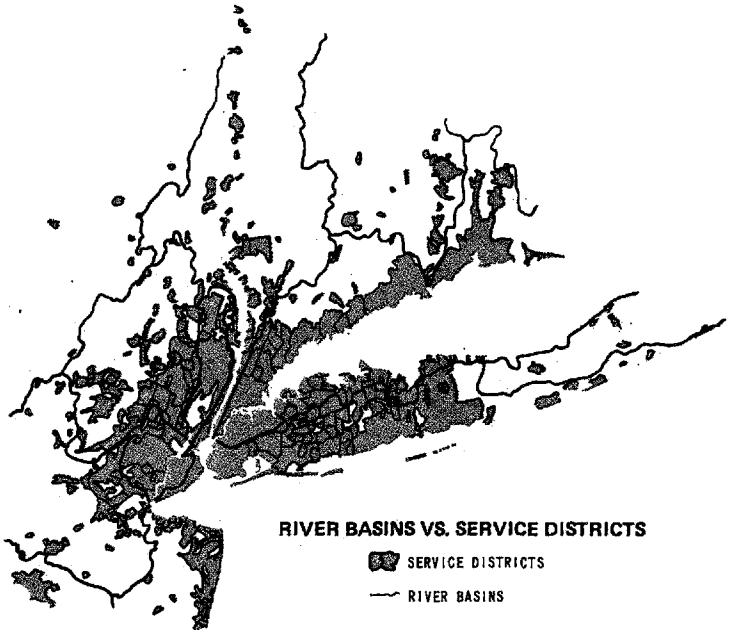
Long-Range Strategy

In sum, the future growth of the Region as a single urban unit can best be served by two major efforts:

- *Reach out to get fresh water where it is available or easily impounded. Collect and store water to meet future growth.*
- *Transfer existing water surpluses to areas of deficiency. The Region can strike a better balance among its internal units and savings can be achieved.*

The major projects described above, together with other projects more local in scope, constitute a unified water collection and delivery plan capable of achieving these aims. This plan will serve 23 million people expected in the Tri-State Region by 1985 and 27 million by the year 2000, earning higher average incomes, enjoying higher average standards of housing and transportation, and consuming more of almost everything, including water.

Over the years this and other alternatives should be constantly monitored to determine whether other means of serving the Region have become economically feasible and socially desirable.



Water should be distributed according to need among the hundreds of districts served by private companies and public agencies in order to equalize surplus and shortage from one district to another. To accomplish this, interconnections are recommended among the service districts and even between the much larger natural basins where water can be collected in quantity. The states are logical agents for the interconnections that cross town and county boundaries.

An Action Program for the Seventies

The Tri-State Commission believes that priority should be given to these transmission lines and interconnections during the next ten years:

- *Bring surplus Raritan water to Newark and other northeastern New Jersey communities. This would relieve shortages in the Passaic and Hackensack river basins.*
- *Bring surpluses from the Bridgeport area to the Stamford-Norwalk section of Connecticut, a potentially deficient section of the Region.*
- *Bring water from upstate sources through Bronx and Manhattan to central Queens and Nassau County, where present ground water supplies are inadequate.*

For new water supplies the following projects should have priority in the next decade:

- *Develop the first stage of the Hudson River project, with the intake at Hyde Park and the aqueduct to Kensico Reservoir, and establish compensating reservoirs in the upper basin.*
- *Acquire and develop additional reservoirs in the central Passaic and Raritan basins.*
- *Acquire sites and develop reservoirs in north-central New Jersey for storage of water from the mid-Delaware basin. Construct an aqueduct from the Delaware River to these storage reservoirs.*
- *Continue the development of ground water sources under Suffolk County for local use.*
- *Tap ground water near the Housatonic River at Shelton to serve the southwestern part of Connecticut.*

The Cost of Meeting Future Needs

To generate 1700 million more gallons per day of water, as needed by the year 2000, and to deliver it to the users will cost at least $3.2 billion. Some experts say much more than 1700 million gallons per day must be scheduled for development to cover the slow pace of reservoir construction and imperfect transfer of water to deficient areas—as much as 2600 million gallons per day. To do this would increase capital costs by $0.5 billion. Others say that since reservoirs are designed to furnish water even in very dry years, they produce more than enough in most years and public use of water can be curtailed in a drought year without endangering health.

