

Salton Sea Community Forum Meeting Synopsis

Prepared for the United States Environmental Protection Agency (EPA Region 9) and for the California Air Resources Board (CARB Contract Number 21RD014)

Authors

David Lo, MD, PhD, University of California, Riverside

Julia (Ky) Gress, PhD, California Air Resources Board

May Bhetraratana, PhD, California Air Resources Board

September 2023

Table of Contents

Executive Summary.....	7
I. Background	9
I.A. Brief Overview of the Salton Sea and its Environmental Issues.....	9
I.B. Communities of the Salton Sea	11
I.C. Community and Tribal Activities Related to Salton Sea	13
II. U.S. EPA 105 Project – Salton Sea Community Webinars	13
II.A. Planning Committee and Production of the Community Events.....	14
II.B. Summaries of the “Salton Sea Community Webinars” (“Foros Comunitarios de la Laguna del Salton”)	18
III. Conclusion: Ongoing and Future Needs for Research and Actions at the Salton Sea.....	30
III.A. Environmental Science – Water Ecology, Geochemistry, and Pollutant and Dust Studies.....	31
III.B. Medical Research on Health Impacts.....	32
III.C. Data Communication and Dissemination	33
III.D. Other Impacts at the Salton Sea	33
IV. References.....	35

Disclaimer

The statements in this document are those of the authors and/or presenters, and not necessarily those of the Center for Health Disparities Research at the University of California, Riverside nor the California Air Resources Board. The mention of commercial products, their source, or their use reported herein is not to be construed as actual or implied endorsement of such products.

Contacts

Please reach out to the following points of contact for any questions regarding this report:

David Lo, MD, PhD

Senior Associate Dean of Research, University of California, Riverside School of Medicine

Director for the Center for Health Disparities Research

Email: david.lo@medsch.ucr.edu

Julia (Ky) Gress, PhD

Air Pollution Specialist

Research Division

California Air Resources Board

Email: julia.gress@arb.ca.gov

Abbreviations

CARB	California Air Resources Board
CCV	Comite Civico del Valle
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
EPA	Environmental Protection Agency
HARC	Health Assessment and Research for Communities
HDR@UCR	Center for Health Disparities Research at the University of California, Riverside
HVAC	heating, ventilation, and air conditioning
ICAPCD	Imperial County Air Pollution Control District
IVAN	Identifying Violations Affecting Neighborhoods
MERV	minimum efficiency reporting value
NGO	non-governmental organization
PM	particulate matter
SCAQMD	South Coast Air Quality Management District
SES	socioeconomic status
SSMP	Salton Sea Management Program
UCLA	University of California, Los Angeles
UCR	University of California, Riverside
US	United States
USC	University of Southern California

Acknowledgements

We gratefully acknowledge the groups that participated in the Planning Committee for this project (list below), whose representatives began meeting in September 2020 with the California Air Resources Board to design this community forum series. Their engagement and input were essential in identifying issues of top priority to the people living in Salton Sea communities, as well as developing a format for effective presentation and dissemination of this important information.

Groups/organizations represented in the Planning Committee:

- Alianza Coachella Valley
- Comite Civico del Valle
- Leadership Counsel
- Loma Linda University
- Torres Martinez Desert Cahuilla Indians
- Tracking California
- Twenty-Nine Palms Band of Mission Indians
- United for Justice
- University of California, Riverside

The publicity and production of the events was capably handled by staff in the Center for Health Disparities Research at the University of California, Riverside: Katheryn Rodriguez, Cristina Gonzalez, Pamela Acosta, Gennie Robles, Selina Hernandez, Joshua Liashenko, Sahar Foruzan, and Preeti Juturu, with technical assistance by Ross French of the University of California Riverside School of Medicine. Finally, we recognize with gratitude Sarah Bliss, Director of Tribal Programs EPA, and Kelsey Bosch, Cultural Resource Specialist, both of whom are of the Twenty-Nine Palms Band of Mission Indians and opened each community forum event with a Land Acknowledgment.

And lastly, funding for this project was provided by a United States Environmental Protection Agency 105 grant.

