Tijuana River Action Plan
(TRAP)

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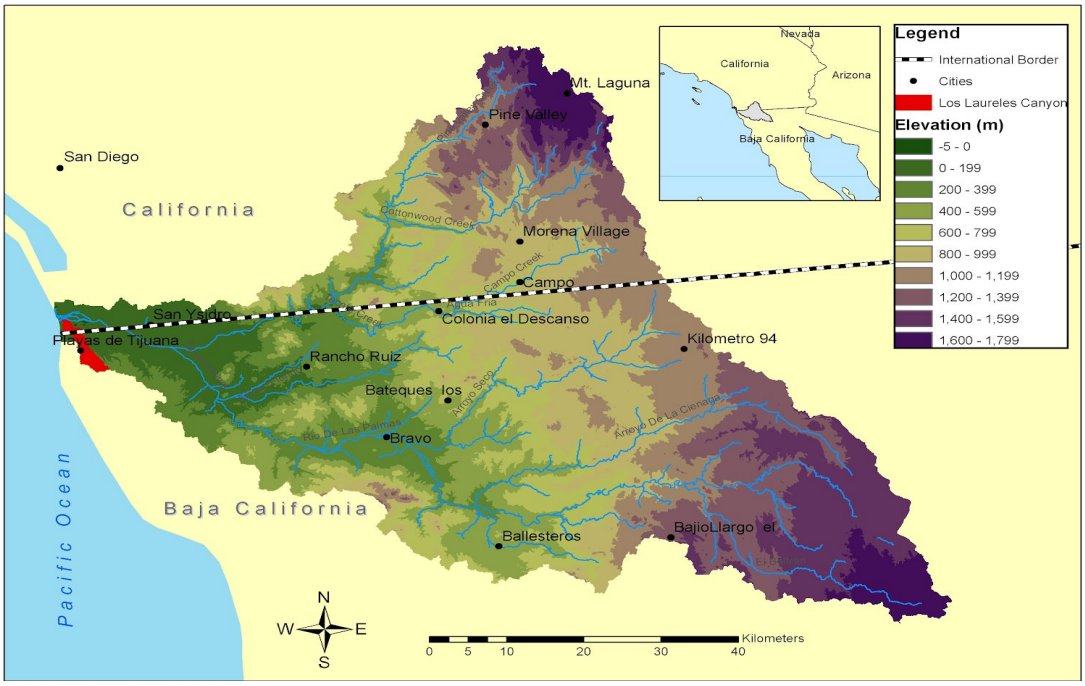
MISSION STATEMENT

The mission of TRAP is to mitigate pollution and improve water quality standards in the Tijuana River watershed in Southern California and Northwestern Mexico through cooperation of binational stakeholders by 2040.