The question of how much to invest for insurance against a year of water shortage needs further study. The Commission does note that capital costs for development of sources and transmission will range between $2 billion and $2.5 billion. Local distribution systems are expected to cost an additional $1.2 billion.

The largest share of total costs will come in the 1970's when many large projects must be initiated. Later stages of these projects will not be so costly.

Capital Costs of Water-Supply Projects for New Growth

(in billions of dollars)

	1965-1985	1985-2000	TOTAL
Sources, treatment and transmission..	$1.5	$0.5	$2.0
Local distribution systems.....	0.6	0.6	1.2
Subtotal, New Growth.....	$2.1	$1.1	$3.2

Also, present facilities must be replaced or upgraded where urban growth has exceeded the original capacity or where the physical plant has deteriorated. This has not received sufficient attention in the past decade, and deficiencies are present in many water systems.

Capital Costs of Water-Supply Projects for Replacements

(in billions of dollars)

	1965-1985	1985-2000	TOTAL
Sources, treatment, etc.....	$0.3	$0.3	$0.6
Distribution.....	0.7	0.7	1.4
Subtotal, Replacements.....	$1.0	$1.0	$2.0
TOTAL NEW GROWTH AND REPLACEMENTS	$3.1	$2.1	$5.2

This Region has been spending about $4.50 per year per person served for the development of water-supply projects. From 1965 to 1985 this rate should average $8 as major proposals are inaugurated, but in the last 15 years of the century it should drop to an average of $5.75 per person per year.

Average Annual Capital Expenditures for Water Supply

	1960 - 1965	1965 - 1985	1985 - 2000
Total.....	$75,000,000	$155,000,000	$140,000,000
Per Capita.....	$4.50	$8.00	$5.75
Average Population Served..	16,800,000	19,600,000	24,200,000

Organizing to Carry Out the Program

Water supply and distribution should be a self-supporting utility, much like electricity and telephones. The general principle is well established that water is paid for by the users, but in some instances the charges are insufficient to support entirely the capital improvements and operating costs. Fresh water, delivered at the tap, has a cost equivalent to $13.50 per person annually, or about 25 cents per 1000 gallons. A healthier industry, public and private, would result from full payment by the user of all costs. The added burden upon the consumer would not be large.

There are sound reasons for separating the responsibility for water supply from water distribution. Towns, cities, even counties are no longer able to find sufficient water within their borders. The water resources that must now be developed are often well outside the communities served and sometimes extend outside the Region itself. Moreover, a single project will often serve many communities. The states, therefore, singly or in combination, are more appropriate instruments for water-supply develop- than the local communities, and, indeed, there is a national interest in some places.

The states should organize water-supply agencies capable of developing and managing large water-supply projects. Financing of the projects should be advanced by the states, but the rates charged for water sold wholesale to the local utilities, public and private, should make each project self-supporting. These local utilities should retail water to the users at rates that would cover the cost of water from the state agency plus the full cost of distribution.

