Hooray for Barnegat Bay!

Subject Areas: Science, Social Studies
Setting: Classroom
Duration: One class period
Skills: critical thinking, discussing, listing, comparing, listening, interviewing
Vocabulary: estuary, National Estuary Program, river, lake, wetland, bay, ocean, Lenni Lenape, wampum, reef, clammer, dealer, retailer, consumer, relay

Correlation to Core Curriculum Standards:
Science: 5.1 (A,B), 5.2 (A), 5.10 (A,B);
Social Studies: 6.1(A), 6.3 (A,B), 6.5 (A, B), 6.6 (C)
Language Arts: 3.1 (A,E,H), 3.2 (A,B,C,D), 3.5 (A,B,C)
Math 4.1 (A,B), 4.5 (A,C)

Objectives:
1. Students will understand why estuaries are important
2. Students will identify how different groups used the Barnegat Bay Estuary over time

Materials: Barnegat Bay Watershed Map, paper and pencil or student journal,

Background:
Land around the Barnegat Bay has been inhabited by many groups over time. This is partly because of the rich resources surrounding an estuary, a place where fresh and salt water meet. Estuaries have some of the highest productivity and diversity of plants and animals in the world. Over 80% of the world’s fish and shellfish depend on estuaries for habitat during part of their lives. The riches of this resource have made it very attractive to human settlement. Ocean County, New Jersey has a long maritime tradition in association with the
people who have lived on the bay. The Barnegat Bay is one of 28 National Estuary Programs recognized by the Environmental Protection Agency, and one of three protected estuaries in New Jersey. Established in 1995, the Barnegat Bay National Estuary Program is responsible for helping to educate the public about this precious resource, as well as teaching ways to reduce their pollution contributions.

**Procedure:**
Tell students that the Barnegat Bay area has been inhabited by various cultures for a very long time. Ask them to come up with reasons why this area might be a good place to visit or settle. Divide class in three, and assign each group a culture: Lenni Lenape (early 1600s), revolutionary soldiers, (late 1700s) or 1920s vacationers. Have them describe, either individually, or as a group what they think area around the bay may have been like at that time.

**Procedure: Activity - Short Term/Younger Grades**
Have students interview someone who moved down to the Barnegat Bay/Ocean county area, such as a family member or friend’s parents. Ask them why they moved to the Jersey Shore. Have them list things they enjoy about living near the bay. Compare these things to what you discovered in the previous activity. Have them categorize the items on their lists in a way that makes sense to them—(suggestion: recreation, nature, basic needs). Discuss the lists in class, and make a master list of the benefits of living in the Barnegat Bay Watershed.

**Procedure: Activity - In-Depth/Older Grades**
New Jersey is home to six major commercial fishing ports, with four ranked among the top fifty ports in the nation in terms of value of the harvest: Cape May was the fifth largest commercial fishing port in the nation, bringing in 74.6 million pounds valued at $68.4 million in 2005; Barnegat Light landed $26.7 million of fish, primarily sea scallops and monkfish; Point Pleasant’s 2005 catch of 24.8 million pounds was valued at $21.6 million; and Atlantic City brought in $18.5 million, mostly ocean quahogs and surf clams. This makes the Barnegat Bay
(combining the Barnegat Light and Point Pleasant ports) very important as a commercial fishery, worth over $48 million dollars annually. This is largely because estuaries are among the world's most productive habitats. What threatens this valuable fishery? Ask students what the consequences of losing this valuable “crop” are at every level, including ecologically, economically, and as a food source. Explain that if shellfish are harvested from less than approved waters, they have to go through depuration or relay, meaning they are put in clean waters so the clams can cleanse themselves. There is more on this in section three.

**Extension: Taking it further**
In 2007, the NJ Museum of Agriculture in North Brunswick is hosting an exhibit on aquaculture. The Tuckerton Seaport, Ocean County Historical Museum, and several coastal towns (such as Toms River) also have information and exhibits on the maritime history of Ocean County. Design a scavenger hunt for students based on the exhibit, identifying objects, facts, or answers they have to find. Have students visit one of these venues either as a class trip, or with their families. Have students report on what they saw at the exhibit, and all of the ways that coastal living influenced Ocean County residents over time.

**Assessment:**
Class participation, Discussion
Hooray For the Bay Worksheet
Harvest Economics Worksheet
Student Journals
Report on Museum experience/ Scavenger Hunt Results

**Also see:** Discover People and Places section of Discovering Barnegat Bay.
Watery World, Salt Marsh in Winter from Discovering Barnegat Bay.
Hooray for the Bay worksheet

Use the word bank below to complete the following statements. Each word or number will be used one time.