BACKGROUND

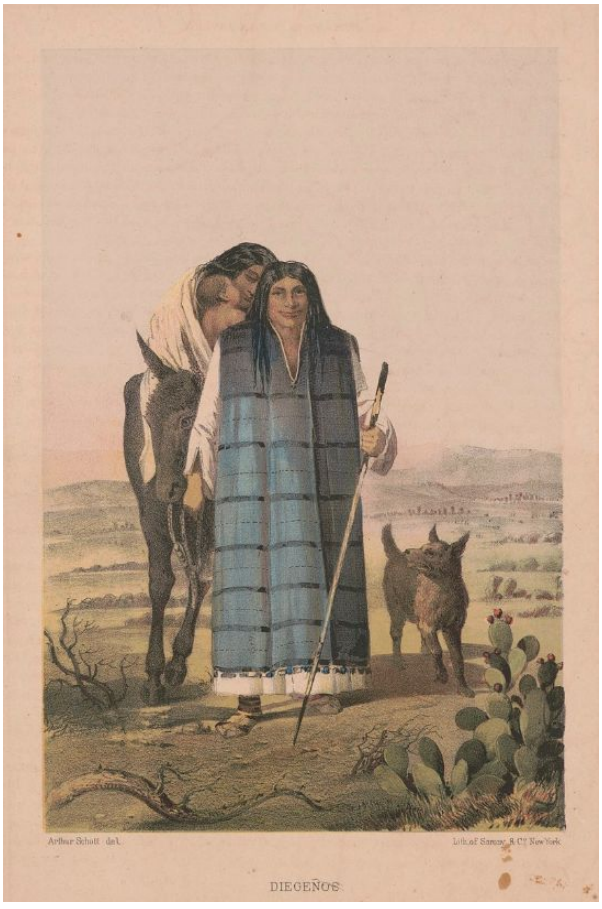
The Tijuana River is formed by two drainage networks from the U.S. and Mexico that merge in the City of Tijuana, about 11 miles (17km) from the Pacific Ocean. Water in the Tijuana River flows through a concrete channel through the City of Tijuana. The 1,750 square-mile (4,532 km²) basin that lies on either side of the international boundary has diverse landforms and topography that range from the tidal estuary at the mouth of the Tijuana River to the pine forest-covered mountains above 6,000 feet (1,829 m) at the upper end of the basin. Gowing economic linkages across the border of the Tijuana River watershed (TRW) are producing an integrated regional economy. The transborder population is also becoming more integrated through the long-term trend of increasing Mexican-origin population on the San Diego portion of the TRW, both in the lower and upper parts of the basin. Coastal mesas and foothills; several broad interior valleys that include those of Tijuana, Alamar, Las Palmas, and Tecate; and a high plateau and mountains on the eastern edge of the basin complete the picture of the basin's topography. The varied topography and the Mediterranean climate produce average temperatures that range from 8 to 18 degrees Celsius (46-64 degrees Fahrenheit) and precipitations from 150 to 650 millimeters

(5.9-25.6 in) per year that occurs mainly in the winter months in a few storms. Though most of the watershed falls within the Mediterranean climate system, some of its area is subject to arid and semi-arid conditions. Some species native to the area include Desert Cottontail rabbits, Southern California Steelhead Trout, and the Red Diamond Rattlesnake. The variations in topography, geology, rainfall, and temperature have produced a vast diversity of ecosystems and flora and fauna species. Changing land use, driven by population growth, has caused this region to have one of the highest numbers of endangered species of anywhere in North America.

HISTORY

The San Dieguito are the earliest humans known to inhabit the Tijuana River watershed toward the end of the Pleistocene era during the Early Holocene period, dating from 10,000 to 8,000 years ago. The San Dieguito used spears called *atlatls*, to hunt the megafauna that roamed the continent. As the climate became more arid and the Pleistocene mammals were hunted to extinction, native people were forced to adapt to the changing environment.

The La Jolla people of the Middle Holocene, dating 8,000-1,300 years ago, gradually developed new ways to live off the land through more intensive hunting and gathering throughout the watershed as well as greater utilization of the estuarine and marine resources of the lower watershed. Stabilizing sea levels around 3,500 years ago created a lagoon abundant in fish and shellfish that was surrounded by fertile marsh and riparian woodlands. Technological advances of the La Jollans include basket-making, which allowed them to harvest shellfish more easily, and grinding tools that would have been used to mill plant materials to incorporate more plant foods into their diet.



Baja Schott, Sorony, and Co., 1857

As the climate became drier, the trees and grasslands receded, drought-tolerant scrub and chaparral spread over the uplands, and salt-tolerant species took over the expanding marshes. Increased sedimentation converted the lagoon into a mudflat and estuary that was occupied by a group called the Kumeyaay in the Late Holocene, around 1,300 years ago. The Kumeyaay belong to an extended family of cultures and languages whose groups are located throughout California,

California, and Arizona. The Kumeyaay of the Tijuana River watershed refer to themselves a Tipai, meaning “the people.” Extensive interaction with the watershed’s various ecosystems led to an increase in population and patterns of material culture began to resemble those of the Native American populations living throughout the watershed. Archaeological evidence suggests that the Tipai engaged in farming and also made ceramics, a skill they may have learned from relatives in inland deserts, from clay collected from oceanside cliffs.

