



Borders Committee Agenda

Friday, March 22, 2024

1 p.m.

Welcome to SANDAG. The Borders Committee meeting scheduled for Friday, March 22, 2024, will be held in person in the SANDAG Board Room. While Borders Committee members will attend in person, members of the public will have the option of participating either in person or virtually.

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Vision Statement: *Pursuing a brighter future for all*

Mission Statement: *We are the regional agency that connects people, places, and innovative ideas by implementing solutions with our unique and diverse communities.*

Our Commitment to Equity: *We hold ourselves accountable to the communities we serve. We acknowledge we have much to learn and much to change; and we firmly uphold equity and inclusion for every person in the San Diego region. This includes historically underserved, systemically marginalized groups impacted by actions and inactions at all levels of our government and society.*

We have an obligation to eliminate disparities and ensure that safe, healthy, accessible, and inclusive opportunities are available to everyone. The SANDAG equity action plan will inform how we plan, prioritize, fund, and build projects and programs; frame how we work with our communities; define how we recruit and develop our employees; guide our efforts to conduct unbiased research and interpret data; and set expectations for companies and stakeholders that work with us.

We are committed to creating a San Diego region where every person who visits, works, and lives can thrive.

Borders Committee

Friday, March 22, 2024

Comments and Communications

1. Non-Agenda Public Comments/Member Comments

Members of the public shall have the opportunity to address the Borders Committee on any issue within the jurisdiction of the Borders Committee that is not on this agenda. Public speakers are limited to three minutes or less per person. Public comments under this agenda item will be limited to five public speakers. If the number of public comments under this agenda item exceeds five, additional public comments will be taken at the end of the agenda. Borders Committee members and SANDAG staff also may present brief updates and announcements under this agenda item.

Consent

+2. Approval of Meeting Minutes

Approve

Tessa Lero, Francesca Webb, SANDAG

The Borders Committee is asked to approve the minutes from its January 26, 2024, meeting.

[Meeting Minutes](#)

Reports

+3. Tijuana River Valley U.S. – Mexico Transborder Pollution Environmental Crisis

Information

Mayor Paloma Aguirre, City of Imperial Beach

Mayor Aguirre will present on the status of the Tijuana River Valley emergency, the comprehensive plan to address the issue, and current implementation challenges.

[Tijuana River Valley U.S. - Environmental Crisis.pdf](#)
[Att. 1- Board Resolution No. 2024-05](#)

+4. Public Health Report on Exposure Risks from Contaminated Water in the Tijuana River Valley

Discussion

Prof. Paula Stigler-Granados, San Diego State University

Prof. Stigler-Granados will discuss how public health impact may extend far further than beach closures due to sewage and toxic spill on the Tijuana River estuary.

[Att. 1 - SDSU Public Health and Tijuana River-white-paper.pdf](#)
[Supporting Materials.pdf](#)

5. Cross Border Xpress Update

Information

Jorge Goytortua, Cross Border Xpress

Cross Border Xpress (CBX) is an enclosed pedestrian bridge that connects users of the Tijuana International Airport directly through the U.S.-Mexico border at Otay Mesa. CBX began operating in December 2015, serving the cross-border community. Jorge Goytortua will present an overview of the operation, crossing volumes, and plans to meet future demand.

6. Adjournment

The next Borders Committee meeting is scheduled for Friday, April 26, 2024, at 1 p.m.

+ next to an agenda item indicates an attachment

March 22, 2024

January 26, 2024, Meeting Minutes

[View Meeting Video](#)

Vice Chair Jesus Eduardo Escobar (Imperial County) called the Borders Committee to order at 1:26 p.m.

1. Public Comments/Communications/Member Comments

Truth, member of the public, spoke regarding border issues.

Blair Beekman, member of the public, spoke in support of collaboration with Mexico.

The OriginalDra, member of the public, spoke regarding immigration issues.

Vice Chair Escobar welcomed the new members of the Borders Committee and acknowledged the work of Consul General Carlos González Gutiérrez.

Councilmember Carolina Chavez (South County) acknowledged the work of Consul General Carlos González Gutiérrez.

Consent

2. Approval of Meeting Minutes

The Borders Committee is asked to approve the minutes from its September 22, 2023, and its November 15, 2023, meetings.

3. 2025 Regional Plan Tribal and Binational Outreach Summary

This report provided a summary of tribal and binational outreach SANDAG conducted in support of 2025 Regional Plan development.

The OriginalDra spoke regarding immigration issues.

Blair Beekman spoke regarding tribal collaboration on the Regional Plan.

Action: Upon a motion by Councilmember Chavez and a second by Supervisor Joel Anderson (County of San Diego), the Borders Committee voted to approve the consent agenda.

The motion passed.

Yes: Vice Chair Escobar, Supervisor Anderson, Councilmember Patricia Dillard (East County), and Councilmember Chavez.

No: None.

Abstain: Councilmember Terry Gaasterland (North County Coastal).

Absent: City of San Diego and North County Inland.

Reports

5. 2024 World Design Capital

Mai Nguyen, 2024 World Design Capital, presented updates on the San Diego-Tijuana 2024 World Design Capital, the first binational designation.

Action: Information only.

6. SANDAG's Approach to 2024 World Design Capital

Borders Program Manager Hector Vanegas and Regional Planners Marisa Mangan and Zach Hernandez presented an update on the designation of San Diego-Tijuana binational region as the 2024 World Design Capital and how SANDAG aims to participate.

The Original Dra spoke regarding the climate action plan.

Blair Beekman spoke regarding binational collaboration.

Action: Information only.

4. San Diego and Imperial Counties Sustainable Freight Implementation Strategy

Regional Planner Tim Garrett and Senior Regional Planner Mariela Rodriguez presented an update on the San Diego and Imperial Counties Sustainable Freight Implementation Strategy.

Blair Beekman spoke regarding hydrogen fuel cells as an alternative energy source.

The Original Dra spoke regarding goods movement and climate mitigation.

Action: Information only.

7. Adjournment

The next Borders Committee meeting is Friday, February 23, 2024, at 1 p.m.

Vice Chair Escobar adjourned the meeting at 2:40 p.m.