<table>
<thead>
<tr>
<th>Word Bank</th>
<th>Number Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>estuary</td>
<td>75</td>
</tr>
<tr>
<td>ocean</td>
<td>80</td>
</tr>
<tr>
<td>oyster</td>
<td>159</td>
</tr>
<tr>
<td>quahog</td>
<td>660</td>
</tr>
<tr>
<td>wampum</td>
<td></td>
</tr>
</tbody>
</table>

1. The place where fresh and salt water meet is an __________.
2. ______ percent of all the world's fish and shellfish depend on these environments at some point in their life cycle.
3. The Barnegat Bay itself is ______ square miles, and the largest enclosed body of water in New Jersey.
4. The Barnegat Bay watershed is______ square miles, and covers most of _______ County.
5. The Lenni Lenape used pieces of shell as money, and they called it __________.
6. The ______ is currently an important recreational and commercially harvested shellfish species in Barnegat Bay.
7. In 2005, the dockside value of the commercial fisheries harvest in New Jersey was ______ million dollars.
8. _______ were part of a thriving shellfish industry in Barnegat Bay in the early 1900s.
Hooray for the Bay Worksheet Answers

1. The place where fresh and salt-water meet is an **estuary**.
2. **80** percent of all the world’s fish and shellfish depend on these environments at some point in their life cycle.
3. The Barnegat Bay itself is **75** square miles, and the largest enclosed body of water in New Jersey.
4. The Barnegat Bay watershed is **660** square miles, and covers most of **Ocean** County.
5. The Lenni Lenape used pieces of shell as money, and they called it **wampum**.
6. The **quahog** is currently an important recreational and commercially harvested shellfish species in Barnegat Bay.
7. In 2005, the dockside value of the commercial fisheries harvest in New Jersey was **159** million dollars.
8. **Oysters** were part of a thriving shellfish industry in Barnegat Bay in the early 1900s.
Harvest Economics Worksheet

A clammer may catch between 800 and 1200 clams a day in a good spot. For this worksheet we will say there is no cost for harvest however, there are some costs associated with shellfishing (cost of license, boat, gas, maintenance, cost of being sick or unable to harvest, etc). Remember the following calculations are for one day of work, and unpredictable conditions may limit harvest time.

1. If the clammer caught 1151 clams, how much money is made from selling them at seventeen cents each? __________

2. If a dealer, who bought the clams for 17 cents each, then sells them for 23 cents each to a retailer, how much profit will be made on 1151 clams? __________

3. If a restaurant then buys the clams for $4.99 a dozen, and sells them for $1 per clam, how much profit do they make? __________

4. If, due to pollution and over fishing, the clammer can only catch 300 clams on a good day, and then the clams have to be relayed into cleaner waters at 7 cents per clam, how much money does the clammer lose from question 1? __________

5. What effects might this have on the consumer?
_____________________________________________________
_____________________________________________________

6. How much money is made if pollution harms all shellfish populations and closes harvesting waters? __________
Harvest Economics Worksheet ANSWERS

A clammer may catch between 800 and 1200 clams a day in a good spot. For this worksheet we will say there is no cost for harvest however, there are some costs associated with shellfishing (cost of license, boat, gas, maintenance, cost of being sick or unable to harvest, etc). Remember the following calculations are for one day of work, and unpredictable conditions may limit harvest time.

1. If the clammer caught 1151 clams, how much money is made from selling them at seventeen cents each?
   \[1151 \times 0.17 = 195.67 \text{ cents} \div 100 = \$195.67\]

2. If a dealer, who bought the clams for 17 cents each, then sells them for 23 cents each to a retailer, how much profit will be made on 1151 clams?
   \[23 - 17 = 6 \times 1151 = 6906 \text{ cents or } \$69.06\]

3. If a restaurant then buys the clams for \$4.99 a dozen, and sells them for \$1 per clam, how much profit do they make?
   \[\frac{4.99}{12} = 0.42; \ 1 - 0.42 = 0.58 \times 12 = \$6.96\]

4. If, due to pollution and over fishing, the clammer can only catch 300 clams on a good day, and then the clams have to be relayed into cleaner waters at 7 cents per clam, how much money does the clammer lose from question 1?
   \[17 \text{ cents per clam} - 7 = 10 \text{ cents per clam profit. } 300 \times 10 = \$30; \ 195.67 - 30 = \$165.67\]
   in lost income PER DAY.

5. What effect might this have on the consumer?
   The consumer will pay more for shellfish, and they may be harder to find.

6. How much money is made if pollution harms all shellfish populations and closes harvesting waters?
   \$0.