NAME: Cedar Creek Water Pollution Control Plant

TYPE: Visitation

LEVEL: 5th through college

AREA: Wantagh, New York

Arrangements: Contact Mr. David Flaumenbaum at 516/781-4439 Monday - Friday 8AM - 4PM. Arrange tours at least two weeks in advance.

Directions: Seaford-Oyster Bay Expressway (Rt. 135) south to Merrick Rd. West on Merrick Rd. Approximately 3/4 mile to Cedar Creek Park. Left into Park. Proceed through the park to the Plant.

Facilities: Parking and restrooms available. Visitation takes about 1 1/2 hours, including 45 minutes in classroom setting (capacity 35) with large, multifunctional diagrammatic light-board showing the plant, its functions, and treatment process, and 45-minute walk-thru tour, giving students a look into the continuous process of sewage treatment.

Best Usage: The material presented includes the function of this plant as a positive impact on our environment, and the actual operation of the various treatment processes.

Suggested Activities:

Prior to trip:

a) vocabulary review (dependent on level)
b) discussion of the need for a treatment plant versus cesspools and septic tanks
c) review of the general treatment process

Upon return:

a) review and define all vocabulary
b) discussion of the general way a treatment plant is conceived, funded, built, and operated
c) review treatment process at Cedar Creek versus the process of older plants versus cesspools
d) discussion of the effect of the laws prohibiting ocean dumping of sludge in the 1980s
e) discussion of the practical uses of sludge
f) discussion of the need for tertiary treatment on Long Island

General Comments: Cedar Creek is one of the most modern treatment plants in the country, and it is well adapted to perform the functions of an educational institution.

Warnings: Please advise students to stay within their groups and not to go near the edge of the treatment tanks.

Author-Educator: Mr. Dave Flaumenbaum, Cedar Creek Water Pollution Control Plant, Wantagh, New York 11793.

Suggested References: (GE) 17, 18.
NAME: Rocky Coast Field Trip

TYPE: Field Work

LEVEL: Secondary; however, the activities can be modified to interest intermediate and elementary students.

AREA: The North Shore of Long Island; Town of Bayville, Nassau County.

Arrangements: During school year, no arrangements are required. Park buses and cars along the road or in Town of Oyster Bay Parking Fields without permits.

Directions: Long Island Expressway to Exit 41N. Route 106 to Berry Hill Rd; Left on Lexington Ave. to Shore Rd. Follow Shore Rd. (turn left). Shore Rd. winds around Oyster Bay and over the Bayville Bridge. At traffic light in Bayville turn right and follow Bayville Ave. to entrance into village of Centre Island. On left are hundreds of glacial erratics partially exposed in Long Island Sound.

Facilities: During the school year, this site offers no provisions for food, shelter or restrooms. Parking facilities were indicated under arrangements.

Water Facilities: There is no suitable site to launch a boat; however, inflatable rafts are possible. Swimming, seining, snorkeling and collecting are permitted.

Best Usage: The intertidal rocks that comprise the Centre Island Reef are just about the closest a Long Islander can come to studying the ecological interactions of a Rocky Coast Community. At low tide, students can walk out several hundred yards into Long Island Sound without getting their chests wet.

Type of Environment: An intertidal area in Long Island Sound that has many large glacial erratics. At high tide these rocks are completely submerged; however, at low tide they are exposed and accessible for student study. A modified type of zonation is in evidence on these rocks. It is an excellent study in flora and fauna adaptations. Also in evidence are many examples of symbiosis.

Suggested Activities: The number and variety of activities possible in this area make it applicable to all grade levels. Listed below are some that can be used:

1) The area can be used to discuss glaciation and its role in the formation of Long Island.
2) The teacher and his students can wade out to an erratic sand-rock bar, and engage in a show-and-tell type activity.
3) Students can divide the rocks into distinct zones, collect specimens from each zone and relate the distribution of an organism with his adaptive structures.
(4) Using snorkeling devices, students can collect specimens from the sub-tidal portions of the rock as well as from the bottom adjacent to the rock.

(5) Using simple quadrats, barnacle and blue mussel densities can be determined. Students will see the inter and intra-species competition that results from limited substrate.

(6) Upon returning to class, students can key out their specimens and place them into trophic levels. Trophic levels can be matched with approximate population densities to demonstrate the "pyramid of numbers" concept in ecology.

(7) A typical follow-up lab report might include the answers to the following questions:

(a) Identify all the plants and animals you found on the intertidal rock. For each species you identify, indicate (1) whether it was a primary consumer, producer, secondary consumer, scavenger or decomposer; (2) its location on the rock and (3) what it feeds upon.

(b) Draw a sketch of the rock and show the location of the different plants and animals with respect to the low tide line.

(c) Which plants seem to be dominant? Indicate their density in some suitable unit.

(d) Which animals are most numerous? Indicate their density as above.

(e) Rank your animal species in an order showing decreasing abundance on the rock. Does your ranking data conform with the concept of "pyramid of numbers" in Ecology?

(f) Which plants and animals seem best able to withstand the extremes of temperature, salinity, dessication and wave action? Do these organisms have the least or greatest tidal range?