Shortly after the Spanish explorer, Hernán Cortés, arrived in Mexico in 1519, he captured the Aztec capital, Tenochtitlán (present-day Mexico City). Spanish expansionism continued over the next three centuries. Imperial Spain acquired vast territory in Central and South America as the country grew more dependent upon resources, particularly silver, imported from the New World Colonies. As Spaniards moved to expand their empire deeper into North America, many Native Americans were forced to convert to Christianity, work on Spanish occupied land, and forced to use Spanish practices. The Tipai went undisturbed by the Spanish until the mid-eighteenth century and efforts to convert the Kumeyaay in the San Diego region were largely unsuccessful.

In 1821, Mexico won its independence from Spain and all of Southern California became part of the Republic of Mexico. Rancho grants were given to prominent families to oversee the land and cattle of former Spanish missions. In 1929, Governor Augustin Melijo of Baja California gave Santiago Arguëllo nearly 26,000 acres in the Tijuana River Valley, which became Rancho Tia Juana. The Mexican government planned on resetting ex-neophytes (Native Americans who converted to christianity). Very few ex-neophytes were given land, and many struggled to adapt to their freedom. Many became servants for Californios, cowboys and laborers, while others roamed the backcountry with unconverted natives who frequently raided ranchos. Ultimately, ranchos in the area flourished and disease decimated the Kumeyaay population, killing children and elders, and drastically altering the way Kumeyaay lived.

In 1845, U.S. President James Polk’s emissary to Mexico failed to secure boundary adjustments, resulting in war between the U.S. and Mexico. After U.S. troops took Mexico City in 1847, Mexico ceded half its territories, including Alta California, San Diego, and the estuary to the United States. Most of the Tijuana River watershed upstream remained under Mexico’s jurisdiction. In 1848, the treaty of Guadalupe-Hidalgo was signed. The treaty specified a 2,000-mile border between the two countries. The treaty stated that the border’s westernmost position: “The international boundary will begin at a point one marine league south of the Port of San Diego, and run to the junction of the Gila and Colorado River.”

In 1851, Congress passed a law creating a Board of Land Commissioners to reject or confirm Mexican Land claims. Most Mexicans inhabiting the San Diego region chose to give up their Mexican citizenship under the assumption that their right to their land would be upheld.

However, the law allowed the U.S. government to challenge the board's rulings in local district courts. As a result, many Mexican rancheros in San Diego County were lost. Between 1940 and 1942, the Navy leased 245 acres along the border in the Tijuana River estuary as a training base, the same land that had been the hunting and gathering grounds of the Tipai 150 years earlier.

In 1971, 372 acres of the estuary became Border Field State Park, however, most of the Tijuana River estuary remained unprotected. There was no infrastructure to prevent sewage and other toxic waste from the *colonias* in Tijuana from flowing into the river, across the border into the estuary and out to sea. In addition, intermittent flooding carried massive amounts of garbage, housing materials, tires, dead animals, and sewage through the river valley. Developers wanted to purchase land in the estuary to build a marina. Environmentalists fought developers for nearly a decade to preserve the Tijuana River estuary. In 1980, officials purchased 500 acres which became the Tijuana Slough National Wildlife Refuge. The estuary became part of the U.S. Department of Commerce's National Estuarine Sanctuary Program, one year later. The Tijuana Estuary was chosen for the sanctuary program because it was the last remaining estuary not bisected by roads, rail-lines, or powerlines, though it was impacted by wastewater and sediment, like all wetlands in Southern California.

Now called the Tijuana River National Estuarine Research Reserve, and managed by the National Oceanic and Atmospheric Administration (NOAA). The Navy leases other land to the U.S. Fish and Wildlife Service for the Tijuana Slough National Wildlife Refuge. Together, the Border Highlands, Border Field State Park, Tijuana River Valley Regional Park, Tijuana Slough National Wildlife Refuge, and the Tijuana River National Estuarine Research Reserve constitute approximately 5,000 acres.

