Tijuana River National Estuarine Research Reserve

High School Teachers' Guide

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Introduction

We San Diegans are fortunate to have one of the few intact estuaries in Southern California, our only coastal wetland not bisected by roads and rail lines, and one of the largest estuaries on the west coast - the 2,500 acre Tijuana River National Estuarine Research Reserve (TRNERR).

Estuaries, where rivers meet the sea, are among the most biologically productive ecosystems on the planet - well worth preserving and well worth exploring. Over 370 species of birds have been recorded in the Tijuana Estuary and its adjacent river valley. The endangered California Least Tern, Least Bell's Vireo, California Brown Pelican, Light-footed Clapper Rail, and an endangered plant, Salt Marsh Bird's Beak, are all here. The Western Snowy Plover, a threatened species, is a year-round resident and nests on the beaches.

Like all estuaries, it filters terrestrial pollutants and provides protection from flooding. Like all estuaries, it also has economic importance. These dynamic bodies of water provide us with important sources of food, since more than two thirds of the fish and shellfish we eat spend some part of their lives in estuaries. Seeing is believing how important estuaries are to preserve and protect.

At the Tijuana Estuary, we attempt to do quality environment-based environmental education in this valuable habitat. Environmental education (EE), according to the California's *Education and the Environment* plan, focuses on environmental "literacy:" learning about and caring for the total environment, understanding how humans interact with natural ecosystems, and developing critical thinking skills to resolve environmental issues. Environment-based education uses the environment (in this case an estuary) to engage students through "real world" learning experiences Classroom-based case studies of several schools conducted by the California State Education and Environment Roundtable provide evidence that good environment based education improved education in general and decreased discipline and attendance problems. In fact, a March 2000 study showed that student in schools using environment-based learning earned higher scores on their standardized tests than their more traditional counterparts (*Education and the Environment/Strategic Initiatives for Enhancing Education in California,* 2003).

Environmental education is an integral component of programming to serve educational goals and to serve resource protection and ecosystem management at TRNERR. In order to develop lasting solutions to problems ranging from habitat destruction to upstream water pollution, education on the value of estuarine and wildlife resources is required. At the Reserve, education and outreach are viewed as powerful tools that the operating agencies (California State Parks (CSP) and U.S. Fish and Wildlife Service (FWS)) can use in overseeing the human aspect of

resource management.

The education and outreach programs at Tijuana River NERR strive to go beyond providing information to resource users, as information alone does not protect the resources. To effect behavior change, education programs must instill knowledge and overcome the barriers to performing the positive behavior.

One goal of this curriculum is to improve environmental and estuarine literacy using standards-based (where possible) classroom lessons and environment-based field trip activities. Another goal is to promote responsible decision-making by:

- Teaching *what* estuaries are, what lives there, how they function, and how we depend on them;
- Providing opportunities to practice making *decisions* affecting estuaries; and
- Encouraging students to examine their *daily behaviors* that effect their estuary.

How to Use this Curriculum

Our educational system tends to compartmentalize learning, isolating individual subjects and ignoring the important connections that make learning relevant and useful. The component parts of this curriculum can be taught independently in the traditional disciplines of geology, history, humanities, or biology. Ideally, however, the Tijuana Estuary will serve as a theme for learning, illustrating how the various subjects interact as a coherent whole. A team of teachers from different disciplines might coordinate to present a tangible theme, bringing the real world into the classroom.

The whole program includes readings, classroom activities, and a field trip to the Tijuana Estuary (see Field Trip Guide).

There are five topics in this Teachers' Guide - Ecology, Geology, History, Language Arts, and Human Use. The readings can serve as background for teachers or student reading material. The activities are meant to serve as a unit in your classroom and as preparation for the Field Trips. Much of the Reading, Classroom, and Field Trip Activities align with State Content Standards.

Tijuana Estuary Visitor Center

Tijuana Estuary is one of the 27 Reserves in the National Estuarine Research Reserve System. This program was established in 1972 under the Federal Coastal Zone Management Act. The purpose of this program is to set aside estuaries in different biogeographical regions of the United States for research and education.

Tijuana Estuary is surrounded by Imperial Beach, California to the north and Tijuana, Baja California, Mexico to the south. It is the only NERR on an international boundary. Tijuana Estuary is committed to serving the under-served community of Imperial Beach (mostly Hispanic and at poverty level) as well as our Spanish speaking neighbors to the south, in our K-12 and community education programming. The Reserve capitalizes on its unique environmental education niche, having an on-site Research Coordinator, in especially the High School level programming. In providing high quality science-based environmental education to these under-served communities, we can build their capacity to positively impact the valuable ecosystems within the Reserve.

The Tijuana Estuary Visitor Center provides educational and research facilities which include exhibits and a trail system. Exhibits at the Visitor Center cover migration, estuary habitats, food chains, adaptation, and endangered species.