



NATIONAL ESTUARINE RESERVES LESSON PLAN

For the Last 10,000 Years...

Theme

National Estuarine Research Reserve System (NERRS)

Links to Overview Essays and Resources Needed for Student Research

<http://oceanservice.noaa.gov/topics/coasts/reserves/>

Subject Area

Life Science/Earth Science/Social Sciences

Grade Level

9-12

Focus Question

How may estuarine research reserves improve our understanding of interactions between human cultures and estuarine systems?

Learning Objectives

- Students will describe the National Estuarine Research Reserve System, and explain how to obtain information on the 26 sites in the System.
- Students will discuss why sites in the National Estuarine Research Reserve System are likely to contain important cultural artifacts.
- Students will provide an overview of a 10,000 year-old human culture associated with the region containing what is now the Tijuana River National Estuarine Research Reserve.

Materials Needed

- (optional) Computers with internet access; if students do not have access to the internet, download copies of materials cited under “Learning Procedure” and provide copies of these materials to each student or student group

- Copies of “Tijuana River NERR Worksheet” found at the end of this lesson plan, one copy for each student or student group

Audio/Visual Materials Needed

None

Teaching Time

One 45-minute class period, plus time for student research

Seating Arrangement

Classroom style if students are working individually, or groups of 3-4 students

Maximum Number of Students

30

Key Words

Estuary
National Estuarine Research Reserve System
Tijuana River NERR
Kumeyaay
Cultural resources

Background Information

Estuaries are water bodies and adjacent wetlands found in areas where rivers flow into much larger bodies of water, and include bays, sounds, marshes, inlets, lagoons, and sloughs. Most estuaries are formed where a river meets the sea, but there are also freshwater estuaries where rivers flow into much larger bodies of freshwater (such as the Great Lakes). Estuaries provide many benefits, including:

- essential spawning and nursery areas for many species, including fish and shellfish important to commercial and recreational fisheries;
- protection for upland areas from flooding and shoreline erosion; and
- habitat and food for estuarine species as well as species that live in other habitats.

Unfortunately estuaries (and the benefits they provide) are threatened by impacts from human activities such as coastal

erosion, water pollution, and habitat destruction, as well as a variety of natural disturbances such as winds, waves, heavy rainfall, and severe storms.

The National Estuarine Research Reserve System (NERRS) is a network of 26 estuaries that was established to represent different biogeographical regions of the United States and support long-term research, education, and stewardship of estuarine resources. Within each reserve, field staff work with local communities and regional groups on issues such as nonpoint source pollution, habitat restoration, and how best to cope with invasive species. For more information on these topics, see:

- http://nerrs.noaa.gov/Background_Bioregions.html
- <http://oceanservice.noaa.gov/education/kits/pollution/>;
- http://oceanservice.noaa.gov/education/classroom/lessons/09_coast-manag_point.pdf;
- http://oceanservice.noaa.gov/education/classroom/lessons/08_restor_fixit.pdf;
- http://oceanservice.noaa.gov/education/classroom/lessons/06_coastal_alien.pdf;
- <http://oceanservice.noaa.gov/education/kits/estuaries/>; and
- <http://oceanservice.noaa.gov/education/stories/lionfish/>.

While much of the work at NERRS sites is focussed on protecting, restoring, and understanding natural resources, these sites also include important cultural resources because the benefits provided by estuaries have been important to humans for many centuries. Recently, scientists working on a restoration project in the Tijuana River National Estuarine Research Reserve made an exciting discovery: buried under several feet of fill material (soil or other material dumped to raise the level of low-lying land) was a 1,600 year-old archeological site, so well-preserved that artifacts probably lie exactly where they were discarded sixteen centuries ago. This site was once inhabited by members of the Kumeyaay (pronounced koo-me-eye) Nation, whose members have lived in the area now known as San Diego for 10,000 years.

In this lesson, students will explore the Kumeyaay culture and the Tijuana River National Estuarine Research Reserve, where the newly-discovered archeological site is expected to yield

important clues about the historic relationship between human communities and coastal wetlands.

Learning Procedure

1.

Preparation: If students do not have access to the internet, download and copy:

- Introductory essay on National Estuarine Research Reserves (<http://oceanservice.noaa.gov/topics/coasts/reserves/>);
- Pages on Tijuana River Reserve, California: Site Description, Cultural History, and Archeological Discovery at the Tijuana River Reserve Provides Insight into Local History and Ecology (linked from <http://www.nerrs.noaa.gov/TijuanaRiver/Highlights.html>);
- Essays concerning Kumeyaay history (there are many Web sites that contain this information, including: <http://www.sycuan.com/history.html>; <http://www.campo-kumeyaay.org/>; <http://www.americanindiansource.com/khistories/kumeyaaymill.html>; and <http://powayusd.sdcoe.k12.ca.us/projects/kumeyaay/WebLinks.htm>; the exact references depend upon the level of detail that you expect students to include in their reports.