Confirmed Attendance at Borders Committee Meeting

Jurisdiction	Name	Member/ Alternate	Attended
South County	Carolina Chavez	Member	Yes
	Mitch McKay	Alternate	No
East County	Laura Koval	Member	No
	Patricia Dillard	Alternate	Yes
City of San Diego	Vivian Moreno	Member	No
	Sean Elo-Rivera	Alternate	No
County of San Diego	Joel Anderson	Member	Yes
	Nora Vargas	Alternate	No
Imperial County	Jesus Eduardo Escobar, Vice Chair	Member	Yes
	Luis Plancarte	Alternate	No
North County Coastal	Terry Gaasterland	Member	Yes
	Ryan Keim	Alternate	No
North County Inland	Dane White	Member	No
	Joe Garcia	Alternate	No
Riverside County	Crystal Ruiz	Member	No
	Yxstian Gutierrez	Alternate	No
Republic of Mexico	Carlos González Gutiérrez	Member	No
	Luisana Gonzalez	Alternate	Yes
Southern California Tribal Chairmen's Association	Raymond Welch	Member	Yes
	Cody Martinez	Alternate	No
Caltrans	Everett Townsend	Member	No
	Roy Abboud	Alternate	No
	Mario Orso	Alternate	No
San Diego County Water Authority	Valentine Macedo, Jr.	Member	No
	Steve Casteneda	Alternate	No
Southern California Association of Governments	Vacant	Member	
	David C. Salgado	Alternate	No
Orange County	Vacant	Member	
	Vacant	Alternate	

March 22, 2024

Tijuana River Valley U.S. - Mexico Transborder Pollution Environmental Crisis

Overview

On September 22, 2023, the SANDAG Board of Directors adopted [Resolution No. 2024-05](#), (Attachment 1) joining the cities of San Diego and Imperial Beach, and the County of San Diego, in declaring a local emergency in the Tijuana River Valley from sewage, sedimentation and trash, and requesting federal and state action to address the water quality crisis.

Key Considerations

Persistent impact of transborder flows of untreated wastewater in the Tijuana River, excessive discharge of sediment into the Tijuana Estuary during storm events, and the continued impact of trash and waste tires in the Tijuana River Valley have resulted in an international water quality problem along the south San Diego County shoreline. This has resulted in significant impacts to residents and visitors of the Tijuana Slough, Imperial Beach, Silver Strand State Beach, and Coronado. For example, the Tijuana Slough beach area was closed for a total of 246 days in 2021; 365 days in 2022; and 257 days in 2023.

In July 2022, U.S. and Mexican federal agencies, in cooperation with state and local stakeholders, unveiled a comprehensive solution and signed [binational agreements](#) as a commitment to reduce transborder pollution through a suite of capital infrastructure projects on both sides of the border.

The binational agreements outline sanitation projects to be constructed in San Diego and Tijuana using approximately \$330 million from the U.S. government and \$144 million from the Mexican government.

Next Steps

Staff will follow up discussions and recommendations and will continue including this topic in future agendas.

Antoinette Meier, Senior Director of Regional Planning

Attachment: 1. Board Resolution No. 2024-05

Action: Information

Mayor Paloma Aguirre (City of Imperial Beach) will present on the status of the Tijuana River Valley emergency, the comprehensive plan to address the issue, and current implementation challenges.

Fiscal Impact:

None.

Schedule/Scope Impact:

None.

Resolution in Support of Local Emergency for U.S.-Mexico Transborder Pollution Environmental Crisis and Request for Federal and State Action

WHEREAS, the City of [Imperial Beach](#), and the [City](#) and [County](#) of San Diego have declared a local emergency from the persistent impact of transborder flows of untreated wastewater in the Tijuana River, excessive discharge of sediment into the Tijuana Estuary during storm events, and the continued impact of trash and waste tires in the Tijuana River Valley; and

WHEREAS, transboundary flow events in the Tijuana River impacts water quality along the south San Diego county shoreline resulting in significant beach including Imperial Beach, Silver Strand State Beach, Tijuana Slough, and Coronado closure days. The Tijuana Slough area closures total 246 days in 2021; 365 days in 2022; and 257 days in 2023.

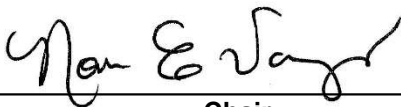
WHEREAS, the presence of pollution is creating unsafe conditions for residents and visitors who live, work, or recreate in the Tijuana River Valley and south San Diego shoreline who may come in contact with contaminated water; and

WHEREAS, in July 2022 U.S. and Mexican federal agencies, in cooperation with state and local stakeholders, have developed a comprehensive solution and signed [binational agreements](#) as a commitment to reduce transborder pollution through a suite of capital infrastructure projects on both sides of the border,

WHEREAS, the binational agreements outline sanitation projects to be constructed in San Diego and Tijuana using approximately \$330 million from the U.S. government and \$144 million from the Mexican government;

NOW THEREFORE BE IT RESOLVED that the SANDAG Board of Directors:

- 1) Supports the City of Imperial Beach, and City and County of San Diego in their proclamation of a local emergency for the Tijuana River Valley due to transboundary pollution and the work of our congressional delegation to request a federal state of emergency; and
- 2) Requests that the Governor of the State of California and President of the United States proclaim a California and federal state of emergency for the Tijuana River Valley, and
- 3) Will work with federal, state, local agencies, and stakeholders to seek federal and state funding to implement a comprehensive solution consistent with Goal No. 17 of the SANDAG 2023 Legislative Program, and
- 4) Will utilize the SANDAG Borders Committee as a forum for collaboration to help address the transborder pollution environmental crisis occurring in the Tijuana River Valley.



Chair

Attest:



Secretary

Member Agencies: Cities of Carlsbad, Chula Vista, Coronado, Del Mar, El Cajon, Encinitas, Escondido, Imperial Beach, La Mesa, Lemon Grove, National City, Oceanside, Poway, San Diego, San Marcos, Santee, Solana Beach, Vista, and County of San Diego.