SEWAGE

Sewage Management Goals

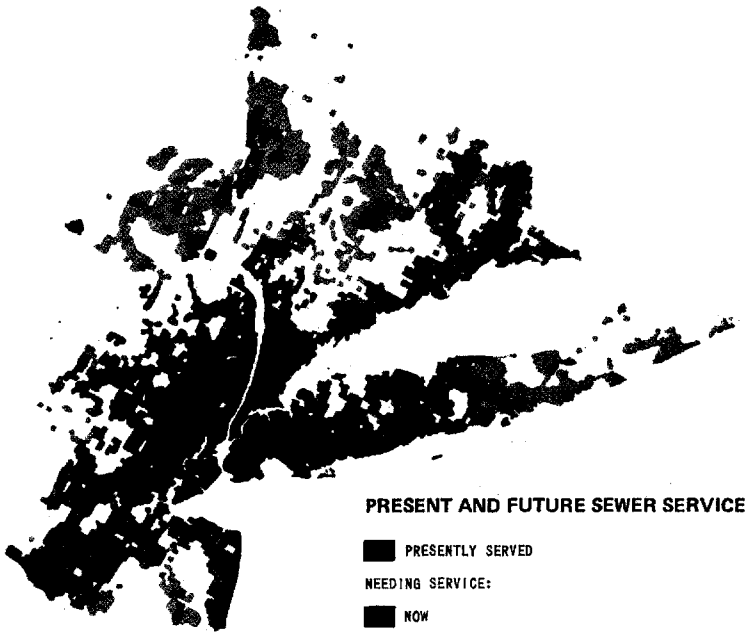
In the absence of a recent epidemic we tend to forget that the first goal of a sewerage system is to get sewage away from people. There can be no argument about this goal, or the necessity for public action to achieve it. Thus a sewerage system is essential for collecting waste water and safely arranging for its disposition.

The second generally accepted goal is protection of public water supplies. Most of this Region's sewage is discharged into sea-level waterways that are too salty to drink anyway. The major problem is to keep inland streams and reservoirs free from pollution caused by urban development.

A third goal is to protect our environmental water from unsafe and unaesthetic pollution. This means that for the future, all sewage must be treated before being discharged into the Region's water bodies. Preserving the recreational value of our waters and their ecology is an important public goal today because the population has outgrown the capacity of our environmental waters to absorb waste reasonably.

Future Needs

At present this Region of 18 million people discharges the raw sewage equivalent of 11 million people into its waterways. Most of this comes from untreated or inadequately treated effluent from old and overloaded sewage-treatment plants. Included in this equivalent of raw sewage is waste water from industries. In addition, there is direct pollution such as oil spillage and substantial floating debris. More than 90 percent of this waste is discharged within a 20-mile radius of Manhattan's lower tip. It is within our power to eliminate the major portion of this pollution, and programs are in operation to do this, but they are well behind schedule for lack of financing.



As raw land is put into urban use, utility services must be furnished to homes and businesses. The general geographic extent of these services is evident from this map, but the specific arrangement of pipelines and treatment plants is properly a responsibility of subregional units such as counties and major cities.

The largest and most important programs deal with sewage. Volumes are growing rapidly, as shown by water consumption. Projections for the remainder of this century suggest a need for nearly doubling present treatment capacity and collecting sewage from many newly developed parts of the Region.

Forecast of Sewage Volume

	1965	1985	2000
Total population.....	18,400,000	23,200,000	27,400,000
Population served.....	14,880,000 (80%)	20,800,000 (90%)	25,200,000 (92%)
	Sewage Volumes in Gallons per Day		
Per capita daily flow.....	145	150	155
Total daily flow.....	2,150,000,000	3,100,000,000	3,900,000,000
Current daily treatment capacity	2,300,000,000	2,300,000,000	2,300,000,000
Surplus or deficit.....	+150,000,000 (+7%)	-800,000,000 (-35%)	-1,600,000,000 (-70%)

Although a statistical surplus of treatment capacity exists now, in actual practice there are imbalances from one part of the Region to another that result in substantial sectors of deficiency.

Optional Levels of Water-Pollution Control

There are several levels of water quality at which the Region could aim. These are the major options.

● To prevent life systems in the water from being altered. While this may be ideal, our knowledge of this subject is so limited and the probable costs of complete control are so high that this objective is not considered feasible at present. Besides, if all pollution ceased today, water and marine life would not return to some earlier pure state.