Executive Summary

The Salton Sea is the largest lake in California, with a surface area of more than 300 square miles. As a terminal lake surrounded by agricultural land in Riverside and Imperial counties, Salton Sea receives freshwater inputs that are heavily contaminated with pesticides, fertilizers, and other pollutants. As a result, the salinity of Salton Sea has increased to nearly twice that of the Pacific Ocean and the nutrient over-load results in periodic toxic algal blooms and hydrogen sulfide emissions, both of which contribute to large-scale fish and migratory bird die-offs. Following a recent history of reduced freshwater inputs from the Colorado River, chronic drought conditions are now further contributing to the rapid lowering of the Salton Sea water level and increasing exposure of the shoreline. Residents have expressed long-standing concerns over the environmental decline of Salton Sea and the human health effects from exposures to windblown contaminated dust from the receding shoreline, bioaerosols, and hydrogen sulfide gas. Numerous local, state, and federal agencies, as well as local tribes and community-based organizations, are involved in addressing these concerns.

To better understand the health concerns of people living near Salton Sea, the California Air Resources Board (CARB) received United States Environmental Protection Agency funding to engage researchers and local communities in this collaborative project. The primary goal of this project was, during a series of community forums, to facilitate communication between these stakeholder groups, and to identify community concerns about Salton Sea-related emissions and where to focus future research. In addition, the project aimed to improve coordination and cooperation in the region by building relationships between academic researchers working on Salton Sea-related projects, representatives of groups active in Salton Sea-area communities, local residents, and CARB.

CARB contracted with University of California Riverside Center for Health Disparities Research (HDR@UCR) to organize and host the forums. In the initial stage of the project, CARB also formed a Planning Committee comprised of representatives of community groups, researchers, and CARB staff. The Planning Committee identified key topics related to Salton Sea air emissions and public health, plus formulated an approach to engaging residents in discussion on these topics. In consultation with CARB, HDR@UCR then organized four online community forums between June and August 2022. These forums consisted of brief presentations in English with simultaneous Spanish translation followed by a moderated community discussion of the presentations. Each event focused on a specific topic identified by the Planning Committee: Emissions (What is in the air?), Health effects (Air quality and pulmonary health impacts), Community action (Community actions to monitor and improve air quality), and a Perspective and Overview (Salton Sea: Past, present, and future).

This synopsis documents the implementation of the project by providing an overview of each event and concluding with future needs for research and action in the Salton Sea-area

based on information gathered both from these forums and meetings with Planning Committee members. Important identified needs include:

- Enhanced understanding of the environmental and human health impacts from agricultural pesticides, fertilizers, and heavy metals in the region, and changes in the Salton Sea ecosystem that cause hypersalinity and the formation of microbial toxins and hydrogen sulfide;
- Improved understanding of the environmental and health impacts of local activities such as dust mitigation efforts and lithium extraction;
- Additional medical research on what factors contribute to health disparities in the region, especially with respect to asthma impacts and community-level mental and emotional health impacts from the decline of the Salton Sea;
- A central “data hub” that brings together easily accessible information in a single site for community residents; and
- Development of inclusive state and local policies that consider tribal and community input.

This synopsis is intended to serve as a useful information resource and a reference for future discussions and actions to improve air quality and reduce health impacts related to the Salton Sea, and to guide future research on the environmental health of communities near the Salton Sea.