EXISTING GOVERNING BODIES

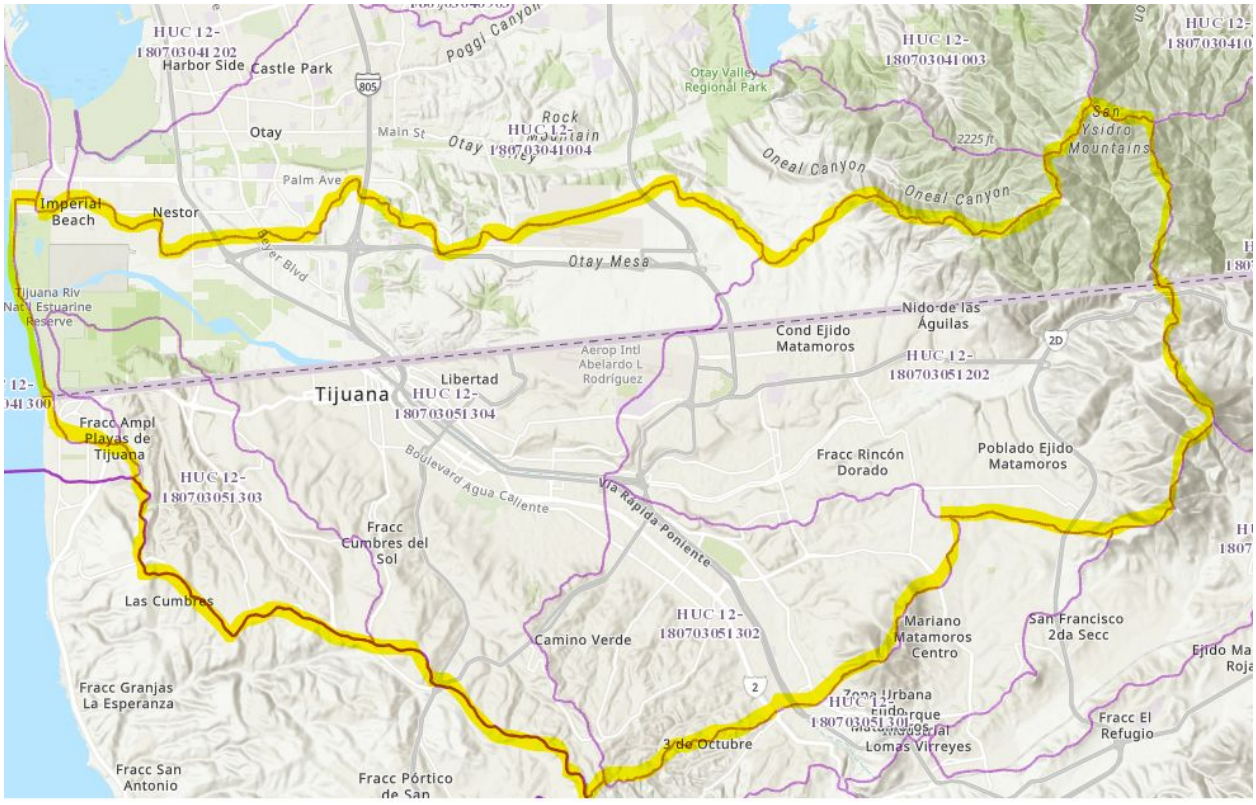
of

=The National Water Commission (CONAGUA) in Mexico is an administrative, technical advisory commission of Mexico's Ministry of the Environment and Natural Resources (SEMARNAT). They are responsible for overseeing water related projects and improvements. CONAGUA administers national waters, manages and controls the country's hydrological system, and promotes social development.

