A PROPOSED PROBLEM–ORIENTED MARINE RESEARCH PROGRAM FOR LONG ISLAND

Prepared by
The Center for the Environment
and Man, Inc.

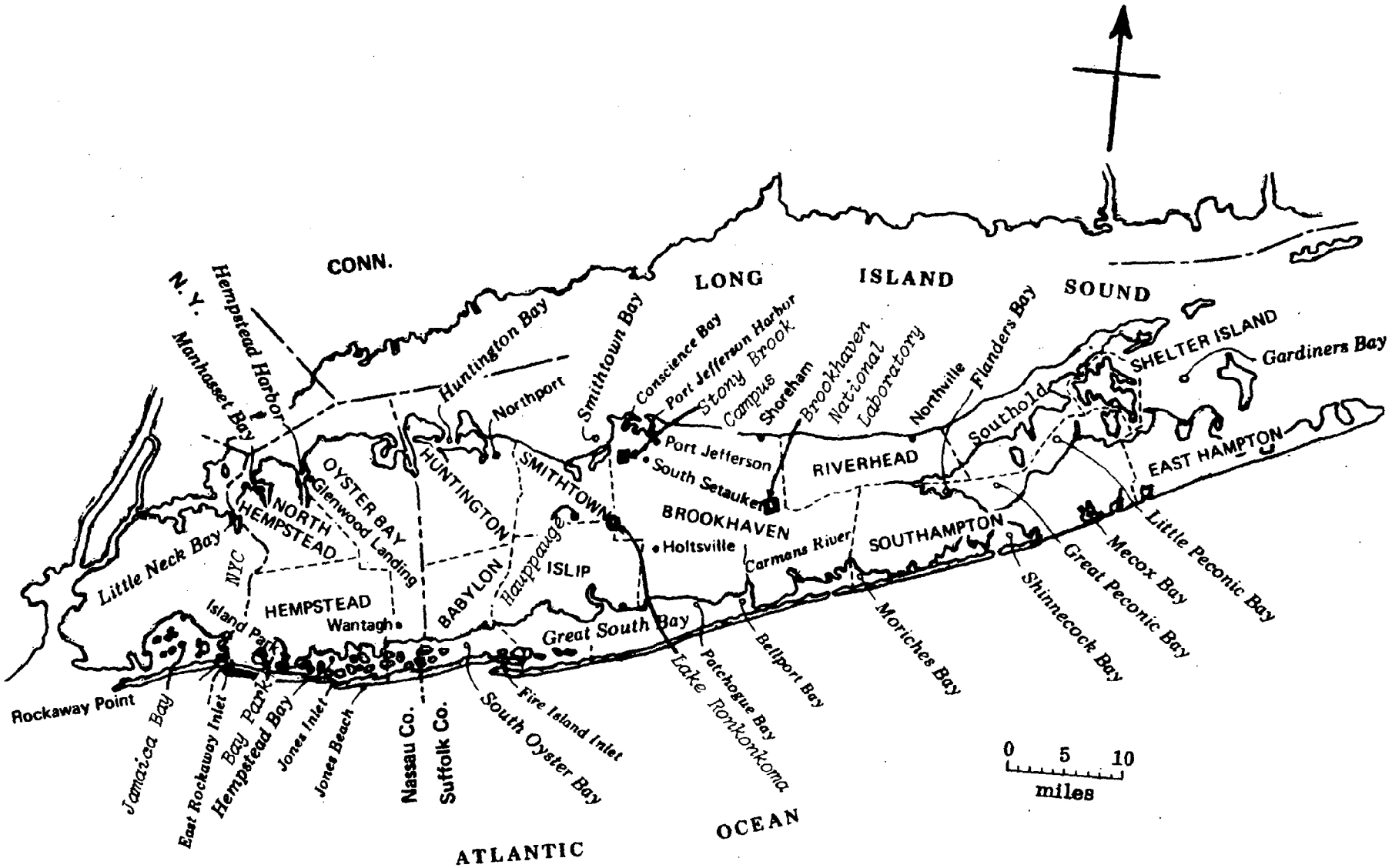
under
Sea Grant Project GH-63
National Oceanic and Atmospheric Administration
U.S. Department of Commerce

February 1972
CEM-4103-456

R. Pitchai
W. V. McGuinness, Jr.

Regional Marine Resources Council

A COMMITTEE OF THE NASSAU-SUFFOLK REGIONAL PLANNING BOARD.


CONN.
LONG ISLAND SOUND
N.Y.
Hempstead Harbor
Manhasset Bay
Huntington Bay
Smithtown Bay
Conscience Bay
Port Jefferson Harbor
Stony Brook
Campus
Shoreham
Brookhaven National Laboratory
Northville
Flanders Bay
Southold
SHELTER ISLAND
Gardiners Bay
EAST HAMPTON
Northport
Port Jefferson
South Setauket
RIVERHEAD
OYSTER BAY
Glenwood Landing
NORTH HEMPSTEAD
HUNTINGTON
SMITHTOWN
BROOKHAVEN
Holtsville
Little Neck Bay
NYC
HEMPSTEAD
Island Park
Wantagh
BABYLON
Hauppauge
ISLIP
Great South Bay
Carmans River
SOUTHAMPTON
Little Peconic Bay
Mecox Bay
Great Peconic Bay
Shinnecock Bay
Moriches Bay
Bellport Bay
Patchogue Bay
Lake Ronkonkoma
Fire Island Inlet
South Oyster Bay
Rockaway Point
Jamaica Bay
East Rockaway Inlet
Bay Park
Hempstead Bay
Jones Inlet
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THE CENTER FOR THE ENVIRONMENT AND MAN, INC.
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FOREWORD

This report is part of a series prepared by The Center for the Environment and Man, Inc., (CEM) for the Regional Marine Resources Council (the Council) of the Nassau-Suffolk Regional Planning Board under the continuing program: The Development of Methodologies for Planning for the Optimum Use of the Marine Resources of the Coastal Zone. The program is being funded in part by the Sea Grant Program of the National Oceanic and Atmospheric Administration, U.S. Department of Commerce, and is structured into six functional steps:

Functional Step One (Problems). Identifies, classifies and briefly analyzes the problems that confront planners and decision makers with regard to the area's marine resources.

Functional Step Two (Knowledge Requirements). Categorizes the data and knowledge necessary for making sound decisions with regard to the use of the marine resources.

Functional Step Three (State of the Art). Assesses the availability and adequacy of the necessary data and knowledge.

Functional Step Four (Knowledge Gaps). Determines necessary data collection and research activity.

Functional Step Five (Data Collection and Research Program). Formulates a priority-oriented, marine-related data collection and research program and monitors its implementation.

Fuctional Step Six (Management Information System). Develops a system for organizing and synthesizing the data and knowledge and provides analyzed information to marine resource planners.

Functional Steps One, Two and Three were completed in previous reports of this series [1a, 1b, 1c and 1k].[1]

The current report [1ℓ] presents CEM's recommendations for an integrated data collection and research program geared to the solution of Long Island's highest priority, marine

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[1] Numbers in brackets refer to references listed in Appendix A.

and marine-related problems. The report analyzes data collection and research needs identified in Functional Step Three [1k] and in seven feeder reports [1d, 1e, 1f, 1g, 1h, 1i, 1j]. Three of the feeder reports were completed in 1970 on coastal water quality standards [1d], on estuarine models [1e], and on interim high priority research and data needs [1f]. Four of the feeder reports in the current program address selected priority problems on integrated water supply and waste water disposal [1g], coast stabilization and protection [1h], dredging [1i], and wetlands [1j]. The current report is being developed simultaneously with reports on guidelines for policy and planning [1m] and a marine management information system (Functional Step Six) [1n].

The current report will provide the basic input to Functional Step Five, which is to be further developed after the completion of the present contract. In that step, the recommendations in this report will be used as a basic tool in formulating and adopting the Council's program and in promoting the program's implementation and use.

TABLE OF CONTENTS

SECTION 1 - INTRODUCTION

1.1 SCOPE OF THIS REPORT

This report presents CEM's recommended problem-oriented marine research program to the Regional Marine Resources Council of the Nassau-Suffolk Regional Planning Board for the Council's consideration.

The program consists of 77 marine and marine-related data collection and research projects. The projects are arranged in four priorities and will cost about $25 million to complete.[1]

The 77 projects were developed in previous reports of this series on the basis of their potential contribution to solving the area's "highest-priority marine-related problems," which have been designated by the Council as:

(1) Integrated water supply and waste water treatment and disposal,

(2) Coast stabilization and protection,

(3) Dredging and spoil disposal, and

(4) Wetland management.

Each project is considered briefly in terms of 13 characteristics—its marine-relationship, adequacy of the relevant data and information base, feeder relationship to other projects, public interest, current status, value of the results sought, level of effort required, general benefit/cost relationship, breadth of applicability, potential sponsors, references and priority. An abstract is provided giving the objective of each project and some comments as to its scope and importance.

About 60% of the projects are "marine projects." They deal primarily or exclusively with marine subjects. An example is a coastal water quality monitoring system. The remaining 40% are classified as "marine-related." They are primarily associated with non-marine needs, but they have a very significant secondary relationship to the marine environment. An example is advanced waste water treatment technology (AWT).

Some of the projects are new, some have been proposed, and some are currently underway by many agencies and institutions on Long Island and elsewhere. For the first

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[1] All dollar costs and values cited herein are in terms of constant 1971 dollars.

group, this report seeks to kindle useful initiatives. For the second group, the report seeks to improve the likelihood of approval. For the third group, the report seeks to encourage continued support and the widespread dissemination of results.

It is important to restress that the projects considered herein have one major characteristic in common; they are directly related to solving a selected set of high-priority problems. This means that two important types of research will not be found herein: (1) research that seeks to improve background knowledge without particular concern as to the immediacy or possibility of its application (sometimes called "basic research"), and (2) research that is addressed to other problems not emphasized herein, e.g., port development or fisheries development. It would, therefore, be a mistake to infer from this report, which concentrates on problem-oriented research, any conclusions as to the relative long-range importance of applied and basic research. A protracted deemphasis of either type of research would be short sighted.

1.2 USERS OF THIS REPORT

The report is being prepared primarily for its sponsors, the Regional Marine Resources Council and its parent body, the Nassau-Suffolk Regional Planning Board. The interests of the Council are bicounty and coastal. The interests of the Board are bicounty and comprehensive, covering the long-range preservation, use, and development of the entire area, inland as well as coastal. All the reports of this series, including this one, reflect these interests by viewing the coastal dimensions as important but subordinate parts of the overall planning problem. For the Council to be responsible and successful, its coastal input must be founded on a broad, objective understanding of the overall needs. Accordingly, the program recommended in this report reflects deliberate integration of marine needs with the broader needs of the island.

As reflected later in the recommendations, this report was developed with the anticipation (1) that the Council will use it as a tool to develop its own research program, (2) that the Council will employ its coordinating and leadership capabilities to foster the execution of the program, and (3) that the Council will provide a continuing forum to improve the application of research conclusions to major marine-oriented planning, policy-formulation and action programs.

In addition to serving the Council's needs, we hope that the report will also provide a useful compilation of data and research needs for the two county governments, academic institutions, and all others interested in the basic resource management and planning problems.

Although the developed data and research needs are specific to the bicounty area, the methodology and many of the conclusions should be applicable to the formulation of problem-relevant research programs in other densely populated coastal locations throughout the nation, thus facilitating technology transfer.

SECTION 2 - PROGRAM

2.1 METHODOLOGY

The six-functional step approach was outlined in the foreword to this report. In following that approach, one of the major purposes of many earlier reports in this 14-report series was to identify data and information gaps that were impeding the solution of major coastal problems. In particular, recent reports on integrated water supply and waste water disposal [1g], coast stabilization and protection [1h], dredging [1i], and wetlands [1j] identified a number of these gaps. The state-of-the-art report [1k] produced an integrated recapitulation and succinct description of the most important data collection and research needs.

That recapitulation and the reports from which it was developed provided the initial input to this report in the form of 77 projects.

In Appendix B, each project is described in a brief abstract and classified in the following ways, which are described in detail in the appendix:

- Type—marine or marine related.
- Adequacy of the supplementary data and information bases that provide the initial input to the project.
- Feeder relationships to other projects.
- The probable degree of public interest in the project.
- Whether the project is already underway and if so, by whom.
- The value of the results expected of the project in terms of their contribution to the solution of the designated highest priority problems.
- The level of effort required in order-of-magnitude dollars.
- The general benefit/cost ratio of the project.
- The breadth of applicability of the project results—local, state, regional or national.
- Potential sponsors.
- References to earlier reports of this series whence the project originated.
- The recommend priority of the project—A+, A, A-, B+, B, B-, C and D. Priorities were based mainly upon the estimated value of the results expected of the project. The priorities express our recommendations of the

projects the Council should most desire to have accomplished. They are not influenced by the anticipated ease or difficulty of funding, although that consideration will obviously be very important in future efforts to implement the program. Thus, for example, some "easily-supported" priority D projects might well get underway before some more essential but harder-to-fund priority A projects.

2.2 THE PROGRAM

Table 1 summarizes the recommended program. Within each priority grouping the order of listing is strictly serial with no priority implications. As indicated above, considerable additional information is presented in the appendices, especially in Appendix B.

2.3 HIGHEST PRIORITY PROJECTS

Eight projects were given the highest (A+) priority:

103—Unit cost data. Improved indices are needed to permit badly-needed, order-of-magnitude comparisons of alternative water supply and waste water disposal strategies. The choices involved here have cost connotations in the billion dollar range and deserve the cost-awareness perspectives that can emerge from the data sought by this project.

205—Wetlands classification and inventory. This project is intended to provide an organized basis for the improved management of the 3-1/2 percent of the bicounty area's surface that is represented by wetlands. It is also a necessary basis for a rational policy to regulate dredging.

207—Coastal water quality monitoring system. This project is intended to provide a systematic, coordinated and cost-effective way of selectively observing and obtaining data on the changing quality of Long Island's surrounding waters with particular attention to its embayments, in sufficient detail to facilitate surveillance and enforcement where needed.

602—Salinity effects in bays. Alternative water strategies now being considered can change the salinity regimes of the embayments, particularly along the south shore, but the consequent effects on marine biota are poorly known. Additional expenditures of hundreds of millions of dollars might unnecessarily be incurred—or unwisely avoided—without the factual knowledge sought by this project.

TABLE 1

PROPOSED PROBLEM-ORIENTED MARINE RESEARCH PROGRAM

FOR LONG ISLAND

Serial # Short title	Level of effort ($1,000's)	
	Marine	Marine-related
PRIORITY A+		
103 - Unit cost data		10 - 100
205 - Wetlands classification and inventory	100 - 1,000	
207 - Coastal water quality monitoring system	1,000 - 1,000+	
602 - Salinity effects in bays	100 - 1,000	
604 - Contaminant effects of ocean outfalls	100 - 1,000	
807 - Feasibility of importing water		10 - 100
818 - Feasibility of stream recharge	100 - 1,000	
820 - Value judgments on water systems		10 - 100
Sub-total	(1,400 - 5,000+)	(30 - 300)
PRIORITY A		
107 - Coastal use survey	10 - 100	
203 - Offshore geological information	100 - 1,000	
405 - Future coastal usage	100 - 1,000	
705 - Impact of groundwater level changes		100 - 1,000
806 - Predictive inlet models	1,000 - 1,000+	
822 - Screening of dredging applications	10 - 100	
823 - Wetlands management	100 - 1,000	
Sub-total	(1,320 - 4,200+)	(100 - 1,000)
PRIORITY A-		
204 - Offshore sand inventory	10 - 100	
802 - Subsurface hydrological model		100 - 1,000
804 - Water quality models in bays	1,000 - 1,000+	
813 - Feasibility of AWT		1,000 - 1,000+
Sub-total	(1,010 - 1,100)	(1,100 - 2,000+)
TOTAL PRIORITY A		
19 projects: 13 marine & 6 marine-related	3,730-10,300+	1,230 - 3,300+
PRIORITY B+		
403 - Offshore petroleum	100 - 1,000	
701 - General usage impacts	100 - 1,000	
Sub-total	(200 - 2,000)	(0)
PRIORITY B		
102 - Waste water inventory		10 - 100
108 - Man-induced surface changes		100 - 1,000
201 - Monitoring groundwater levels		100 - 1,000
208 - Monitoring groundwater quality		100 - 1,000
406 - Information on water quality violations	10 - 100	
407 - Adequacy of coliform standards	100 - 1,000	
410 - Improving water transport system design		10 - 100
501 - Evapotranspiration processes		100 - 1,000
502 - Infiltration processes		100 - 1,000
503 - Movement of contaminants in groundwater		1,000 - 1,000+
708 - Understanding wetland values	100 - 1,000	
801 - Surface hydrological accretion model		100 - 1,000
803 - Groundwater quality models		100 - 1,000
816 - Feasibility of recharge by spray irrigation		1,000 - 1,000+
817 - Feasibility of recharge through storm basins		100 - 1,000
821 - Feasibility of land use management techniques	100 - 1,000	
Sub-total	(310 - 3,100)	(2,820-10,200+)
PRIORITY B-		
601 - Contaminant effects in bays	100 - 1,000	
704 - Feasibility of requiring depuration	10 - 100	
	(110 - 1,100)	(0)
TOTAL PRIORITY B		
20 projects: 8 marine & 12 marine-related	620 - 4,400	2,820-10,200+

TABLE 1 (Continued)

Serial # Short title	Level of effort ($1,000's)	
	Marine	Marine-related
PRIORITY C		
101 - Water usage data		10 - 100
104 - Ocean dumping data	10 - 100	
106 - Beach attendance data	10 - 100	
109 - Inventory of land use regulations	0 - 10	
110 - Inventory of major development plans	10 - 100	
111 - Inventory of dredged spoil areas	0 - 10	
206 - Water quality data bank		100 - 1,000
401 - Future travel times		10 - 100
402 - Future public values		100 - 1,000
409 - Adequacy of thermal discharge criteria	100 - 1,000	
504 - Movement of contaminents in bays	100 - 1,000	
603 - Toxic effects in the food chain	100 - 1,000	
605 - Contaminant effects of ocean dumping	1,000 - 1,000+	
608 - Effects of inlets on biological exchange	100 - 1,000	
610 - Ecology-productivity analysis of wetlands	100 - 1,000	
702 - Fish diversity and density	1,000 - 1,000+	
703 - Feasibility of opening shellfish areas	10 - 100	
707 - Extent of beach closures	10 - 100	
811 - Feasibility of evaporation control		10 - 100
812 - Feasibility of sewer infiltration control		10 - 100
815 - Feasibility of recharge by injection		100 - 1,000
TOTAL PRIORITY C		
21 projects: 14 marine & 7 marine-related	2,550 - 7,520+	340 - 3,400
PRIORITY D		
105 - Survey of sports fish catch	10 - 100	
202 - Onshore geological information		100 - 1,000
209 - Monitoring possible land subsidence		10 - 100
404 - Future industrial water requirements		10 - 100
408 - Adequacy of bacterial pollution indices	100 - 1,000	
505 - Movement of contaminants in ocean	100 - 1,000	
506 - Salinity changes in bays	100 - 1,000	
606 - Contaminant effects of oil spills	100 - 1,000	
607 - Effects of potholes	10 - 100	
609 - Eelgrass control	100 - 1,000	
706 - Limit to cesspool sites		10 - 100
805 - Water quality models in ocean	1,000 - 1,000+	
808 - Feasibility of desalination		10 - 100
809 - Feasibility of iron removal		10 - 100
810 - Feasibility of leakage control		10 - 100
814 - Feasibility of packaged treatment plants		100 - 1,000
819 - Feasibility of direct recycling of AWT effluent		100 - 1,000
TOTAL PRIORITY D		
17 projects: 8 marine & 9 marine-related	1,520 - 6,200+	360 - 3,600

RECAPITULATION:

Priority	Marine			Marine-related		
	No. of Projects	Level of effort ($1,000's)		No. of Projects	Level of effort ($1,000's)	
		Range	Probable*		Range	Probable*
A	13	3,730-10,300+	6,200	6	1,230- 3,300+	2,030
B	8	620- 4,400	1,650	12	2,820-10,200+	5,360
C	14	2,550- 7,520+	4,380	7	340- 3,400	1,080
D	8	1,520- 6,200+	3,070	9	360- 3,600	1,140
TOTAL	43		15,300	34		9,610

*Geometric mean.

604 - Contaminant effects of ocean outfalls. Increased use of ocean outfalls appears very likely. The information sought by this project is essential if the degree of treatment is to be adequately related to its environmental implications.

807 - Feasibility of importing water. Integrating the Nassau-Suffolk water system with an expanded New York City system now under study can provide some significant cost and environmental advantages to Long Island and also some potential political/jurisdictional disadvantages. As an alternative or fallback to long-range strategies based solely upon aquifer supply and recharge, the feasibility of the regional linkage with New York deserves careful analysis.

818 - Feasibility of stream recharge. The need for massive recharge of Long Island's aquifers in the future can be greatly simplified if this concept of concentrating the recharge at the primary points of need proves successful.

820 - Value judgments on water systems. No matter how complete existing knowledge may be and how successful the proposed research may turn out, major water policy decisions will involve important value judgments (e.g., levels of environmental quality versus the cost of achieving them). This project enlists the social sciences to confirm or modify significant assumptions as to what the public wants in terms of what it is willing to pay to achieve it.

The above eight projects and all the other 69 projects are explained more completely in Appendix B.

2.4 COMMENTS ON THE PROGRAM

Costs:

- The estimated cost of the entire program ranges from about 13 to 50 million dollars. The most likely total is about $25 million.[1]
- Of this $25 million, about $15 million is for marine projects and $10 million is for marine-related projects.
- Allocated against major problem areas, the projects and most likely associated costs are about as follows[2]:

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[1] Based simply on the geometric mean of the extremes.

[2] Note that the totals exceed 77 projects and $25 million. Many projects contribute to several problems.

Problem Area	No. of Projects	Cost ($Million)
Water supply and waste water disposal	55	20
Coast stabilization and protection	19	5
Dredging	11	4
Wetlands	11	4
Others	3	2

- Ten projects in the million-dollar range make up about 40% of total estimated costs.

Related values:

- The cost of satisfying the bicounty area's water supply and waste water disposal needs, at the anticipated year-2000 level, is about $10—13 billion [1g]. The related high-priority research proposed herein is about 0.2% of that total.
- The cost of protecting the bicounty area's shoreline has been estimated at about $300 million [1h]. The related high-priority research proposed herein is about 1.7% of that total.
- The value of the bicounty area's wetlands, as approximated by the developmental values foregone to preserve them, is about $400 million (Appendix B). The high-priority research proposed herein to improve the public stewardship of these wetlands is about 1% of that total.
- Dredging regulation is closely related to the value of wetlands; almost all of the research related to dredging is also included in the research cited under wetlands above.
- The value of three projects considered as "others" can best be evaluated individually rather than as a class. These three projects are listed as 101, 403 and 702 in Table 1.

Implementation: Problems and techniques of implementation can be addressed in depth after the Council has reached conclusions on what its program should be. Nevertheless, the program, and the projects recommended herein were developed with the realities of implementation in mind. The Council presumably will employ a wide variety of tactics. A few examples are cited below:

- In some project areas, considerable work is already underway. The Council's action here might be primarily directed towards endorsement, support, liaison and stimulating the articulation of needs and results between planners, policy-formulators and decision makers on the one hand and the researchers on the other.