I. Background

I.A. Brief Overview of the Salton Sea and its Environmental Issues

The Salton Sea is California's largest lake, covering approximately 340 square miles, with a 130-mile shoreline. Salton Sea is in a geological depression in inland Southern California and straddles Riverside and Imperial counties, with most of the watershed located in Imperial County (California Water Boards n.d.). With its low elevation, the Salton Sea has no outlets, making it a terminal lake. While the lake has come and gone numerous times over thousands of years, supporting the indigenous Chemehuevi peoples throughout its history, the most recent manifestation was created in 1905 by a breach in an irrigation canal from the Colorado River. In the 1950s, the Salton Sea became a popular recreational area and supported a robust tourist economy, but its water quality has been declining for decades, with broad negative impacts on local communities and wildlife habitat (Taylor 2018). It is widely believed that the Salton Sea ecosystem is threatened with environmental collapse (Cohen 2014, California Department of Fish and Wildlife Inland Deserts Region (Region 6) 2023), for which California voters passed Proposition (Prop) 68 in 2018, which authorized \$200 million to respond to the decline of the Salton Sea (Salton Sea Authority 2018). In addition, the federal government also recently allocated \$250 million for environmental cleanup and restoration (Ronayne 2022). However, the communities around the Salton Sea have long-standing concerns about the environmental and potential health effects from the continued decline of the lake.

I.A.1. Agricultural Contaminants

The Salton Sea was designated an agricultural waste sump by the federal government in 1928 (Goolsby 2015) and is now categorized as a Category 1 (impaired) Watershed due to it being heavily polluted by decades of agricultural run-off (California Water Boards n.d.) contaminated with pesticides and inorganic contaminants, which have accumulated in the water and sediment (Orlando et al. 2008, California Department of Fish and Wildlife Inland Deserts Region (Region 6) 2023). These contaminants have entered the Salton Sea primarily via transport in irrigation run-off into the New and Alamo Rivers from Imperial County and the Whitewater River from Riverside County (California Water Boards 2000, Orlando et al. 2008). Although legacy pesticides such as DDT/DDE continue to be found in Salton Sea sediments and fish (Moreau et al. 2007) and ecotoxic concentrations of selenium have been documented in sediments for many years, the current use of pesticides and inorganic contaminants continue to impact the Salton Sea (Xu et al. 2016). In 2021, nearly 5 million pounds of pesticides were applied on Imperial County lands, including 1.4 million pounds of sulfur (California Department of Pesticide Regulation 2021b, California Department of Pesticide Regulation 2021a).

Besides pesticides, in-flow high in salts from irrigation of fertilized farmland has increased the salinity of the Salton Sea, which is now nearly twice the salinity of the Pacific Ocean

(Salton Sea Authority n.d.). Nutrient overload (eutrophication) from fertilizer run-off also periodically results in toxic algal blooms and mass die-offs of fish and birds. At present, few species of fish can survive these conditions, leading to a major shift from fish to insects as food sources for the migratory bird populations (Llamas 2020). Historically, the Salton Sea ecosystem has been a critical stopover for millions of migratory birds, representing nearly 400 bird species. Presently, the population of migratory birds feeding and nesting at the Salton Sea is changing due to the absence of fish, with rapid declines in the numbers of some species such as pelicans and cormorants, among others (Audubon California n.d.).

I.A.2. Dust Emissions

Besides agricultural contaminants, dust is also a major problem at the Salton Sea. Following the full implementation of the Quantification Settlement Agreement in 2018, which shifted the transfer of Colorado River water away from Imperial County to southern California, the amount of freshwater entering the Salton Sea via these waterways was dramatically reduced (Taylor 2018, Acero Triana and Ajami 2022). The reduction of freshwater in-flow led to a decline in water level and subsequent increase in the area of exposed dried lakebed (playa), which was originally contaminated lake sediment. The reduction in water volume is also exacerbated by increasing temperatures in the region and the arid climate, which drive increased freshwater evaporation and further exposure of the playa (Acero Triana and Ajami 2022). The amount of exposed playa was estimated to be 42,500 acres in 2022 but is expected to increase to 67,500 acres by 2028 and 84,300 acres by 2047 (**Figure 1**).

In fact, the region surrounding the Salton Sea is characterized by extremely high levels of ambient particulate matter (PM₁₀) throughout the year, and includes areas designated for nonattainment of the EPA's national 24-hour average PM₁₀ standard of 150 µg/m³. In 2019-2020, the amount of PM₁₀ emissions from the Salton Sea playa were estimated to be up to 42.86 tons/day (Formation Environmental LLC 2022). The dust comes from a variety of sources, but particular attention has been on the emissions of the exposed playa contaminated with metals and pesticides. Residents of Salton Sea-area communities, as well as environmental and public health researchers, have expressed concerns that windblown particulate matter from the dried Salton Sea lakebed is resulting in increased exposure to toxins in the dust and adverse health impacts, such as asthma (Frie et al. 2017, Johnston et al. 2019, Bernstein 2022).