Advisory Members: California Department of Transportation, Metropolitan Transit System, North County Transit District, Imperial County, U.S. Department of Defense, Port of San Diego, San Diego County Water Authority, Southern California Tribal Chairmen's Association, and Mexico.

Tijuana River Contamination from Urban Runoff and Sewage: A Public Health Crisis at the Border

Lead Authors: Paula E. Stigler Granados, PhD, MS^{1*}, Karilyn E. Sant, PhD, MPH², Penelope J.E. Quintana, PhD, MPH², Eunha Hoh, PhD, MS²
Contributing Authors: Eyal Oren, PhD, MS^{3,5}, Nicolas Lopez-Galvez, PhD, MPH², Miguel Angel Zavala Perez, PhD, MS^{2,4}, Yu NI, PhD, MPH⁵

¹Division Head, Environmental Health, School of Public Health (SPH), San Diego State University (SDSU), ² Division of Environmental Health, SPH SDSU, ³ Director, SPH SDSU, ⁴Division Environmental Health, Imperial Valley Campus SDSU, ⁵Division of Epidemiology, SPH SDSU

*Corresponding Author: pstiglergranados@sdsu.edu

Date of Release: February 13, 2024

Introduction

The Tijuana River flows north from Tijuana into the Tijuana River and Estuary (TJRE) in the US, emptying into the Pacific Ocean at Imperial Beach, CA (Figure 1). The TJRE is severely contaminated by untreated sewage, industrial waste, and urban run-off due to inadequate infrastructure and urbanization and the watershed is classified as an impaired water body according to the U.S. Clean Water Act.¹⁻⁷ This contamination is a persistent environmental and **public health threat** with major economic, legal, social, and **health implications** for the nearby California communities such as San Ysidro and Imperial Beach, who have long been concerned about this devastating problem. Threats to public health include known concerns posed by any exposure to untreated sewage in the U.S., but of special concern and specific to this watershed are the unusual threats to health from pollutants arising in Mexico, including human and livestock diseases eradicated in California, pathogens carrying antibiotic-resistant genes, and industrial and municipal chemicals not permitted to be discharged into the environment in California, among others. Heavy rainfall events, including the recent Hurricane Hilary, have caused further damage to the aging infrastructure and continue to overwhelm the systems on both sides of the border, exacerbating concerns.⁸ Extreme events related to climate change are only anticipated to become more frequent and intense, increasing the urgency for a solution to this crisis.⁹⁻¹¹ Contaminated water is flowing into the ocean year-round, and, especially after rain events, has forced beach closures in the region for several years (Figure 2)^{12,13}; however, this problem does not just adversely affect beachgoers and surfers exposed to contaminated seawater. Exposures impact the health of people who live and work nearby like children, seniors, lifeguards, military personnel, border patrol officers and other at-risk populations.¹⁴ Current regulation and monitoring measures are inadequate in relation to known contaminants yet the potential health risks to surrounding communities from **harmful viruses, bacteria and parasites as well as toxic chemicals in water and air**, presenting a pressing **public health crisis**.¹⁵⁻¹⁸

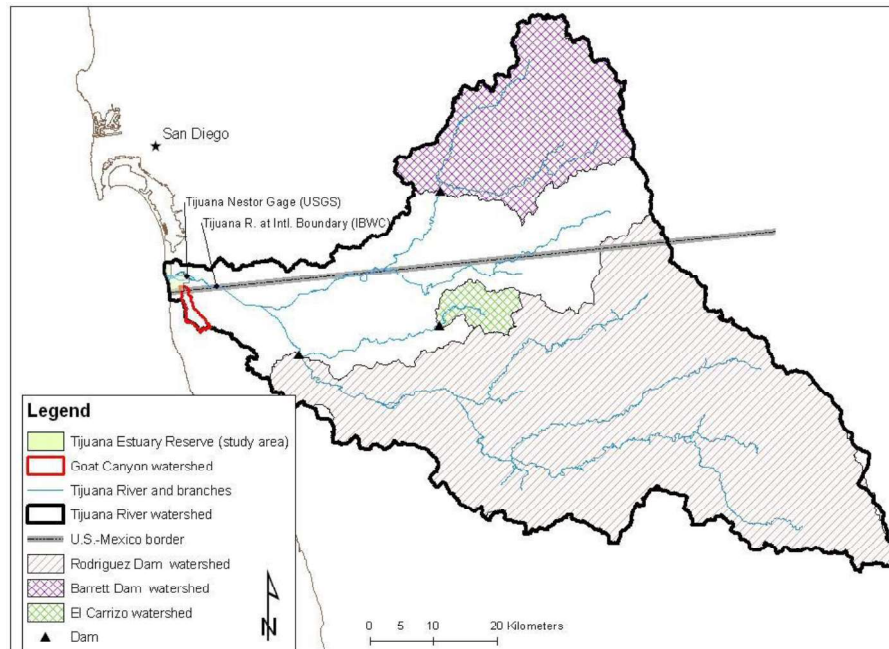


Figure1. Map of the Tijuana River Watershed, from Biggs, et.al. ¹⁹

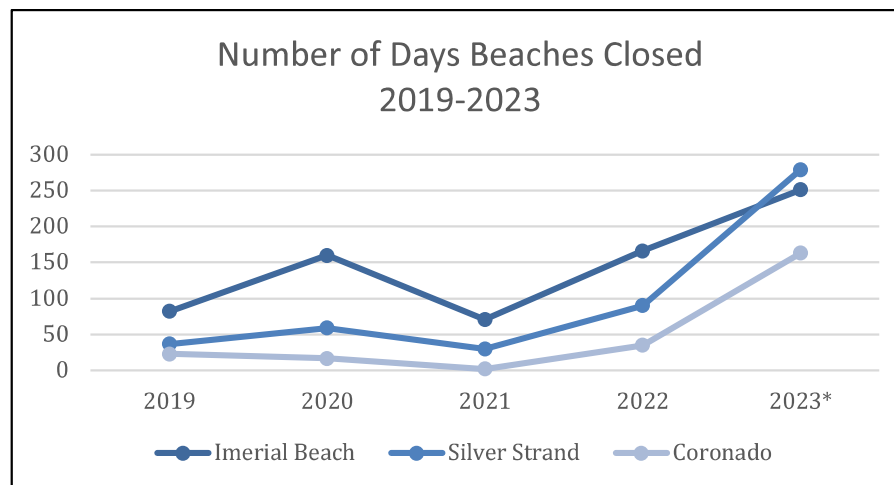


Figure 2. Beach closures due to contamination, 2019-2023, *data as of October 20,2023 from San Diego County Department of Environmental Health and Quality

What's in the soil, water, and the air?