- Some projects are identified in Appendix B as having wide applicability, frequently national. The Council may wish to use this characteristic in several ways. It can be emphasized to attract a higher level of federal support to the project, or it can point up the alternative of "piggy-backing" on the findings of researchers elsewhere by emphasizing liaison and technology transfer.
- The Council may wish to stimulate the incorporation of many projects in research programs and graduate theses as constantly being formulated at academic institutions.
- For some projects, the Council itself may wish to become the full or joint sponsor.

SECTION 3 - RECOMMENDATIONS

It is recommended that—

the Council use this report as a tool to develop its own flexible, priority-oriented, research program;

the Council exploit its coordinating and leadership capabilities to foster the execution of that program; and

the Council provide a continuing forum to improve the application of research findings to planning, policy-formulation and action programs on Long Island.

APPENDIX A

REFERENCES

APPENDIX A

REFERENCES

This appendix lists the references cited in brackets throughout the remainder of the report, generally in the order in which the references are first cited.

1. Retional Marine Resources Council, Nassau-Suffolk Planning Board, The Development of a Procedure and Knowledge Requirements for Marine Resource Planning, The Center for the Environment and Man, Inc. (formerly The Travelers Research Corporation), Hartford, Connecticut:

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   h. Bartholomew, F. L. and W. V. McGuinness, Jr., Coast Stabilization and Protection on Long Island, February 1972.

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   k. McGuinness, W. V., Jr., State of the Art for Selected Marine Resources Problems on Long Island, February 1972.

   l. Pitchai, R. and W. V. McGuinness, Jr., A Proposed Problem-Oriented Marine Research Program for Long Island, February 1972.

   m. Ellis, R. H., et al., Guidelines for Marine Resources Planning and Policy on Long Island, February 1972.

   n. Ellis, R. H., et al., The Design of a Management Information System for Coastal Resources Planning, February 1972.

APPENDIX B

INDIVIDUAL PROJECT SUMMARIES

APPENDIX B

INDIVIDUAL PROJECT SUMMARIES

1.0 SCOPE

This appendix describes and categorizes each data collection and research project according to a common set of selected characteristics. The categorization system is first explained. The projects and their ratings are then tabulated in summary form, followed by an individual treatment of each project.

2.0 CATEGORIZATION SYSTEM

Each project is described and categorized on a project summary sheet, an example of which is provided by Figure B-1.

Project Summary Sheet

Project: 602 - Salinity effects in bays

Type	Marine
Supplementary data base	Fair
Supplementary information	Fair
Feeder relationship	Feeds 818. Fed by 506,804,806
Public interest	High
Is project already underway?	No
Value of results	Highest
Level of effort required	Medium—$100K to $1 million
Benefit/cost ratio	High
Breadth of applicability	National
Potential sponsors	NOAA/SG, EPA, Int
References	fghk
Priority	A+

Abstract: The objective of this project is to determine the effects upon marine biota of changes in salinity concentrations in the bays. All stages in the life cycles should be considered for selected species (e.g., the hard clam, oyster, menhaden, sea bass, starfish and oyster drill). Priority attention should be given to evaluating the effects of changes within the 25—35 ppt range over most of the major south shore bays and within the 0—25 ppt range in the immediate vicinity of inflowing streams.

This project is given the highest priority because of the importance of its conclusions in rationally formulating water supply and waste water disposal strategies. Additional expenditures of hundreds of millions of dollars might unnecessarily be incurred—or unwisely avoided—without the knowledge to be provided by this research project.

Figure B-1
SAMPLE PROJECT SUMMARY SHEET

Each entry on this sheet is explained below.

Project. A project number and brief title are entered here. Both are related to the preceding report in this series on the state of the art [1k]. "Project 602—Salinity effects in bays," for example, falls under the sixth category of the state-of-the-art report.

Type. Entries are "Marine" or "Marine-related" (designated as M and MR later in Table B-2).

"Marine" projects deal primarily or exclusively with marine subjects. Examples are coastal water quality monitoring systems, salinity effects in bays, and wetlands management. The Council will probably want to exert direct leadership in seeing that marine projects are accomplished.

"Marine-related" projects are primarily associated with non-marine needs, but have a very significant secondary relationship to the marine environment. Examples are subsurface hydrological models, advanced waste water treatment technology, groundwater recharge, and alternative sources of public water supply. Leadership in these areas resides outside the Council, but success there can help solve many of the marine problems of direct concern to the Council. Therefore, for marine-related projects the Council will probably want to make its needs known and lend its support and endorsement to the cognizant agency or authority that is providing, or can provide, the leadership.

Supplementary data base. Entries are "Outstanding," "Good," "Fair" or "Poor" (designated as 3, 2, 1, 0 later in Table B-2). This entry reflects our current assessment of the adequacy of the existing data relevant to the particular research project.

"Outstanding" indicates that most of the relevant data have been collected, verified, and recorded, and are readily available.

"Poor" indicates that the relevant data base is essentially non-existent. A major effort will be required to develop it involving much survey, sampling, analysis, interviewing or other methods of controlled data collection.

Most situations will lie somewhere in between the above extremes. To allow some discrimination, the intermediate ratings of "Good" and "Fair" are used.

Supplementary information. Entries are "Outstanding," "Good," "Fair," or "Poor" (designated as 3, 2, 1, 0 later in Table B-2). A distinction is made between the previous entry which reflected the adequacy of raw data for carrying out a project,

and this entry which reflects the availability of processed data with inferences and significant conclusions. Entries here cannot be higher than the preceding entry. A rating equal to the data base rating indicates not only that a large portion of the existing, collected and verified data have been processed and systematically integrated into an acceptable framework, but also that substantive inferences based upon significant manipulation and analysis are forthcoming. For instance, considerable, well-arranged data are periodically reported on fishing catches and prominent fluctuations in the catch have been well defined. There is little evidence, however, of established relationships between observed results and causative processes. Therefore the information rating is scored as only "Fair" for "Project 702—Fish diversity and density."

Feeder relationship. Entries are "Feeds (project number)," "Fed by (project number," or a dash (-) to indicate no major feeder relationship. This entry calls attention only to major direct relationships between projects. Most relationships are iterative and are quite a bit more complex than can be conveniently indicated in this brief report. For example, projects calling for the collection of data and improved knowledge of processes and effects feed projects that call for model development. On the other hand, the early development of models helps orient the contributing data collection effort and the final model contributes to the assessment of effects. Because of numerous interrelationships such as these, we gave much thought to the manner in which the projects could be most usefully packaged. The relationship of AWT research to recharge research is a case in point. The feasibility of AWT can be investigated only in terms of the desired effluent criteria. Those criteria, in turn, are based primarily upon the recharge strategy adopted, and this strategy depends upon an assessment of numerous socio-economic and environmental impacts. Thus it is tempting to widen the scope of almost every project to encapsulate everything relevant within it. But the gigantic projects that can result from such continuing broadening can cause extremely difficult problems in implementation. These problems can only be resolved by a high degree of centralized authority that might not be achievable or even desirable. Therefore, we have intentionally segmented interrelated chains of research needs into digestible bits, called projects. The researcher on almost every project will have to make several explicit assumptions as to the most likely range of results and needs of closely related

projects. He will also have to maintain a dialogue with researchers on these inter-related projects and refine his initial assumptions accordingly.

Public interest. Entries are "High," "Low," or a dash to indicate not conspicuously high or low (designated as H, L, later in Table B-2). This entry reflects our current assessment of the degree to which the public will readily recognize and support the need for this project. An entry of "Low" is an alert that, if public endorsement is considered essential, public information measures should be considered to overcome current apathy or, in rare cases, possible hostility.

Is project already underway? Entries are "Yes" followed by the organization involved,[1] or a dash to indicate no, unconfirmed, or not to a major degree (designated as √, later in Table B-2). As one example, we know that each county government and the U.S. Geological Survey have long been involved in monitoring groundwater levels. Suffolk County, for one, has recently decided to expand its program. The entry under "Project 201—Monitoring groundwater levels" briefly cites these efforts.

Some difficulty was encountered in making this entry because of (1) the dearth of authoritative published information on current research efforts and (2) problems in interpretation.

To overcome the first difficulty we supplemented our own knowledge by writing to 18 research organizations on Long Island and 22 in adjacent areas. The letters requested information on the addressees' on-going and proposed marine and marine-related data acquisition and research programs. Responses have been received from about half of the addressees. Some responses were detailed and some cursory. Samples of our letters and a list of addressees annotated to indicate those who responded are contained in Appendix C.

The second difficulty was one of interpretation. Because of the keen concern and excellent sense of awareness of the research community, for each of the projects, there is someone, somewhere, who has done, is doing, or is proposing to do, something related in some way to each project. It might have been possible to develop a sophisticated coding system to portray these varying degrees of involvement; but we judged that the

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[1] A list of organizational abbreviations is contained in Enclosure B-1.

data base and effort required to do so would not warrant such an attempt at this stage, before the Council has had any chance even to react to the proposed program in any way.

With the above considerations in mind, we decided to keep this entry simple. Only two entires were allowed—a "Yes" followed by an abbreviated identification of the organization that is pursuing the research or a dash (-). The former entry is used sparingly. It is reserved to reflect fully-documented major research efforts substantially aligned to the basic purpose of the project. We expect that, as the program evolves, this entry will be expanded significantly. The responses to our letters will provide the beginning of an information file on each significant research organization. Development and maintenance of such a file will be a continuing part of next year's program, which will stress implementation.

Value of results. Entries are "Highest," "Relatively high," "Relatively low," or "Lowest" (designated as A, B, C, D, later in Tables B-1 and B-2). This entry reflects our judgment as to the relative value of the projects in contributing to the solution of high-priority problems. On any absolute scale, all projects included in the total program would rank very high in this attribute, because this was the basis for their initial selection—their exceptional pertinence in solving major problems. Therefore, the entry here is necessarily comparative (of the good-better-best type), rather than absolute (of the good-bay type). To insure a good spread, we limited each of the above four ratings to approximately 25 percent of the total. The "Highest" rating, for example, means that we judge the value of the results for a particular project to fall in the top quartile. As might be expected, there was considerable competition for the top ratings and much juggling back and forth. For one project to move up, another had to move down. The major difficulty was with borderline cases, but attempts to flag these cases by creating additional step ratings were considered not justified by the information available and the multi-dimensional, multi-problem nature of the analysis.

As a tool for exercising the judgments required for this entry, we grouped the projects under the problems to which they significantly relate. Many projects were listed under more than one problem. We then grouped each set of problem-related projects under several useful subheadings and made judgments as to the relative value of the results. Table B-1 depicts the final results of this evaluation.

TABLE B-1

RELATIVE VALUE OF RESULTS IN PROBLEM SOLVING

	Relative Value of Results		
1. INTEGRATED WATER SUPPLY AND WASTE WATER DISPOSAL			
a. Freshwater quantity:			
Understanding the natural system			
201 - Monitoring groundwater levels		B	
202 - Onshore geological information			D
203 - Offshore geological information	A		
501 - Evapotranspiration processes		B	
*502 - Infiltration processes		B	
*801 - Surface hydrological accretion model		B	
*802 - Subsurface hydrological model	A		
Understanding man's water supply system			
*101 - Water usage data			C
108 - Man-induced surface charges		B	
*404 - Future industrial water requirements			D
*801 - Surface hydrological accretion model		B	
*802 - Subsurface hydrological model	A		
Effects of deficiencies			
*209 - Monitoring possible land subsidence			D
*602 - Salinity effects in bays	A		
705 - Impact of groundwater level changes	A		
Potential improvements			
*103 - Unit cost data	A		
410 - Improving water transport system design		B	
*807 - Feasibility of importing water	A		
808 - Feasibility of desalination			D
810 - Feasibility of leakage control			D
811 - Feasibility of evaporation control			C
812 - Feasibility of sewer infiltration control			C
815 - Feasibility of recharge by injection			C
816 - Feasibility of recharge by spray irrigation		B	
817 - Feasibility of recharge through storm basins		B	
818 - Feasibility of stream recharge	A		
819 - Feasibility of direct recycling of AWT effluent			D
*820 - Value judgments on water systems	A		

*Indicates project is entered at more than one place in this table.

TABLE B-1 Continued

	Relative Value of Results		
b. Freshwater quality:			
Understanding the natural system			
208 - Monitoring groundwater quality		B	
*502 - Infiltration processes		B	
503 - Movement of contaminants in groundwater		B	
*803 - Groundwater quality models		B	
Understanding man's waste water disposal system			
*101 - Water usage data			C
102 - Waste water inventory		B	
*404 - Future industrial water requirements			D
706 - Limit to cesspool sites			D
*803 - Groundwater quality models		B	
Potential improvements			
*103 - Unit cost data	A		
809 - Feasibility of iron removal			D
813 - Feasibility of AWT		B	
814 - Feasibility of packaged treatment plants			D
*820 - Value judgments on water systems	A		
c. Saltwater quality:			
Understanding the natural system			
206 - Water quality data bank			C
207 - Coastal water quality monitoring system	A		
*504 - Movement of contaminants in bays			C
505 - Movement of contaminants in ocean			D
*506 - Salinity changes in bays			D
*804 - Water quality models in bays	A		
805 - Water quality models in ocean			D
*806 - Predictive inlet models	A		
Understanding man's inputs			
*101 - Water usage data			C
104 - Ocean dumping data			C

*Indicates project is entered at more than one place in this table.

TABLE B-1 Continued

	Relative Value of Results
Effects of deficiencies	
406 - Information on water quality violations	B
601 - Contaminant effects in bays	B
*602 - Salinity effects in bays	A
603 - Toxic effects in the food chain	C
604 - Contaminant effects of ocean outfalls	A
605 - Contaminant effects of ocean dumping	C
606 - Contaminant effects of oil spills	D
*701 - General usage impacts	B
707 - Beach closures	C
Potential improvements	
407 - Adequacy of coliform standards	B
408 - Adequacy of bacterial pollution indices	D
409 - Adequacy of thermal discharge criteria	C
703 - Feasibility of opening shellfish areas	C
704 - Feasibility of requiring depuration	B
2. COAST STABILIZATION AND PROTECTION	
a. Understanding the value of the coast	
106 - Beach attendance data	C
107 - Coastal use survey	A
*110 - Inventory of major development plans	C
401 - Future travel times	C
402 - Future public values	C
405 - Future coastal usage	A
b. Other relevant data and knowledge	
*111 - Usage of dredged spoil areas	C
204 - Offshore sand inventory	A
*209 - Monitoring possible land subsidence	D
*504 - Movement of contaminants in bays	C
*506 - Salinity changes in bays	D
*806 - Predictive inlet models	A
c. Potential improvements	
*109 - Inventory of land use regulations	C
*607 - Effects of potholes	D
608 - Effects of inlets on biological exchange	C
*701 - General use impacts	B

*Indicates project is entered at more than one place in this table.

TABLE B-1 Continued

	Relative Value of Results
c. Potential improvements (continued)	
*821 - Feasibility of land use management techniques	B
*822 - Screening of dredging applications	A
*823 - Wetlands management	A
3. DREDGING	
a. Directly related	
*111 - Usage of dredged spoil areas	C
*205 - Wetlands classification and inventory	A
*607 - Effects of potholes	D
*804 - Water quality models in bays	A
*806 - Predictive inlet models	A
*822 - Screening of dredging applications	A
b. Indirectly related	
*109 - Inventory of land use regulations	C
*110 - Inventory of major development plans	C
*708 - Understanding wetland values	B
*821 - Feasibility of land use management techniques	B
*823 - Wetlands management	A
4. WETLANDS	
a. Directly related	
*205 - Wetlands classification and inventory	A
609 - Eelgrass control	D
610 - Ecology-productivity analysis of wetlands	C
*708 - Understanding wetland values	B
*822 - Screening of dredging applications	A
*823 - Wetlands management	A
b. Indirectly related	
*109 - Inventory of land use regulations	C
*110 - Inventory of major development plans	C
*111 - Usage of dredged spoil areas	C
*806 - Predictive inlet models	A
*821 - Feasibility of land use management techniques	B
5. OTHER PROBLEM AREAS	
105 - Survey of sports fish catch	D
403 - Offshore petroleum	B
702 - Fish diversity and density	C

*Indicates project is entered at more than one place in this table.

Relatively little weight was given to the remaining characteristics: type, supplementary data base, supplementary information, public interest, underway status, level of effort, breadth of applicability and potential sponsors. These entries have as their chief purpose a further description of the project and the provision of some advance insights as to the ease with which the proposed project might be funded and executed. Thus, a certain fortunate and worthwhile project might enjoy high public interest, be already underway, require a low level of effort, have widespread national appeal and be blessed with a long list of very interested potential sponsors. All these characteristics would lead to the anticipation that this project will be easy to get funded. That type of conclusion will be very significant next year when the Council begins implementing its program.

The priority here, however, is not influenced by this anticipated ease or difficulty of funding. Instead, as stated earlier, the priority rating reflects our suggestions as to the projects the Council should most desire to have accomplished to satisfy its leadership responsibilities for improving major policy, planning and action programs that relate prominently to Long Island's marine needs and environment.

Also note that whether a project is typed as "marine" or "marine-related" has little if any impact upon its priority rating. It is a common occurrence that the completion of a "marine-related" project, e.g., "Project 813 - Feasibility of AWT" by some non-marine oriented agency may be much more important to the Council than the completion of a "marine" project such as "Project 505 - Movement of contaminants in ocean."

Lastly, the forced-choice nature of the priority ratings should be empha ized. As mentioned earlier, we allowed only about a quarter of the projects to fall in each basic priority grouping—A, B, C, and D. In anticipation that a further delineation would be desired towards the top of the priority listing, we provided a finer gradation there, A+, A, A-, B+, B, B-.

Level of effort required. Entries are:

Small - probably less than $10K.
Low - probably between $10K and $100K.
Medium - probably between $100K and $1 million.
High - probably more than $1 million.

These entries are designated as S, L, M, H in Table B-2.

The overview nature of this effort, and the fact that the budget estimates for each project will be largely influenced by detailed work statements to be prepared by agencies having jurisdiction, render budgeting estimates somewhat premature. However, the scope of the projects—as reflected in the abstracts at the bottom of each individual project summary sheet—makes it feasible to enter a preliminary order-of-magnitude judgment of the level of funding that probably will be required. This entry is also significantly influenced by the earlier entries that described the adequacy of the supplementary data base and supplementary information.

Benefit/cost ratio. Entries are "High," "Low," or a dash to indicate not conspicuously high or low (designated as H, L, - in Table B-2). This entry is essentially a ratio of the previous two entries. Thus, a project rated "Highest" in terms of value and "Small" in terms of level of effort would clearly merit a "High" rating here.

Breadth of applicability. Entries are "Local," "State," "Regional," or "National" (designated as L, S, R, N, later in Table B-2). They reflect our judgment as to the highest level at which the results of the project would be applicable. For example, "Project 101 - Water usage data" contemplates the acquisition and integration of data that would help us understand how water is used and modified by man in the bicounty area. Even though the way that these data are acquired and integrated might be worthy of emulation in other coastal areas, the basic contribution of the project is to improve bicounty planning and project formulation. Hence, this project is coded "Local." On the other hand, any major advances in the technology of individual packaged treatment plants (Project 814) would have direct relevance to many communities throughout the nation. In the implementation of the Council's program next year, this characteristic can have substantial relevance. Everything else being equal, a demonstration that a given project has nationwide implications should enhance the chances of it receiving federal sponsorship and funding. Taking an opposite approach, for some national-level projects, the Council may choose to adopt the tactic of pinpointing where in the nation the relevant research is being undertaken and insuring that a liaison is established to facilitate the prompt transfer of new technologies to Long Island planners and policy formulators.

It should be emphasized that the entry here in no way reflects jurisdictions or interests of higher levels of government. Many projects identified as "Local" clearly merit federal and state support under well-established policies. Among the many

conspicuous examples that could be cited are the long-demonstrated federal and state interest in funding efforts to abate local pollution and to improve knowledge of the local aquifer.

Potential sponsors. Entered here are some sources of funding that should be considered.[1] Major federal sources are listed first, followed by progressively lower levels of government, and then foundations. No effort is attempted at this time to pinpoint the agency within the state or county governments, or the particular foundation, that might be interested. Once a program is adopted, this entry can be expanded in greater detail.

References. Entered here is a citation of the previous reports in this series, listed in Appendix A, that treat prominently of the need for the particular project being rated and provide additional background. The most relevant reference is underlined. Of course, there were numerous other references that contributed to the formulation of each project; these can be found by consulting the referenced feeder reports.

Priority. Entries are "A+, A, A-, B+, B, B-, C and D." This is the key entry. It reflects our recommendations of the projects the Council should most desire to have accomplished. It is influenced by the earlier entries in greatly varying degrees generally as follows:

The greatest weight was given to "Value of results": consequently, this characteristic dominated the eventual priority rating.

Also given some weight were the benefit/cost ratio and the feeder relationship. Theoretically, if several projects feed another which receives a high priority, the feeder projects should also merit at least an equally high priority. Strict adherence to this relationship, however, could cause the few highest priority slots to be monopolized by feeder-type projects—or conversely cause the priority of most of the interrelated feeder-fed projects to be suppressed to avoid such a monoply. It was, therefore, found desirable, notwithstanding the appearance of some paradox, to depart from this theoretically appealing approach. For example, "Project 818 - Feasibility of stream recharge" is given the highest priority (A+). One of its feeders, "Project 602 - Salinity effects in

[1] A list of origanizational abbreviations is included as Enclosure B-1.

bays," is also given an A+ priority, but another feeder project, "Project 601 - Contaminant effects in bays," is rated as B priority, despite its feeder relationship to Project 818. In this particular case, we felt that a much improved understanding of the significance of salinity changes was an inescapable input to Project 818. On the other hand, although knowledge of the significance of recharging the streams with waters of various degrees of quality was also very important, meaningful research on stream recharge feasibility could perhaps proceed based upon existing knowledge of water quality criteria, notwithstanding its major inadequacies.

Abstract. This is a synoptic description of the project. In all cases, the abstract begins with a terse statement of the objective of the project. Further information is often added on the importance of the project and some aspects of the work required. No attempt is made, however, to completely capture the background and rationale developed at varying length in the earlier project reports.

3.0 RECAPITULATION

Table B-2 is a summary recapitulation of all of the projects and how they are categorized.

4.0 INDIVIDUAL PROJECTS

Following Table B-2 is a project summary sheet for each individual project, listed in serial order.

TABLE B-2

SUMMARY OF PROJECT RATINGS

For explanations of codes used, see following pages.