(g) For each of the following physical problems, select 2 species and describe the structural adaptations they possess that enable them to overcome the following hazards (1) maintaining one's position in the surf and current and (2) avoiding drying out and oxygen deprivation.

(h) Which species seem to have the least tidal range? Explain.

(i) Was there any evidence of interspecific competition or intra-specific competition on the rock? Explain.

(j) Where are the favorable spots on the rock. What makes them favorable?

(k) Did you find any evidence of structural or behavioral camouflage in this study?

(l) Describe the physical make-up of the bottom next to the rock. How did the plants and animals on the bottom compare with those attached to the rock?

(m) After examining shells and seaweeds, did you find any epiphytes epizoites?

(n) Did you find any examples of symbiosis (mutualism, commensalism or parasitism)?

(8) Concepts can be assessed with traditional exams or with a "practical" using the specimens collected.
Preparation: The following items should be brought by the students or teacher: clipboard, paper, pencil, bathing suit, (worn) towel, old sneakers, warm clothing (for when you come out of the water), face mask, snorkel, swim fins (optional), pocket knives, tweezers, quadrats, jars or plastic bags, styrofoam basket.

Warnings: Do not attempt this trip at mid or high tide. Students should wear protective coverings on their feet and hands in order to avoid barnacle cuts. Be alert for jellyfish as Cyanea has been seen on several occasions in this area. Look out for rocks coated with enteromorpha as they can be very slippery.

General Comments: This is a highly motivational trip.

Author-Educator: Robert A. Bosco,
c/o Deer Park High School, 30 Rockaway Ave., Deer Park, N.Y. 11729,
516-242-6548.

Suggested Publications and References: (GE) 1, 6, 7, 10, 13, 23.
NAME: Ecology of a Salt Marsh

TYPE: Field Work

LEVEL: Elementary - Secondary

AREA: Long Island - Jones Beach - State Channel

Arrangements: Contact Jones Beach State Parkway Authority, Wantagh, N.Y. for permit to enter tollgate. Do not pay parking lot fee since this is an educational trip. Call for permit at least three weeks in advance.

Directions: Wantagh State Parkway toward fishing piers at Jones Beach (bear right approximately ½ mile past the tollgate). Sign will indicate fishing piers. Take road toward Coast Guard Station and turn right at sign for fishing piers. Enter parking lot and make right turn and proceed to the end of the parking lot.

Water Facilities: Mud-flats - excellent for seining -- flounder, pipefish, killies, occasional tropicales
Sandy beach - swimming, snorkeling
Piers - attached organisms - sponges, sea anemones, sea urchins

Best Usage: This strip could best be used for collecting organisms.
   a. Seining - population studies
   b. Plankton work
   c. Net can be tossed from piers
   d. Snorkeling
   e. Pollution tests
   f. Attached to piers and docks are large numbers of anemones, sponges, sea squirts.

Type of Environment: Estuary - salt marsh particularly good site for collections of salt marsh types.

Preparation: Educational - Lessons on salt marsh and estuarine ecology, cycles, bird life
   Physical - How to use equipment - nets, etc.

Suggested Activities On All Three Levels: Prior to trip; plankton lesson, how to use nets. Since great numbers of anemones (Metridium) may be collected, it is advisable to study the anatomy beforehand. Same with sea squirts - especially heartbeat and circulation; At the Site: Collections - students may study zonation of organisms on pier post piling. Plankton collections from piers, surface, depth. Fish sampling and anemone and Sea Squirts collection.
At the end of the trip: Many follow-up lessons can be undertaken:

a. Analyze specimens collected in zonation study. Why were certain organisms collected at different levels?

b. Microscopic examination of plankton from surface and greater depth.

c. Stomach analysis of fish.

d. Use anemones to study stinging cells, digestion.

e. Circulation may be studied in sea squirts.

Warnings: Barnacle-covered rocks, debris along bottom.

Author - Educator: Burton Goldfeld, Marine Science Instructor, Valley Stream North High School, 750 Herman Ave., Franklin Square, New York, 11010

Suggested Publications: (GE) 8, 13, 26, 32, 33; (B) 35; (I) 45, 46.
NAME: Loop Bridge Field Trip

TYPE: Field Work Including Testing, Collecting and Hiking

LEVEL: Secondary but Activities can be modified for Intermediate or College Study

AREA: A Marsh Island in Great South Bay

Arrangements: Since no parking facilities are available, only the discharge of students and materials is permitted. Several days previously, notify Nassau County Police Dept. of arrival and departure times (Traffic Safety 516/535-4126 and the Marine Bureau 516/593-7132.

Directions: Take Merrick Road (Route 27A) to Meadowbrook Parkway southbound. Pass through the toll booths on the right side and pass on to the Loop Parkway extension in the direction of Point Lookout and Long Beach. Continue just 100 feet beyond the second bridge and stop on the right shoulder. Immediately unload materials and students for no parking is allowed. Walk down (do not cross over the parkway) to the beach, under the bridge to the beach on the other side of the parkway. Bus and automobile parking is available about one-half mile from the site at the parkway's end. Bear to the right and park in the lot provided for in the public marina.