Water Contamination

Multiple studies over the last decade done by our team at SDSU and other regional experts have shown the presence of **serious pathogens** such as viruses and bacteria, including SARS-CoV-2 and Hepatitis in the water sampled from the TJRE.^{2,5,13,20-25} These pathogens pose a serious health risk to both humans and aquatic species.²⁶⁻²⁹ One recent example of an emerging zoonotic pathogen of concern impacting our local

aquatic system was documented in bottle nosed dolphins found stranded in San Diego. The animals were found to have died from sepsis caused by a bacterium called *Erysipelothrix rhusiopathiae*, which is generally transmitted through contact with feces or urine in contaminated water, food or soil.²⁷ The authors of the study also noted an increase in the number of stranded dolphins in the region, indicating that changes in their environment or exposures to contaminated water could be causing illness and subsequent death. These dolphins serve as sentinels for the risk of possible human exposures to dangerous bacteria such as *E. rhusiopathiae* by both recreational water users and through occupational health exposures.³⁰

Research into the extent of **chemical contamination** has been sporadic, however studies by local government agencies have reported high levels of metals, pesticides, herbicides, volatile organic carbons (VOCs), and semi-volatile organic compounds (SVOCs).^{13,20,31} Additionally, researchers have found highly concentrated toxicants such as acetone, methanol, xylene, plasticizers, hormones, and flame retardants.^{32,33} Another recent study by SDSU experts identified 392 organic chemical contaminants in the border water by applying a novel analytical approach, mass spectrometry based nontargeted analysis. Out of the 392 identified compounds, 224 appeared on a regulatory list, and 175 appeared in the U.S. Environmental Protection Agencies Toxic Substance Control Act. A substantial number of **contaminants of emerging concern** were detected in the water for the first time.³

Another developing threat recently found through the application of metagenomic analysis by SDSU researchers is the significantly elevated levels of microbes carrying antibiotic-resistant genes (ARG), including beta-lactamases (resistant to antibiotics including penicillin), and resistant strains of *E. coli* and *Legionella*, which are of considerable public health concern.^{23,34} This study also revealed the presence of microbial species that are not routinely monitored but are potential pathogens such as *Acrobacter cryaerophilus*, which can cause severe gastrointestinal illness, and was the most common species of bacteria found.³⁴⁻³⁷ Other pathogens that can cause significant illness were identified and included bacteria such as *Salmonella enterica*, *Vibrio parahaemolyticus*, *Streptococcus pneumoniae*, *Mycobacterium tuberculosis* and *Listeria monocytogenes*, parasites like *Trichomonas vaginalis*, and viruses such as HIV-1, Hepatitis B and C.²³ These findings indicate the **potential for community exposure to harmful pathogens including antibiotic resistant varieties** due to cross-border sewage contamination and illustrate the need for increased surveillance of a broader range of contaminants.

Air Contamination

Air contamination originating from nearby impaired water bodies and contaminated ocean water is a concern and is a pathway of exposure that has hardly been studied.^{15,16,38-41} A recent study examining air over the coastal waters near TJRE

documented airborne microbes and chemicals related to the sewage and runoff over the ocean.¹⁵ However, no studies have been conducted inside communities where people live, work and play. Contaminated air from the nearby Tijuana River outflows can possibly diffuse across the community of San Ysidro and Imperial Beach and enter homes, childcare centers, schools, and potentially **increase the health risks of local community members without any direct water contact**. Community concerns about strong odors and pollution within San Ysidro from the Tijuana River have been frequently reported.^{42,43} Air mass transport patterns that can potentially transfer pollutants to border communities are not well characterized. While long-range transport of persistent chemicals transferring from water to air has a strong theoretical basis^{18,44-46}, and is a well-known cause of global chemical contamination, pollution transfer to air basins inside communities next to or near impaired water bodies has not been thoroughly explored and poses a potentially serious health threat to already at-risk communities.^{40,47-49} This is an area of urgent need for increased monitoring and surveillance.

Soil Contamination

Analysis conducted on soil sediments in and around the Tijuana River and Estuary by the authors and others have detected over 170 organic chemicals and inorganic elements including toxic polycyclic aromatic hydrocarbons (PAHs), banned pesticides such as chlordane and DDT, polychlorinated biphenyls (PCBs), heavy metals, and phthalates.^{4,49-53} Many of the detected contaminants are a direct result of the transboundary sewage flows and are known to be **persistent, bio-accumulative, carcinogenic, toxic** and can be **resuspended in water and air** during weather events in both the wet and dry seasons, exposing nearby communities.^{4,53} San SDSU experts found significant levels of harmful chemical contaminants in the soil from Los Laureles-Goat Canyon, a sub watershed located within the Tijuana River Watershed. Arsenic and cadmium concentrations were higher than the EPA recommended levels (0.07 ppm for arsenic and 1.7 ppm for cadmium) in soil samples taken from Los Laureles Canyon and TJRE (Figure 3).⁵⁴ Bisphenol A (BPA) and triclosan were also high and comparable to concentrations found in sewage sludge and soils amended with sewage sludge.⁵⁴ The results of this study indicate that the heavy metals and organic contaminants in the soil are not just coming from solid waste disposal sources but are also from wastewater flows and pose a health risk to residents in the area. Exposure to these contaminants may come from ingestion, respiration or/and dermal contact and are known to have significant harmful effects on humans and wildlife.⁵⁵⁻⁵⁸