2.

Briefly review the concept of estuaries. You may want to have students review the tutorial in the “Estuaries Discovery Kit” (<http://oceanservice.noaa.gov/education/kits/estuaries>), and complete portions of the self-test in the Discovery Kit Lesson Plan section. Discuss the importance of estuaries to human communities, and encourage students to consider the role of estuaries in human history. Introduce the National Estuarine Research Reserve System. Point out that while natural resources are often the primary focus of these reserves, they all have the potential to include important cultural resources as well because of the historical importance of estuaries to human communities. Tell students that they will be investigating an exciting discovery recently made at one of these reserves.

3.

Provide each student or student group with a copy of the “Tijuana River NERR Worksheet,” as well as copies of the materials downloaded in Step 1 above if students do not have

access to the internet. Have students answer the worksheet questions. If students are using the internet, you may want to provide them with the following URL <http://www.kumeyaay.com>, which contains information needed to answer Questions 8 through 15, or allow them to discover this information on their own.

4.

Lead a discussion of students' answers to worksheet questions. The following points should be included:

- The primary purposes for which National Estuarine Research Reserves are established are stewardship, research, and education.
- The Tijuana River NERR is located in Imperial Beach in San Diego County, CA, near the Mexican border.
- Most of the watershed that drains into the Tijuana River NERR is in Mexico.
- The major urban areas surrounding the Tijuana River NERR include Tijuana, Imperial Beach, and San Diego.
- Natural habitats found within the Tijuana River NERR include beach, dune, tidal channel, mudflat, saltmarsh, riparian (of or on a riverbank), and upland.
- The recent discovery of a 1,600 year-old archeological site with extremely well-preserved artifacts in the Tijuana River NERR provides insight into local history and ecology.
- This discovery concerns the Kumeyaay Nation.
- The Kumeyaay Nation has been in the area now included within the Tijuana River NERR for approximately 10,000 years.
- The approximate geographic range of the Kumeyaay Nation is along waterways from the San Diego coastal area, east to the Salton Sea, and south past present-day Ensenada, Mexico.
- The Kumeyaay believe that they have always lived in the San Diego basin: "our beginning is this land."

- The first known European contact in Kumeyaay territory took place in 1542 with the landing of Portuguese explorers at present-day Point Loma in San Diego. 1769 was the beginning of the Spanish period, marked by the founding of the San Diego mission by Father Junipero Serra. The mission was completed in 1775, but was destroyed by the Kumeyaay one month after its completion (the mission was rebuilt in less than a year). In 1821, Mexico won its independence from Spain, and large land grants were given to Mexican supporters, including San Diego. This marked the end of the Spanish period and the beginning of the Mexican period, which lasted until the end of the U.S. Mexican War in 1848. In 1851, the Kumeyaay rebelled against U.S. rule. Their chief complaint was that they were being taxed without having any rights extended to them; ironically reminiscent of the “taxation without representation” issue that helped fuel the American revolution nearly a century before. The leader of the short-lived rebellion was Antonio Garra, who was executed in 1852 for treason, murder, and theft. In 1924, Native Americans officially became U.S. citizens under the Citizenship Act of 1924, and women (including Indian women) were given the right to vote. Native Americans, however, could not vote for local officials until they received full voting rights in 1952.
- The Kumeyaay were suspicious of European explorers, and several members of the 1542 expedition were attacked and wounded. Early Spanish settlers were weak and sickly, and were frequently raided by the Kumeyaay. A brief episode of tolerance was broken when Spanish soldiers attacked the wife of a Kumeyaay chief, and the first Spanish mission was destroyed a month after its completion. The Kumeyaay continued to harass Spanish expeditions, and early Spanish pueblos or missions on the Colorado River were abandoned and never re-established. The Kumeyaay were a major threat to Spanish security throughout the Spanish period. The same pattern continued through the Mexican period, as Kumeyaay reacted to loss of their tribal lands to settlers who had received land grants from Mexico. When the U.S. declared war on Mexico in 1846, some Kumeyaay leaders saw an advantage in developing alliances with the

Americans. Despite these efforts, many Kumeyaay were eventually evicted from their traditional ancestral lands by the U.S. government.

- Disease, particularly smallpox, drastically reduced the population size of Native Americans following early European contacts.
- Currently, the Kumeyaay are attempting to shape their children's future through economic ventures (such as casinos) to acquire a political presence that will allow them to influence policies to improve housing, health care, and other community services.