		Type	Supplementary Data Base	Supplementary Information	Feeds	Fed By	Public Interest	Underway	By Whom	Value of Results	Level of Effort Required	Benefit/Cost Ratio	Breadth of Applicability	Potential Sponsors	References	Priority
101.	Water usage data	MR	2	1	801,804	—	L			C	L	—	L	Int.,counties, SCWA	gk	C
102.	Waste water inventory	MR	1	1	803,804,805	—	—			B	L	H	L	EPA, counties	gk	B
103.	Unit cost data	MR	2	2	807,808,810-819	410	—			A	L	H	L	HUD, NSRPB	gk	A+
104.	Ocean dumping data	M	1	1	603,605,805	—	L	✓	SUNY	C	L	—	R	EPA, Corps	bk	C
105.	Survey of sports fish catch	M	1	0	107	—	—			D	L	—	R	Int., NOAA	bk	D
106.	Beach attendance data	M	2	1	107,405	—	—			C	L	—	L	Int., counties	hk	C
107.	Coastal use survey	M	2	1	405	105,106	—	✓	TPC	A	L	H	L	HUD, NOAA/SG, Corps	hk	A
108.	Man-induced surface changes	MR	1	1	801,811	—	—			B	M	—	L	HUD, USGS	gk	B
109.	Inventory of land use regulations	M	3	2	405,821,823	—	L			C	S	—	L	HUD, NOAA/SG, NSRPB	hk	C
110.	Inventory of major development plans	M	3	2	405,821,823	—	L			C	L	—	L	HUD, NSRPB	hik	C
111.	Usage of dredged spoil areas	M	1	0	405,823	—	—			C	S	H	L	Corps, NSRPB	ik	C
201.	Monitoring groundwater levels	MR	1	1	802	—	H	✓	USGS, counties	B	M	—	L	USGS, counties	gk	B
202.	Onshore geological information	MR	1	1	802	—	L			D	M	—	L	USGS	gk	D
203.	Offshore geological information	M	1	0	802	—	L			A	M	—	L	USGS	gk	A
204.	Offshore sand inventory	M	1	0	—	—	L			A	L	H	L	Corps, NSRPB	hk	A-
205.	Wetlands classification and inventory	M	2	1	823	—	H	✓	SUNY, N.Y.State	A	M	—	L	N.Y.State, Int.,NOAA/SG	fijk	A+
206.	Water quality data bank	M	1	1	803,804,805	—	—	✓	Counties, SUNY	C	M	—	L	EPA, NOAA/NOS	fgh	C
207.	Coastal water quality monitoring system	M	2	0	804,805	—	H	✓	EPA	A	H	—	R	EPA	fgh	A+
208.	Monitoring groundwater quality	MR	1	1	803	—	H	✓	USGS, counties	B	M	—	L	USGS, counties	gk	B
209.	Monitoring possible land subsidence	MR	1	0	—	—	—			D	L	—	L	NOAA, Corps, USGS	bgk	D
401.	Future travel times	MR	1	0	405		L			C	L	—	L	HUD, Int.	k	C
402.	Future public values	MR	0	0	405,820,823		L			C	M	—	L	HUD, NSF, FF	k	C
403.	Offshore petroleum	M	1	1	405		H			B	M	—	R	Int.,NOAA	k	B+
404.	Future industrial water requirements	MR	1	0	410,801,803		L			D	L	—	L	Counties, HUD	gk	D
405.	Future coastal usage	M	1	1	410,821,823	(too numerous,see preceding)	—			A	M	—	L	HUD, NOAA/SG, Corps	hk	A
406.	Information on water quality violations	M	2	1	405,601		H			B	L	H	L	Counties, EPA	gk	B
407.	Adequacy of coliform standards	M	3	1	405	408	—			B	M	—	N	EPA	gk	B
408.	Adequacy of bacterial pollution indices	M	2	1	407		L			D	M	—	N	EPA, NSF	gk	D
409.	Adequacy of thermal discharge criteria	M	2	1	405		L	✓	SUNY	C	M	—	N	FPC	bfk	C
410.	Improving water transport system design	MR	2	2	103,404,405,807,816	—	—			B	L	H	N	Int.,HUD, SCWA	gk	B

	Type	Supplementary Data Base	Supplementary Information	Feeds	Fed By	Public Interest	Underway	By Whom	Value of Results	Level of Effort Required	Benefit/Cost Ratio	Breadth of Applicability	Potential Sponsors	References	Priority
501. Evapotranspiration processes	MR	1	0	801		L			B	M	—	N	USGS	gk	B
502. Infiltration processes	MR	1	1	802,803		L			B	M	—	N	USGS	gk	B
503. *Movement of contaminants in groundwater*	MR	1	1	803		H			B	H	—	N	USGS, NSF, EPA	gk	B
504. Movement of contaminants in bays	M	1	1	601,804,806	506,602	—			C	M	—	N	EPA, N.Y.State	egk	C
505. Movement of contaminants in the ocean	M	0	0	604,805	104	—			D	M	—	N	EPA, Corps, NOAA	egk	D
506. Salinity changes in bays	M	2	1	602,806		—			D	M	—	N	EPA, NOAA/SG	egk	D
601. Contaminant effects in bays	M	0	0	823	504,804	H			B	M	—	N	NOAA/SG, EPA, Int.	fgk	B-
602. Salinity effects in bays	M	1	1	818	506,804,806	H			A	M	H	N	NOAA/SG, EPA, Int.	fghk	A+
603. *Toxic effects in the food chain*	M	1	1	—	104,805	—	✓	Several	C	M	—	N	NSF, NOAA/SG, EPA	gk	C
604. Contaminant effects of ocean outfalls	M	0	0	807,813	805	H	✓	Nassau	A	M	H	N	Corps, EPA, NOAA/SG	gk	A+
605. Contaminant effects of ocean dumping	M	1	1	—	104,603,805	H	✓	SUNY, Corps, EPA	C	H	—	N	Corps, EPA, NOAA/SG	gk	C
606. *Contaminant effects of oil spills*	M	1	1	—		H			D	M	—	N	CG, EPA, NOAA/SG	bk	D
607. Effects of potholes	M	0	0	823		—			D	L	—	N	Corps, NOAA/SG	ik	D
608. Effects of inlets on biological exchange	M	1	0	823	805,806	—			C	M	—	N	Corps, EPA, NOAA/SG	hk	C
609. Eelgrass control	M	1	1	405,823		H			D	M	—	L	Agrl., Corps	bk	D
610. Ecology-productivity analysis of wetlands	M	1	0	823		L			C	M	—	L	N.Y.State, Int.,NOAA/SG	jk	C
701. General usage impacts	M	1	1	405		L			B	M	—	N	Int., NOAA/SG.	hk	B+
702. *Fish diversity and density*	M	3	1	823		H	✓	SUNY	C	H	—	N	NOAA/SG.,Int.	bk	C
703. Feasibility of opening shellfish areas	M	2	0	405,813,823		H			C	L	H	N	HEW, EPA, NOAA	k	C
704. Feasibility of requiring depuration	M	1	1	813		H			B	L	H	N	HEW, NOAA, EPA	k	B-
705. Impact of groundwater level changes	M	1	0	405		H			A	M	H	L	Corps, Int., EPA, HUD	gk	A
706. Limit to cesspool sites	MR	0	0	803		L			D	L	—	N	HUD, Counties	gk	D
707. Extent of beach closures	M	2	1	405		H			C	L	H	S	Counties, EPA, Int.	gk	C
708. Understanding wetland values	M	1	1	823		H			B	M	—	N	NSF, Int.,NOAA/SG	jk	B

EXPLANATION OF CODES

M=marine; MR=marine related
0=poor; 1=fair; 2=good; 3=outstanding
Public Interest: H=high; L=low
Underway: ✓=yes
Value of Results: A=highest; B=relatively high; C=relatively low; D=lowest

Level of effort required:
S=small; probably less than $10K
L=low; probably between $10K & $100K
M=med; probably between $100K & $1 mil.
H=high; probably more than $1 million

B/C ratio: H=high; L=low
Applicability: L=local; S=state; R=region; N=national
References: as listed in Appendix A

	Type	Supplementary Data Base	Supplementary Information	Feeds	Fed By	Public Interest	Underway	By Whom	Value of Results	Level of Effort Required	Benefit/Cost Ratio	Breadth of Applicability	Potential Sponsors	References	Priority
801. Surface hydrological accretion model	MR	2	2	802,803,804	101,108,404,501	L			B	M	—	L	USGS, HUD	g k	B
802. Subsurface hydrological model	MR	2	2	803,804,805	201-203,502,801	—	✓	USGS, MIT, BNL	A	M	—	L	USGS	g k	A-
803. Groundwater quality models	MR	1	0	804	*	—			B	H	L	L	USGS, EPA, NSF	g k	B
804. Water quality models in bays	M	2	1	601,602,806,823	*	—			A	H	—	R	EPA, Corps, NOAA	efghk	A-
805. Water quality models in the ocean	M	1	0	604,605	*	L			D	H	L	R	Corps, EPA, NOAA	efgk	D
806. Predictive inlet models	M	2	1	602,608,823	504,804	—			A	H	—	L	Corps,NOAA/SG, EPA	fhk	A
807. Feasibility of importing water	MR	2	2	—	103,410,604,801,802,803	—	✓	Corps	A	L	H	R	Corps, counties	gk	A+
808. Feasibility of desalination	MR	2	2	—	103,801,802,803	L	✓	Int./OSW	D	L	—	N	Int./OSW	gk	D
809. Feasibility of iron removal	MR	2	2	—	—	L			D	L	—	N	EPA, counties	gk	D
810. Feasibility of leakage control	MR	1	1	—	103,801,802	L			D	L	—	L	Counties	gk	D
811. Feasibility of evaporation control	MR	1	0	—	103,108,801,802	L			C	L	—	N	USGS, counties	gk	C
812. Feasibility of sewer infiltration control	MR	1	0	—	103,801,802	L			C	L	H	N	EPA, counties	gk	C
813. Feasibility of AWT	MR	2	1	—	103,604,703,704,815-819	H	✓	EPA	B	H	—	N	EPA	gk	A-
814. Feasibility of packaged treatment plants	MR	2	2	—	103,801,802,803,817	—	✓	EPA	D	M	—	N	EPA, HUD	gk	D
815. Feasibility of recharge by injection	MR	2	1	813	103,801,802,803,817-819	—	✓	EPA, Nassau	C	M	—	L	USGS, EPA	gk	C
816. Feasibility of recharge by spray irrigation	MR	1	1	—	103,410,801,802,803	H			B	H	—	N	EPA, Corps	gk	B
817. Feasibility of recharge through storm basins	MR	2	2	813	103,801,802,803	H	✓	Suffolk	B	M	—	L	Counties, HUD	gk	B
818. Feasibility of stream recharge	M	1	0	405,813,823	103,601,602,801,802,804	H	✓	Suffolk	A	M	H	L	Counties, EPA, NOAA	gk	A+
819. Feasibility of dir.recycling of AWT effluent	MR	1	0	813	103	L			D	M	—	N	EPA, HEW	gk	D
820. Value judgments on water systems	MR	0	0	807,814,816,817,819	402	L			A	L	H	L	NSF, HUD	gk	A+
821. Feasibility of land use management techniques	M	2	1	405,823	109,110,405	—			B	M	—	L	HUD, NOAA/SG, Corps	hk	B
822. Screening of dredging applications	M	3	1	405,823	—	H			A	L	H	N	Corps, EPA, NOAA	ik	A
823. Wetlands management	M	?	1	405	*	H			A	M	H	N	N.Y.State,Int.,NOAA/SG	ik	A

*Too numerous to list here; see previous column.

EXPLANATION OF CODES

M=marine; MR=marine related
0=poor; 1=fair; 2=good; 3=outstanding
Public Interest: H=high; L=low
Underway: ✓=yes
Value of Results: A=highest; B=relatively high; C=relatively low; D=lowest

Level of effort required:
S=small; probably less than $10K
L=low; probably between $10K & $100K
M=med.; probably between $100K & $1 mil.
H=high; probably more than $1 million

B/C ratio: H=high; L=low
Applicability: L=local; S=state; R=region; N=national
References: as listed in Appendix A

Project Summary Sheet

Project: 101 - Water usage data

Type	Marine related
Supplementary data base	Good
Supplementary information	Fair
Feeder relationship	Feeds 801,804*
Public interest	Low
Is project already underway?	No
Value of results	Relatively low
Level of effort required	Low - probably between $10K and $100K
Benefit/cost ratio	-
Breadth of applicability	Local
Potential sponsors	Int., counties, SCWA
References	gk
Priority	C

Abstract: The objective of this project is to collect, edit and correlate quantitative data that depict the flow of water through man's water supply and waste water disposal systems.

A significant effort towards this objective was developed in an earlier report [1g]. However, as that report emphasized, the data were developed from sources that varied significantly in quality, and a number of important assumptions had to be made.

Because of the importance of these basic data to suggested models (e.g., Project 801) and the significant perspectives that can emerge from analysis of the data, the basic data inputs deserve in-depth evaluation and improvement. Areas especially meriting improvement are:

- Total pumpage.
- Losses through leakage and undetected unauthorized uses.
- The disaggregation of water use between residential, industrial, and agricultural uses.
- The disaggregation of residential water disposal between treated sewage, untreated sewage, and other types of disposal such as sprinkling.
- The disaggregation of industrial water usage between treated and untreated sewage, cooling and other uses.
- The infiltration of groundwater into sewerage systems.
- The ultimate distribution of used water between the atmosphere, streams, bays, sound and ocean.

*801 - Surface hydrological accretion model
804 - Water quality models in bays

Project Summary Sheet

Project: 102 - Waste water inventory.

Type	Marine related
Supplementary data base	Fair
Supplementary information	Fair
Feeder relationship	Feeds 803,804,805*
Public interest	-
Is project already underway?	No
Value of results	Relatively high
Level of effort required	Low - probably between $10K and $100K
Benefit/cost ratio	High
Breadth of applicability	Local
Potential sponsors	EPA,counties
References	gk
Priority	B

Abstract: The objective of this project is to collect and consolidate information about residential, industrial and agricultural waste water discharges, to include their volumes, locations and representative constituents, sufficient to permit the results to be computerized and automotically processed.

During the preparation of an earlier report [1g], it was pointed out that the available information was too scattered and incomplete to portray quantitatively the concentrations of selected contaminants such as nitrogen, phosphorus, detergents or chlorides in waste water discharges or effluents. It is especially important to be able to trace forms of nitrogen because of its potential to contaminate aquifers and induce eutraphication in poorly flushed estuaries. Even though the quality of industrial discharges may be small, no quality and management perspectives can be formed concerning their disposal without a detailed source inventory (including characterization) of such discharges. Hence, this project.

This project is mainly in the nature of collecting, collating and publishing data on industrial waste discharges by the cognizant county departments. Therefore, the level of effort required is low. Very little sampling or laboratory analysis is foreseen although not ruled out.

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* 803 - Groundwater quality models
804 - Water quality models in bays
805 - Water quality models in the ocean

Project Summary Sheet

Project: 103 - Unit cost data

Type	Marine related
Supplementary data base	Good
Supplementary information	Good
Feeder relationship	Feeds 807,808,810-819; fed by 410*
Public interest	-
Is project already underway?	No
Value of results	Highest
Level of effort required	Low - probably between $10K and $100K
Benefit/cost ratio	High
Breadth of applicability	Local
Potential sponsors	HUD, NSRPB
References	gk
Priority	A+

Abstract: The objective of this project is to improve the accuracy and breadth of the unit cost data that are most relevant to evaluation of the economic aspects of alternative water supply-waste water disposal systems.

Alternative systems should be compared in many ways, one of which is on a cost basis. In a previous report [1g], a consistent set of unit costs were developed to facilitate cost analysis. Analysis based upon these unit costs indicated that the total cost of alternative solutions ranges between 10 and 13 billion dollars.

The magnitude of these total and differential costs justifies an in-depth review and improvement of the unit cost indices employed.

An improved, verified set of unit costs can greatly facilitate and unify economic comparisons associated with the feasibility studies proposed in the 800-series projects listed herein. For example, why allocate extensive research effort to testing the details of a proposed solution, if it can be rather easily demonstrated that, even at the best, the proposed solution is not competitive with other known tested solutions?

*807 - Feasibility of importing water
808 - Feasibility of desalination
810 - Feasibility of leakage control
811 - Feasibility of evaporation control
812 - Feasibility of sewer infiltration control
813 - Feasibility of AWT
814 - Feasibility of packaged treatment plants
815 - Feasibility of recharge by injection
816 - Feasibility of recharge by spray irrigation
817 - Feasibility of recharge through storm basins
818 - Feasibility of stream recharge
819 - Feasibility of dir. recycling of AWT affluent
410 - Improving water transport system design

Project Summary Sheet

Project: 104 - Ocean dumping data

Type	Marine
Supplementary data base	Fair
Supplementary information	Fair
Feeder relationship	Feeds 603,605,805*
Public interest	Low
Is project already underway?	Yes - SUNY
Value of results	Relatively low
Level of effort required	Low - probably between $10K and $100K
Benefit/cost ratio	-
Breadth of applicability	Region
Potential sponsors	EPA,Corps
References	bk
Priority	C

Abstract: The objective of this project is to collect data on the quantity and constituents of wastes being dumped into New York Bight and Long Island Sound with particular emphasis on toxic materials and nutrients.

A considerable quantity of solid wastes, including sludge originating principally from the New York metropolitan area, is being dumped in known disposal sites in New York Bight. U. S. Army Corps of Engineers, New York District has records of the quantities, locations and timings of the dumps, but little data appears to be available on the physical and chemical composition of the wastes being dumped. The marine waste deposits have been the subject of a research study at the State University of New York at Stony Brook. The program needs to be expanded to cover the inventory of all the wastes that are being dumped into the ocean.

*603 - Toxic effects in the food chain
605 - Contaminant effects of ocean dumping
805 - Water quality models in the ocean

Project Summary Sheet

Project: 105 - Survey of sports fish catch

Type	Marine
Supplementary data base	Fair
Supplementary information	Poor
Feeder relationship	Feeds 107*
Public interest	-
Is project already underway?	No
Value of results	Lowest
Level of effort required	Low - probably between $10K and $100K
Benefit/cost ratio	-
Breadth of applicability	Region
Potential sponsors	Int.,NOAA
References	bk
Priority	D

Abstract: The objective of this project is to determine the volume and value of the sports fish catch in Long Island waters. . Available data needs to be collected from widely scattered sources. Gaps will have to be filled by estimation, and the resulting estimates of total catch should be consolidated in a format comparable to the periodic commercial fish catch statistics issued by the National Marine Fisheries Services. What is needed is approximate volumes of the catch by major locations, species and season. A way for estimating values of the catch should be developed and used, probably based upon estimates of the total dollar and time expenditures of typical fisherman.

This project is given a relatively low priority because there does not yet appear to be a strong current demand for management of this fishery, despite the fact that its total "dollar value" probably will be found in this project to exceed that of commercial fishing in the area by several times over.

*107 - Coastal use survey

Project Summary Sheet

Project: 106 - Beach attendance data

Type	Marine
Supplementary data base	Good
Supplementary information	Fair
Feeder relationship	Feeds 107,405*
Public interest	-
Is project already underway?	Low
Value of results	Relatively low
Level of effort required	Low - probably between $10K and $100K
Benefit/cost ratio	-
Breadth of applicability	Local
Potential sponsors	Int., counties
References	hk
Priority	C

Abstract: The objective of this project is to collect and consolidate information on the attendance at all non-private beaches in the bi-county area, to include hourly fluctuations in attendance at major beaches and daily attendance at all beaches, sufficient to permit the results to be computerized and portrayed in map printouts.

Although information on the current recreational use of Long Island's beaches has been reported by several sources [1k], there is no single complete source of beach-by-beach attendance data collected and reported in a controlled manner. This type of information provides a necessary base for comprehensive recreation planning, and for other programs tied to recreational use, such as shore protection and water quality improvement.

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*107 - Coastal use survey
405 - Future coastal usage

Project Summary Sheet

Project: 107 - Coastal use survey

Type	Marine
Supplementary data base	Good
Supplementary information	Fair
Feeder relationship	Feeds 405; fed by 105,106*
Public interest	-
Is project already underway?	Yes- TPC
Value of results	Highest
Level of effort required	Low - probably between $10K and $100K
Benefit/cost ratio	High
Breadth of applicability	Local
Potential sponsors	HUD,NOAA/SG, Corps
References	hk
Priority	A

Abstract: The objective of this project is to develop a folio of large-scale maps identifying each significant coastal use location and summarizing selected usage data relating thereto. Data must be collected, collated and portrayed to depict the current intensity of major shoreline uses with particular emphasis on beach recreation, boating, aesthetic appreciation, conservation, fishing and residential, commercial and industrial development.

This project is given a high priority because of its fundamental input to coastal planning and policy formulation. It should be accomplished in a way that quickly develops the most important and available information and yet permits subsequent expansion to the extent of detail later judged to be rewarding.

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*405 - Future coastal usage
105 - Survey of sports fish catch
106 - Beach attendance data

Project Summary Sheet

Project: 108 - Man-induced surface changes

Type	Marine related
Supplementary data base	Fair
Supplementary information	Fair
Feeder relationship	Feeds 801,811*
Public interest	-
Is project already underway?	No
Value of results	Relatively high
Level of effort required	Medium - probably between $100K & $1 million
Benefit/cost ratio	-
Breadth of applicability	Local
Potential sponsors	HUD,USGS
References	gk
Priority	B

Abstract: The objective of this project is to evaluate the extent to which the changes man is making to the surface of Long Island are affecting evapotranspiration losses.

About half of the bi-county area's precipitation (the sole source of natural aquifer recharge) is lost as evapotranspiration. The loss is divided about evenly between evaporation losses and transpiration losses. Based upon a crude assessment of very inadequate data [1g], it appears that man may have already increased natural evaporation losses by as much as 40% and decreased natural transpiration losses by as much as a half. Since these two major changes tend to compensate each other the overall change in total evapotranspiration loss may not be great.

The very high magnitude of the water volumes involved and the inadequacy of current knowledge both point to the need for improved understanding. Evaporation and transpiration loss rates from various surfaces need to be confirmed. Data on past and current surface changes made by man need to be collected and their impact on evapotranspiration losses estimated. Against such a backdrop, the master plan should be evaluated in terms of estimating how its implementation could alter the annual replenishment of the aquifer.

Note: Man-induced changes can affect the area's water budget in ways other than those under consideration here, e.g., by sewering and irrigation. These significant losses are considered elsewhere. The project here is confined to an examination of how man-induced surface changes (deforestation, paving, etc.) affect evapotranspiration losses.

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*801 - Surface hydrological accretion model
811 - Feasibility of evaporation control

Project Summary Sheet

Project: 109 - Inventory of land use regulations

Type	Marine
Supplementary data base	Outstanding
Supplementary information	Good
Feeder relationship	Feeds 405,821,823*
Public interest	Low
Is project already underway?	No
Value of results	Relatively low
Level of effort required	Small - probably less than $10K
Benefit/cost ratio	-
Breadth of applicability	Local
Potential sponsors	HUD, NOAA,SG, NSRPB
References	hk
Priority	C

Abstract: The objective of this project is to develop and maintain a basic file of existing local regulations that pertain to the preservation, use and development of coastal lands.

All existing state, county and local zoning ordinances, building codes, orders and other land use regulations should be collected along with published policies on taxation, cost sharing, permits, and various forms of acquisition. This file should then be screened to extract and sort the elements that are most relevant to specified coastal planning issues. For example, all regulations that control beach development and use are very relevant to coastal stabilization and protection. Regulations that control occupancy of town beaches are relevant to coastal recreation. Regulations and policies that delineate the boundaries between private and public ownership and use are relevant to many coastal planning issues such as wetlands conservation.