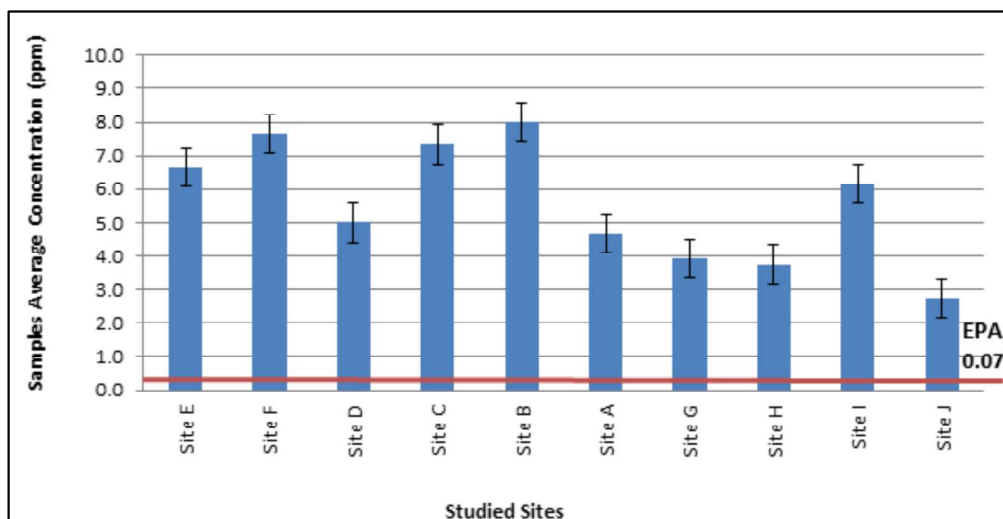


Figure 3. Average concentrations of arsenic found at study sites in Los Laureles Canyon and TJRE, A-F are sites in Mexico and G-J are sites in the U.S., n=22⁵⁴

Exposures Pathways and Risks

Dangerous pathogens and chemicals in contaminated waters pose a spectrum of short and long-term health risks, spanning gastrointestinal illnesses to neurological disorders.^{26,59} Sewage and runoff are reservoirs for diverse and prevalent pathogenic bacteria (including antibiotic resistant), viruses, harmful chemicals, and pollutants that can cause both acute and long-term health consequences, especially when being chronically exposed.^{34,60} Contaminated soils from years of transborder flows of polluted waters are laden with dangerous and toxic legacy chemicals, and when they enter the waterways or become airborne during dry weather seasons, they present major health concerns for residents and workers. Exposure pathways include contact/touching, leading to ingestion, either through contaminated soil, water or house dust, and this pathway may be especially significant for infants and toddlers. Inhalation is also a pathway of exposure, as these dangerous contaminants can also be airborne.^{15,40,61} Contaminated aerosols can be transported over land and deposited through various mechanisms, exposing residents and workers by inhalation.⁶¹



Figure 4. Photos taken of the TJRE during sampling events by SDSU researchers, courtesy of Dr. Kari Sant

Public Health Significance

Community concerns and the documented presence in the Tijuana River and Estuary of toxic chemicals and human and animal pathogens, especially antibiotic resistant pathogens, demands urgent attention. Monitoring for a wide suite of chemicals and microbes in water and air is necessary to characterize the risks and geographic extent of the contamination to our region. In addition, special populations within this area may be at heightened risk, including workers such as lifeguards, other outdoor workers and border patrol agents, pregnant women, with their increased risk from exposure to chemical and microbial pollutants, and children, who are both highly susceptible and at increased risk of exposures due to hand-to-mouth behaviors. The possibility for a **heightened incidence of illnesses** linked to the influx and constant exposure to wastewater into California communities along the U.S.-Mexico border should be investigated. New analytical tools (e.g. non-targeted analysis of chemicals and microbial genomes) that allow characterization of a wide range of chemical and microbial pollutants much beyond the contaminants currently measured should be used to help paint a better picture of the magnitude of the problem. Especially, **poorly understood pathways of exposure should be carefully and explicitly studied**, such as

exposures through breathing community air and through particulate matter and dust deposited on

surfaces touched by children. The potential for acute infectious diseases as well as long-term health impacts in both humans and animals necessitates comprehensive monitoring and more research. Health data collection for environmental epidemiology, a robust monitoring program assessing chemicals and pathogens correlated to toxicity and a broad suite of microbial risks should be considered. A multidisciplinary approach such as this is critical for understanding the current ecological and human health risks prevalent in the region and to determine best solutions for reducing the flow of sewage and improving public health.

Environmental Justice

The U.S. border communities of San Ysidro and Imperial Beach are located directly adjacent to the border and are both within the boundaries of the Tijuana River Watershed. Both cities are characterized as having a majority of residents who are resource limited and economically marginalized with an overall elevated risk of chronic diseases compared to surrounding cities in San Diego county.⁶² Increased exposure to soil, air and waterborne contaminants from the pollution in the region could be one potential factor for the increased risk of disease. Also, despite being on the coast, both cities are designated as being “park poor”.⁶³ By definition this means that there is less than three acres of green space per 1,000 residents, and there is inequitable access to these green spaces and their quality is subpar.⁶⁴ A qualitative study looking at community perceptions of their environment and the sewage contamination issues demonstrated that the majority of youth living in or near Imperial Beach are “disgusted” with the environmental issues and feel the beaches and water are unsafe.⁶⁵ This environmental injustice has created both real and perceived barriers for these communities to access outdoor spaces and healthy environments. These current environmental health challenges faced in the region may have lasting effects that will be difficult to mitigate if urgent action is not taken.