Ask students to discuss the importance of estuarine reserves to cultural resources. Students should realize that the benefits of estuaries cause these areas to be the site of intense human activity, which often obliterates evidence of prior uses including potentially important cultural artifacts. In heavily urbanized areas such as the area surrounding the Tijuana River NERR, estuarine reserves may be only places in which such artifacts can be protected and systematically studied.

The Bridge Connection

www.vims.edu/bridge/ – Click on “Ocean Science Topics” in the navigation menu to the left, then “Habitats,” then “Estuary.”

The “Me” Connection

Have students write a brief essay from the perspective of a Kumeyaay child in the 1900's, describing the importance of the Tijuana River estuary and how they feel about being forced to move 60 miles inland. For details of this event, read “Eviction at Cupa” by Richard W. Amero (<http://members.cox.net/ramero/eviction.htm>).

Extensions

1. Have students select other NERRS estuaries or projects in the CICEET project database, and prepare brief reports about these systems or projects.

2. Visit <http://oceanservice.noaa.gov/education/kits/estuaries/> and <http://nerrs.noaa.gov/Education/Curriculum.html> for more information and activities related to estuaries.

Resources

<http://oceanservice.noaa.gov/education/kits/estuaries/> – NOAA's Estuary Discovery Kit, with a tutorial, roadmap to resources, and lesson plans on estuaries

<http://nerrs.noaa.gov/Education/k12Educators.html> – Information on education programs offered at National Estuarine Research Reserve sites, including curricula, Powerpoint presentations, and lesson plans

<http://ciceet.unh.edu/searchprojects.html> – The CICEET Project Explorer, which provides a visually-stimulating and user-friendly way to experience the CICEET project database.

<http://powayusd.sdcoe.k12.ca.us/projects/kumeyaay/WebLinks.htm> – Links to Web sites with information and resources about the Kumeyaay

NOAA, 2000. Polluted Runoff: Lessons Learned from the National Estuarine Research Reserve System. Estuarine Reserves Division. Silver Spring, MD (available online at www.ocrm.nos.noaa.gov/pdf/NERRLessonsLearned.pdf)

<http://www.epa.gov/owow/estuaries/kids/> – Games and activities about estuaries produced through the National Estuary Program

<http://www.onr.navy.mil/focus/ocean/> – Oceanography site from the Office of Naval Research including online quizzes and activities. See the Habitats section for information and activities about estuaries.

<http://www.ncnerr.org/education/estnet/index.html> – Estuary-Net Project; an online project for grades 9-12 to help solve non-point source pollution problems in estuaries and their watersheds

National Science Education Standards

Content Standard A: Science as Inquiry

- Understandings about scientific inquiry

Content Standard E: Science and Technology

- Understandings about science and technology

Content Standard F: Science in Personal and Social Perspectives

- Personal and community health
- Population growth
- Natural resources
- Environmental quality
- Natural and human-induced hazards
- Science and technology in local, national, and global challenges

Content Standard G: History and Nature of Science

- Science as a human endeavor
- Historical perspectives

Links to AAAS "Oceans Map" (aka benchmarks)

5D/H3 – Human beings are part of the Earth's ecosystems. Human activities can, deliberately or inadvertently, alter the equilibrium in ecosystems.



NATIONAL ESTUARINE RESEARCH REVERVES WORKSHEET

Tijuana River NERR Worksheet

Begin research for the following questions at <http://oceanservice.noaa.gov/topics/coasts/reserves>. You will need to locate additional resources to answer questions 8 through 15.

1. What are three primary purposes for which National Estuarine Research Reserves are established?
2. Where is the Tijuana River NERR located?
3. Where is most of the watershed that drains into the Tijuana River NERR?
4. What major urban areas surround the Tijuana River NERR?
5. Name seven natural habitats found within the Tijuana River NERR.
6. What recent discovery in the Tijuana River NERR provides insight into local history and ecology?
7. This discovery concerns what culture?
8. How long has this culture been present in the area now included within the Tijuana River NERR?
9. What was the approximate geographic range of this culture?
10. According to beliefs within this culture, what was the origin of the first people of this group?
11. What milestone events in the history of this culture took place in 1542; 1769; 1775; 1821; 1848; 1852; 1924; 1952
12. Describe relationships between this culture and Spain, Mexico, and the United States.

13. In addition to murder and slavery, what other factor played a major role in reducing the population of California Indians from 150,000 in 1845 to less than 16,000 in 1900? (Hint: find out what happened to Juan Antonio, a chief from the San Bernardino region)

14. How are the Kumeyaay currently shaping the future for their children?