Facilities: There are no services available and as there are no phones, previous arrangements must be made for pick up. Vehicles upon their return can now stop on the opposite side of the parkway as before and students need only carry their materials up to the roadway.

Beach Environment: The area provides the following for investigation:
1. Narrow sandy beaches that lend themselves to docking small boats or rafts
2. A swift current in the boat channel during mid tides
3. Sand dunes with associated vegetation
4. Salt water marsh
5. Bridge pilings and supportive rock structures with distinct zonation

Materials and Equipment: The following items should be brought along:
1. Clipboard or small pocket notebook
2. Bathing suit to be worn and warm clothes for after-water work
3. Towels
4. Skin diving gear - mask, snorkel, fins
5. Plastic pails and jars with screw lids
6. Seine nets
7. Plankton nets
8. Portable aerators
9. Chemical test kits
10. Liquid refreshments
11. Camera
12. First aid kit
13. Comfortable walking-hiking shoes
14. Pocket and salt water diving knife
15. Sieve boxes with shovels

Caution: 1. Sample collecting from the bridge pilings is easy and highly recommended. The first set of pilings are at the waters' edge and go to a depth of about 3 feet. The second set of pilings are about 15 feet from the shore and are in about 6 feet of water. Do not go beyond these for you will then be in a boat channel.

2. Pre-planning, to be in the water collecting at slack low tide, is most important. The shallow water diving and lack of tidal currents provide a more accurate situation for viewing and sampling.

3. Caution when walking underneath the bridge is recommended because there is a great deal of algal growth on the rocks making them slippery when wet.

4. When walking through the dunes stay on the natural paths because some poison ivy is present.

Suggested Activities:

Pre-trip activities:
1. Map study - road, topographic, navigational charts.
2. Marine life study - organisms are attached and in area of rapid tidal currents.
3. Marine aquarium must already be in operation if sampling is to be done.
4. A great deal of marine algae will be exposed at low tide with zonation among the brown and green algae most prominent.

At site:
5. Assign groups of students to sample specific depths along the bridge piles - barnacles, mussels, sea anemone, sponge, hydroids, snails.
6. Plankton tows at different depths.
7. Seining.
8. Sand sampling - quartz, magnetite, garnet.
9. Clamming on the beach on the other side of the bridge.
10. Water transport measurements with incoming tidal currents.
11. Chemical tests and physical measurements.
13. Sieve boxes for sediment study and small-organism study.

Post-trip activities:
15. Key out marine organisms and local flora.
17. Specific ecologic studies - sponges, crabs, clams, fish.
18. Chromatography and pigmentation studies.

General Comments: The general location of this area in the bay near Jones Inlet and ocean beaches is most attractive and full of diversified life. I recommend visiting this site in very early fall, summer or very late spring.

Author-Educator: Ronald S. Carol, Baldwin High School, High School Drive, Baldwin, New York 11510 (516) BA-3-8100.

Suggested References: (GE) 11, 12, 17, 26, 29, 32; (I) 46; (PL) 68, 70.
NAME: Carvies Point

TYPE: Field Work and Observation

LEVEL: Elementary, Intermediate, Secondary

AREA: North Shore of Long Island

Arrangements: Approximately two months notification that you will be there with your classes is all that is necessary. Check with the tide table and confirm with Carvies Point when the lowest tides are in order to reveal more of the beach area. Contact the museum at 516 671-0300.

Directions: Long Island Expressway or Northern Blvd. to Glen Cove Rd., follow north to Glen Cove. Once in Glen Cove follow signs to Carvies Point.

Facilities: Picnic tables available (suggest students bring lunch), parking available and free for both autos and busses; adequate restrooms indoor and outdoor; no boating; shelter from foul weather provided for those groups taking a planned program supplied by the Museum at the point.

Water Facilities: Not for boating, seining possible. Investigation and exploration recommended best at low tide.

Best Usage: All facets of biology and botany. Ecology and the study of ecosystems; the interrelationships between organisms; and geology.

Type of Environment: A harbor of the Long Island Sound noted especially for its formation due to past glacial action. Carvies Point has the distinction of having a cliff the facade of which exposes layers of rock strata formed in the cretaceous period. Results of wave and tide action are also observable.

Suggested Activities: (see accompanying papers)

Preparation: Outdoor clothing (boots, etc.), writing utensils, clipboard, etc.; field guide books, collecting bottles, magnifying glasses, camera, nets.

Warnings: Cliffs are very steep; there are steps, but caution must be used. Rocks and boulders on shore are slippery. There is also much clay on the shore which should not be stepped in. Students can become lost in the woods, and thus must stay in the group.

General Comments: Cost varies with the price of the bus rented from the school. It usually averages about $1 per student. There is no fee to enter the preserve. However, if you wish to tour the museum, a fee of $5.00 per class of 30 is required. Checks are made payable to Treasurer of Nassau County.