This project should be accomplished in close coordination with the Nassau-Suffolk Regional Planning Board so as to build upon, rather than duplicate, the considerable work of this sort already done by the Board.

*405 - Future coastal usage
821 - Feasibility of land use management techniques
823 - Wetlands management

Project Summary Sheet

Project: 110 - Inventory of major development plans

Type	Marine
Supplementary data base	Outstanding
Supplementary information	Good
Feeder relationship	Feeds 405,821,823*
Public interest	Low
Is project already underway?	No
Value of results	Relatively low
Level of effort required	Low - probably between $10K and $100K
Benefit/cost ratio	-
Breadth of applicability	Local
Potential sponsors	HUD, NSRPB
References	hik
Priority	C

Abstract: The objective of this project is to develop an inventory of major plans that can affect the preservation, use and development of coastal lands.

The land use aspects of federal and state plans, the proposed bi-county master plan, town plans, and plans of major developers should be assembled and portrayed systematically in a folio of coastal planning maps.

The Regional Planning Board is envisioned as the logical agency to conduct this project since it is primarily an extension of work already done by the Board.

*405 - Future coastal usage
821 - Feasibility of land use management techniques
823 - Wetlands management

Project Summary Sheet

Project: 111 - Usage of dredged spoil areas

Type	Marine
Supplementary data base	Fair
Supplementary information	Poor
Feeder relationship	Feeds 405,823*
Public interest	-
Is project already underway?	No
Value of results	Relatively low
Level of effort required	Small - probably less than $10K
Benefit/cost ratio	High
Breadth of applicability	Local
Potential sponsors	Corps, NSRPB
References	ik
Priority	C

Abstract: The objective of this project is to obtain information on the intended future use of major dredged spoil areas.

As indicated in a previous report [1i], this type of information is often missing in applications for dredging permits, and without it the review of applications can not consider their compatibility with existing master plans.

The tasks envisioned in this project include, (1) ascertaining how major dredged spoil areas related to approved permits are currently being used or planned to be used and (2) coordinating with the regulatory and review agencies in order to have this type of information included in future applications.

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* 405 - Future coastal usage
823 - Wetlands management

Project Summary Sheet

Project: 201 - Monitoring groundwater levels.

Type	Marine related
Supplementary data base	Fair
Supplementary information	Fair
Feeder relationship	Feeds 802*
Public interest	High
Is project already underway?	Yes - USGS, counties
Value of results	Relatively high
Level of effort required	Medium - probably between $10K and 100K
Benefit/cost ratio	-
Breadth of applicability	Local
Potential sponsors	USGS, counties
References	gk
Priority	B

Abstract: The objective of this project is to expand, on a selective basis, the existing system of monitoring wells in order to improve knowledge of groundwater levels and the piezometric surface of the artesian aquifers.

The emphasis should be on additional wells which will delineate the Magothy aquifer water levels more clearly than they are known at present. The existing network of observation wells and associated observational programs of the Nassau and Suffolk Counties, the USGS and the New York State Department of Environmental Conservation are generally sufficient for providing data on gross water table changes, but they are not yet adequate to define the piezometric surfaces of the artesian aquifers. In order to verify whether the piezometric surfaces are lower than the water table in the center of the region (especially Nassau County) and higher near the coast, and in order to determine the flow patterns between different aquifers, more reliable data from an expanded network of monitoring wells are needed. The inadequacy of the present system in Suffolk County has been demonstrated by the Mid-Island Test Well Program water level survey.

The project envisages the construction of more than 150 wells in the region. The high value of the results for evaluating the ground water resources of Long Island coupled with the high cost of the project led to a B priority rating for this project.

*802 - Subsurface hydrological model

Project Summary Sheet

Project: 202 - Onshore geological information

Type	Marine related
Supplementary data base	Fair
Supplementary information	Fair
Feeder relationship	Feeds 802*
Public interest	Low
Is project already underway?	No
Value of results	Lowest
Level of effort required	Medium- probably between $10K and $100K
Benefit/cost ratio	-
Breadth of applicability	Local
Potential sponsors	USGS
References	gk
Priority	D

Abstract: The objective of this project is to determine more accurately the horizontal and vertical permeability rates in the Long Island aquifers and the locations of selected strata, especially the Gardiners clay.

In a previous report [1g], the need for better basic data on horizontal and vertical permeability rates and geological profiles was pointed out. For developing groundwater models, much better information than that available at present is needed on the locations of selected strata such as the "20-foot clay," Gardiners clay and the bottom sediments, (especially the Gardiners clay which partially seals off the Magothy aquifer from salt water and provides a boundary).

The tasks contemplated in this project include yield tests using mainly existing wells but adding a few additional wells at carefully selected sites to maximize the information in a cost effective way. Also, a few infiltration wells with sampling provisions at chosen vertical intervals, may be needed.

Since there is already some indication of the permeability characteristics and some onshore geological information and the value of the results will be in the nature of additions to and improvement of information, the project has been rated priority "D".

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*802 - Subsurface hydrological model

Project Summary Sheet

Project: 203 - Offshore geological information

Type	Marine
Supplementary data base	Fair
Supplementary information	Poor
Feeder relationship	Feeds 802*
Public interest	Low
Is project already underway?	No
Value of results	Highest
Level of effort required	Medium - probably between $10K and $100K
Benefit/cost ratio	-
Breadth of applicability	Local
Potential sponsors	USGS
References	gk
Priority	A

Abstract: The objective of this project is to determine the geological profile, at least to the bottom of the Magothy aquiter., off the south coast of western Suffolk County, giving particular attention to the location of the Gardiners clay.

Recently developed subsurface hydrological models have indicated that the threat of salt water intrusion is remote in terms of magnitude and imminence. The importance of this reassuring conclusion in formulating Long Island's water policies is hard to overstate. The conclusion must therefore be founded upon a very high degree of certainty. Currently, the major uncertainty is ignorance of offshore geology. The existance and location of the Gardiners clay, for example, currently has to be assumed. Errors in these assumptions can greatly influence the models' estimate of the current and future locations of the salt-water-freshwater interface, and of groundwater levels.

To gain the required knowledge, some combination of offshore seismic observations and borings will probably be required. Therefore, before major expenditures are made on this project, an initial scoping study should be required.

*802 - Subsurface hydrological model

Project Summary Sheet

Project: 204 - Offshore sand inventory

Type	Marine
Supplementary data base	Fair
Supplementary information	Poor
Feeder relationship	-
Public interest	Low
Is project already underway?	No
Value of results	Highest
Level of effort required	Low - probably between $10K and $100K
Benefit/cost ratio	High
Breadth of applicability	Local
Potential sponsors	Corps, NSRPB
References	hk
Priority	A-

Abstract: The objective of this project is to develop an inventory of offshore sand deposits usable for beach nourishment.

It is known generally that there are large deposits of sand off the coast of Long Island, particularly off the south shore. It is also known that it is feasible to use this sand for beach nourishment (1) when it is close to the recipient beach, (2) when the grain-size distribution characteristics of the sand fall within certain known ranges, (3) when the removal will not increase the energy that has to be dissipated by the beach, and (4) when ecological impacts are negligible. It is also reasonably predictable where major demand for beach renourishment or enhancement will occur.

This project seeks to correlate these considerations, and considerable field surveys, in a way that will indicate to public planners how realistic it is to think in terms of beach nourishment.

The project is given a high rating because of its impact on the achievability of the most often expressed soultion to Long Island's severe coastal stabilization problems.

Project Summary Sheet

Project: 205 - Wetlands classification and inventory

Type	Marine
Supplementary data base	Good
Supplementary information	Fair
Feeder relationship	Feeds 823*
Public interest	High
Is project already underway?	Yes - SUNY, N.Y. State
Value of results	Highest
Level of effort required	Medium - probably between $100K and $1 million
Benefit/cost ratio	-
Breadth of applicability	Local
Potential sponsors	N.Y. State, Int., NOAA/SG
References	fijk
Priority	A+

Abstract: The objective of this project is to develop a uniform, carefully-defined system for classifying wetlands and shoal areas, and to inventory the bi-county area in accordance with that system.

The classification system should (1) itemize the physical, chemical, biological and social (ownership, use, accessibility, etc.) descriptors; (2) select the descriptors that are most relevant to assessing existing and potential values (see Project 708); and (3) structure the descriptors in a sequence that permits an initial general description, to be made progressively more detailed as the sequence is completed. Definitional precision should be emphasized to permit the inventory to be developed progressively over time by different persons in a uniform, controlled way. Existing classification schemes used by the U.S. Fish and Wildlife Service and others identified in a previous study [1j] should be considered in developing the classification system.

Existing wetland studies should be collected and used to fill out the inventory framework. The information in these existing studies should be verified, updated and supplemented by spot checks on the ground and/or by aerial observation.

Remaining gaps in the inventory should be identified and assigned priorities. Consistent with the resources available, the inventory should be progressively completed in terms of those priorities.

Ways of identifying trends in wetland losses should be investigated, recommended and initiated (e.g. - screening of dredging applications, annual comparison of aerial photos, and periodic spot checks of selected parameters).

This project is given the highest priority because it provides the fundamental basis for managing wetlands (Project 823). Wetlands account for about 3-1/2% of the bi-county area's land surface.

*823 - Wetlands management

Project Summary Sheet

Project: 206 - Water quality data bank

Type	Marine
Supplementary data base	Fair
Supplementary information	Fair
Feeder relationship	Feeds 803,804,805*
Public interest	-
Is project already underway?	Yes - Counties, SUNY
Value of results	Relatively low
Level of effort required	Medium - probably between $100K and $1 million
Benefit/cost ratio	-
Breadth of applicability	Local
Potential sponsors	EPA,NOAA/NOS
References	fgh
Priority	C

Abstract: The objectives of this project are to collect, evaluate and collate existing data on the concentration of selected water quality parameters in marine surface waters and to integrate the data into a system capable of incorporating newer and better data.

This effort should be coordinated with the monitoring system for New York Bight and adjacent inshore waters currently being prepared for the U.S. Environmental Protection Agency (EPA), and Project 207 - Coastal water quality monitoring system.

The county departments and several academic institutions on Long Island have on-going marine surface water quality monitoring programs. There is no central data bank designed to provide historical and up-to-date water quality information pertaining to all marine surface waters in Long Island. Therefore, the existing programs may produce unnecessary duplication while failing to monitor critical parameters at critical times. The coastal water quality monitoring system (see project 207) is to b designed to furnish a system comprehensive enough to return data for surveillance and enforcement purposes. The data from the system should be processed on shore (smoothed, validated, analyzed) and stored in a data bank which should be computer-compatible. The design of the data bank should be flexible enough to add new water quality parameters as their monitoring becomes feasible. The design should also facilitate quick retrieval. The value of the data bank would be much enhanced if groundwater quality data could also be processed and stored. Efforts should also be directed towards this objective in the later phases of the project.

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*803 - Groundwater quality models
804 - Water quality models in bays
805 - Water quality models in the ocean

Project Summary Sheet

Project: 207 - Coastal water quality monitoring system

Type	Marine
Supplementary data base	Good
Supplementary information	Poor
Feeder relationship	Feeds 804,805*
Public interest	High
Is project already underway?	Yes - EPA
Value of results	Highest
Level of effort required	High - probably more than $1 million
Benefit/cost ratio	-
Breadth of applicability	Region
Potential sponsors	EPA
References	fgh
Priority	A+

Abstract: The objective of this project is to develop a coastal water quality monitoring system for selected marine surface waters such as the south shore bays, Long Island Sound and the vicinity of offshore dumping sites and outfalls.

A major objective in the multibillion dollar waste water collection, treatment and disposal program in the bi-county area is to maintain and improve the quality of coastal waters. Without a good water quality monitoring system, there is no reliable way of continuously appraising the growing success or failure of the program in meeting this objective.

The effective evaluation of water quality management programs in the region depends greatly on the scope, precision and accuracy of the characterization of both the waste sources and the receiving waters. Long-term information on the water quality is essential for:

- Identification and documentation of water quality law violations (see project 406 in this connection),
- Identification of short-term and long-term variations in water quality resulting from natural causes,
- Determination of impact of existing and planned waste discharges and other influencing activities on water quality.

The absence of long-term information on water quality makes it difficult, if not impossible, to establish a cause-effect relationship between an observed undesirable effect such as fish kills and possible contributing causes such as tidal exchanges or waste discharges. There is no evidence that the various monitoring attempts currently underway have been specifically designed for surveillance and enforcement requirements. Also, unless one can get a reasonably adequate description of the water quality on a continuing (both space and time) basis, many of the biological studies proposed here and elsewhere may fail to establish vital causal mechanisms. The lesson to be learned is to identify the coastal water quality monitoring needs in the light of existing and planned use, design a suitable monitoring network, and implement it without delay.

(cont'd)

Project 207 (Continued)

This project encompasses the planning, design and implementation phases. Although the planning and design will only be a medium-level effort (around $100 K), implementation will probably be a higher-level effort (over $1000 K). The planning and design phase should identify the site-specific water quality parameters to be monitored, survey existing monitoring capabilities, identify gaps and provide a flexible, cost-effective system as well as budget and implementation schedules. The project should be coordinated with the on-going work of EPA in New York Bight.

Because of the fundamental importance of the project and the very high value of the results to so many other projects in this and other programs in Long Island, the project is given the highest (A+) priority rating.

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* 804 - Water quality models in bays
805 - Water quality models in the ocean

Project Summary Sheet

Project: 208 - Monitoring groundwater quality

Type	Marine related
Supplementary data base	Fair
Supplementary information	Fair
Feeder relationship	Feeds 803*
Public interest	High
Is project already underway?	Yes - USGS, counties
Value of results	Relatively high
Level of effort required	Medium - probably between $100K and $1 million
Benefit/cost ratio	-
Breadth of applicability	Local
Potential sponsors	USGS, counties
References	gk
Priority	B

Abstract: The objective of this project is to expand the current system of collecting and analyzing water quality samples from selected wells because of their strategic locations and depths.

Particular attention should be given to monitoring the rate of travel of particulate and dissolved matter and depth of contamination in the center part of the interior recharge area. This project envisages data collection on water quality from an expanded network of monitoring wells, with particular emphasis on selected locations near recharge sites and population centers.

The existing water quality monitoring programs have helped the county engineers to recognize the shifting trends in groundwater quality such as increasing nitrate concentrations in groundwaters. However, the existing programs are too limited in scope and frequency to be of use in evaluating the effects of proposed actions such as accelerated sewering and waste water recharge into the ground. Specifically, the monitoring programs should cover possible additional pollutants such as C.O.D. detergents and phosphates as well as chlorides and some heavy metals. Also, the frequency of monitoring should be increased if one is to detect the effects of sewering or recharge, or of precipitation, stream flow and seasonal effects.

*803 - Groundwater quality models

Project Summary Sheet

Project: 209 - Monitoring possible land subsidence

Type	Marine related
Supplementary data base	Fair
Supplementary information	Poor
Feeder relationship	-
Public interest	-
Is project already underway?	No
Value of results	Lowest
Level of effort required	Low - probably between $10K and $100K
Benefit/cost ratio	-
Breadth of applicability	Local
Potential sponsors	NOAA, Corps, USGS
References	bgk
Priority	D

Abstract: The objective of this project is to provide a continuing evaluation of the possibility that land subsidence may become a problem on Long Island.

Land subsidence is a possible, increasingly common, irreversible phenomenon associated with groundwater drawdown. Appreciable drawdown has occurred in Nassau County since the introduction of sewers. Extensive additional sewering is contemplated for most of Long Island. The feasibility of recharge is currently being investigated but it has not yet been fully confirmed. Thus, the possibility for additional drawdown is high.

The granular structure of Long Island's subsoils and the apparent absence of any significant subsidence to date are reassuring. This project advocates that this assurance be periodically confirmed in a way that will provide timely warning if subsidence begins.

Existing geodetic records and control systems should be evaluated with the possibility of land subsidence in mind and their adequacy should be either confirmed or improved sufficiently to guarantee a highly-accurate detection of incipient trends.

Project Summary Sheet

Project: 401 - Future travel times

Type	Marine related
Supplementary data base	Fair
Supplementary information	Poor
Feeder relationship	Feeds 405*
Public interest	Low
Is project already underway?	No
Value of results	Relatively low
Level of effort required	Low - probably between $10K and $100K
Benefit/cost ratio	-
Breadth of applicability	Low - probably between $10K and $100K
Potential sponsors	HUD, Int.
References	k
Priority	C

Abstract: The objective of this project is to produce estimates of the most probable travel times between strategic points on Long Island (and adjacent areas) at different time horizons in the future.

It is a common observation on Long Island, and in other densely developed areas, that improvements in public transportation only produce temporary reductions in travel times; and that increasing usage rapidly nullifies the initial time savings.

In any evaluation of future demand and use of coastal resources, accessibility, as measured mainly by travel times, must be given prominent attention. For example, to assess the implications of the master plan and the growth rates associated with it on the intensity of coastal usage in the future, the transportation plan must first be converted into typical travel times.

Rather than saddle coastal planners (and almost all other planners) with developing these time relationships, it would appear that transportation planners should express the anticipated results of their planning in these useful terms and let coastal (and other) planners concentrate their efforts on interpreting the consequences of these changes in accessibility.

*405 - Future coastal usage

Project Summary Sheet

Project: 402 - Future public values

Type	Marine related
Supplementary data base	Poor
Supplementary information	Poor
Feeder relationship	405,820,823*
Public interest	Low
Is project already underway?	No
Value of results	Relatively low
Level of effort required	Medium - probably between $100K and $1 million
Benefit/cost ratio	-
Breadth of applicability	Local
Potential sponsors	HUD,NSF,FF
References	k
Priority	C

Abstract: The objective of this project is to provide insights as to likely future changes in public values insofar as they might affect major coastal uses.

Comprehensive planning for coastal areas, as for all areas, should be strongly influenced by efforts to perceive the future. Major factors that influence future demand have been identified [1k] as including trends associated with (1) resource availability, (2) demographic factors, (3) transportation, (4) affluence, (5) leisure time, (6) multi-use conflicts, (7) management controls, and (8) public values. Despite some problems, most of these factors can be estimated using established projections and technologies. The major unknown is the last, future public values.

This project anticipates that sociological techniques such as opinion sampling can provide some significant insights as to whether recent trends in public values are likely to be passing or permanent or something in between.

The conclusions developed by this type of research can hardly be expected to be precise. This project is given a high priority, however, based upon the conviction that almost any improvement in this area of major uncertainty is better than the often-unstated assumptions that must, in the absence of a better basis, be made intuitively by individual planners.

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*405 - Future coastal usage
820 - Value judgments on water systems
823 - Wetlands management

Project Summary Sheet

Project: 403 - Offshore petroleum

Type	Marine
Supplementary data base	Fair
Supplementary information	Fair
Feeder relationship	Feeds 405*
Public interest	High
Is project already underway?	No
Value of results	Relatively high
Level of effort required	Medium - probably between $100K and $1 million
Benefit/cost ratio	-
Breadth of applicability	Region
Potential sponsors	Int.,NOAA
References	k
Priority	B+

Abstract: The objective of this project is to determine the social, environmental and technological impacts upon Long Island (and northeastern United States) of alternative strategies for extracting, transporting, refining and distributing oil and gas in substantial quantities from anticipated sources off the north-east coast.

Currently it appears clear that there are substantial quantities of gas and oil off the northeast coast, generally in the vicinity of the Grand Banks. The mining of this source is receiving increasing discussion. The economic potential of this project in offsetting the region's chronic high-cost basic fuel needs is probably great. But the possibility of sustaining major environmental damages in a stormy part of the Atlantic near major shipping lanes must be very carefully assessed.

This project is given a high priority because of the potential of such mining to produce very great economic benefits and major environmental damage.

*405 - Future coastal usage

Project Summary Sheet

Project: 404 - Future industrial water requirements

Type	Marine related
Supplementary data base	Fair
Supplementary information	Poor
Feeder relationship	Feeds 410,801,803*
Public interest	Low
Is project already underway?	No
Value of results	Lowest
Level of effort required	Low-probably between $10K and $100K
Benefit/cost ratio	-
Breadth of applicability	Local
Potential sponsors	Counties, HUD
References	gk
Priority	D

Abstract: The objective of this project is to provide planning estimates of future industrial freshwater usage and waste water discharges.

With reasonable accuracy, consumption estimates of this type can be made for future residential and agricultural uses, which currently represent 72% and 5%, respectively of total usage [1g]. The remaining 23%, which represents industrial and major commercial uses, is much more difficult to estimate, even crudely. What is needed to shed necessary light on this significant usage sector is (1) to collect information on current levels and trends in industrial water usage and waste discharges, (2) to examine the master plan and estimate the nature of future industrial growth, (3) to consider possible technological impacts and regulatory trends, (4) to examine projections made for the North Atlantic Region Type 1 plan by the U.S. Department of Commerce, and (5) by adding considerable judgment, to produce a set of maximum-minimum-most probable projections of future demand in this sector.

*410 - Improving water transport system design
801 - Surface hydrological accretion model
803 - Groundwater quality models

Project Summary Sheet

Project: 405 - Future coastal usage

Type	Marine
Supplementary data base	Fair
Supplementary information	Fair
Feeder relationship	Feeds 410,821,823*
Public interest	-
Is project already underway?	No
Value of results	Highest
Level of effort required	Medium - probably between $100K and $1 million
Benefit/cost ratio	-
Breadth of applicability	Local
Potential sponsors	HUD, NOAA/SG, Corps
References	hk
Priority	A

Abstract: The objective of this project is to evaluate the relationships between the Nassau-Suffolk Comprehensive Development Plan and future usage of the coast. Needing assessment are (1) the impact of The Plan, and projections associated with its formulation, on the future demand for each major coastal use, especially recreation and land use, and (2) the adequacy of the coastal resource base to meet these future demands. Where probable deficiencies are thus identified, alternative solutions need to be conceived and evaluated, and action programs need to be formulated.

This extensive, in-depth project must display imagination in developing alternative solutions (always including "no action") and evaluating them in terms of costs, benefits, side effects and harmony with Long Island's future, as the latter is percieved in The Plan. Terms such as "costs" and "benefits" used here must be interpreted in their broadest sense to include market and non-market values, externalities, and incidence of the costs, benefits and side effects.

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* 410 - Improving water transport system design
821 - Feasibility of land use management techniques
823 - Wetlands judgment

Project Summary Sheet

Project: 406 -Information on water quality violations

Type	Marine
Supplementary data base	Good
Supplementary information	Fair
Feeder relationship	Feeds 405,601*
Public interest	High
Is project already underway?	No
Value of results	Relatively high
Level of effort required	Low - probably between $10K and $100K
Benefit/cost ratio	High
Breadth of applicability	Local
Potential sponsors	Counties, EPA
References	gk
Priority	B

Abstract: The purpose of this project is to ensure regular and periodic dissemination to the public, in a simple, easily-understood format, of the extent to which established water quality classifications are not currently being met.

Currently, it is difficult for even the most conscientious and motivated person on Long Island to develop an objective perception of the extent of the water pollution problem. Water quality violations are given wide and emotional attention in the press, but the prevalence of these abuses is not made clear. Contrary opinions are advocated by interested parties (e.g., Long Island Sound is "dead" or it is "healthy.") These disparate evaluations can probably never be simply resolved, but one important, defined, well-established tool for improving public understanding is not given adequate attention--systematic reporting of water quality classification violations.