Next Steps

To better understand the human and environmental risks both short term and long term imposed by this public health crisis and environmental disaster, activities focused on **monitoring of environmental contaminants and investigating nearby community exposures and health effects** are urgently needed, especially exposures to at-risk individuals. Collaborations among healthcare professionals, public health departments, researchers, local organizations, and government agencies are necessary to ensure adequate data access and collection to provide evidence-based solutions and allocate appropriate resources. Investments by Congress and federal and state agencies are desperately needed to not only slow and prevent the ongoing and egregious contamination but to also assess the health and environmental harm that has occurred

as a result. Strategic planning amongst partners in both Mexico and the U.S. to prioritize infrastructure investments and find a reliable funding stream to implement improvements is of utmost urgency and should be prioritized to prevent further harm to the residents, visitors, workers and wildlife in our region.⁶⁶

References

1. Cooper JM. Same As It Ever Was: The Tijuana River Sewage Crisis, Non-State Actors, and the State. *Cardozo Int'l & Comp L Rev.* 2021;5:501.
2. Gersberg RM, Daft D, Yorkey D. Temporal pattern of toxicity in runoff from the Tijuana River Watershed. *Water Research.* 2004;38(3):559-568.
3. Espinoza J. *Identification and Assessment of Constituents of Emerging Concern in the Tijuana River Stormwater*: Masters Thesis, San Diego State University; 2023.
4. McLamb F, Feng Z, Shea D, et al. Evidence of transboundary movement of chemicals from Mexico to the US in Tijuana River estuary sediments. *Chemosphere.* 2023;140749.
5. Villaverde GA. *A study of international wastewater challenges and policy in the Tijuana River Watershed*. The University of Texas at El Paso; 2012.
6. Ayad M, Li J, Holt B, Lee C. Analysis and classification of stormwater and wastewater runoff from the Tijuana River using remote sensing imagery. *Frontiers in Environmental Science.* 2020;8:599030.
7. California Water Boards. *Sewage Pollution within the Tijuana River Watershed*. 2023.
8. Leggate J. San Diego Wastewater Plant Damaged By Tropical Storm Hilary Needs \$8M in Repairs. *Engineering News Related* Septmeber 15, 2023, 2023.
9. Swain DL, Langenbrunner B, Neelin JD, Hall A. Increasing precipitation volatility in twenty-first-century California. *Nature Climate Change.* 2018;8(5):427-433.
10. Rosa M, Haines K, Cruz T, Forman F. A binational social vulnerability index (BSVI) for the San Diego-Tijuana region: mapping trans-boundary exposure to climate change for just and equitable adaptation planning. *Mitigation and Adaptation Strategies for Global Change.* 2023;28(2):12.
11. Schwarz L. *Climate knows no borders: Assessing the role of extreme weather events in driving adverse health outcomes in a binational United States-Mexico border region*: Doctoral Dissertation, San Diego State University; 2023.
12. University of San Diego Non Profit Insitute. Beach and Coastal Health. 2023; <https://www.sandiego.edu/soles/centers-and-institutes/nonprofit-institute/signature-programs/dashboard/water-quality.php>. Accessed December 10, 2023.
13. U.S. Border Patrol San Diego. *Tijuana Wastewater FlowsImpact on CBP Operations*. U.S. Customs and Border Protection;2019.
14. Stahl L. Raw sewage flowing into the Tijuana River brings toxic sludge to California. In: 60 Minutes Nature; 2020.
15. Pendergraft MA, Belda-Ferre P, Petras D, et al. Bacterial and Chemical Evidence of Coastal Water Pollution from the Tijuana River in Sea Spray Aerosol. *Environmental Science & Technology.* 2023;57(10):4071-4081.
16. Dueker ME, O'Mullan GD, Juhl AR, Weathers KC, Uriarte M. Local environmental pollution strongly influences culturable bacterial aerosols at an urban aquatic superfund site. *Environmental science & technology.* 2012;46(20):10926-10933.

17. Hurtado L, Rodríguez G, López J, et al. Characterization of atmospheric bioaerosols at 9 sites in Tijuana, Mexico. *Atmospheric Environment*. 2014;96:430-436.
18. Dachs J, Van Ry DA, Eisenreich SJ. Occurrence of estrogenic nonylphenols in the urban and coastal atmosphere of the lower Hudson River estuary. *Environmental Science & Technology*. 1999;33(15):2676-2679.
19. Biggs TW, Atkinson E, Powell R, Ojeda-Revah L. Land cover following rapid urbanization on the US–Mexico border: Implications for conceptual models of urban watershed processes. *Landscape and Urban Planning*. 2010;96(2):78-87.
20. Fox AN. *Assessment of Bacterial Contamination in the US Portion of the Tijuana River and Tijuana River Estuary*, San Diego State University; 2021.
21. Gersberg R, Brooks H. *A Human Health Risk Assessment for Enteroviruses and Hepatitis A in Runoff from the Tijuana River and in Bathing Waters of Nearby Imperial Beach*, Project Number: W-02-03.
22. Johnsen C. *Countries Divided, Shared Pollution: Whose Mess is it? A Case Study on the issue of Transnational Border Sewage in the Tijuana River Valley Watershed*: Masters Thesis, Lund University; 2018.
23. Allsing N, Kelley ST, Fox AN, Sant KE. Metagenomic Analysis of Microbial Contamination in the US Portion of the Tijuana River Watershed. *International Journal of Environmental Research and Public Health*. 2022;20(1):600.
24. Steele JA, Blackwood AD, Griffith JF, Noble RT, Schiff KC. Quantification of pathogens and markers of fecal contamination during storm events along popular surfing beaches in San Diego, California. *Water research*. 2018;136:137-149.
25. Rocha AY, Verbyla ME, Sant KE, Mladenov N. Detection, quantification, and simplified wastewater surveillance model of SARS-CoV-2 RNA in the tijuana river. *ACS Es&t Water*. 2022;2(11):2134-2143.
26. Feddersen F, Boehm AB, Giddings SN, Wu X, Liden D. Modeling Untreated Wastewater Evolution and Swimmer Illness for Four Wastewater Infrastructure Scenarios in the San Diego-Tijuana (US/MX) Border Region. *GeoHealth*. 2021;5(11):e2021GH000490.
27. Danil K, Colegrove KM, Delaney MA, Mena A, Stedman N, Wurster E. Systemic Erysipelas Outbreak among Free-Ranging Bottlenose Dolphins, San Diego, California, USA, 2022. *Emerging Infectious Diseases*. 2023;29(12):2561.
28. Shuval H. Estimating the global burden of thalassogenic diseases: human infectious diseases caused by wastewater pollution of the marine environment. *Journal of water and health*. 2003;1(2):53-64.
29. Arnold BF, Schiff KC, Ercumen A, et al. Acute illness among surfers after exposure to seawater in dry-and wet-weather conditions. *American Journal of Epidemiology*. 2017;186(7):866-875.
30. Ugochukwu IC, Samuel F, Orakpoghenor O, et al. Erysipelas, the opportunistic zoonotic disease: history, epidemiology, pathology, and diagnosis—a review. *Comparative Clinical Pathology*. 2019;28:853-859.
31. Venn MA. *Mitigation of Contaminated Transboundary Flows in the Tijuana River: Public Health Considerations for Remediation Strategies*: Masters Thesis, San Diego State University; 2021.
32. Árnason ÁV. *The determining legal, political, and social factors that need to be taken into account when trying to solve binational water pollution: The case of Tijuana, Mexico* Masters Thesis, Lund University Sweden; 2007.