Author-Educators: John Kaiser
Alva T. Stanforth Junior High School
700 Hempstead Turnpike
Elmont, New York 10003

Brother Alphonse Matuga
51 Clapham Ave.
Manhasset, N.Y. 11030
SUGGESTED ACTIVITIES:

1. **Beach Area:** Shore life differs on rocky and sandy beaches, and on exposed and protected ones. Each bit of beach shows how plants and animals live together in certain broad life zones or areas. First and highest is the dry beach or dune area. The uppermost beach is reached only by the highest tides, storm waves, and ocean spray. The upper beach gets wet by tides twice daily, but the plants and animals are more adapted to land and air than to water. In the middle beach, which is covered with water most of the time, plants and animals are normally less exposed to air and are more harmed by drying. The lower beach is almost always submerged or covered with water except during the very lowest tides.

   Plant and animal life form characteristic communities within these broad zones. Each is adapted to a particular marine environment and its food supply.

   1. You will each make a detailed study of a section of each area of the beach. Include:

       a) The names of all the animals and plants you find (including dead animals or plants - make sure the specimen just didn't float into your area, rather than actually living there). This includes all shells of animals - identify the shell, and determine whether it or anything else would belong in this zone.

       b) Study each animal (such as a snail, oyster, barnacle, and more) in detail such as: 1. how it moves 2. how protected 3. color 4. size 5. where found - in sand, on top sand, under rock, log, attached to rock, plant, to another animal, etc. From the way the animal is put together, give reasons for finding the animal where you did.

       c) Were the animals found alone, or living very close with different animals or with its own kind. Describe how the animals were living together, why they were living together, and if one animal seemed to be more dominant than another. What was their means of protection as a group? Does one animal seem to be living off of another animal, or just plantlife? How does each animal feed? Does its feeding habits explain the reason for the area in which you found it?

       d) Study each plant found in detail:

          1. Name the plant 2. Describe the plant in detail, such as color, size, shape, the way it feels, the way it is put together (its different parts, and the purpose of each part). Is it a floating or attached plant (careful - might be a dead floating)? 4. Record exactly where you got the plant, and how it was growing. 5. Was the plant by itself, or was it in a community with other plants or with the same type of plants? 6. Were there any plants or animals attached to the plant you found? If so, explain what they were doing there!

       e) What was the overall relationship between the plants and the animals found in your area (living together? animals feed on plants? more plants than animals? vice-versa?, etc.)

       f) Do not forget to describe each area in detail, such as: sandy, many slimy rocks, or much soft clay, or moving water, or puddle in sand, under rocks, dry sand, cliff side, etc.

       g) You will carry on the same detailed research (a - f) for each area or community (1 - 5).
2. You will then compare each community with every other community regarding a) type of environment b) type of plant and animal life. Take plant and animal life from one environment and put them in the other environments (one area at a time,) and explain why that plant life and animal life was found where it was, and why it could or might not survive when put in each of the other environments or communities! Be sure to include in your explanation a) the biology of the plant and animal b) how it feeds c) the type food it needs d) the protection it needs e) how it moves f) its coloration g) its outer covering.

3. Look for and describe signs of pollution on the beach, in the beach area or visible from the beach (across the shore, factories in distance, etc.) Explain your solutions for the pollution signs that you see!

4. Look for and describe in detail signs of EROSION in the beach area, ESPECIALLY ON OR NEAR THE CLIFFS LEADING DOWN ONTO THE BEACH. a) Find a very small stream (trickle) of water coming down from the top of the cliff and follow it as far down as it will go. This is just the way rivers erode or wash away the land. 1. Describe the course of the stream or how the stream goes. (Does it travel straight down or crooked?) Explain why! Does the stream carry anything? What? Where do these things go? Are there different particle sizes carried in the stream, and do they go to different places? What does the area at the end of the stream look like and why? Where is the water coming from for the stream? 2. Describe any other examples of erosion, such as chunks of the cliff sliding onto the beach. 3. Describe your solutions to the erosional problems seen.

5. THE MEADOW: The meadow is a grassy, sun-filled open area, and is an example of another type of ecological community or environment. a) Look for signs of life, such as tracks of animals, feathers, clumps of fur, animal droppings, etc. From these signs, describe the kind of life that lives in a meadow. b) Find actual examples of living animals, insects, etc. c) Explain how these animals are adapted for living in a meadow, and not in the beach area. d) What type of plant life is in a meadow and how are these plants adapted for living in the meadow? e) Describe any signs and solutions of pollution here!

6. THE WOODLANDS: Characterized mainly by the heavy growth of trees. a) While walking along the path, look for signs of spring, animal life, plant life being attacked, fungus, and vines, and pollution. b) Make a study of an area of the woodlands, looking under leaves and dead logs. Notice the type of plant life and if one type of plant is more dominant than another. c) Compare the Woodland community with the Meadow community and Beach community. Explain why the types of plant and animal life are different for each environment.