All Long Island waters have been officially classified for certain uses and a set of criteria is associated with each use. Regular monitoring is being accomplished by the county governments and others.

It would, therefore, be feasible for the county governments to reach some conclusions as to where the assigned classifications are being violated. This information could be periodically reported in the press, probably in the form of an annotated map. The map would show locations where the assigned standards are not being met. To the extent considered feasible, supplementary information could portray the duration, areal extent, severity and causes of the violations.

The importance of providing this type of consolidated, objective assessment to the public and to professionals alike is the basis for the high priority assignment.

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*405 - Future coastal usage
601 - Contaminant effects in bays

Project Summary Sheet

Project: 407 - Adequacy of coliform standards

Type	Marine
Supplementary data base	Outstanding
Supplementary information	Fair
Feeder relationship	Feeds 405,601*
Public interest	High
Is project already underway?	No
Value of results	Relatively high
Level of effort required	Medium - probably between $100K and $1 million
Benefit/cost ratio	-
Breadth of applicability	National
Potential sponsors	EPA
References	gk
Priority	B

Abstract: The objective of this project is to evaluate the adequacy of the coliform criterion of 240 MPN/100ml now administratively employed in the bi-county area for judging the quality of marine waters for bathing purposes.

Although traditionally the coliform criterion for marine waters developed from public health considerations for shellfish harvesting, the same indicator has been used also for regulating contact recreation. However, there is less agreement on this criterion for contact recreation. For example, the nearby New England Interstate Sanitation Commission prescribes a maximum median limit of 700 MPN/100 ml, the Interstate Sanitation Commission uses 1000, the state standard is 2400, and the two counties employ an administrative standard of 240. The British do not use coliform standards for saltwater bathing; they have concluded that marine beaches can be used for bathing if the water is aesthetically acceptable. In view of the importance of ocean bathing as a recreational activity on Long Island (about 20 million visitor days annually in the bi-county area and about 50 million at nearby New York City beaches) and since the coliform standard now plays a key role in decisions on water quality suitability and waste water treatment programs, there is a need to reevaluate the criterion.

This project should establish relationships between the coliform levels and selected water quality variables, bather preferences, seasonal factors, user health, and coliform source characteristics. Substitution of possible alternative indices is also to be examined. The end result will be development of a rational basis for decision regarding suitability of a marine water for contact recreation.

*405 - Future coastal usage
601 - Contaminant effects in bays

Project Summary Sheet

Project: 408 - Adequacy of bacterial pollution indices

Type	Marine
Supplementary data base	Good
Supplementary information	Fair
Feeder relationship	Feeds 407*
Public interest	Low
Is project already underway?	No
Value of results	Lowest
Level of effort required	Medium - probably between $100K and $1 million
Benefit/cost ratio	-
Breadth of applicability	National
Potential sponsors	EPA, NSF
References	gk
Priority	D

Abstract: The objective of this project is to develop a more reliable, easily-measured and unambiguously-interpreted approach to measuring bacterial pollution then the coliform approach now employed.

Coliforms, as indicators of contact with human or animal wastes, suffer from limitations such as lack of fixed relationships to other water quality indicators, time-lag between sampling and availability of results for decision-making, and ambiguity of interpretation. Surface runoff, storm water runoff and a variety of other sources can contribute coliforms to receiving waters: so, it is not source specific. Also, attempts at differentiating fecal coliforms from non-fecal lead to more difficulties in interpretation. Administratively, there is no uniform coliform standard for determining the suitability of a marine surface water for bathing. (See also project 407 on 'adequacy of coliform standards').

For some years, efforts have been directed at developing better alternative indicators of bacterial pollution in water. There have been attempts at using different intestinal bacteria, algae or blood components for this purpose. Therefore, there is a need to review the "state-of-the-art," identify accomplishments and deficiencies, recommend and conduct the research, and develop this tool.

This would be a project of national significance and the level of effort required will be medium. The results are not expected to be available quickly.

*407 - Adequacy of coliform standards

Project Summary Sheet

Project: 409 - Adequacy of thermal discharge criteria

Type	Marine
Supplementary data base	Good
Supplementary information	Fair
Feeder relationship	Feeds 405*
Public interest	Low
Is project already underway?	Yes - SUNY
Value of results	Relatively low
Level of effort required	Medium - probably between $100K and $1 million
Benefit/cost ratio	-
Breadth of applicability	National
Potential sponsors	FPC
References	bfk
Priority	C

Abstract: The objective of this project is to evaluate the adequacy of existing criteria governing thermal discharges. Alternative heat dissipation objectives should be identified. Examples are (1) minimize the total heat entrainment in the water body and (2) minimize the aquatic temperature differential between the discharged water and the ambient water. Each objective should then be evaluated, to the extent possible, in terms of its importance to the ecology of Long Island Sound. The adequacy of existing and alternative heat dissipation criteria to foster the attainment of the most desirable objectives should then be evaluated to the extent possible, and recommendations for improvements should be made.

Note that this project does not include the much larger issues involving judgments as to how much society is willing to pay to avoid or minimize known or potential environmental effects. Its much more limited thrust is to recommend how heat dissipation criteria can be expressed to encourage the attainment of selected ecological objectives.

*405 - Future coastal usage

Project Summary Sheet

Project: 410 - Improving water transport system design

Type	Marine related
Supplementary data base	Good
Supplementary information	Good
Feeder relationship	Feeds 103,404,405,807,816*
Public interest	-
Is project already underway?	No
Value of results	Relatively high
Level of effort required	Low - probably between $10K and $100K
Benefit/cost ratio	High
Breadth of applicability	National
Potential sponsors	Int.,HUD, SCWA
References	gk
Priority	B

Abstract: The objective of this project is to investigate techniques for improving the design of water distribution and waste water collection systems in the Nassau and Suffolk counties, and demonstrate their application in cost effective design of such systems especially in developing areas.

In a previous report of this series [1g], it has been shown that the unit costs of an integrated water supply-waste water treatment-effluent disposal system for Long Island would amount to approximately $3000 per million gallons, the actual figure depending upon the alternative selected. Of this, nearly 55%, or more than half is the cost of transporting treated water and raw waste water between treatment plants and water users. The potential for cost savings in water distribution systems and sewerage systems is at least as great as, if not greater than in other parts of the system. Therefore, a modest investment in examining closely the design of such systems, especially for new developments and for capacity expansion in existing areas, is highly desirable.

The results of the project should include techniques for cost-effective sizing of components of water distribution and sewerage systems for selected location on Long Island. The techniques should be able to consider the normal diurnal variations in water use and also occasional peak loads such as fire-fighting use. Computer models of selected systems are needed as part of the project.

The value of the results of the project has been judged to be relatively high; therefore it is given a 'B' priority.

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*103 - Unit cost data
404 - Future industrial water requirements
405 - Future coastal usage
807 - Feasibility of importing water
816 - Feasibility of recharge by spray irrigation

Project Summary Sheet

Project: 501 - Evapotranspiration processes

Type	Marine related
Supplementary data base	Fair
Supplementary information	Poor
Feeder relationship	Feeds 801*
Public interest	Low
Is project already underway?	No
Value of results	Relatively high
Level of effort required	Medium - probably between $100K and $1 million
Benefit/cost ratio	-
Breadth of applicability	National
Potential sponsors	USGS
References	gk
Priority	B

Abstract: The objective of this project is to improve the adequacy of current knowledge about evaporation, transpiration and combined evapotranspiration processes and rates in the bi-county area.

The comprehensive project includes understanding the mechanisms of the processes as they apply to Long Island, determination of the parameters which are significant in controlling evapotranspiration losses, establishing cause-effect relationships and quantitative predictive models between the parameters and the losses, identification of control techniques, pilot studies at selected sites, study of the effectiveness of these techniques, and developing management tools for controlling this major hydrological loss amounting to about half of the precipitation falling on Long Island.

Although evaporation and transpiration have been studied extensively as basic processes in hydrology, their individual and combined effects are not known well enough to estimate or predict, except in an unacceptably crude way, the effects of this process which dominates Long Island's water budget.

As indicated in "Project 108 - Man induced surface changes", it is important for planners to know how the continuing development of Long Island might be affecting evapotranspiration losses. To do so adequately, the knowledge sought in this project will be necessary.

*801 - Surface hydrological accretion model

Project Summary Sheet

Project: 502 - Infiltration processes

Type	Marine related
Supplementary data base	Fair
Supplementary information	Fair
Feeder relationship	Feeds 802,803*
Public interest	Low
Is project already underway?	No
Value of results	Relatively high
Level of effort required	Medium - probably between $100K and $1 million
Benefit/cost ratio	-
Breadth of applicability	National
Potential sponsors	USGS
References	gk
Priority	B

Abstract: The objective of this project is to improve the adequacy of current knowledge of infiltration and percolation processes in the bi-county area.

Specific efforts are to be directed towards quantitative estimates of the rate of downward infiltration from the surface as well as the vertical and horizontal rates of water movement through the aquifers.

The results from this project are necessary for accurately building models of subsurface hydrological accretion and groundwater quality. The results, accordingly, are closely tied to questions of recharge feasibility, salt water intrusion, and impact of cesspools or individual household waste water disposal. Very little detailed and organized information on these important processes seems to exist currently pertaining to the Long Island aquifers. Therefore, site-specific information should be gathered on priority basis for areas in the central recharge belt and in the vicinity of population centers. Efforts, on a limited basis, are also to be directed at understanding the mechanisms of the constituent processes and causative factors. The value of the results of the project are expected to be high and it is given a 'B' priority rating.

* 802 - Subsurface hydrological model
803 - Groundwater quality models

Project Summary Sheet

Project: 503 - Movement of contaminants in groundwater

Type	Marine related
Supplementary data base	Fair
Supplementary information	Fair
Feeder relationship	Feeds 803*
Public interest	High
Is project already underway?	No
Value of results	Relatively high
Level of effort required	High - probably more than $1 million
Benefit/cost ratio	-
Breadth of applicability	National
Potential sponsors	USGS,NSF, EPA
References	gk
Priority	B

Abstract: The objective of this project is to improve the adequacy of current knowledge of the processes by which contaminants enter the aquifers, increase, move or decrease therein, and eventually leave the aquifer through seepage to surface water bodies, underflow to the bays or oceans, and through pumpage.

Primary emphasis should be placed on selected contaminants such as nitrogen compounds, phosphorus compounds, detergents, C.O.D., and pathogens.

Movement in groundwater is an important process governing the entry and loss of contaminants in the subsurface hydrologic cycle of Long Island. It needs to be studied in detail since it is closely tied to the following important questions:

1) To what extent does groundwater pumping affect water and contaminant movement in aquifers and saltwater intrusion?

2) To what extent do cesspools and septic tanks affect groundwater quality?

3) How feasible is the recharge of the aquifer by treated waste water through injection, spray irrigation or spreading over storm water basins?

This is conceived to be a large-scale effort which will identify and characterize the mechanisms of significant processes involved in the transformation of the selected contaminants in the aquifers, and describe their transport and distribution. The project will also identify and characterize the processes relevant to the feasibility study of total wastes recycling in Long Island being recommended in waste water disposal guidelines. The project will be both field- and laboratory-based and will among others include construction of a few observation wells at carefully selected locations with facilities for depth sampling.

The high value of the results coupled with the high level of effort and long-term nature of the project led to a 'B' priority rating.

*803 - Groundwater quality models

Project Summary Sheet

Project: 504 - Movements of contaminants in bays

Type	Marine
Supplementary data base	Fair
Supplementary information	Fair
Feeder relationship	Feeds 601,804,806; fed by 506, 602*
Public interest	-
Is project already underway?	No
Value of results	Relatively low
Level of effort required	Medium - probably between $100K & $1 million
Benefit/cost ratio	-
Breadth of applicability	National
Potential sponsors	EPA,N.Y. State
References	egk
Priority	C

Abstract: The objective of this project is to improve the adequacy of existing knowledge of the processes of suspension, transport and deposition that influence the ultimate fate of major sewage constituents, both conservative and non-conservative, in the bays.

The major sewage constituents would include nitrogen and carbon compounds, phosphorus, and parameters such as coliforms, dissolved oxygen, BOD, COD and total dissolved solids.

Knowledge of the rate of transport and decay, and distribution of the waste water constituents in the bays is generally poor. For instance, it is not known to what degree the contaminated groundwater from waste waters or solid waste sources is entering the coastal waters and affecting their quality. Although, as a matter of policy, no further waste water outfalls may be allowed in the bays, water quality there could be affected by overland runoff, groundwater upwelling or underflow, sediment suspension, tidal exchange, and existing discharges. There is, therefore, a continuing need for understanding the processes involved in contaminant movement in the bays.

Quantitative estimates of the transformation of the selected nutrient elements in the bays with a view to assessing their impact on water quality in the bays, should be attempted to a limited extent as part of the project. This project will draw substantial base data from projects 506 and 602 (Salinity changes and effects in bays) and provide input to projects 601 (Contaminant effects in bays), 804 (Bay water quality models) and 806 (Predictive inlet models). The processes of incorporation of the nutrient elements into the biomass and release therefrom are sought to be modeled, only to a very limited extent in this project, as visualized at this time.

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601 - Contaminant effects in bays
804 - Water quality models in bays
806 - Predictive inlet models
506 - Salinity changes in bays
602 - Salinity effects in bays

Project Summary Sheet

Project: 505 - Movement of contaminants in ocean

Type	Marine
Supplementary data base	Poor
Supplementary information	Poor
Feeder relationship	Feeds 604, 805; fed by 104*
Public interest	-
Is project already underway?	No
Value of results	Lowest
Level of effort required	Medium - probably between $100K and $1 million
Benefit/cost ratio	-
Breadth of applicability	National
Potential sponsors	EPA,Corps, NOAA
References	egk
Priority	D

Abstract: The objective of this project is to improve the adequacy of existing knowledge of the processes involved (including outfall design and dumping methods) in influencing the fate of major constituents of sewage and dumped wastes in the vicinity of ocean outfalls and ocean dumping sites.

The major waste water treatment plants in the region,such as the Wantagh plant in Nassau County and the Southwest Sewer District plant in Suffolk, are together scheduled to discharge between 75 and 150 mgd into the Atlantic Ocean in the near future. Dumping of waste sludge and solid wastes in the ocean is likely to continue at a high level unless a policy of inland disposal or complete recycling of all wastes is also adopted. In this context there is a need to understand and improve the knowledge about the movement of contaminants in the ocean, the primary emphasis being on selected, well-established contaminants.

The dispersion, deposition and resuspension of major constituents of wastes caused by hydrodynamic properties of the dumping or outfall sites, as well as the biochemical changes in the zone caused by the wastes disposal, are sought to be represented. The result of the project should be an operational program for predicting the fate of major waste constituents in the ocean surrounding a discharge site. The project will draw heavily on 104 (Ocean dumping) for waste source data and provide input to the projects on ocean water quality models (805) and contaminant effects in the ocean (604).

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* 604 - Contaminant effects of ocean outfalls
805 - Water quality models in the ocean
104 - Ocean dumping data

Project Summary Sheet

Project: 506 - Salinity changes in bays

Type	Marine
Supplementary data base	Good
Supplementary information	Fair
Feeder relationship	Feeds 504,602,806*
Public interest	-
Is project already underway?	No
Value of results	Lowest
Level of effort required	Medium - probably between $100K and $1 million
Benefit/cost ratio	-
Breadth of applicability	National
Potential sponsors	EPA,NOAA/SG
References	egk
Priority	D

Abstract: The objective of this project is to improve the adequacy of current knowledge of the mixing and flushing processes that influence salinity concentrations in a few selected bays such as Great South Bay and South Oyster Bay under potential changes in stream inflow and inlet size and location.

Spatial and temporal variations in current patterns and salinity distributions should be observed from historical records, predictive salinity models should be developed for the selected bays, and the models validated with observed data. The results should facilitate development of operational models, capable of subsequent integration with the projects on bay water quality models (804) and movement of bay contaminants (504).

This knowledge will improve the accuracy of models that predict changes in salinity levels (Projects 804 and 806) caused by potential natural causes (e.g., the storms which opened Moriches and Shinnecock Inlets) and potential human causes (e.g., inlet modification plans and various outfall plans).

The effects of mixing and flushing on salinity levels are likely to be bay-specific and are only generally understood. The most important factors (forcing functions) are the tidal flux through the coastal inlets and stream flow. Precipitation and evaporation are also significant, but upflow into the bay appears to be relatively minor (only about 5% of the total freshwater inflow) [lg].

A preliminary evaluation of the salinity record in some bays, the preferred and tolerable salinity levels of the biota of the bays, and the hydraulic forcing functions seem to indicate that the value of the results of the project for solving Long Island's marine resource problems can be rated 'D' although intrinsically, it would have a higher value at several places: for instance, where freshwater flow is relatively high compared to tidal exchange and where salinity sensitive marine species are commercially important.

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* 504 - Movement of contaminants in bays
602 - Salinity effects in bays
806 - Predictive inlet models

Project Summary Sheet

Project: 601 - Contaminant effects in bays

Type	Marine
Supplementary data base	Poor
Supplementary information	Poor
Feeder relationship	Feeds 823; fed by 504,804*
Public interest	High
Is project already underway?	No
Value of results	Relatively high
Level of effort required	Medium - probably between $100K and $1 million
Benefit/cost ratio	-
Breadth of applicability	National
Potential sponsors	NOAA/SG,EPA, Int.
References	fgk
Priority	B-

Abstract: The objective of this project is to estimate the most likely effects, on marine biota in the bays, of changes in a few selected significant water quality characteristics.

It is important to note the general way this objective is stated. From a different, completely rigorous, point of view, one could require precise, currently unavailable data on (1) the introduction and fates of pollutants from the atmosphere, streams, outfalls, underflows, and the ocean and (2) the numerous internal relationships within the bay ecosystem. Under such an approach, useful biological evaluation could be postponed indefinitely.

This project suggests a far less rigorous approach aimed at approximate answers only. The researcher is asked to assume certain reasonable ranges (maximum and minimum) of water quality descriptors, then highlight any points of great sensitivity within these ranges. For example, if probable variations in the levels of dissolved solids or coliforms within a certain definied area are not likely to be significant, the data collector, modeler, system analyst and designer can avoid unrewarding precision on these parameters in favor of greater precision in more sensitive parameters and locations.

Although all marine life is certainly interrelated, it may be desirable to focus attention on selected species such as the hard clam, oyster, menhaden, sea bass, starfish and oyster drill.

This project would merit an "A" priority if current trends towards ocean outfalls should be reversed towards increased use of in-bay outfalls.

*823 - Wetlands management
504 - Movement of contaminants in bays
804 - Water quality models in bays

Project Summary Sheet

Project: 602 - Salinity effects in bays

Type	Marine
Supplementary data base	Fair
Supplementary information	Fair
Feeder relationship	Feeds 818; fed by 506,804,806*
Public interest	High
Is project already underway?	No
Value of results	Highest
Level of effort required	Medium - $100K to $1 million
Benefit/cost ratio	High
Breadth of applicability	National
Potential sponsors	NOAA/SG,EPA, Int.
References	fghk
Priority	A+

Abstract: The objective of this project is to determine the effects upon marine biota of changes in salinity concentrations in the bays. All stages in the life cycles should be considered for selected species (e.g., the hard clam, oyster, menhaden, sea bass, starfish and oyster drill). Priority attention should be given to evaluating the effects of changes within the 25-35 ppt range over most of the major south shore bays and within the 0-25 ppt range in the immediate vicinity of inflowing streams.

This project is given the highest priority because of the importance of its conclusions in rationally formulating water supply and waste water disposal strategies. Additional expenditures of hundreds of millions of dollars might unnecessarily be incurred--or unwisely avoided--without the knowledge to be provided by this research project.

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818 - Feasibility of stream recharge
506 - Salinity changes in bays
804 - Water quality models in bays
806 - Predictive inlet models

Project Summary Sheet

Project: 603 - Toxic effects in the food chain

Type	Marine
Supplementary data base	Fair
Supplementary information	Fair
Feeder relationship	- fed by 104,805*
Public interest	-
Is project already underway?	Yes - Several
Value of results	Relatively low
Level of effort required	Medium - probably between $100K & $1 million
Benefit/cost ratio	-
Breadth of applicability	National
Potential sponsors	NSF,NOAA/SG,EPA
References	gk
Priority	C

Abstract: The objective of this project is to review in depth existing knowledge of the multiplication effects of introducing toxic material into the food chain and improve this knowledge sufficiently to make possible the rational surveillance and control of these materials as a part of all future waste disposal strategies.

Knowledge of the effects of pesticides, radionucleides and heavy metals on marine biota is mostly general as reported earlier [1k]. Some species, particularly the oyster, hard clam and fluke, concentrate some of these toxic substances; however, systematic knowledge of the multiplication effects of these concentrations throughout the complex marine food chain is yet to be gained. The state-of-the-art is thus not adequate to set rational water quality criteria with confidence.

Although the industrial waste water discharges containing persistent chemicals and toxic heavy metals, and agricultural discharges containing pesticides are relatively minor in Long Island in terms of total waste waters [1g], their significance could increase in the years to come under certain strategies for planned development.

In this project, both laboratory studies under controlled conditions and extensive field tests are envisaged. The effort will be of national significance and is, therefore, more logically undertaken by federal agencies.

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*104 - Ocean dumping data
805 - Water quality models in the ocean

Project Summary Sheet

Project: 604 - Contaminant effects of ocean outfalls

Type	Marine
Supplementary data base	Poor
Supplementary information	Poor
Feeder relationship	807,813; fed by 805*
Public interest	High
Is project already underway?	Yes - Nassau
Value of results	Highest
Level of effort required	Medium - probably between $100K and $1 million
Benefit/cost ratio	-
Breadth of applicability	National
Potential sponsors	Corps, EPA,NOAA/SG
References	gk
Priority	A+

Abstract: The objective of this project is to remove current uncertainties as to the widespread impacts of ocean outfalls on ocean ecosystems.

Opinion on the biological effects of discharging secondary effluent by ocean outfall is currently divided. Assuming the removal of toxic materials and floating solids, some view the secondary effluent as nutrients that will significantly benefit marine life by intentionally fostering eutrophic and upwelling conditions. Others hold that any waste water discharged into the ocean is undesirable.

Since ocean outfalls figure prominently in any evaluation of Long Island's waste water disposal policies, this important area of uncertainty badly needs major research attention at least to demonstrate the general relationships involved. To what order of magnitude extent does improved treatment have a payoff in terms of the ocean ecosystem?

*807 - Feasibility of importing water
813 - Feasibility of AWT
805 - Water quality models in the ocean

Project Summary Sheet

Project: 605 - Contaminent effects of ocean dumping

Type	Marine
Supplementary data base	Fair
Supplementary information	Fair
Feeder relationship	- fed by 104,603,805*
Public interest	High
Is project already underway?	Yes - SUNY, Corps, EPA
Value of results	Relatively low
Level of effort required	High - probably more than $1 million
Benefit/cost ratio	-
Breadth of applicability	National
Potential sponsors	Corps, EPA,NOAA/SG
References	gk
Priority	C

Abstract: The objective of this project is to determine the biological impacts of dumping sludge, and dredgings containing toxic materials, at designated off-shore sites with particular attention to effects outside the disposal areas.

