The Education Program at the
NJ Marine Sciences Consortium/NJ Sea Grant
22 Magruder Road Fort Hancock, NJ 07732 732-872-1300 njmsc.org

SALT MARSH IN A PAN

OVERVIEW

Students create a model of a salt marsh to discover the impact of pollution and human activities on water-based habitats including bays and the ocean. Model may also be used to demonstrate salt marsh functions, non-point source pollution and watershed concepts.

OBJECTIVES

Following completion of this lesson, students will be able to:

- Recognize the relationship between natural and developed areas and the impact human activities have on those areas;
- Understand watershed concepts by observing what happens to an aquatic area during a rain event;
- Draw conclusions about what they can do to help reduce, reuse and recycle products in every day use
- Name several salt marsh functions (optional extension).

GRADE LEVELS

4th -12th grades

NJCC STANDARDS

Science Indicators:
5.1: End of Grade 4: A1, A2, B1, B2, End of Grade 8: A2;
5.3: End of Grade 4: A1, End of Grade 8: A1;
5.4: End of Grade 2: C2, End of Grade 4: B1;
5.5: End of Grade 2: B1, End of Grade 4: B1, B2, End of Grade 8: B2, B3; **5.7:** End of Grade 2: A2, End of Grade 4: A1, A2, **5.8:** End of Grade 2: A3, B1, End of Grade 4: A1, End of Grade 6: B1; **5.10:**End of Grade 2 A1, End of Grade 4: A1, B1, End of Grade 6: A1, B1.
Mathematics Indicators:
4.1: 6C3; **4.2:** 4D5, 8A5, 12A4; **4.3:** 6C1, 12D3;
4.4: 2A1, 4A1, 6A1, 6B1, 12A5, 12C3; **4.5A:** 1, 2, 3, 4, 5;
4.5B: 1, 2, 4; **4.5D:** 1, 2, 3, 5, 6; **4.5E:** 1; **4.5F:** 5
Visual and Performing Arts:
1.6;
Language Arts:
3.4, **3.5**;
Social Studies:
6.8, **6.9**;
Cross-Content Workplace Readiness:
2, 3

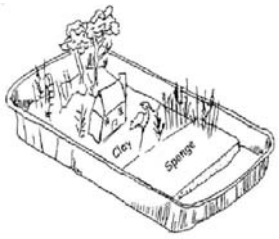
MATERIALS

To make model you will need:

- One paint roller pan, non-hardening modeling clay to fill 1/3 the roller pan,
- sponges to fit across the width of the tray (optional),
- supplies to make a road, houses, birds
- and anything else found in a neighborhood including trees and grasses.
- To complete demonstration you will need:

- Watering can, Green food coloring,
- Soy sauce or oil, Bits of paper,
- Ground coffee, chocolate sprinkles.

PROCEDURES



Spend about 5 minutes discussing the causes of water pollution and the possible origins of litter found on the beach, riverbank or salt marsh. Divide students into three groups; Developers, Residents and Rainmakers. The Developers build the model in the roller pan by adding a 1/2" thick layer of clay to the shallow top third of the pan. This group should build creeks, a river, a storm drain, a road, houses, trees and plants into their clay terrain. The low end of the tray represents a large body of water, such as the bay or the ocean. The Residents add pollutants to the landmass built by the Developers by adding a few drops of food coloring to symbolize fertilizer, bits of paper to symbolize litter, chocolate sprinkles to symbolize pet waste, oil or soy sauce to symbolize motor oil dumped or leaked from automobiles and coffee grounds to represent loose sediment and topsoil which contribute to **turbidity**. All students then make predictions about what will happen when the model terrain is rained upon. After predictions are recorded, the Rainmaker group uses the watering can to make it rain. Students observe where their pollutants went and compare what happened to the model when it rained to their predictions. Pour dirty water into a clear container so students can see just how polluted the rainwater became.

BACKGROUND

Salt marshes help protect our **estuaries** from the impacts of nature and humans. The special grasses that grow in the marsh can tolerate flooding from salt water. These plants are effective storm buffers because they dissipate wave energy and soak up tidal surges. Salt marsh plants are also a defensive against the erosive power of tides because they have deep roots that hold soil in place. Salt marshes plants and mud also hold and trap pollutants and excess sediment, which helps to improve water quality. When we develop an area along a waterway, **effluents** such as fertilizers, sewage, and storm drain runoff all enter the water. Left untreated or free-floating in the water, high levels of these nutrients cause **eutrophication** which causes an initial explosion of algal growth followed by decline in plant life and dissolved oxygen. Plants from the salt marsh help to handle pollutants in several ways. Marshes can take up and filter the pollutants while others settle into the soil strata and are chemically reduced over time. More are processed by bacterial action. When salt marshes are filled or lost, pollutants they could have rendered harmless remain in the water, free to move all over the water system and into the ocean. In addition to the great buffer zone and filtering capacity, the salt marsh is capable of absorbing and holding large quantities of water for use by wildlife in times of drought.