7. FRESH WATER: The pond was developed to establish a new environment. Minnows eliminate mosquito larvae. Dragonflies skim the pond. The quiet visitor
may surprise ducks on the water and seasonal birds in the trees. The fresh water attracts raccoons, chipmunks, rabbits, turtles and frogs.

a) Describe the Fresh Water community in detail, including the pond itself, and the surrounding area. Include all plant and animal life seen, signs of any animal life, and any specimens discovered in the pond water (most likely done when brought back to classroom, as will the specimens of salt water also).

b) Compare the Fresh Water community with the Woodland, Meadow, and Beach communities. Explain why the types of plant and animal life are different for each environment.

Suggested References: (GE) 5, 7, 10, 13, 20; (B) 35; (I) 46; (PL) 68, 71.
NAME: TOWN OF HEMPSTEAD MARINE NATURE STUDY AREA
Foot of Slice Drive
Oceanside, NY

TYPE: Guided (or self-guided) tour of salt marsh, bay and upland fringe communities

LEVEL: Elementary (fifth and above), Junior High School, High School and College

AREA: South Shore of Nassau County, Long Island, NY

Arrangements: Arrangements for guided tours can be made by calling the Marine Nature Study Area at 516/766-1580. Such arrangements should be made at least two weeks in advance, and special requirements or requests should be stated at the time the reservation is made. Request a Marine Nature Study Area brochure from:
Department of Conservation & Waterways
1 Parkside Drive
Point Lookout, NY 11569
516/671-9200
The brochure describes the area, details the time when it is open to the public, and describes the best route to reach it.

Directions: Take any convenient route (e.g., Southern State Parkway, Merrick Road, Sunrise Highway) to Rockville Centre, N.Y. Proceed south on Oceanside Road in Rockville Centre and into Oceanside, N.Y. Turn left from Oceanside Road on to Waukena Avenue. Proceed east on Waukena Avenue to Park Avenue. Follow the green and white signs from the intersection of Park and Waukena to the Marine Nature Study Area.

Facilities: No food concession or picnic area on site.
Parking at the site is ample, but limited.
Restrooms at the site.
There is a small meeting room for a single class of 25-30 students or individuals.
There is a rain shelter located along the main trail to provide some relief from inclement weather.

Water Facilities: The Marine Nature Study Area is dominated by the bay, creeks, leads and drainages that surround it, but opportunities for water sport are not available; that is, there are no facilities for swimming or boating.

However, provisions are made for sampling and seining in the bay at the south end of the area, and nets, rakes and other collecting gear are...
available upon request, but collecting of specimens is very limited and only under supervision.

**Best Usage:** The best use of the Marine Nature Study Area is as an outdoor classroom in which to become familiar with the salt-marsh ecosystem. A simulated barrier beach and the fringing upland afford a good opportunity to experience the interfaces of these systems with the marsh and bay.

The obvious surroundings of development (e.g., housing, landfill, park) illustrate man's impact on the estuarine environment.

Arrangements can be made for the limited collection of specimens (i.e., in small quantity and for a good purpose), and the area is an ideal place for nature photography (especially bird life).

**Type of Environment:** The Marine Nature Study area is a 52-acre salt marsh dominated by *Spartina alterniflora*. There are 5 Patens/Distichlis associations on a higher area of the marsh, and complex upland plant communities on the northern fringe. Many of the natural and introduced plants of the barrier beach are present.

The invertebrate population is numerous and quite varied (e.g., 28 species of mollusks), and the bird life is outstanding (area life list numbers more than 170 species). Muskrats are resident, as are diamond back terrapin, several of the mice and voles, raccoons and rabbits.

This is an outstanding example of Long Island salt marsh in the glacial outwash plain. It provides a unique opportunity to get close to the elements of the marsh and to enjoy a broad view of the entire estuarine ecosystem. It is also an excellent area to see and study the various types of shore birds and waders that visit and utilize the area both on a seasonal and year-round basis.

**Suggested Activities:**

**Prior to trip** (all three levels) - general reading concerning the salt marsh ecosystem. Read generally about ecological principles such as producers, consumers, and the salt water flora and fauna.

**At the Site** - 1. General guided or self-guided tours
   2. Seining the fish populations
   3. Also bird watching, photography, sketching, flora and fauna identification

**Upon Return** - Summation of the salt-marsh ecosystem. Discuss similarities between it and other ecosystems visited previously. Class could also establish and maintain salt-water aquaria. Plan follow-up visits to see how the salt-marsh ecosystem changes seasonally.

Post-tour projects should include discussion of the value of the marsh-estuary, man's impact upon it, the history of marsh destruction and protection, and research into recent legislation designed to preserve tidal wetlands and related ecosystems (i.e., recent public awareness of the changing nature of "progress").

**Preparation:** Physical - wear proper clothing according to season and day of visit. Bring binoculars and bird identification field guides. Bring containers, if collecting is to be done.

**Warnings:** Observe signs and general rules for visiting a wildlife sanctuary.
Comments: Staff at the site has a varied educational background and would be willing to set up any type of activity to accommodate any educational group that could find this area useful.