33. García J, García-Galán MJ, Day JW, et al. A review of emerging organic contaminants (EOCs), antibiotic resistant bacteria (ARB), and antibiotic resistance genes (ARGs) in the environment: Increasing removal with wetlands and reducing environmental impacts. *Bioresource technology*. 2020;307:123228.
34. Shahar SA. *Metagenomic Analysis of Microbial Communities in the Tijuana River, Antibiotic Resistance Genes, and Potential Sources*: Masters Thesis, San Diego State University; 2023.
35. Barboza K, Cubillo Z, Castro E, Redondo-Solano M, Fernández-Jaramillo H, Echandi MLA. First isolation report of *Arcobacter cryaerophilus* from a human diarrhea sample in Costa Rica. *Revista do Instituto de Medicina Tropical de São Paulo*. 2017;59:e72.
36. Figueras M, Levican A, Pujol I, Ballester F, Quilez MR, Gomez-Bertomeu F. A severe case of persistent diarrhoea associated with *Arcobacter cryaerophilus* but attributed to *Campylobacter* sp. and a review of the clinical incidence of *Arcobacter* spp. *New microbes and new infections*. 2014;2(2):31-37.
37. Hsueh P-R, Teng L-J, Yang P-C, et al. Bacteremia caused by *Arcobacter cryaerophilus* 1B. *Journal of Clinical Microbiology*. 1997;35(2):489-491.
38. Dueker ME, O'Mullan GD. Aeration remediation of a polluted waterway increases near-surface coarse and culturable microbial aerosols. *Science of the Total Environment*. 2014;478:184-189.
39. Maqbool A. *Investigating Distribution of Legionella Pneumophila in Urban and Suburban Watersheds*: Masters Thesis, Queens College; 2021.
40. Pendergraft MA, Grimes DJ, Giddings SN, et al. Airborne transmission pathway for coastal water pollution. *PeerJ*. 2021;9:e11358.
41. Weagle CL, Saint-Louis R, Dumas-Lefebvre É, Chavanne C, Dumont D, Chang RY-W. Sea-air transfer of a tracer dye observed during the Tracer Release Experiment with implications for airborne contaminant exposure. *Marine Pollution Bulletin*. 2022;182:113945.
42. California Air Resources Board. *International Border Community Steering Committee Meeting, AB617*. January 18, 2023.
43. San Diego Air Pollution Control District. *International Border Committee Meeting*. July 18, 2023.
44. Achman DR, Hornbuckle KC, Eisenreich SJ. Volatilization of polychlorinated biphenyls from Green Bay, Lake Michigan. *Environmental science & technology*. 1993;27(1):75-87.
45. Finizio A, Mackay D, Bidleman T, Harner T. Octanol-air partition coefficient as a predictor of partitioning of semi-volatile organic chemicals to aerosols. *Atmospheric Environment*. 1997;31(15):2289-2296.
46. Miller MM, Wasik SP, Huang GL, Shiu WY, Mackay D. Relationships between octanol-water partition coefficient and aqueous solubility. *Environmental science & technology*. 1985;19(6):522-529.
47. Beyer A, Mackay D, Matthies M, Wania F, Webster E. Assessing long-range transport potential of persistent organic pollutants. *Environmental Science & Technology*. 2000;34(4):699-703.
48. Gouin T, Mackay D, Jones KC, Harner T, Meijer SN. Evidence for the “grasshopper” effect and fractionation during long-range atmospheric transport of organic contaminants. *Environmental pollution*. 2004;128(1-2):139-148.

49. Shen L, Wania F, Lei YD, Teixeira C, Muir DC, Bidleman TF. Atmospheric distribution and long-range transport behavior of organochlorine pesticides in North America. *Environmental science & technology*. 2005;39(2):409-420.
50. Wang Y, Qian H. Phthalates and their impacts on human health. Paper presented at: Healthcare; 2021.
51. Agency for Toxic Substances and Disease Registry. Polycyclic Aromatic Hydrocarbons (PAHs). In: 2023.
52. Science Direct. Organochlorine Pesticide. <https://www.sciencedirect.com/topics/earth-and-planetary-sciences/organochlorine-pesticide>. Accessed December 9, 2023.
53. US Environmental Protection Agency. Polychlorinated Biphenals. 2023; <https://www.epa.gov/pcbs/learn-about-polychlorinated-biphenyls>. Accessed December 9, 2023.
54. Galvez NIL. *Soil analysis of organic and inorganic contaminants in Goat Canyon (Cañon De Los Laureles), at the US-Mexico border*: Masters Thesis, San Diego State University; 2014.
55. Agency for Toxic Substances and Disease Registry [ATSDR]. *Toxicological profile for cadmium*. Atlanta, GA: U.S. Department of Health and Human Services;;1997.
56. Agency for Toxic Substances and Disease Registry [ATSDR]. *Toxicological profile for arsenic (update)*. Atlanta, GA: U.S. Department of Health and Human Services;;2007.
57. İyigündoğdu İ, Üstündağ A, Duydu Y. Toxicological evaluation of bisphenol A and its analogues. *Turkish Journal of Pharmaceutical Sciences*. 2020;17(4):457.
58. Milanović M, Đurić L, Milošević N, Milić N. Comprehensive insight into triclosan—from widespread occurrence to health outcomes. *Environmental Science and Pollution Research*. 2023;30(10):25119-25140.
59. Boehm AB, Soller JA. Recreational water risk: pathogens and fecal indicators. In: *Environmental Toxicology: Selected Entries from the Encyclopedia of Sustainability Science and Technology*. Springer; 2012:441-459.
60. Gaffield SJ, Goo RL, Richards LA, Jackson RJ. Public health effects of inadequately managed stormwater runoff. *American Journal of Public Health*. 2003;93(9):1527-1533.
61. Huang Z, Yu X, Liu Q, et al. Bioaerosols in the atmosphere: A comprehensive review on detection methods, concentration and influencing factors. *Science of The Total Environment*. 2023:168818.
62. Agency CoSDHHS. *Disease Deaths in San Diego County—South Region, 2000–2018*; 2020.
63. Wolch J, Wilson, J., P., Fehrenbach, J. . *Parks and Park Funding in Los Angeles: An Equity Mapping Analysis*. Los Angeles, CA; 2002.
64. The San Diego Foundation. *Parks for Everyone* San Diego, CA; 2020.
65. Holliday E. *Place-Based Environmental Education and Environmental Justice in Imperial Beach, California*, San Diego State University; 2020.
66. Ganster P, I. Coronado, J. McNeece, W. M. Micklin, K. S. Becker, J. K. Niernan, J. L. Palacios, E. Moderow, L. Fleet, J. Rizk, J. M. Heyman, F. Lara, A. Sweedler, R. DeLeon, M. Jordan, J. Collert, C. Helmer, J. Payne, C. Suarez, S. Mumme, P. Aguirre, A. R. Barcenas, K. Collins, E. A. Cruz, M. E. Gonzales-Roses, J. Hinojosa, M. D. Hollis, J. P. King, E. Lee, M. Lopez, J. Maruffo, J. Murrieta-Saldivar, P. L. Vandervoet, M. E. Giner, and T. R. Pohlman. *Water and Wastewater in the U.S.–Mexico Border Region* Washington, D.C; 2023.