The metropolitan area will continue to generate enormous quantities of these types of wastes, and the wastes will have to be disposed. Disposal alternatives must take into account a number of aspects--economic, social, political, aesthetic, as well as biological. Currently the least understood of these aspects is probably biological.

Many alternatives must be compared, e.g. inland disposal, incineration, AWT treatment, deep ocean and near shore ocean disposal, stopping all dredging, baling, etc. It is very easy to find major objections to every one of these alternatives, and yet at least one has to be practiced. To develop a balanced appreciation of the tradeoffs involved, the biological impacts need to be understood, at least in order-of-magnitude terms.

To give one example: even when the alternatives are narrowly defined (say to put all ocean dumpings in one concentrated area or to disperse them evenly over many areas), existing biological knowledge appears inadequate even to suggest a preference.

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* 104 - Ocean dumping data
603 - Toxic effects in the food chain
805 - Water quality models in the ocean

Project Summary Sheet

Project: 606 - Contaminant effects of oil spills

Type	Marine
Supplementary data base	Fair
Supplementary information	Fair
Feeder relationship	-
Public interest	High
Is project already underway?	No
Value of results	Lowest
Level of effort required	Medium - probably between $100K and $1 million
Benefit/cost ratio	-
Breadth of applicability	National
Potential sponsors	CG, EPA, NOAA/SG
References	bk
Priority	D

Abstract: The objective of this project is to resolve current uncertainties as to the most probable effects on marine life, other than on waterfowl , of oil spills in the vicinity of Long Island.

Extensive research on this subject has been done nationally with surprisingly different conclusions tending to polarize at the extremes (insignificant threat, very temporary at worst--or--perhaps the most critical threat to marine ecology known today).

The Long Island Sound will probably continue to be a major artery for the coastal transport of petroleum projects. Ambitions plans have been proposed by some for regional petroleum offloading facilities in Long Island Sound and for petroleum production off the Atlantic Coast. It, therefore, seems important that additional research be conducted to better characterize the biological significance of oil spills. The results of such research should provide a major input to the trade-off decisions that are anticipated in the future.

Project Summary Sheet

Project: 607 - Effects of potholes

Type	Marine
Supplementary data base	Poor
Supplementary information	Poor
Feeder relationship	Feeds 823*
Public interest	-
Is project already underway?	No
Value of results	Lowest
Level of effort required	Low - probably between $10K and $100K
Benefit/cost ratio	-
Breadth of applicability	National
Potential sponsors	Corps, NOAA/SG
References	ik
Priority	D

Abstract: The objective of this project is to determine the circumstances in which, out of consideration of marine life, the granting of a dredging permit should direct or encourage the permittee to avoid leaving (or leave) potholes on the dredged bottom.

As indicated in a previous report [1k], some research has concluded that potholes are pollutant traps and very harmful to marine life. Other research has concluded that potholes are very desirable habitats for some species of fish. Usually, dredging operations can be easily regulated so as to produce or not produce potholes, but intelligent use of this option will remain unexploited until current understanding is improved to the extent that the desired configuration can be determined without extensive ecological investigation in each individual instance.

*823 - Wetlands management

Project Summary Sheet

Project: 608 - Effects of inlets on biological exchange

Type	Marine
Supplementary data base	Fair
Supplementary information	Poor
Feeder relationship	Feeds 823; fed by 805,806*
Public interest	-
Is project already underway?	No
Value of results	Relatively low
Level of effort required	Medium - probably between $100K and $1 million
Benefit/cost ratio	-
Breadth of applicability	National
Potential sponsors	Corps, EPA, NOAA/SG
References	hk
Priority	C

Abstract: The objective of this project is to determine the effects of inlet characteristics in promoting biological interchange between the oceans and embayments. Knowledge of the possible implications of various inlet configurations, jetties and currents, on the passage of floating eggs, larvae, young fish and predators would be useful when inlet stabilization works and maintenance plans are being prepared.

In addition to a thorough search of existing literature and research efforts, it will probably be necessary to establish some controlled observations, perhaps of "before and after" conditions at sites where man-made and natural changes are likely.

*823 - Wetlands management
805 - Water quality models in the ocean
806 - Predictive inlet models

Project Summary Sheet

Project: 609 - Eelgrass control

Type	Marine
Supplementary data base	Fair
Supplementary information	Fair
Feeder relationship	Feeds 405,823*
Public interest	High
Is project already underway?	No
Value of results	Lowest
Level of effort required	Medium - probably between $100K & $1 million
Benefit/cost ratio	-
Breadth of applicability	Local
Potential sponsors	Agr., Corps
References	bk
Priority	D

Abstract: The objective of this project is to examine alternative methods of controlling the growth and spread of eelgrass and to develop a plan for employing these methods.

The idea is not only to determine feasible methods of control, but also to evaluate whether, how and to what extent these methods should be employed. To be considered here are the frequently-conflicting needs of fishermen, boaters, shore residents and other shoreline users. Possible plans will vary with location. For example, in some places, there may be compelling net benefits in completely eliminating this "pest" and in other locations its growth might be stimulated to improve its habitat and nutrient values. The cost and side effects of various methods of control will also influence control plans.

As indicated in a previous report [1b], the severity of this problem is perceived with greatly different intensity by various classes of affected residents. This project is an attempt to achieve a solution that will undoubtedly involve tradeoffs between biological and social sensitivities.

*405 - Future coastal usage
823 - Wetlands management

Project Summary Sheet

Project: 610 - Ecology-productivity analysis of wetlands

Type	Marine
Supplementary data base	Fair
Supplementary information	Poor
Feeder relationship	Feeds 823*
Public interest	Low
Is project already underway?	No
Value of results	Relatively low
Level of effort required	Medium - probably between $100K and $1 million
Benefit/cost ratio	-
Breadth of applicability	Local
Potential sponsors	N.Y. State, Int., NOAA/SG
References	jk
Priority	C

Abstract: The objective of this project is to evaluate the ecological contribution of Long Island wetlands by type and location.

The productivity of Atlantic coast wetlands has been gauged by the annual production of smooth cordgrass in tons dry weight per acre. On this basis, productivity appears to diminish sharply from south to north, but no thorough ecology-productivity study on Long Island has apparently been conducted on this basis or on any important alternative basis. Data on "estuarine-relationships" (percentage of the annual commercial fish catch that is composed of species that inhabit estuaries during any phase of their life cycles) indicates that this relationship also falls off sharply from south to north, although it is still strong as far north as Long Island.

These and other relationships more directly tied to Long Island's wetlands should be determined and measured.

This project is closely related to the preservation and enhancement of wetland values, many of which hinge rather directly upon the contribution of wetlands to the local and regional ecology.

*823 - Wetlands management

Project Summary Sheet

Project: 701 - General usage impacts

Type	Marine
Supplementary data base	Fair
Supplementary information	Fair
Feeder relationship	Feeds 405*
Public interest	Low
Is project already underway?	No
Value of results	Relatively high
Level of effort required	Medium - $100K to $1 million
Benefit/cost ratio	-
Breadth of applicability	National
Potential sponsors	Int., NOAA/SG
References	hk
Priority	B+

Abstract: The objective of this project is to improve existing knowledge of the relationships between selected coastal uses and the coastal characteristics controllable by man.

Both man and nature are changing existing coastal characteristics significantly. Examples are water quality, beach size and composition, wetland characteristics, aesthetic factors, degree of surf action, and many others.

This project seeks to identify these changing characterisitcs, their locations, magnitudes and rate of change and then estimate what difference these changes will make in the intensity and quality of major human coastal uses, such as fishing, recreation, aesthetic appreciation and residential development.

Initially, the evaluation will be highly structured and somewhat abstract, but this conceptual approach should be developed only to the extent that it can assist in pinpointing unwelcome changes or opportunities for enhancement.

It should be noted that, as broad as this project is, the quality of the coastal resource is only one of several major determinants of coastal usage. See, for example, Project 402 and the further development of this general theme under Categories IV and VII of the state-of-the-art report [1k].

*405 - Future coastal usage

Project Summary Sheet

Project: 702 - Fish diversity and density

Type	Marine
Supplementary data base	Outstanding
Supplementary information	Fair
Feeder relationship	Feeds 823*
Public interest	High
Is project already underway?	Yes, by SUNY
Value of results	Relatively low
Level of effort required	High - probably more than $1 million
Benefit/cost ratio	-
Breadth of applicability	National
Potential sponsors	NOAA/SG., Int.
References	bk
Priority	C

Abstract: The objective of this project is to determine the causes of major annual fluctuations in the populations of various species observed in coastal waters.

Substantial variations in fish abundance are rather clearly implied by the great fluctuations in the total commercial catch and even greater fluctuations in individual species. The demise of the oyster is a well-known example. Although these fluctuations have been well documented for years, the reasons for them are still largely speculation. Possible causes sometimes cited include (1) problems of the industry itself, (2) overfishing (3) minor water temperature changes, (4) disease, (5) predators, (6) "natural" biological fluctuations, and (7) pollution. The relationship between waste disposal and fish abundance, except in obviously extreme cases, is poorly known.

In this project, the available evidence should be assembled and attempts should be made to establish correlations with fish abundance.

This project is given a middle priority because, although the importance of getting answers is high, the likelihood of getting them unfortunately appears low.

*823 - Wetlands management

Project Summary Sheet

Project: 703 - Feasibility of opening shellfish areas

Type	Marine
Supplementary data base	Good
Supplementary information	Poor
Feeder relationship	Feeds 405, 813, 823*
Public interest	High
Is project already underway?	No.
Value of results	Relatively low
Level of effort required	Low - probably between $10K and $100K
Benefit/cost ratio	High
Breadth of applicability	National
Potential sponsors	HEW, EPA, NOAA
References	k
Priority	C

Abstract: The objective of this project is to evaluate the likelihood of opening areas currently closed to shellfish harvesting, if anticipated wastewater treatment and boat pollution programs are completely implemented.

The criteria for rating shellfish areas have been prescribed and the people who must interpret these criteria are available for interview. Programs for upgrading wastewater treatment and abating boat pollution have generally been announced or can be postualted in terms of several likely alternatives.

This project seeks analysis of the question, "If _____ is done as planned (or postulated), what will be the most probable effect on shellfish harvest areas?".

Detailed answers would probably require expensive, sophisticated modeling and many years of research. However, no such precision is advocated for this project. Very helpful answers ought to be attainable using currently-available knowledge.

*405 - Future coastal usage
813 - Feasibility of AWT
823 - Wetlands management

Project Summary Sheet

Project: 704 - Feasibility of requiring depuration

Type	Marine
Supplementary data base	Fair
Supplementary information	Fair
Feeder relationship	Feeds 813*
Public interest	High
Is project already underway?	No.
Value of results	Relatively high
Level of effort required	Low - probably between $10K and $100K
Benefit/cost ratio	High
Breadth of applicability	National
Potential sponsors	HEW, NOAA, EPA
References	k
Priority	B-

Abstract: The objective of this project is to evaluate the proposition that all shellfish from Long Island waters should be depurated and that commercial fishermen should receive a public subsidy for the increased cost.

The highest water quality standards (SA) are prescribed for areas in which the harvesting of shellfish for direct human consumption is permitted. It is known that shellfish grow and even thrive in waters of lesser quality. Depuration techniques have been well developed for purging shellfish from lower water quality areas so that they can be marketed. Since the individual fishermen currently feel the brunt of this society-inflicted pollution, the alternative suggested here should be considered:

(1) As a public safeguard -- something like the pasteurization of milk -- require all shellfish to be depurated before marketing, with adequate safeguards against breakdown of depuration.

(2) Accept Class SB waters (suitable for bathing).

(3) Subsidize commercial fisherman for the added cost of depuration as an equitable redress for a society-inflicted harm.

The cost of the subsidy should be compared with the added cost of upgrading from SB to SA waters (see Project 703), and any additional public health safeguards that might accrue.

*813 - Feasibility of AWT

Project Summary Sheet

Project: 705 - Impacts of groundwater level changes

Type	Marine
Supplementary data base	Fair
Supplementary information	Poor
Feeder relationship	Feeds 405*
Public interest	High
Is project already underway?	No
Value of results	Highest
Level of effort required	Medium - probably between $100K and $1 million
Benefit/cost ratio	High
Breadth of applicability	Local
Potential sponsors	Corps, Int., EPA, HUD
References	gk
Priority	A

Abstract: The objective of this project is to identify the potential impacts of changes in groundwater levels and evaluate their significance.

Various strategies for meeting the bi-county area's water supply and waste water disposal needs will lower, stabilize or even raise existing groundwater levels. Without recharge or importation, for example, an extensive sewer program is certain to lower groundwater levels, probably to the extent of substantially drying up existing freshwater lakes and streams in heavily populated areas in several decades. An alternative strategy, the importation of water from the mainland, can cause existing water levels to rise somewhat.

The biological, recreational and aesthetic impacts of this range of potential changes badly needs to be evaluated as a basic contribution to important public policy decisions. (Note that Project 602 is particularly relevant to this evaluation.)

*405 - Future coastal usage

Project Summary Sheet

Project: 706 - Limit to cesspool sites

Type	Marine related
Supplementary data base	Poor
Supplementary information	Poor
Feeder relationship	Feeds 803*
Public interest	Low
Is project already underway?	No
Value of results	Lowest
Level of effort required	Low - probably between $10K and $100K
Benefit/cost ratio	-
Breadth of applicability	Narional
Potential sponsors	HUD, Counties
References	gk
Priority	D

Abstract: The objective of this proposal is to estimate the limit on the number of successive cesspool or septic tank locations that representative plots of residential property can accommodate.

Cesspools and septic tanks (henceforth "cesspools" for short) must be cleaned out frequently and reconstructed in new locations less frequently when the filtering capacity of the site is exhausted. With a minimum of sampling, the frequency of reconstruction can be approximated for typical conditions. Some observations are needed on the recovery rate of abandoned cesspool sites. Analyzing the information gathered on the frequency of reconstruction, the recovery rate of abandoned cesspool sites and the usable areas of typical sites (mostly residential) ought to yield some very useful insights to planners and policy makers as to just how temporary (or permanent) cesspools are as practical solutions.

The limited nature of this project is stressed. It makes no pretentions to investigate the effects on the aquifer, economics, etc. It merely seeks, with a minimum of effort, to define in an approximate way one factor in evaluating cesspools -- the physical limitations of the site over years.

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*803 - Groundwater quality models

Project Summary Sheet

Project: 707 - Extent of beach closures

Type	Marine
Supplementary data base	Good
Supplementary information	Fair
Feeder relationship	Feeds 405*
Public interest	High
Is project already underway?	No
Value of results	Relatively low
Level of effort required	Low - probably between $10K and $100K
Benefit/cost ratio	High
Breadth of applicability	State
Potential sponsors	Counties, EPA, Int.
References	gk
Priority	C

Abstract: The objective of this project is to assemble and evaluate information on the number, location and duration of beach closures in the bi-county area, the criteria and data employed in making the closure decisions, and the impacts on health and recreation.

Information on beach closures ought to be easily collected from local agencies. Its consolidation and dissemination should provide very useful perspectives on the degree which pollution abatement plans can help meet projected demands for beach recreation.

Health impacts will be harder to evaluate. As a minimum, a systematic effort should be made to collect and document all reports of illness ascribed to bathing in contaminated sea water anywhere on Long Island, including Kings and Queens counties.

*405 - Future coastal usage

Project Summary Sheet

Project: 708 - Understanding wetland values

Type	Marine
Supplementary data base	Fair
Supplementary information	Fair
Feeder relationship	Feeds 823*
Public interest	High
Is project already underway?	No
Value of results	Relatively high
Level of effort required	Medium - probably between $100K and $1 million
Benefit/cost ratio	-
Breadth of applicability	National
Potential sponsors	NSF, Int.,NOAA/SG
References	jk
Priority	B

Abstract: The objective of this project is to develop a comprehensive list of beneficial uses of wetlands and quantitatively estimate how specific Long Island wetland complexes provide these benefits.

The list of beneficial uses should include, but not be limited to (1) environmental enhancement such as nutrient recycling, nursery and wildlife habitat, upland protection and open sapce; (2) social enhancement such as visual aesthetics, nature appreciation and certain forms of recreation; and (3) land enhancement for residential, commercial, industrial and recreational development. Note that some of these uses are incompatible with some others.

Existing wetlands in the bi-county area should be grouped into complexes that reflect generally similar characteristics and values. Examples might be (1) wetlands on the bay (north) side of Fire Island, or (2) wetland islands along the south shore of Nassau County.

Each complex should be analyzed in terms of the beneficial uses derived above. The benefits should be quantified, preferably in terms of dollar value. For example, "Upland protection" is meaningful but too general; "Reduces area inundated by 5-year storm by amount shown on map" is better because it is quantified; "Reduces average annual inundation damages along this reach by $___" is even better because it quantifies the benefit in terms of the most frequently used common denomination - - - dollars.

This project is given a fairly high priority because of the need to sharpen understanding of how wetland areas contribute to social, economic and environmental values. Without such a foundation, major decisions on the management, preservation, use, enhancement or development of wetland areas will be largely intuitive.

*823 - Wetlands management

Project Summary Sheet

Project: 801 - Surface hydrological accretion model.

Type	Marine related
Supplementary data base	Good
Supplementary information	Good
Feeder relationship	Feeds 802, 803, 804; fed by 101,108,404,501*
Public interest	Low
Is project already underway?	No
Value of results	Relatively high
Level of effort required	Medium - probably between $100K and $1 million
Benefit/cost ratio	-
Breadth of applicability	Local
Potential sponsors	USGS, HUD
References	gk
Priority	B

Abstract: The objective of this project is to develop a mathematical model that will integrate existing and developing information on natural hydrological phenomena, man's surface changes, and man's water supply and waste water disposal systems.

Considerable information of this type of irregular quality, is available from several sources, and a number of feeder projects are intended to improve the adequacy of this information. A simple model for interpreting the information was developed in an earlier report [1g] and the model's utility as a tool for analyzing alternative water supply-waste water disposal approaches was briefly illustrated.

This project seeks a further development of that model in computerized form. Further development could take the form of (1) improving the consistency and accuracy of data entries, (2) increasing the depth of categorization, and (3) providing important geographic distinctions not ascertainable in the single total-water-budget area model.

This model is intended to bring out the interrelationships between area rainfall patterns; evapotranspiration losses now and as influenced by master plans; storm basin recharge; stream runoff; various water conservation, sewering and recharge strategies; intra-island water transfers, and the like.

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*802 - Subsurface hydrological model
803 - Groundwater quality models
804 - Water quality models in bays
101 - Water usage data
108 - Man-induced surface changes
404 - Future industrial water requirements
501 - Evapotranspiration processes

Project Summary Sheet

Project: 802 - Subsurface hydrological models

Type	Marine related
Supplementary data base	Good
Supplementary information	Good
Feeder relationship	Feeds 803,804,805; fed by 201-203,502,801*
Public interest	-
Is project already underway?	Yes - by USGS, MIT GNL
Value of results	Highest
Level of effort required	Medium - probably between $100K and $1 million
Benefit/cost ratio	-
Breadth of applicability	Local
Potential sponsors	USGS
References	gk
Priority	A-

Abstract: The objective of this project is further development and improvement of existing hydrological models of the Long Island aquifer such as the Hele-Shaw model, Battelle model and the USGS family of groundwater models, with a view to evaluate the impact of surface hydrological accretion changes on groundwater levels and saltwater infiltration.

This project is of fundamental importance in answering questions connected with groundwater levels and flows. There is already a growing family of groundwater models applied to the Long Island aquifer. The more sophisticated multi-layer, 2-dimensional models of the aquifer under construction at USGS should be adequate for most planning purposes. However, the feasibility of 3-dimensional models in near-shore areas, suited for accurately computing heights and rate of movement of salt water in the aquifer immediately adjacent to the shoreline, at critical zones such as southwest Nassau County, under alternative strategies needs to be examined. This project in part, should address that need. The high value of the results, coupled with the fact that we have several existing models led to an A- priority rating.

Continuation of on-going analog model work insofar as accurate delineation of groundwater levels and flow rates are concerned (under varying accretion rates, permeability rates, drawoff rates and surface changes) is a part of the project. Also to be emphasized is the development of digital computer simulation models which have greater flexibility and which can be easily adapted to areas of special concern such as recharge sites to provide answers in finer detail.

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*803 - Groundwater quality models
804 - Water quality models in bays
805 - Water quality models in the ocean
201 - Monitoring groundwater levels
202 - Onshore geological information
203 - Offshore geological information
502 - Infiltration processes
801 - Surface hydrological accretion model

Project Summary Sheet

Project: 803 - Groundwater quality models

Type	Marine related
Supplementary data base	Fair
Supplementary information	Poor
Feeder relationship	Feeds 804*
Public interest	-
Is project already underway?	No
Value of results	Relatively high
Level of effort required	High - probably more than $1 million
Benefit/cost ratio	Low
Breadth of applicability	Local
Potential sponsors	USGS, EPA, NSF
References	gk
Priority	B

Abstract: The objective of this project is to develop models to predict the subsurface fate of contaminants introduced into the groundwater by natural forces and human activities, especially cesspool disposal and surface fertilization activities.

The project is closely related to and draws largely upon, "503 - Movement of contaminants in groundwater." The primary emphasis should be on modeling selected contaminants such as nitrogen compounds, phosphorus compounds, detergents, C.O.D. and pathogens.

The importance of the project derives from its usefulness to answer questions on effects of groundwater pumping on groundwater quality, effects of cesspool and septic tank discharges on groundwater quality, and feasibility of recharge of aquifer with treated waste water as evaluated by groundwater quality considerations. It is conceived as a large-scale effort, often going beyond the existing state-of-the-art, to develop mathematical models of the transport and distribution of selected contaminants in groundwater, and thereby predict the impact of alternative water supply and waste water disposal strategies on groundwater quality.

*804 - Water quality models in bays

Project Summary Sheet

Project: 804 - Water quality models in bays

Type	Marine
Supplementary data base	Good
Supplementary information	Fair
Feeder relationship	Feeds 601,602,806,823*
Public interest	-
Is project already underway?	No
Value of results	Highest
Level of effort required	High - probably more than $1 million
Benefit/cost ratio	-
Breadth of applicability	Region
Potential sponsors	EPA,Corps, NOAA
References	efghk
Priority	A-

Abstract: The objective of this project is to develop models to predict the fate of selected contaminants (including salinity), (a) introduced into bay waters through stream inflow, overland runoff, groundwater upwelling, and in-bay waste disposal (present) and (b) modified by potential man-made and natural changes in the location and size of inlets.

Model development will be specific to sites where water quality problems have been known to occur repeatedly and where the bay shores are used extensively for recreational purposes and the waters for contact recreation such as, for instance, Great South Bay.

Space and time descriptions of selected water quality parameters including temperature, salinity, D.O., B.O.D., coliforms, major nutrients such as nitrogen and phosphorus and a few well-defined biological indices should be attempted in this project. Major forcing functions will be tidal exchanges and stream flows, overland runoff, storm surges, existing waste discharges, upwelling and atmospheric energy. Established numerical models of circulation, which have been made operational for neighboring areas such as Jamaica Bay (vertically-averaged, 2-dimensional) should largely be used in this project so that theoretical development is minimized. In the vicinity of stream transition zones and special pockets, modification of the established models might be necessary.