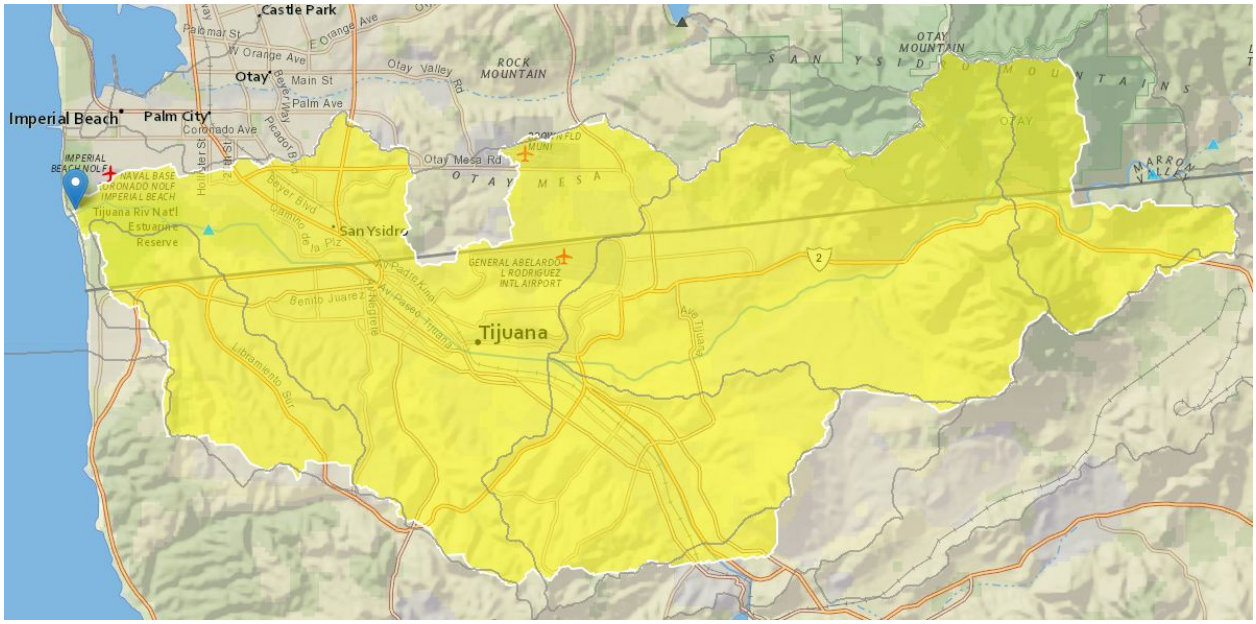
The Environmental Protection Agency (EPA) is a United States based federal body that monitors and regulates US waterways and water health. Both of these agencies will need to be contacted and consulted with to create a plan that will be applicable in both nations.

STAKEHOLDERS

International	Mexico United States of America	
National	National	State of Baja California State of California
Large Cities	Large Cities	City of Tijuana City of San Diego
Local	Local	Small Towns Local governing bodies Businesses Residents



ArcView GIS



StreamStats

PROBLEMS

TRAP focuses on three problems facing within the Tijuana River watershed, including sediment accumulation, solid-waste management, and poor water quality.

Problem	Description	Causes
P1: Sediment	Excessive sediment and waste are flowing into the river, causing issues for aquatic life.	Unplanned and improperly built structures are causing premature soil erosion. Trash and other waste being washed into or dumped in river.
P2: Solid Waste Management	Organochlorine Pesticides (OCPs), Polychlorinated Biphenyls (PCBs), and Polybrominated Diphenyl Ethers (PBDEs) were found in collected samples from the river.	Lack of solid waste disposal system in many areas within the watershed. Legislature varies across national boundaries as well as within local regions, and some areas lack the infrastructure to dispose of

	Tires, plastics, and other dumped materials are a common site throughout the Tijuana River.	waste.
P3: Water Quality	Sewage flows are degrading the water quality moving from Tijuana along the river to the Tijuana River estuary.	Rapid urbanization and industrial growth coupled with non-improved sewage infrastructure.