VOCABULARY

Effluents - waste material discharged into the environment.

Estuary - a place where salt water and fresh water meet and mix.

Eutrophication - the process by which a body of water becomes rich in dissolved nutrients either naturally or by pollution.

Turbidity - Thickness or opaqueness made by stirring up of sediment.

EXTENSIONS

Add a salt marsh to the pan by putting damp sponges across the open edge of the clay terrain. Repeat the demonstration. Before rain event, record student predictions about how this demonstration will be different than the first round without the sponges (salt marsh). To demonstrate the ability of a salt marsh to absorb excess water and prevent flooding, use the same, pre-measured amount of water for your "rainstorm" each time (with and without sponges in place). Record predictions and re-measure "polluted" water after each round. Observe changes (less water, less pollution with salt marsh in place).

Revised April 14, 2009

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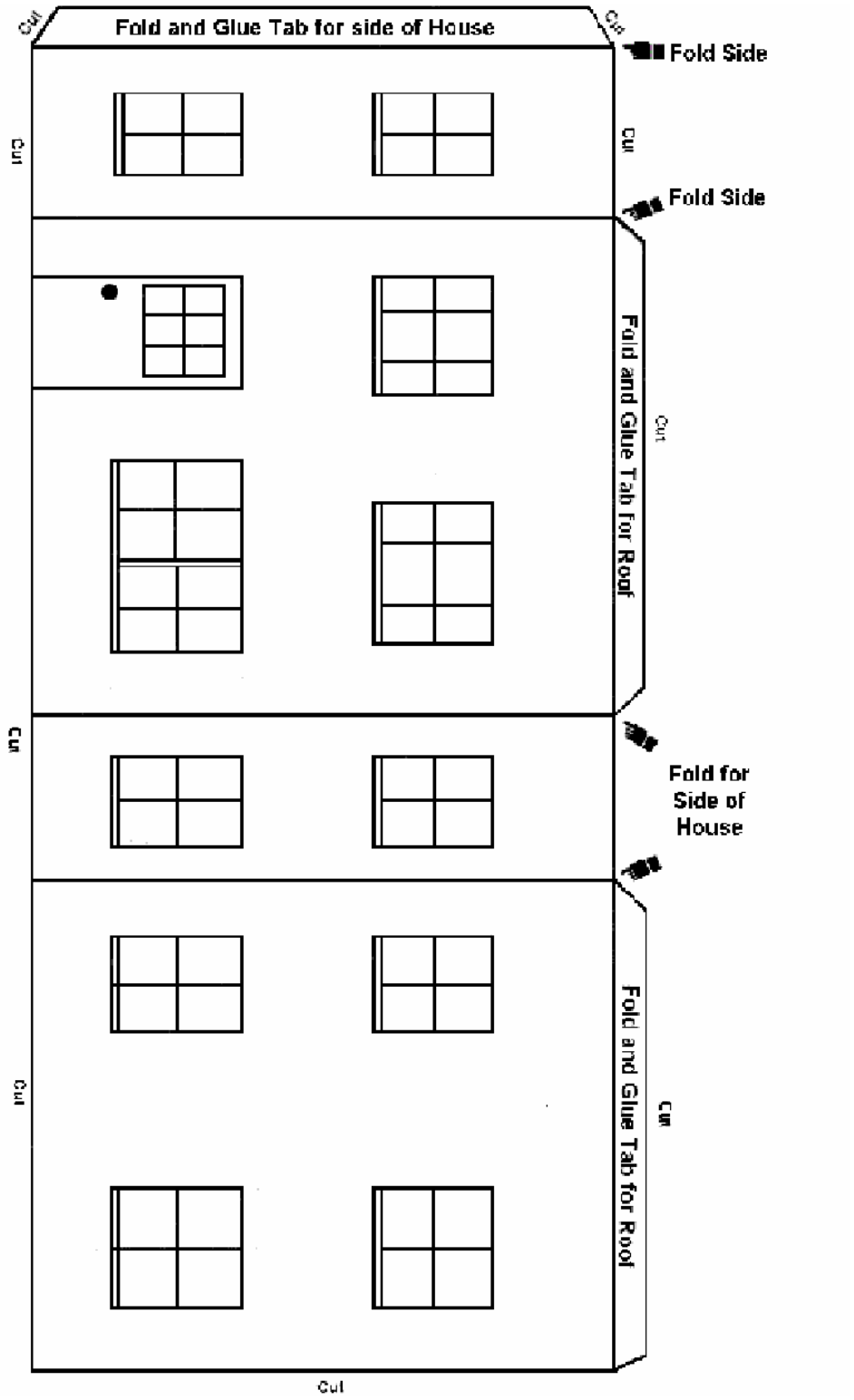

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