● To raise the quality of all streams used for drinking water to the point where no filtration would be necessary. This is an issue in only a few places in the Region. Where polluted streams are now used for water supply, it has been shown to be cheaper to provide treatment at the intake.

● To maximize opportunities for swimming. This is probably the most widely accepted reason for water-pollution control. Control of pollution can restore many sites to safe swimming, and can protect many from future impairment.

● To protect fishing grounds. The ease of transporting fish from other locations reduces the economic value of commercial fisheries in this Region. However, recreational fishing in the nearby waters of the Region cannot be easily relocated.

● To provide for recreational boating. This is a growing activity, but it does not require highest levels of water purity.

● To protect or restore the beauty of a natural waterway. This problem arises partly from shoreline development or deterioration, partly from floating debris and partly from water pollution. Where the water is discolored or ill-smelling due to sewage pollution this should be cleaned up; it is a proper goal for sewage treatment. In addition, programs must be instituted to eliminate unsightly and dangerous debris and dumping that spoil waters and shorelines for human enjoyment.

Federal, State and Interstate Water Quality Programs

Federal and state agencies have been grappling with these problems and choosing among alternative solutions. For more than 25 years the three states have supported surveillance and enforcement of pollution control by the Interstate Sanitation Commission. By 1967 the state water-resource agencies, in cooperation with the Federal Water Pollution Control Administration, established standards for the Region's waterways. Each water body was assigned a use classification, such as:

1. Water supply, swimming and shellfishing.
2. Fishing and boating, but no swimming.
3. Navigation and industrial water use.

These agencies also developed criteria to measure whether these waterways are suitable for the assigned use – such as oxygen loss, coliform bacteria, suspended solids, temperature increase and acidity or alkalinity.

These standards have been used in fixing a regionwide ob-

jective for waterway quality. It would be prohibitive in cost and unrealistic to try to return all waterways to a state of purity that existed when the Dutch first settled Manhattan. But it is completely unacceptable for us to continue the reckless pollution that has been characteristic of past growth. This objective will require great but feasible efforts on the part of the community to regain an acceptable and desirable balance. Quality of waterways will be improved and additional usage for recreation and other purposes will be allowed, yet the costs will be held within reasonable scale, considering the total array of community needs that must be met during the next generation.

The Plan

To achieve this objective a plan of action is proposed: first, construction of a proper sewerage network to collect all used water; second, building a set of treatment plants that will provide sufficient sewage treatment so that the resultant effluent will meet the standards for each waterway into which it is discharged; third, a program to clean up debris and prevent dumping of solid wastes from other sources into the waterways. In addition, a program to deal with location and design of all industrial plants that overheat natural waterways is urgently needed.