Author-Educators: William Overton
Conservation Biologist
Marine Nature Study Area
Foot of Slice Drive
Oceanside, N.Y. 11572

Lawrence A. Kelly
Department of Conservation and Waterways
1 Parkside Drive
Point Lookout, N.Y. 11569

Suggested References: (GE) 26, 27, 29; (B) 35; (F) 42; (I) 46; (PL) 68.
NAME: Long Beach

TYPE: Comparative - Sandy Shore vs. Rocky Shore

LEVEL: All Levels

AREA: South Shore Long Island:
Ocean beach with well established rock jetty

Arrangements: Commissioner of Parks and Recreation of the City of Long Beach, New York or for the area selected (most all the beaches of Lido Beach, Long Beach or Atlantic Beach are useful for this field trip.)

Directions: Southern State Parkway to exit 19 (Peninsula Blvd.) South, to Ocean Ave. Left on Ocean Ave. (across Sunrise Highway) to Atlantic Ave. Extension (East Rockaway); then left to Lawson Blvd. to Daly Blvd.; then left to Long Beach Rd.; then right to Park Ave. in Long Beach; then left on Park Ave. to Roosevelt Blvd.; then right to Shore Rd.; then left to beach at Pacific Blvd.

Facilities: None

Boating Facilities: None

Type of Environment: High energy sand beach (Quartz sand)
High energy rocky jetty
Tidal range of about 3 ft. with good zonation on rocks

Best Usage: Rocky shore zonation from splash zone to subtidal region. Some tide pool but very small. Beach erosion and prevention. Life of the beach and surf zone.

Suggested Activities: Substrate analysis vs. marine in fauna (in between sand grains). Dominant plant and animals of rock substrate. Beach slope (good for seasonal change also). Geology of Beach (Lamination). Comparison of sandy shore life with rock shore life. Denude a section of rock and observe colonization and succession (requires periodic returns to area). Microscopic blue - green algae in splash zone on rocks. Water chemistry - DO, PO4, NO3, salinity. Sandy substrate - Emerita - mole crab
Other types of macro and micro crustacea
Polycheate worms

Flora and Fauna: Rocky substrate - Blue-green algae
Green algae - Enteromorpha, Cladophora
Brown algae - Cystosiphon, Fucus, Laminaria (some)
Zooplankton in tide pools and in water
Diatoms & other Phytoplankton in tide pools
Balanus Balanoides - rock barnacle
Mytilus edulis - Blue mussel
Asterias forbesi - common sea star
Metridium - sea anemone
Various types of crabs (Blue, Green, Calico)

Advance Preparations: Equipment for carrying out the various tests and analyses.
Divide into two groups.

Warnings: Jetties can be very slippery and dangerous, especially at the breaking surf both on the jetty or in the water adjacent to the jetty.
Best to go at low tide - this will allow your group to get out to the subtidal area where there are anemones and some Laminaria.

General Comments: There are few places on Long Island where the rocky shore can be observed so well as these long-established rock jetties of the south shore.
Also with the use of aerial photos this area makes a good study of beach erosion and its prevention especially if one can establish the history of the area from earlier aerial photos and maps and personal observations from some "old timers" in the area.

Author-Educator: Steven Lander, East Rockaway High School, Ocean Ave., East Rockaway, New York.

Suggested References: (GE) 7, 32, 33; (B) 35; (F) 40; (PL) 62, 68.

On the rocks at Long Beach
NAME: Silver Point Beach and Jetty

TYPE: Field Work

LEVEL: Intermediate and Secondary

AREA: Long Island Beach South Shore

Arrangements: None - beach may be visited after Labor Day and before Memorial Day (off season).

Directions: Atlantic Beach Bridge - bear left towards Atlantic Beach several hundred yards on the right.

Facilities: Parking lot - no others

Water Facilities: Beach for seining and jetty for collecting

Best Usage: Collecting specimens, ecosystems, adaptations

Type of Environment:

Jetty: On Silver Point Beach - good spot for collecting sea urchins, starfish and observing rocky tidal zonation (at low tide), tide pool in rocks, variety of seaweed, barnacles, snails, etc.

Beach: Marine birds; gulls, sandpipers, beach wrack, and a variety of shells can be found.

Filibigs: Barnacles, jellyfish, sandcrabs, amphipods and copepods.

Organisms which can be collected on the Jetty:
- Calothrix - blue green algae
- Ullothrix flacca - filamentous green algae
- Verrucaria - lichen (black tar-like patches)
- Balanus glandula - acorn barnacle
- Mytilus edulis - mussel
- Enteromorpha - tubular green algae
- Fucus vesiculosus - rock weed with air bladders
- Fucus spiralis - rock weed without air bladders
- Littorina littorea - periwinkle
- Ulua - sea lettuce
- Chondrus crispus - red algae
- Asturias vulgaris - sea star
- Strongylocentrotus - sea urchin

Suggested Activities: Prior to trip: discussion of beach, intertidal zone, marine birds, sea shells.

Post trip: lab work on organisms collected. For example:

Filter Feeding in Barnacles
Purpose -
To observe the filter feeding of barnacles and to observe
the effects of a variety of changing parameters upon the
feeding process.