Tijuana River Contamination: A Public Health Crisis

The Tijuana River's contamination is a critical environmental and public health issue, affecting our communities.

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Summary of White Paper

Previously Published Research

Pollutants like pesticides, herbicides, VOCs, acetone, methanol, xylene, plasticizers, hormones, and flame retardants found in the water samples. At least 392 organic chemical contaminants found in water samples, many are of emerging concern.

Over 170 organic chemicals and inorganic elements including toxic PAHs, chlordane, DDT, PCBs, heavy metals, and phthalates have been found in the soil sediments

Dangerous pathogens such as viruses, bacteria, and parasites including *Salmonella*, *Vibrio*, *Streptococcus*, *Listeria Hepatitis B and C* have been found in the water samples. Antibiotic resistant genes found in abundance.

Limitations on the knowledge of airborne contaminants and exposure risks.

Water Contamination and Public Health

1

Pathogen Presence

Studies reveal pathogens like SARS-CoV-2 and Hepatitis in the Tijuana River. An abundance of antibiotic resistant genes. Presence of microbial species that are not routinely monitored

2

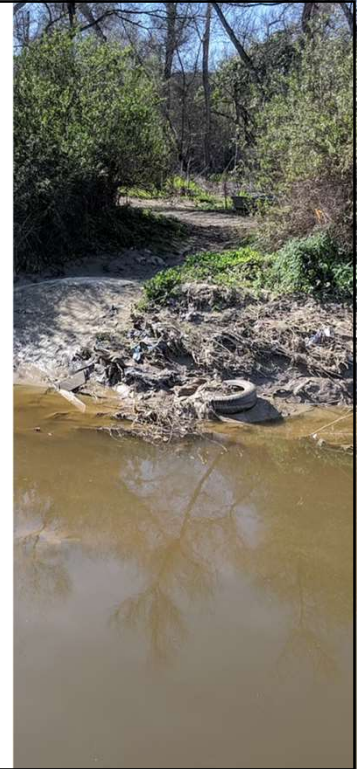
Zoonotic Threats

Local dolphins affected by *Erysipelothrix rhusiopathiae*, indicating possible human health risks.

3

Chemical Contaminants

High levels of metals, pesticides, and toxicants like acetone and methanol found. 392 chemicals compounds found, 175 of those are considered toxic by the US EPA



Air Contamination Risks

1

Unstudied Pathways

Air contamination from water bodies is a significant, yet understudied exposure pathway.

2

Community Impact

Contaminated air may affect San Ysidro and Imperial Beach residents' health. Limitations to what we know, more studies are needed.

3

Urgent Surveillance

Increased monitoring of airborne pollutants is necessary to assess community risks. Need to do additional research and expand distance and locations for monitoring.



Soil Contamination Concerns

Organic Chemicals

Soil sediments contain over 170 organic chemicals and toxic elements.

Heavy Metals

Arsenic and cadmium levels exceed EPA recommended levels, posing health risks.

Legacy Chemicals

Banned pesticides like DDT and PCBs found, indicating persistent environmental issues.



Exposure Pathways and Health Risks

1

Contact

Direct contact with contaminated water can lead to serious health issues.

2

Inhalation

Airborne contaminants could be inhaled by residents and workers, but we have limited knowledge and need more research in this area.

3

Resuspension

Contaminants in soil and water could also become airborne, increasing exposure risks. Climate change can play a role in increasing exposure risks.



Public Health Significance

Urgent Attention

Toxic chemicals and pathogens in the environment demand immediate action.

At-Risk Populations

Special populations like children and outdoor workers are at heightened risk.

New Analytical Tools

Advanced methods needed to characterize the range of pollutants.

Environmental Justice

Community Impact

San Ysidro and Imperial Beach face increased risks to health, including mental health, and their economic livelihoods due to dealing with contamination issues.

Limited Green Space

Both cities suffer from a lack of accessible, quality outdoor spaces and depend on the beach as a significant part of access to green space. Beach closures severely limit their access.

Youth Perception

Local youth feel outdoor environments are unsafe due to contamination.



Next Steps for Resolution

1

Monitoring

Enhanced monitoring of environmental contaminants is crucial.

2

Collaboration

Partnerships among collaborators are necessary for effective solutions.

3

Investment

Funding is needed to prevent contamination and assess environmental harm.