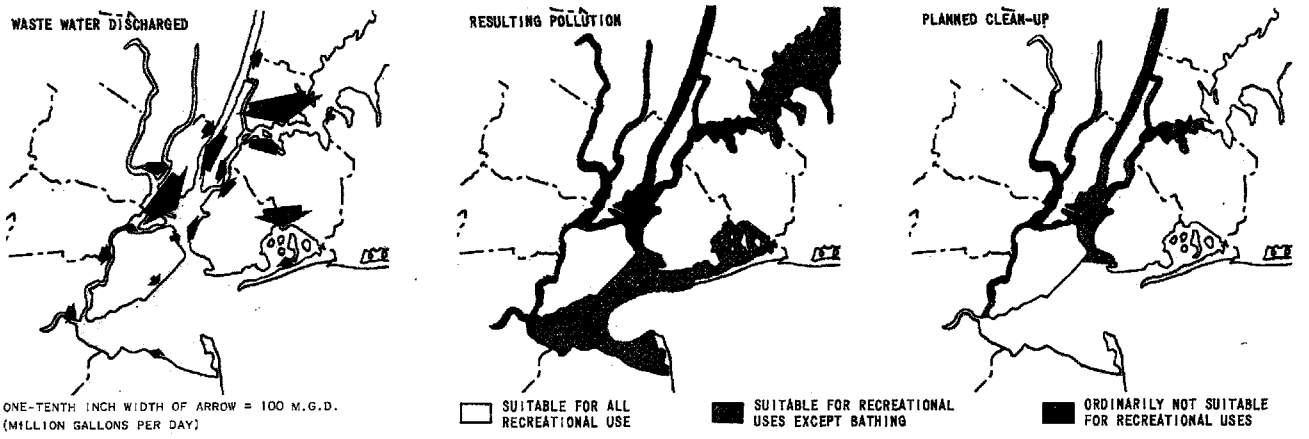
A Strategy for the Seventies

Our sewage-collection goals can be met by requiring that all areas be sewered at the time of development, by requiring that developers meet these costs, and by assessing costs of trunk sewers against local residents. Where backlogs must be overcome, costs should be assessed against present and future structures. The counties of New York and New Jersey and the planning regions of Connecticut are logical agencies for overseeing this work. Under federal requirements, they are currently drawing up plans and programs for basic sewer and water facilities to serve future development.

The proper course of action for waterways clean-up is not so clear. In 1967, when the federal-state program was developed, it included a timetable for completion by 1972. It was based on the assumption that substantial federal aid for water-pollution control would be available. In the past, federal appropriations have not fully materialized, and the program is badly behind schedule. New York State and Connecticut have provided some additional state aid for sewerage projects, and New Jersey voters approved a water-quality bond issue in November, but these steps cannot maintain the schedule set in 1967.

Under the Federal Water Pollution Control Act, this Region, with its commitments of state aid and with its regional planning mechanisms in operation, is eligible for 55 percent federal aid for sewage-treatment projects. In the period 1963 through 1968

IMPROVING THE QUALITY OF CENTRAL WATERWAYS



the federal share in such projects here was about 9 percent. The present level of appropriations for this purpose for the nation as a whole indicates that federal aid will not exceed 9 percent of project costs through 1972.

It is clear that the Region does not have the money to accomplish its clean-up objectives without much greater federal support. In the early Sixties the Region's sewerage utilities spent about $90 million per year on capital projects, of which about $55 million went to sewage treatment. If the clean-up timetable were stretched to ten years, the capital program would require $550 million for growth plus $1,400 million for improvement, or nearly $200 million per year – four times the former rate of investment. This does not appear to be a reasonable forecast of events.

With limited resources, we must assign priorities. The following waterways have outstanding potential for recreational use by many people. Some of them are now in use for recreation. Facilities that discharge effluent directly into these waterways should receive priority in the Region's upgrading program.

Jamaica Bay
Passaic River and tributaries, principally the Rockaway, above Dundee Dam
Hudson River above the Bergen-Rockland line
Housatonic River, particularly south of the Naugatuck
Raritan Bay
Coney Island/Manhattan Beach/Brighton Beach
The East River and Long Island Sound from Rikers Island to Mamaroneck and Sands Point
Great South Bay/Moriches Bay
Raritan River and its tributary, the Millstone
The middle portion of the Hackensack River
The bays and harbors of Stamford, Norwalk, the New Haven area, Stratford, Greenwich, Westport and Bridgeport.

Major projects that have already been begun in other areas should be completed.

The states' current programs for requiring the control of specific industrial and institutional pollution are effective and should be continued.

Once constructed, the operation, maintenance and replacement of sewerage facilities should be financed by adequate user charges on those who use them. Operating budgets should provide for high-quality performance and for the prevention of unauthorized use of sewerage facilities for industrial wastes or storm water.

It is clear that this timetable is much slower than the federal-state program, but it aims to assign properly the Region's limited resources and to make the most of them until regional public support and federal aid provide additional funds.