Materials -
Binocular microscope or magnifying glass
Aerator
Culture dish
Barnacles
Seawater
Food - clam, brine shrimp, etc.
Lamp
Hot plate or bunsen burner

Procedure -
1. Remove a small rock, containing barnacles on its surface,
   from the rocky intertidal zone. Barnacles are difficult
to remove from rocks without destroying the organism.
2. Place the barnacles in a culture dish filled with seawater.
3. Place the culture dish under the dissecting microscope.
4. Students should be able to observe the barnacle filter
   feeding. In barnacles the method by which they feed is
   filtering the water. The barnacle will open and extend its
   body and thoracic appendages which have bristle-like structures
   known as cirri.
5. Students should select several environmental parameters which
   can easily be altered and observe their effect on the organism.
6. Some of the parameters which might be altered include:
   A. Changing the temperature of the water (higher and lower)
      and recording the number of movements of the cirri per
      unit of time.
   B. Changing the amount of dissolved oxygen in the water
      (oxygen level in seawater can be decreased by boiling and
      increased by aeration). Caution - Cool the boiled seawater!
   C. Changing the intensity of light (a high-intensity lamp
      may be used).
   D. Feeding the organism different types of food (brine shrimp,
      minced clam, etc.).
7. Complete a parameter chart and draw conclusions from the data.
8. A diagram of a barnacle when it is closed and feeding should
   be drawn with the appropriate parts labeled.

Preparation: Seine net, dip nets, boots, collecting buckets, field guides,
binoculars, cameras, etc. Be sure to dress appropriately for
the weather.

Warnings: Jetty can be slippery. Sneakers should be worn at all times.

Suggested References and Publications:
(GE) 7, 32; (B) 35, 37, 38; (F) 42; (T) 45, 47, 48; (PL) 68.
NAME: Manhasset Bay Marshlands

TYPE: Field Work and Visitation to Environmental Center

LEVEL: Elementary - Secondary

AREA: Long Island - Manhasset Bay - Plandome

Arrangements: Contact: Mrs. Fried - Administrative Assistant at 516/627-9400. Call at least one month in advance - no charge for bus parking.

The North Shore Science Activity and Environmental Center, staffed by volunteers and professional people, offers science programs for elementary and secondary school students. Located on a former estate, the center offers students and teachers choice woodlands, a marsh bordering Manhasset Bay, and opportunities to utilize the laboratories and other facilities.

Directions: Northern Blvd. to Plandome Road in Manhasset (it is the main road through the village of Manhasset). There is a large church on the corner. Travel approximately five miles to a stop sign. (Look for a sign pointing to North Shore Science-Museum Leeds Pond Preserve.) Make a left turn and travel around Leeds Pond. (Manhasset Bay is on your left.) Right turn at end of the pond toward the museum parking lot.

Facilities: There is ample parking. Restrooms are inside the environmental center. If permission is granted, laboratory and meeting facilities can be used.

Water Facilities: There is a saltmarsh, a small sandy beach, mud flats and a tidal marsh stream. Leeds Pond receives fresh water runoff and is constantly mixed with incoming salt water at high tide.

On the bay side, many small pools are left in the marsh, making it an ideal area for collections of fish and other invertebrates.

Best Usage:

a. Salt Marsh Ecosystems
b. Energy relationships in the salt marsh
c. Bird Study - in the spring and fall months many migratory birds can be seen in this area
d. Collection of Specimens
   1. Plankton study - there is a bridge overlooking the tidal stream. It is thus possible to suspend the nets in the current. Interesting plankton collections may be obtained.
   2. Large fiddler and marsh crab populations. An interesting distribution study could be made.
   3. Horseshoe crab studies
e. Pollution studies
f. Measurements in the tide pools

Type of Environment: Brackish pond - receiving fresh water runoff
Manhasset Bay - leads out to L.I. Sound; salt marsh and mud flats bordering Manhasset Bay
Suggested Activities on All three Levels:

A. Prior to Trip
1. Salt marsh ecology studies
2. How to use equipment
3. Plankton relationships
4. Pollution studies

Since this area is very close to New York City, it receives a great deal of out-flow from New York City waters. It would be interesting to monitor the waters for pH, coliforms, etc.

B. At the site
1. Transect study of the marsh
2. Population studies of fish, crabs
3. There are many annelid worms and clams. A detailed study of these organisms would be possible.
4. Pollution tests - O₂, phosphate, nitrate
5. Salinity studies and oxygen levels in tidepools. Make a comparative study of tide pools.
6. Animal studies within the tide pools
7. Plankton collections

C. Upon return
1. Analyze and discuss organisms collected in transect study. Have students graph out transect, listing animals and plants.
2. Examine results of pollution tests, compare to other environments.
3. Laboratory studies of plankton

Warnings:
1. Be careful about mud flats - mud can be very deep. Difficult to pull someone out when caught.
2. Students must not walk barefoot - debris from L.I. Sound is everywhere.