PROBLEM 1: SEDIMENT

Lucy D. Barker

The Tijuana river watershed is one of the fastest growing regions along the border, with almost 5 million people living in the San Diego, CA metropolitan area and more than 1 million people living in Tijuana, Baja California. The population in the watershed, specifically in the city of Tijuana, is growing unsustainably. The upland terrain is being developed with unplanned housing, and storms moving through deforested and vegetated hillsides send sediment down eroding gullies. Sedimentation due to erosion, trash, and waste tires are the main causes of environmental degradation for proximate communities. Pollutants flowing into the Tijuana River watershed include heavy metals, chemicals, fertilizers, and sewage. The large buildup of sediment causes flooding that heavily damages unregulated structures and minimally regulated land use further contributes to the issue.

GOAL 1: REDUCE SEDIMENT IN RIVER

TRAP intends to work with local policy makers to develop a long term dredging plan. The amount of sediment that builds up in the Tijuana River due to the clogging of its tributaries can be reduced via dredging. Additionally, a public outreach strategy will be developed to inform those living and working near the banks of the river and its tributaries about the cost that sedimentation is having on the area. It can already be seen in flooding and destruction of roadways and property, but without widespread awareness a change cannot be made.

PROBLEM 2: SOLID-WASTE MANAGEMENT

Robert Gauthier

Exponential growth in the border region has resulted in increased waste dumping. Waste management services exist, but municipal governments lack sufficient funds to keep up with growing demands, resulting in illegal dumping into canyons, drains, and riverbeds. Furthermore, Mexico treats solid waste differently than California. The state of Baja California does not have a budget for waste management and there is limited collection infrastructure, which makes disposal of solid waste unfeasible for the average person.

As a result, solid waste significantly compromises the Tijuana River. In 2014, The U.S. EPA conducted a Tijuana Valley sediment retention basin characterization study to assess chemical concentrations, physical properties, and plastic content of the sediment in the basins and on two background areas. The study found significant levels of Organochlorine Pesticides (OCPs), Polychlorinated Biphenyls (PCBs), and Polybrominated Diphenyl Ethers (PBDEs) in collected pairs of sediment and plastic samples.

GOAL 2: PRODUCE SOLID-WASTE MANAGEMENT PLAN

The issue of solid waste management is in no way unique to the Tijuana River Watershed. TRAP intends to pursue studies on successful solid waste management plans that have proven effective in similarly large regions. After analyzing this information it will be critical to get in contact with policy makers both in Mexico and the United States to ensure that a united front is presented. Without a solid infrastructure, people will dispose of their waste by any means possible, and one of the easiest ways is to toss it in the river. It will be critical that the members of the Tijuana River Watershed be educated on the impact that solid waste dumping has on the ecology and water quality of their river.

PROBLEM 3: WATER QUALITY

Salvador Rivera

The Tijuana River watershed is a large binational watershed of 1,750 square miles that lies across the California - Mexico border. Approximately 75% is within Mexico and encompasses the densely urbanized city of Tijuana. The watershed drains into the Tijuana River Estuary in the U.S. and ultimately to the pacific Ocean in the city of Imperial Beach. Rapid urbanization and industrial growth in Tijuana has put a strain on Mexican sewage infrastructure in the region. Sewage infrastructure inadequacies have created recurring sewage pollution problems on both sides of the border. Sewage generated on the Mexico side of the watershed travels north into California through the Tijuana River or other cross-border canyon tributaries in the Tijuana River Valley. The sewage flows degrade water quality in the Tijuana River Estuary and adjacent beach coastal waters while also posing a severe health risk to residents on both sides of the border.

GOAL 3: IMPROVE WATER QUALITY

The first step in improving the water quality of the Tijuana River will be taking steps to mitigate the amount of direct sewage outflow into the river. After direct flows have been accessed time and money will need to be invested in creating a viable sewage management system for the city of Tijuana. Given that it has exceeded the capacity of its current system, it is important the system be expanded and improved upon where possible. Reducing sewage inflow to the river will increase the water quality in both Mexico and the United States. A study will then need to be performed on the impacts of these changes, with point sources being identified and addressed on a case by case basis.

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