At present, we do not know if the Region is gaining or losing in efforts to clean up its waterways. The state water-pollution-control agencies, federal agencies, and the Interstate Sanitation Commission each measure water quality at numerous points in the Region, using various types of stations, equipment and samples. However, the information is not collected and analyzed for the Region as a whole.

A systematic program for measuring changes in the quality of the Region's waters is needed, including the long-range effects of environmental change. The Interstate Sanitation Commission or some other interstate operating agency should compile information from these various sources and report annually the trend of water quality in major sectors of the Region's waterways.

Pollutants Other Than Sewage

Perhaps less crucial, but still important, is contamination caused by materials that do not pass through the sewer system. Tin cans, bottles, logs and other junk – as well as oil – are evident along many rivers, and at the central port floating debris reaches major proportions. For a society that is prosperous and conscious of beauty such carelessness should not be tolerated.

A program of control and management is proposed to police continuously the waterways against littering. The Army Engineers have advanced a $29 million program to clean up the New York-New Jersey port during the next eight years. This major step forward should be made permanent through cooperative efforts by federal, state and interstate agencies, and should be extended even farther to cover other parts of the Region. In addition, means should be established to charge public clean-up costs back against the offenders.

Another pollution problem occurs when industrial plants, primarily electric power generating stations, heat nearby waterways

above their natural temperature by withdrawing large volumes of cool water, circulating it over boilers, and returning it hot to the waterways. The result, called thermal pollution, reduces the oxygen content, causing fish to die.

No satisfactory antidote to thermal pollution has been put into practice, yet the need for electricity is predicted to rise threefold by 1985. Major efforts will be needed to find a workable plan for new power-plant sites without despoiling water and shoreline. Even nuclear plants, which eliminate air pollution, cause thermal pollution.

Costs of Meeting Future Needs

Based on estimates of project cost made by the individual states, upgrading our present sewage-treatment facilities to the level that would accomplish the waterways clean-up described earlier would cost $1.4 billion.

Based on recent experience in similar construction, at least $700 million more would be needed to supply sewage-collection and treatment facilities to the 1.9 million people living in developed areas who now lack them.

Finally, our normal growth in population and generation of waste water will require $1.3 billion more for treatment facilities and $3.0 billion for expanded sewage-collection systems by the year 2000.

In other words, it will cost $6.4 billion to catch up on current deficiencies and to keep up with normal growth through the year 2000. At current rates of spending for capital improvements ($90 million annually), the Region will fall far short of meeting its needs.

Capital Costs of Sewerage Projects

(in billions of dollars)

	1965-1985	1985-2000	TOTAL
SEWAGE COLLECTION SYSTEM			
Catch-up phase	$0.7	$0.0	$0.7
Normal growth	1.7	1.3	3.0
SEWAGE TREATMENT FACILITIES			
Catch-up phase	1.4	0.0	1.4
Normal growth	0.8	0.5	1.3
SUBTOTAL, CATCH-UP	2.1	0.0	2.1
SUBTOTAL, NORMAL GROWTH	2.5	1.8	4.3
TOTAL	$4.6	$1.8	$6.4

The Primary Task in Environmental Management

The problem of adequate sewage treatment is the keystone to achieving a proper balance of water purity and human use. This is the most urgent and most expensive element in managing our regional environment, and promises have far outrun actual performance in controlling water pollution.

Therefore, public commitment and government support must be escalated well above present levels in order to make this Region fully habitable in the manner of living expected in a modern urban community. People are no longer content to live and work in a dirty environment, and growing wealth makes it possible for us collectively to clean up waters that were previously considered industrial and municipal dumps.

Of all aspects of environmental management, the prevention and control of water pollution is the paramount task because so much needs to be done to bring past practices under control. Other environmental problems – air pollution, solid waste, water supply–are more readily solvable, starting from present conditions. But sewage treatment will require the greatest fiscal effort to undo a long history of neglect and resultant water pollution.