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Suggested References: (GE) 8, 10, 11, 17, 26, 33; (I) 46.
NAME: Udalls Cove
TYPE: Salt Marsh, Estuary
LEVEL: Elementary, Secondary
AREA: Cove of Little Neck Bay, Long Island Sound

Arrangements: Direct contact - letter of request one month in advance to the Board of Trustees, 4 Gateway Drive, Village of Great Neck Estates, New York, 11023 (516 - 482-6283) OR one week in advance by telephone to Robert D. Abrams, Coordinator of Environmental Education, Great Neck Public Schools, 516 - HU 2-8650.

Directions: Long Island Expressway, exit 33; North on Lakeville Road to Northern Blvd.; then left (west) to Great Neck Road; right (north) onto Great Neck Road which goes directly into Bayview Ave; left (west) onto Laurel Drive which descends just past the junction with Juniper Drive. There is a small parking area at the entrance to the Park.

Facilities: None

Water Facilities: The park enters into a 58-acre salt marsh with a number of mosquito-drainage ditches containing freshwater run-off, a tidal marsh stream, sandy beach and mud flats.

Best Usage: The area illustrates the variations in flora and fauna between the following:
   a) Saltmarsh; b) sandy beach and mud flats; c) meadowland; d) small forest area.

Type of Environment: A general tour of the area gives the student an overview of an environment that leads to and forms a saltwater estuary and marsh.

Following the circular park path in a counter-clockwise direction, your group will pass through a typical meadow with Giant Ragweed, Bindweed, Beach Wormwood, Queen Anne's Lace, Burdock, Curlydock, Butter and Eggs, Common Mullein, Peppergrass, Seaside Goldenrod, Asters, Plantains, Joe Pyeweed and others.

Then the group enters a wooded area noting Staghorn Sumac, Ailanthus, Wild Cherry, Catalpa, Black Birch, Raspberry bushes, Pokeberry, Weeping Willow, Poplars, Honeysuckle and Fox Grape. A unique plant found here in abundance in the Spring is the Horsetail, Equisetum.

At the head of this small woodland, the group arrives at a bench and a view of the Cove and the Bay beyond. Going down a set of steps, the group passes through a stand of Japanese Knotweed with attached Deadly Nightshade and some Beach Rose (Rosa rugosa) to a small sandy beach. When seen at low tide, the sandy area is quickly displaced by mud flats. These flats contain many tidepools that are excellent for observing the local fauna.

Tidepools contain two types of snails, periwinkles (Littorina) and mud snails (Nassarius), ribbed mussels (Modiolus), rock barnacles (Balanus), an occasional hermit crab (Pagurus) or calico crab (Ovalipes).
The dominant algae of this shoreline includes *Ulothrix*, *Enteromorpha*, *Ulva* (sea lettuce) and *Fucus* (rockweed).

Walking along the sandy area fiddler crabs (*Uca*) are found and an occasional dead horseshoe crab (*Limulus*) is seen.

Digging on the edge of the mud flats you will be able to find clam worms (*Nereis*), soft shelled clams (*Mya*) and some small quahogs (*Mercenaria*).

Leaving the shore, the group walks along a "dike" through tall reeds (*Phragmites*). This is particularly intriguing for elementary youngsters. You will pass over a tidal stream where one can observe the oily surface and distinctive odors produced by blue-green algae (*Cyanophytes*). The stream is good for catching fish spawn and killies (*Fundulus*) with hand nets.

Arriving back at the fringe of the meadow, the group can observe the bulk of the salt marsh with its salt meadow grasses, *Spartina alterniflora* along the edges of the mosquito drainage streams and *Spartina patens* making up the greater mass of the area.

Usually unseen, the mud turtle (*Kinosternon*) and the terrapin (*Malaclemys*) are inhabitants here along with the muskrat (*Ondatra*). Large numbers of birds abound. Most common are the gulls (*Larus*) terns (*Sterna*) and Red-winged Blackbird. During the appropriate seasons, the American (*Casmerodius*) and snowy (*Leucophaeus*) egrets and Canada Goose (*Branta canadensis*) are found. During the migratory seasons, thousands of ducks (*Anas*) and brants (*B. bernicla*) use Udalls Cove as a stop-over on their fly-by.

**Suggested Activities:**

A. Prior to trip: A review of the types of plants and animals that may be seen. A discussion of the vital interrelationships found in an estuarine salt-marsh ecosystem.

B. At the site: General population studies of the dominant forms. A transect of the marsh, sandy area and mud flat. Salinity measurements of tidal streams and pools. Oxygen levels in tidal pools.

C. Upon return: Identification and review of organisms seen. The impact of man and society on the marsh shoreline.

**Preparation:**

a) Appropriate dress for time of year.

b) Equipment - small seine, dip nets, collecting buckets, hand nets, field identification guides, binoculars, poles and line, boots.

**Warnings:**

This is a polluted area. Students should not taste anything or put hands to mouth. Sneakers must be worn. Do not enter water at high tide since the mud flats are full of "drop zones." At low tide mud flats can "hold" a person and removal may be difficult. Smoking or littering is not permitted.

**General Comments:**

Since much debris is washed up in the Cove, it would be appreciated if the group brought plastic sacks with them to collect and remove some of society's artifact wastes.

High tide is roughly the same as the announced tide for Willets Point.

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