It is recognized that discharges of domestic waste waters into the bays surrounding Long Island through sewer outfalls may not hereafter be allowed as a matter of policy in the region: however, this policy does not eliminate the need for this high priority research specifically for the following reasons:

- water quality in the bays is influenced, not only by discharges through outfalls, but also, perhaps even more significantly, by tidal exchanges carrying material from coastal waters, overland runoff, stream and upwelling water quality and atmospheric energy;
- the bays will continue to be used for contact recreation and fishing;

Cont'd

- because of the availability, when completed, of the water quality model in the bays, the cost of the coastal water quality monitoring system will be minimized greatly, perhaps by an order of magnitude, when compared with a system consisting entirely of surveys or instruments (see project 207). Because of this complementary nature and because of the high value of the results, the project is given an A rating.

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*601 - Contaminant effects in bays
602 - Salinity effects in bays
806 - Predictive inlet models
823 - Wetlands management

Project Summary Sheet

Project: 805 - Water quality models in the ocean

Type	Marine
Supplementary data base	Fair
Supplementary information	Poor
Feeder relationship	Feeds 604,605*
Public interest	Low
Is project already underway?	No
Value of results	Lowest
Level of effort required	High - probably more than $1 million
Benefit/cost ratio	Low
Breadth of applicability	Region
Potential sponsors	Corps, EPA,NOAA
References	efgk
Priority	D

Abstract: The objective in this project is to develop models to predict the fate of contaminants introduced into offshore waters under alternative strategies involving ocean outfalls and offshore dumping.

The dispersion, deposition and resuspension of major waste constituents in the vicinity of discharge sites are sought to be modeled, as also the biological and chemical changes in the discharge zone to the extent possible. The latter will need extensive development over present state-of-the-art. The major waste constituents of primary interest could be particulate and dissolved organic and inorganic matter, coliforms, and suitable bacterial indicators.

Until and unless a policy of complete recharge of waste waters is implemented in Long Island, between 75 and 150 mgd of treated sewage will be discharged in the near future from major treatment plants in the area, into the Atlantic Ocean. Similarly, dumping of waste sludge and some solid wastes into the ocean, as ultimate disposal, may continue unless a policy of inland disposal or complete recycling of all wastes is adopted. Under such ocean disposal strategies, ocean water quality models are needed to predict the fate and distriubtion of major waste constituents in the vicinity of discharge sites.

Hydrodynamic models of circulation, which are well developed, can be applied to model the physical processes governing distribution. However, modeling the chemical processes, and even more importantly, modeling biological changes in the zone of disposal, are endeavors requiring high level of effort, and the successful completion of the task appears a long way off. The project should be closely coordinated with 505 - Movement of contaminants in the ocean.

*604 - Contaminant effects of ocean outfalls
605 - Contaminant effects of ocean dumping

Project Summary Sheet

Project: 806 - Predictive inlet models

Type	Marine
Supplementary data base	Good
Supplementary information	Fair
Feeder relationship	Feeds 602,608,823; fed by 504,804*
Public interest	-
Is project already underway?	No
Value of results	Highest
Level of effort required	High - probably more than $1 Million
Benefit/cost ratio	-
Breadth of applicability	Local
Potential sponsors	Corps, NOAA/SG, EPA
References	fhk
Priority	A

Abstract: The objective of this project is to develop models for predicting the relationships between the characteristics of selected inlets and the natural environment of backbay systems.

The number, size and location of inlets are the principal determinants of most of the major tide-influenced environmental characteristics of the backbays, such as tidal range, salinity, circulation and velocity patterns, water quality and biological exchange with the ocean. In essence, inlets operate as throttles; opening or closing them by man or by nature, by plan or by inadvertance, will greatly affect the backbays. For example, the opening of Moriches and Schinnecock Inlets by natural causes (and their subsequent stabilization by man) more than doubled the salinity of Great South Bay and relieved some pollution problems most acute in poorly-flushed areas.

This project contemplates the creation of one or more permanent models, of the physical or mathematical type, of the south shore bay system. The models should be capable of manipulation to investigate the environmental implications (enhancement as well as perpetuation of current regime) of potential natural and man-made changes in the number, size and location of inlets. The results should be directly applicable for assessing the impact of inlet changes on shoaling and scouring, wetland formation and water quality changes in the backbays.

This project is given the highest priority because of its fundamental importance to the basic environment of the south shore bay systems. Efforts to improve water quality or create additional wetland areas by inlet adjustments might adversely (or beneficially) affect other objectives. The multi-faceted mix of benefits and adverse effects for a multiplicity of sometimes competing objectives under alternative strategies, of (1) do nothing, (2) stabilize the current situation, or (3) induce change, can not be adequately understood without such models.

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*602 - Salinity effects in bays
608 - Effects of inlets on biological exchange
823 - Wetlands management
504 - Movement of contaminants in bays
804 - Water quality models in bays

Project Summary Sheet

Project: 807 - Feasibility of importing water

Type	Marine related
Supplementary data base	Good
Supplementary information	Good
Feeder relationship	- Fed by 103,410,604,801,802,803*
Public interest	-
Is project already underway?	Yes - Corps
Value of results	Highest
Level of effort required	Low - probably between $10K and $100K
Benefit/cost ratio	High
Breadth of applicability	Region
Potential sponsors	Corps, counties
References	gk
Priority	A+

Abstract: The objective of this project is to evaluate the institutional/political feasibility of importing significant portions of the water supply, especially for Nassau County, from New York City and from Suffolk County.

As indicated in a previous report [1g], it is widely recognized that there are now, and there will increasingly be in the future, gross imbalances in the availability and demand for water within counties and between counties. All plans call for minimizing these imbalances, to some degree, by expanding existing transmission systems, but there is great uncertainty as to what level this increasing regionalization should be carried. Considerable institutional/political opposition has been voiced to proposals to transmit water to Nassau from Suffolk or from Queens/Kings Counties.

Extensive expansion of the New York metropolitan area water supply is being studied, and the mutual regional advantages of interconnecting the City system with an integrated Nassau-Suffolk system have been suggested. The general thrust is that Nassau-Suffolk draw heavily upon the City system in most years, conserving the water in the aquifer for mutual use during dry years. There are considerable potential economic and environmental advantages accruing to Nassau-Suffolk, but these might be more than offset by institutional/political drawbacks which can be anticipated to be severe.

This project seeks to foster an interchange of views between Long Island and New York City authorities on the mutual advantages and disadvantages involved, particularly the significance of potential political objections.

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*103 - Unit cost data
410 - Improving water transport system design
604 - Contaminant effects of ocean outfalls
801 - Surface hydrological accretion model
802 - Subsurface hydrological model
803 - Groundwater quality models

Project Summary Sheet

Project: 808 - Feasibility of desalination

Type	Marine related
Supplementary data base	Good
Supplementary information	Good
Feeder relationship	- fed by 103,801,802,803*
Public interest	Low
Is project already underway?	Yes - Int./OWS
Value of results	Lowest
Level of effort required	Low - Probably between $10K and $100K
Benefit/cost ratio	-
Breadth of applicability	National
Potential sponsors	Int./OSW
References	gk
Priority	D

Abstract: The objective of this project is to maintain a continuing awareness of advances in desalination technology that may make this process feasible for supplementing the bi-county water supply.

In a previous report [1g], the current state of desalination technology was reviewed sufficiently to conclude that it is not now or in the reasonably forseeable future economically competitive in this water-rich area with groundwater or surface water from the mainland. In view of this conclusion, environmental drawbacks associated with desalination (e.g.- brine disposal) were mentioned, but they were not examined in depth.

This project suggests that it is worth keeping track of desalination technology because breakthroughs in the state-of-the-art can become very significant on Long Island. The entire eight-phase system [1g] must be examined, not just the water acquisition phase. For example, the added costs of acquiring water by desalination, as compared to acquiring it by pumping, should be compared against the savings attainable by eliminating requirements for aquifer recharge and the high waste water treatment standards associated with recharge

*103 - Unit cost data
801 - Surface hydrological accretion model
802 - Subsurface hydrological model
803 - Groundwater quality models

Project Summary Sheet

Project: 809 - Feasibility of iron removal

Type	Marine related
Supplementary data base	Good
Supplementary information	Good
Feeder relationship	-
Public interest	Low
Is project already underway?	No
Value of results	Lowest
Level of effort required	Low - probably between 10K and $100K
Benefit/cost ratio	-
Breadth of applicability	National
Potential sponsors	EPA, counties
References	gk
Priority	D

Abstract: The objective of this project is to examine the feasibility of reducing the iron content of Long Island's water supply.

In parts of the island, the high iron content of the local groundwater supply causes problems, especially during the distribution and usage phases.

This study should cover the forms and concentrations in which iron is usually present; methods such as increased treatment, blending with water of low iron content and flushing of distribution systems; residue disposal; and costs. The effects of processes intended to remove iron on other aquatic constituents and on the system components such as pipes should be evaluated as part of the project.

Project Summary Sheet

Project: 810 - Feasibility of leakage control

Type	Marine related
Supplementary data base	Fair
Supplementary information	Fair
Feeder relationship	- fed by 103,801,802*
Public interest	Low
Is project already underway?	No
Value of results	Lowest
Level of effort required	Low - probably between 10K and $100K
Benefit/cost ratio	-
Breadth of applicability	Local
Potential sponsors	Counties
References	gk
Priority	D

Abstract: The objective of this project is to investigate the economic feasibility of reducing leakage losses in the transmission, distribution and usage of freshwater. The magnitude of these losses has been very roughly estimated at about 14% of total pumpage [1g]. This is a substantial acount -- equal to about three-quarters of total industrial/commercial consumption and over three times total agricultural usage.

The state-of-the-art currently permits the location and volumes of all significant leaks to be determined rapidly and inexpensively. Adequate data on the cost of repairing leaks and the value of the water saved can fairly easily be assembled. With these inputs, a rational leakage control program can be developed.

The only reason that this project did not receive a much higher priority is because the leakage is returned to the aquifer. Therefore, the loss is measurable, not in terms of aquifer depletion (as is the case for Project 812), but in terms of the unrewarding cost of pumping the water from the aquifer, treating it and moving it through the transmission-distribution system to the point of leakage.

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*103 - Unit cost data
801 - Surface hydrological accretion model
802 - Subsurface hydrological model

Project Summary Sheet

Project: 811 - Feasibility of evaporation control

Type	Marine related
Supplementary data base	Fair
Supplementary information	Poor
Feeder relationship	- fed by 103,108,801,802*
Public interest	Low
Is project already underway?	No
Value of results	Relatively low
Level of effort required	Low - probably between $10K and $100K
Benefit/cost ratio	-
Breadth of applicability	National
Potential sponsors	USGS, counties
References	gk
Priority	C

Abstract: The objective of this project is to investigate the feasibility of reducing evaporation losses of water during the high-loss summer season by instituting a policy of sprinkling and irrigation during cooler parts of the day such as during early morning or late evening hours.

An appreciable proportion of total water usage (49 of 270 mgd) is for outdoor use, primarily for lawn sprinkling, and another 13 mgd is used for irrigation. By its nature, the sprinkling is necessarily concentrated in the hot summer months when evaporation losses are the greatest. When the sprinkling is done during the middle part of the day, over three-quarters of the water is probably lost as evaporation. In areas such as Long Island, where groundwater recharge is so important, one of the easier ways of reducing the need for recharge may be to encourage sprinkling during less evaporation-prone hours.

This project includes an evaluation of all relevant factors such as (1) the potential for reducing recharge requirements, (2) irrigation efficiency, (3) possible mildew problems (3) social receptivity (e.g., nuisance aspects), (4) and operational considerations such as various mixes of encouragement, prohibition, and enforcement approaches.

For perspective, the cost of this method of reducing recharge requirements should be compared with the cost of other methods cited elsewhere in this report, of providing the recharge.

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*103 - Unit cost data
108 - Man-induced surface changes
801 - Surface hydrological accretion model
802 - Subsurface hydrological model

Project Summary Sheet

Project: 812 - Feasibility of sewer infiltration control

Type	Marine related
Supplementary data base	Fair
Supplementary information	Poor
Feeder relationship	- fed by 103,801,802*
Public interest	Low
Is project already underway?	No
Value of results	Relatively low
Level of effort required	Low - probably between $10K and $100K
Benefit/cost ratio	High
Breadth of applicability	National
Potential sponsors	EPA,counties
References	gk
Priority	C

Abstract: The objective of this project is to investigate the feasibility of minimizing the loss of groundwater that infiltrates into sewer systems and, therefore, is lost to the ocean along with the waste discharge when ocean outfalls are employed.

Presently,approximately 20 mgd out of a total estimated sewage flow of 80 mgd to the ocean is attributed to groundwater infiltrating into sewers. In the year 2020, if accelerated sewering programs continue and development of the area continues according to plans, the proportion of infiltration is expected to increase to 155 mgd out of a total anticipated sewage flow of 622 mgd [1g]. Viewed in this light, the need for this project is readily apparent.

Under this project, these quantitative infiltration loss estimates have to be verified, refined, and seasonally distributed; and the locations of major infiltration losses have to be identified. The technical feasibility of available control techniques including tighter joints, pressurized flow and substitute pipe materials has to be evaluated along with costs and probable losses prevented.

This project is intimately associated with sewering and ocean outfalls and indirectly with the need for groundwater recharge; infiltration losses are increasing the impact of sewering on groundwater depletion by about a third. In the design of the island's future, several-billion-dollar sewer program, the added cost of reducing infiltration losses should be compared with the alternative of offsetting those losses by corresponding increments to AWT and recharge.

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*103 - Unit cost data
801 - Surface hydrological accretion model
802 - Subsurface hydrological model

Project Summary Sheet

Project: 813 - Feasibility of Advanced Waste Treatment (AWT)

Type	Marine related
Supplementary data base	Good
Supplementary information	Fair
Feeder relationship	- fed by 103,604,703,704,815-819*
Public interest	High
Is project already underway?	Yes - EPA
Value of results	Relatively high
Level of effort required	High - probably more than $1 million
Benefit/cost ratio	-
Breadth of applicability	National
Potential sponsors	EPA
References	gk
Priority	A-

Abstract: The objective of this project is to investigate the economic and technical feasibility of advanced waste water treatment (AWT) methods on Long Island with particular attention to physical-chemical processes applicable to raw waste water (as distinct from AWT as an add-on to the primary-biological methods currently employed for secondary treatment).

The characteristics of the waste water discharges, the technical capability of the AWT processes to remove specific contaminants including nutrients, detergents, toxic metals, the associated costs, alternatives for residue disposal, area requirements and operational problems are to be specifically evaluated in this project with a view to assessing whether AWT as an effluent quality control will be effective in Long Island either for preparing for recharge or for ocean disposal.

It is emphasized that the feasibility of AWT has to be evaluated as a step preparatory to the disposal of the effluent. The value of the results of this project is primarily in advising economically, environmentally and technically feasible levels of treatment of waste water, which result the disposal planners and decision-makers can readily use. In a previous report [lg] it has been suggested that at sites where there is already a secondary treatment plant employing conventional biological processes, an "add-on" AWT might be cost-effective; whereas, at sites where entirely new plants are contemplated and where the raw waste waters are highly variable in quality and quantity, physical-chemical treatment might be a better alternative. This needs to be examined and substantiated as part of the feasibility study.

It may be noted that much of the basic work on AWT techniques is being carried out, on a continuing basis, at the AWT Research Laboratory of EPA at Cincinnati, Ohio, and its various field stations. Periodically, organization of seminars and other devices for dissemination of updated information on AWT methods may be coordinated with EPA for Long Island agencies. Such a step is contemplated as part of this project. However, a larger part of the effort is envisaged for conducting specific engineering analysis of AWT applicability for well identified waste water sources and locations in Long Island.

Cont'd

Since this project is closely tied to recharge feasibility studies, it is highly desirable to have almost simultaneous commissioning of all these projects. However, because AWT research is a continuing program of a federal agency (EPA), because little difficulty is expected in examining its applicability to Long Island, and because it should be possible to benefit by an earlier investigation of this project, it is given an A-priority rating.

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103 - Unit cost data
604 - Contaminant effects of ocean outfalls
703 - Feasibility of opening shellfish areas
704 - Feasibility of requiring depuration
815 - Feasibility of recharge by injection
816 - Feasibility of recharge by spray irrigation
817 - Feasibility of recharge through storm basins
818 - Feasibility of stream recharge
819 - Feasibility of dir. recycling of AWT effluent

Project Summary Sheet

Project: 814 - Feasibility of packaged treatment plants

Type	Marine related
Supplementary data base	Good
Supplementary information	Good
Feeder relationship	- fed by 103,801,802,803,817*
Public interest	-
Is project already underway?	Yes - EPA
Value of results	Lowest
Level of effort required	Medium - probably between $100K and $1 million
Benefit/cost ratio	-
Breadth of applicability	National
Potential sponsors	EPA,HUD
References	gk
Priority	D

Abstract: The objective of this project is to remain aware of any major advances in this type of treatment and its potential for solving the area's major water-supply-waste water disposal problem.

The area's major problem is to avoid contaminating its aquifers without significantly depleting their volumes. Sewers are usually proposed to avoid the contamination and AWT-recharge to avoid the depletion.

If it is feasible for packaged treatment plants to produce water of a quality acceptable for recharge, and if current problems of solid residue disposal and fail-safe design can be satisfactorily resolved, then packaged treatment plants offer an attractive possibility of recharging the aquifer without the need for the multi-billion dollar sewer-AWT-recharge system. Considering these potentially large economies when the system is viewed as a whole, such feasible packaged treatment plants could probably be justified even if they cost up to three times as much as the cesspools and septic tanks that would be phased out by them.

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* 103 - Unit cost data
801 - Surface hydrological accretion model
802 - Subsurface hydrological model
803 - Groundwater quality models
817 - Feasibility of recharge through storm basins

Project Summary Sheet

Project: 815 - Feasibility of recharge by injection

Type	Marine related
Supplementary data base	Good
Supplementary information	Fair
Feeder relationship	Feeds 813; fed by 103,801,802,803,817-819*
Public interest	-
Is project already underway?	Yes - EPA, Nassau
Value of results	Relatively low
Level of effort required	Medium - probably between $100K and $1 million
Benefit/cost ratio	-
Breadth of applicability	Local
Potential sponsors	USGS,EPA
References	gk
Priority	C

Abstract: The objective of this project is to investigate the feasibility of injecting water of suitable quality into the aquifers at locations selected to minimize salt water intrusion near the coast and increase potential pumpage rates inland.

Under the alternative of continued use of Long Island groundwater as the principal source of water supply for the region, the need to recharge the aquifers with treated waste waters has been established. There are several options open in accomplishing recharge: one is to treat waste water to a high degree (AWT) and inject it into the aquifer, under pressure, at strategically located points through a system of wells. By carefully selecting the injection well locations, a freshwater "barrier" can be created to minimize shallow salt water intrusion near the coast.

Problems of well-clogging merit special attention and the water considered for injection should include not only AWT effluent but also water drawn directly from the water supply system. The feasibility study should consider questions such as location, area requirements, quality characteristics, well design and costs. An experimental injection feasibility study has been underway at the Bay Park waste water treatment plant of Nassau County for some time. The results of the study are not yet available to the public, but operational problems in injection, especially clogging, are known to have been encountered. This project should be closely coordinated with the Bay Park program, and compared with other recharge feasibility programs (816 to 819).

This concept of recharging treated waste water under pressure at ideal locations, is very attractive. However, despite much research in the last half decade, operational difficulties in the injection process remain apparently unresolved. Therefore, continuing research in this technique is given a lower priority than research on other promising recharge techniques that have received comparatively little study.

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813 - Feasibility of AWT
103 - Unit cost data
801 - Surface hydrological accretion model
802 - Subsurface hydrological model
803 - Groundwater quality models
817 - Feasibility of recharge through storm basins
818 - Feasibility of stream recharge
819 - Feasibility of dir. recycling of AWT effluent

Project Summary Sheet

Project: 816 - Feasibility of recharge by spray irrigation

Type	Marine related
Supplementary data base	Fair
Supplementary information	Fair
Feeder relationship	- fed by 103,410,801,802,803*
Public interest	High
Is project already underway?	No
Value of results	Relatively high
Level of effort required	High - probably more than $1 million
Benefit/cost ratio	-
Breadth of applicability	National
Potential sponsors	EPA,Corps
References	gk
Priority	B

Abstract: The objective of this study is to investigate the economic and technical feasibility of recharging the aquifers by spray irrigation processes at inland sites.

Climate; land characteristics including type of soil, area requirement, crops, and availability; waste characteristics including quantity and quality, sources, treatability and environmental effects; and public acceptance characteristics have to be evaluated in this research project. (See also projects on recharge by injection, by stream recharge and recharge through storm basins.)

If the alternative of continued use of Long Island groundwater is to continue as the principal source of water supply for the region, the need to recharge the aquifers with treated waste waters has been established. This project addresses itself to the testing of spray irrigation as a feasible recharge technique. In an earlier report [lg], a brief evaluation of this alternative based on design experience gained in a Muskegon County, Michigan pilot system showed that between150 and 300 sq. miles of land area may be required. However, as pointed out in the previous study, simple yardsticks, like those derived from experience elsewhere, cannot be legitimately applied to Long Island without a detailed feasibility study generally as outlined herein.

The feasibility study should be aimed at answering specific questions relating to:

(a) level and techniques of required waste water treatment preparatory to recharge of waste water discharges, associated costs;

(b) characteristics and areas of required land, its availability, useful life, compatibility with land use plans, and costs, for groundwater recharge;

(c) the expected quality of surface and groundwaters resulting from such recharge.

Cont'd

Such a comprehensive feasibility study of recharge is likely to involve experimentation and analysis over at least two annual cycles. It will involve coordination with the U.S. Geological Survey, Environmental Protection Agency, N.Y. State Dept. of Environmental Conservation, and the two county departments of public health, environmental control and public works, among others.

This project should be structured in stages with a view to minimizing the cost of unrewarding, costly, detailed investigations. For example, it might be initially determined on a gross appraisal level whether the application of this approach on a major scale has any reasonable possibility of conforming to current and anticipated land use requirements in the high-density bi-county area.

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103 - Unit cost data
410 - Improving water transport system design
801 - Surface hydrological accretion model
802 - Subsurface hydrological model
803 - Groundwater quality models

Project Summary Sheet

Project: 817 - Feasibility of recharge through storm basins

Type	Marine related
Supplementary data base	Good
Supplementary information	Good
Feeder relationship	Feeds 813; fed by 103,801,802,803*
Public interest	High
Is project already underway?	Yes - Suffolk
Value of results	Relatively high
Level of effort required	Medium - probably between $100K and $1 million
Benefit/cost ratio	-
Breadth of applicability	Local
Potential sponsors	Counties, HUD
References	gk
Priority	B

Abstract: The objective of this project is to evaluate the economic and technical feasibility of recharging AWT effluent into Long Island aquifers at existing inland storm water recharge basins.

Particular attention should be given to the apparently high potential for rapid and deep penetration of water borne contaminants along the longitudinal axis of the Island.

Under the alternative of continued use of Long Island groundwater as the principal source of water supply for the region, the need to recharge the aquifers has been established. Nassau and Suffolk counties have about 2,000 storm water recharge basins through which approximately 5.6% of the precipitation in the water budget area is being recharged. Suggestions have been advanced that these basins could be used for recharging AWT effluents. Two of these basins have been studied intensively and the summarized results of storm water percolation rates through them are available [lg]. However, operational and loading problems (clogging, odor, overflow, etc.) could arise when these basins are used to recharge AWT effluent. Monitoring of percolating water quality will be essential, as in other recharge feasibility studies.

The feasibility of recharge through storm basins should be aimed at answering specific questions relating to:

1.) feasibility of AWT as a preparatory step,

2.) characteristics and areas of basins required for recharge, their availability, alternative methods for recharging storm water, and associated costs

3.) costs associated with collection of waste water and distribution of treated waste water

4.) the expected quality of surface and groundwaters resulting from such recharge

Cont'd

Such a comprehensive feasibility study of recharge is likely to involve experimentation and analysis over at least two annual cycles. It will involve coordination with the U.S. Geological Survey, Environmental Protection Agency, N.Y. State Dept. of Environmental Conservation, and the two county departments of public health, environmental control and public works, among others.

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813 - Feasibility of AWT
103 - Unit cost data
801 - Surface hydrological accretion model
802 - Subsurface hydrological model
803 - Groundwater quality models

Project Summary Sheet

Project: 818 - Feasibility of stream recharge

Type	Marine
Supplementary data base	Fair
Supplementary information	Poor
Feeder relationship	Feeds 405,813,823;fed by 103,601,602,801,802,804*
Public interest	High
Is project already underway?	Yes, Suffolk
Value of results	Highest
Level of effort required	Medium - probably between $100K and $1 million
Benefit/cost ratio	High
Breadth of applicability	Local
Potential sponsors	Counties, EPA,NOAA
References	gk
Priority	A+

Abstract: The objective of this project is to evaluate the feasibility of minimizing decreases in stream flows (and lake levels) by discharging make-up water directly into the streams (and lakes).

One of the expected consequences of increased pumping and sewering is a gradual lowering of groundwater tables with a consequent drop in stream flow and lake levels. The most commonly-advocated solutions involve massive groundwater recharge to maintain existing groundwater levels. A conceptually-attractive alternative to this gargantuan undertaking,is to concentrate the replenishment at the point of greatest need -- streams and lakes.

The feasibility of this alternative needs to be evaluated from technical, economic and environmental points of view. Answers will depend to a significant extent upon the results of two related feeder projects, (602 - Salinity Effectw in Bays, and 601 - Contaminant Effects in Bays). The 602 project is particularly relevant. If input from these two projects is not available in a timely way, a spectrum of assumptions will have to be made (eg. - if current stream flow cannot be allowed to drop more than _____ % and if Class _____ water quality criteria are to be observed).

The evaluation should also consider the feasibility of varying the amount of recharge (1) over time, e.g. zero after storms and in the fall, increases over past discharge rates during the spring spawning season; and (2) over space, e.g. increasing discharge in some streams and ignoring it in others.

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*405 - Future coastal usage
813 - Feasibility of AWT
823 - Wetlands management
103 - Unit cost data
601 - Contaminant effects in bays
602 - Salinity effects in bays
801 - Surface hydrological accretion model
802 - Subsurface hydrological model
804 - Water quality models in bays

Project Summary Sheet

Project: 819 - Feasibility of direct recycling of AWT effluent

Type	Marine related
Supplementary data base	Fair
Supplementary information	Poor
Feeder relationship	Feeds 813; fed by 103*
Public interest	Low
Is project already underway?	No
Value of results	Lowest
Level of effort required	Medium - probably between $10K and $100K
Benefit/cost ratio	-
Breadth of applicability	National
Potential sponsors	EPA,HEW/PHS
References	gk
Priority	D

Abstract: The objective of this project is to investigate the economic, technical, and public acceptability aspects of recycling highly-treated AWT effluent directly into the water supply system.

Up to 80% of the bicounty water requirements are for residential purposes and if direct recycling should become feasible even for residential users, it should represent a significant solution. Key questions that should specifically be examined in the project are the rate of solids build-up and measures for control, costs in relation to daily water use, long term physiological effects of trace residuals, if any, and means for eliciting and disseminating information on "public acceptance."

It is pointed out that although sewage effluents have been recycled in some instances and used, eventually, as part of drinking water, the use has generally been indirect: i.e., recharge of AWT effluent into a lake or stream used as water supply source where there was adequate dilution. The concept of direct reuse of AWT effluent for potable use has been discussed for a decade or so, but until 1969 essentially no direct reuse was carried out. Even now, only in Windhoek, Southwest Africa, is an AWT plant reportedly supplying one-third of the water supply of the city.

The value of the results of the project in influencing Long Island's marine resource planning appears limited; however, there is a high potential value since a feasibility analysis may impact on 80% of water requirements. Therefore, the project is included in the program, but given a priority rating of 'D'.

*813 - Feasibility of AWT
103 - Unit cost data

Project Summary Sheet

Project: 820 - Value judgements on water systems

Type	Marine related
Supplementary data base	Poor
Supplementary information	Poor
Feeder relationship	Feeds 807,814,816,817,819; fed by 402*
Public interest	Low
Is project already underway?	No
Value of results	Highest
Level of effort required	Low - probably between $10K and $100K
Benefit/cost ratio	High
Breadth of applicability	Local
Potential sponsors	NSF,HUD
References	gk
Priority	A+

Abstract: The objective of this project is to help decision-makers to improve their understanding of the values with which Long Islanders might be expected to assess alternative water supply and waste water disposal systems.

For example, it is often stated that Long Islanders would not accept for their water supply water from any source that requires substantial treatment before use. It is also stated that Long Islanders would strongly oppose any integration of their water supply system with New York City's system. These statements are sometimes countered (1) by the observation that in major parts of the United States the public has been accepting treated water for decades without apparent problems and (2) by the opinion that the "silent majority" would not really object to increasing regionalization of their system.

These and other value judgements have very important leverage in determining the direction of Long Island water policy, As stated in a previous report [1g], the total cost of the total water supply-wastewater system in the bi-county area will range somewhere between 10 and 13 or more billion dollars, depending largely upon value judgments employed in making basic decisions.

This project is given a very high priority because it is felt that the social sciences ought to be explicitly employed to confirm or modify significant current assumptions about what the public wants.

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*807 - Feasibility of importing water
814 - Feasibility of packaged treatment plants
816 - Feasibility of recharge by spray irrigation
817 - Feasibility of recharge through storm basins
819 - Feasibility of dir. recycling of AWT effluent
402 - Future public values

Project Summary Sheet

Project: 821 - Feasibility of land use management techniques

Type	Marine
Supplementary data base	Good
Supplementary information	Fair
Feeder relationship	Feeds 405,823; fed by 109,110,405*
Public interest	-
Is project already underway?	No
Value of results	Relatively high
Level of effort required	Medium - probably between $100K and $1 million
Benefit/cost ratio	-
Breadth of applicability	Local
Potential sponsors	HUD,NOAA/SG, Corps
References	hk
Priority	B

Abstract: The objective of this project is to evaluate the current and potential application to coastal stabilization and protection problems of management techniques that influence people in their use of land along the shore.

The cost of structural methods of protecting the bi-county area's shoreline has been estimated at about $300 million. A wide variety of non-structural land use management techniques -- such as zoning, building codes, and other regulations -- are known to have a high potential for complementing or substituting for structural approaches.

The various techniques are known and the locations and intensities of shore stabilization problems have been well identified. What is required by this project is a systematic evaluation of the applicability of each technique to each shore erosion and inundation area. Flood plain management techniques -- such as delineating areas with various degrees of damage potential and recognizing these areas in various zoning and building codes -- should receive particular attention.

*405 - Future coastal usage
823 - Wetlands management
109 - Inventory of land use regulations
110 - Inventory of major development plans

Project Summary Sheet

Project: 822 - Screening of dredging applications

Type	Marine
Supplementary data base	Outstanding
Supplementary information	Fair
Feeder relationship	Feeds 405,823*
Public interest	High
Is project already underway?	No
Value of results	Highest
Level of effort required	Low - probably between $10K and $100K
Benefit/cost ratio	High
Breadth of applicability	National
Potential sponsors	Corps, EPA,NOAA
References	ik
Priority	A

Abstract: The objective of this project is to develop and test simplified management tools to facilitate decisions on dredging applications.

A simple method employing five criteria was suggested in a previous report [1i] to help weight the depth of permit evaluations in proportion to the magnitude of potential impacts. The feasibility of this method, or alternatives it might spark, can best be assessed by trying it out in a cooperative venture between the U.S. Army Corps of Engineers and the Council.

*405 - Future coastal usage
823 - Wetlands management

Project Summary Sheet

Project: 823 - Wetlands management

Type	Marine
Supplementary data base	Good
Supplementary information	Fair
Feeder relationship	Feeds 405*
Public interest	High
Is project already underway?	No
Value of results	Highest
Level of effort required	Medium - probably between $100K and $1 million
Benefit/cost ratio	High
Breadth of applicability	National
Potential sponsors	N.Y. State, Int.,NOAA/SG
References	ik
Priority	A

Abstract: The objective of this project is to develop ways of managing wetlands and shoal areas in the bi-county area so as to sustain and enhance the benefits they can provide. A variety of managerial possibilities should be identified and evaluated. Examples: (1) Jurisdictional aspects. Who owns the wetlands and shoal areas? At what levels of government can they best be managed? (2) Improved benefits. How can the "usefulness" of wetlands be improved? Examples: by keeping out nature observers and recreationers or by controlling their entry; by improving vegetative cover through fertilization, selective seeding, and breeding of improved grasses; by ditching and diking selected areas to increase or decrease their salinity; by providing feeders and habitats for wildlife; by improving nursery characteristics; by controlling the application of mosquito control measures such as spraying, draining and flooding; by stocking, etc. (3) Acquiring wetlands. Evaluate the feasibility of public acquisition of the few wetlands that are now privately owned. Consider all types of land use management techniques [1h, 1k] such as acquisition in fee simple, easements and tax inducements. (4) Wetland creation. Evaluate the feasibility of increasing the current supply of wetlands by techniques such as (a) selected disposal of dredgings, (b) influencing tidal ranges by altering inlet cross sections, and (c) intentionally impeding natural drainage channels. (5) Integrating wetland management and land use planning. Develop guidelines to influence the development of land contiguous to wetlands to insure that wetland relationships are considered.

This project is founded upon an unwillingness to assume, without demonstration, that the current state of wetlands, or any past state, is necessarily the "best". It seeks to create an initiative, supported by research, to identify and reinforce wetland attributes that are judged to be desirable (Project 708). Although the above description is necessarily general, it is intended that the recommendations be site specific. For example, one output from item (4) might be "Designate the following location in Great South Bay as a dredgings disposal area under control of (agency) with the intent to develop there a man-made wetland island that will be managed to increase the sports fish catch available to small craft sailing the Bay."

The value of wetlands for land development purposes in the bi-county area (assuming $15,000 an acre because of their choice waterfront locations) is about $400 million. In view of this very high alternative-benefits-forgone value, high priority should be given to developing and executing imaginative ways of managing these areas to maintain and promote the values which justified their being set aside for conservation purposes.

*405 - Future coastal usage

APPENDIX B-1
ABBREVIATIONS FOR GOVERNMENT AND NON-GOVERNMENTAL AGENCIES

Agencies

EPA	U.S. Environmental Protection Agency
EPA/RII	Environmental Protection Agency/Regional Office for New York
USGS	U.S. Dept. of the Interior: U.S. Geological Survey
Corps	U.S. Army, Corps of Engineers
Int.	U.S. Dept. of the Interior
Int./OSW	U.S. Dept. of the Interior/Office of Saline Water
NOAA/SG	National Oceanic & Atmospheric Administration/Sea Grant Programs
NOAA	National Oceanic & Atmospheric Administration
NOAA/NOS	National Oceanic & Atmospheric Administration/National Ocean Survey
DOT	U.S. Dept. of Transportation
HEW/PHS	U.S. Dept. of Health, Education & Welfare/U.S. Public Health Service
HUD	U.S. Dept. of Housing and Urban Development
DOD	U.S. Dept. of Defense
NYEC	New York State Dept. of Environmental Conservation
Counties	Nassau County Dept. of Public Works
	Nassau County Dept. of Public Health
	Suffolk County Dept. of Environmental Control
	Suffolk County Dept. of Public Health
SCWA	Suffolk County Water Authority
NSRPB/MRC	Nassau-Suffolk Regional Planning Board Marine Resources Council
Navy	U.S. Navy Research & Development Office
NASA	U.S. National Aeronautics & Space Administration
NSF	U.S. National Science Foundation
FPC	U.S. Federal Power Commission
MIT	Massachusetts Institute of Technology
BNL	Brookhaven National Laboratory
Battelle	Battelle Memorial Institute
CG	U.S. Coast Guard
AEC	U.S. Atomic Energy Commission
Agr.	U.S. Dept. of Agriculture
ISC	Interstate Sanitation Commission
SUNY	State University of New York at Stony Brook
FF	Ford Foundation

APPENDIX C

RESEARCH ORGANIZATIONS

APPENDIX C

RESEARCH ORGANIZATIONS

The attached letters were sent to research organizations with marine or marine-related data collection and research programs. The first letter was sent to 18 organizations on Long Island. The second letter was sent to 22 organizations in adjacent areas. Enclosure 3 is a tabulation of addressees annotated to indicate the 53% that have responded to this date.

The responses were carefully considered in making the entry, "Is the project already underway?", on each project summary sheet. Some difficulty was encountered in making this entry due to problems in interpretation. Some of the responses were very detailed and some cursory. Also, it was not possible to gauge the depth or breadth of many projects listed by title with a short description, in the responses. However, a survey of the responses led to the judgment that, in the context of the existence of a keen and alert research community, one can establish some relationship, however distant, to an on-going or proposed research project in and around Long Island, for each of the projects in this report. The data base and effort required to bring out all the interrelationships was not judged to be of commensurate value at this stage: but, the identification of fully documented major research projects already initiated and substantially aligned to the basic purpose of the here-proposed project is a service of much benefit that is warranted here. Therefore, where such identification was possible, the entry under, "Is the project already underway?", is a yes, with the organization where it is underway also identified. These will be updated as necessary, when more projects get underway.

The responses are being kept on file and are expected to be of considerable use next year when implementation will be stressed.

All the addressees are active to some degree in marine or marine-related research, and we have probably inadvertently failed to identify others that should have been contacted. The volume and breadth of relevant research is especially prominent at the following organizations, listed alphabetically:

Academic Institutions

Adelphi University
Institute of Marine Sciences
Garden City, N.Y.

Brookhaven National Laboratory
Upton, N.Y.

Long Island University
Mitchell Campus
East Meadow, N.Y.

New York Ocean Science Laboratory
Montauk, N.Y.

State University of New York at Stony Brook
Marine Sciences Research Center
Stony Brook, N.Y.

University of Connecticut
Marine Sciences Institute
Groton, Connecticut

Government Agencies

Nassau County Depts. of Public Works and Public Health

Suffolk County Dept. of Environmental Control and Public Health

New England River Basins Commission

U.S. Corps of Engineers

U.S. Dept. of the Interior, U.S. Geological Survey
Long Island Program

U.S. Environmental Protection Agency

The Center for the **ENVIRONMENT & MAN**, Inc. 275 Windsor Street • Hartford, Connecticut 06120 203 549-4400

CEM

(Sent to addressees on Long Island)

Dear Sir:

As you are probably aware, CEM is preparing for the Nassau-Suffolk Regional Marine Resources Council a report outlining the integrated marine data collecton and research needs for the bicounty area. The marine data and research needs particularly relevant to water supply - waste water disposal, coastal stabilization, dredging and wetlands in Long Island are of special concern in this study. However, non-marine needs which directly have an effect on marine resources are also sought to be identified for completeness in the report.

In this connection, your on-going and proposed marine-related data collection and research projects are of considerable interest, being located in Long Island. We will appreciate very much any descriptive information you can provide on your (1) on-going and (2) proposed, marine-oriented data acquisition and research programs and projects for possible inclusion in this report under preparation. Specifically, it will facilitate their classification if a short title, scope, project duration, level of effort, sponsor, and time when results are expected to be available are included. Your early response will be much appreciated by CEM and the Marine Resources Council since it will help integrate the information in the report.

If you have any questions or points for discussion, please feel free to call me at (203) 549-4400, extension 327.

Thank you.

Sincerely,

(Sd)

R. Pitchai, Ph.D.
Senior Research Scientist

RP/caz

Enclosure 1

The Center for the ENVIRONMENT & MAN, Inc. 275 Windsor Street • Hartford, Connecticut 06120 203 549-4400

CEM

(Sent to addressees outside Long Island)

Dear Sir:

The Center for the Environment and Man is preparing for the Nassau-Suffolk regional Marine Resources Council a report outlining the integrated marine data collection and research needs for the bicounty area. The marine data and research needs particularly relevant to water supply - waste water disposal, coastal stabilization, dredging and wetlands in Long Island are of special concern in this study. However, non-marine needs which directly have an effect on marine resources are also sought to be identified for completeness in the report.

In this connection, your on-going and proposed marine-related data collection and research projects specific to Long Island are of considerable interest. Will appreciate very much any such descriptive information you can provide on your (1) on-going and (2) proposed, marine-oriented data acquisition and research programs and projects for possible inclusion in the report under preparation. Specifically, it will facilitate their classification if a short title, scope, project duration, level of support, sponsor, and time when results are expected to be available are included. Your early response will be much appreciated by CEM and the Marine Resources Council since it will help integrate the information in the report.

If you have any questions or points for discussion, please feel free to call me at (203) 549-4400, extension 327.

Thank you.

Sincerely,

(Sd)

R. Pitchai, Ph.D.
Senior Research Scientist

RP/caz

Enclosure 2

Organizations Contacted in Long Island

	Name and Organization of Representative Contacted	Date Reply Received
1.	Baiardi, Dr. John Director New York Ocean Science Laboratory P.O. Box 867 Montauk, New York 11954	12/13/71
2.	Brenowitz, Prof. A. Harry Director Marine Sciences Institute Adelphi University Garden City, N.Y. 11530	
3.	Chairman, Dept. of Marine Sciences Hofstra University Hempstead, N.Y.	
4.	Cohen, Philip U.S. Geological Survey Long Island Program 1505 Kellum Place Mineola, N.Y. 11501	12/9/71
5.	Director Institute of Oceanography and Marine Biology Oyster Bay, L.I., N.Y.	
6.	Flood, Francis J. Nassau Dept. of Public Works Nassau County Mineola, New York 11501	12/29/71
7.	Flynn, John M. Commissioner, Dept. of Environmental Control Suffolk County 1324 Motor Parkway Hauppauge, N.Y. 11787	12/6/71
8.	Freudenthal, Dr. H. Director, Marine Sciences Program Long Island University 40 Merrick Avenue East Meadow, N.Y. 11554	12/10/71
9.	Hill, Douglas Manager Environmental Program Ecosystems Corporation Bethpage, N.Y. 11714	
10.	Jensen, Albert G. Asst. Director, Marine & Coastal Research Dept. of Environmental Conservation New York State 4175 Veterans Highsay Ronkonkoma, New York 11799	
11.	Kinnaman, Dr. J.H. Commissioner Nassau County Dept. of Health Mineola, N.Y. 11501	12/9/71
12.	The Research Officer U.S. Bureau of Sport Fish and Wildlife 50 Maple Avenue Patchogue, N.Y. 11934	
13.	Principal Queens College Flushing, N.Y. 11667	
14.	Small, Maxwell M. Plant Engineering Dept. Brookhaven National Lab Upton, L.I., N.Y. 11973	12/6/71
15.	Smith, Sheldon O. Director, Bureau of Water Resources Nassau County Dept. of Public Health Mineola, N.Y. 11501	
16.	Smith, Professor Walter Chairman, Biology Dept. Suffolk County Community College Selden, N.Y. 11784	

Enclosure 3

	Name and Organization of Representative Contacted	Date Reply Received
17.	Smith, Roger President, Synecology, Inc. P.O. Box 502 Port Washington, N.Y. 11050	12/17/71
18.	Squires, Prof. Donald F. Director Marine Sciences Research Center State University of New York at Stony Brook Stony Brook, N.Y. 11790	1/14/17

Organizations Contacted Outside Long Island

	Name and Organization of Representative Contacted	Date Reply Received
1.	Boyd, William A. Director Essex Marine Lab. Novelty Lane Essex, Conn. 06426	11/30/71
2.	Bromberg, Albert W. Chief, Operations Branch Water Quality Office, Region II Environmental Protection Agency Edison, New Jersey	12/6/71
3.	Chairman City College of New York Dept. of Biology New York, N.Y. 10031	
4.	Dehlinger, Prof. Peter Director Marine Sciences Institute U. of Conn., Avery Point Groton, Conn. 06340	
5.	Director Bingham Oceanographic Laboratory Yale University New Haven, Conn.	
6.	Director of Research Conn. Development Comm. P.O. Box 865 Hartford, Conn. 06115	12/10/71 (telephone)
7.	Director Woods Hole Oceanographic Institute Woods Hole, Mass.	12/8/71
8.	Director Windward Oceanography Institute 119 Rowayton Ave. Rowayton, Conn. 06853	12/23/71
9.	Doebler, Henry M. Director of Public Affairs Long Island Lighting Co. Mineola, New York	
10.	Gallagher, James USN Underwater Systems Center New London, Conn 06320	
11.	Gregg, Frank F. Chairman New England River Basins Commission 55 Court Street Boston, Mass. 02108	1/28/72
12.	Hanks, Dr. James Director National Marine Fisheries Science Biological Lab Milford, Conn. 06460	
13.	Hansler, Gerald M. Regional Administrator Region II Environmental Protection Agency 26 Federal Plaza New York, N.Y. 10007	12/8/71
14.	Knauss, Dr. John A. Dean, Graduate School University of Rhode Island Bay Campus Narragansett, R.I. 02882	1/17/72
15.	May, CMDR Robert B. U.S. Merchant Marine Academy Kings Point, N.Y.	
16.	McGill, Dr. David A. Professor of Ocean Science U.S. Coast Guard Academy New London, Conn. 06320	12/1/71
17.	Metzler, Dr. Dwight Deputy Commissioner N.Y. State Dept. of Environmental Conservation Albany, N.Y.	12/9/71
18.	Meyer, George C. Regional Shellfish Consultant F.D.A., U.S.P.H.S. 850 Third Ave. Brooklyn, N.Y.	

	Name and Organization of Representative Contacted	Date Reply Received
19.	Nelson, Mr. J .Richards President Long Island Oyster Farms, Inc. New Haven, Conn.	12/1/71
20.	Pinata, Louis Asst. Commissioner, Permits Branch U.S. Army Corps of Engineers New York District 26 Federal Plaza New York, N.Y. 10007	
21.	Sanders, Dr. John E. Dept. of Geology Barnard College New York, N.Y. 10027	
22.	Verber, James L. Director, FDA Laboratories, F.D.A., U.S.P.H.S. N.E. Technical Services Unit, CB Center, Bldg. S-26 Davisville, R.I., 02854	12/13/71