Figure 1: Map of the Salton Sea, showing the predicted retreat of the shoreline from 2018 to 2047, illustrating the rapidly expanding area of exposed playa (Center for Health Disparities at UCR n.d.).

I.B. Communities of the Salton Sea

The history of local Indigenous tribes who lived in the Salton Sea region extends back over 10,000 years. Among the Indigenous tribes, originating from the Chemehuevi ancestors, are the modern tribes including Twenty-Nine Palms Band of Mission Indians, Agua Caliente Band of Cahuilla Indians, Augustine Band of Cahuilla Indians, Cabazon Band of Mission Indians, and the Torres Martinez Desert Cahuilla Indians. When the Colorado River flooded the area in 1905, forming the Salton Sea, the Torres Martinez Desert Cahuilla Indians lost nearly half of their reservation due to flooding (Salton Sea Restoration Project n.d.).

The population of Imperial County rapidly grew in population following the filling of the basin, with the population of 13,591 residents in 1910 growing nearly 220% to over 43,000 in 1920 (Bureau of the Census (U.S. Census Bureau) 1920). This was due in large part to agriculture supported by irrigation, but also due to the recreational potential of the large inland lake. A US Navy facility, the Salton Sea Test Base, was later built at the southern end of the lake in 1942 in support of the development of nuclear weapons, with barracks for 600 people, but full-time occupation ended in 1987. Military operations ended completely in the early 1990s, when the clean-up of unexploded munitions began (Trevet 2013, The Center for Land Use Interpretation n.d.).

There are currently at least seven small communities located along the shoreline of the Salton Sea, including Mecca, North Shore, and Oasis located in Riverside County, and Desert Shores, Salton Sea Beach, Salton City, and Bombay Beach in Imperial County. Despite the two counties sharing a border and the Salton Sea, they have different demographics. According to 2020 year estimates from the U.S. Census Bureau, 85% of the 179,702 people living in Imperial County identified as Hispanic or Latino (U.S. Census Bureau 2020b), and the county had a per capita income of \$18,064, compared to that of \$38,576 for all of California (U.S. Census Bureau 2020a). Riverside County has a much larger population and higher per capita income than Imperial County, with nearly 50% out of the over 2.4 million residents identifying as Hispanic or Latino (U.S. Census Bureau 2020b), and a per capita income of \$29,913 estimated for the year 2020 (U.S. Census Bureau 2020a). The unemployment rate in Imperial County in May 2023 was 16.3% (U.S. Bureau of Labor

Statistics: Local Area Unemployment Statistics 2023a), which varies seasonally because of the agricultural growing seasons and is nearly four times the unemployment rate for Riverside County (4.4%) and for the state (4.6%) (Caltrans 2021, U.S. Bureau of Labor Statistics: Local Area Unemployment Statistics 2023b).

As the commercial and tourism potential of the region started declining in the 1980s, the economy of the region became more heavily dependent on agriculture and immigrant Latino farmworkers (Tracey 2022). Currently, agriculture is the second largest employment sector in Imperial County, following government services, and employed over 11,000 people in the county in 2020 (San Diego-Imperial Center for Excellence for Labor Market Research (COE) 2021).

I.B.1. Health Concerns of Local Communities

The arid climate of the desert region, year-round agricultural activities, and increasing exposure of dried Salton Sea lakebed result in increased particulate matter (PM) emissions, with Imperial County regularly designated a nonattainment area for PM_{2.5} (California Air Resources Board 2018, U.S. Environmental Protection Agency 2023). Acute exposure to high concentrations of PM_{2.5} can cause adverse health effects such as aggravation of heart and lung disease, asthma attacks, and increased hospital admissions. Long-term inhalation of high concentrations of PM_{2.5} can lead to premature death and lung cancer. People with chronic heart and lung disease, including asthma, as well as infants and children are particularly vulnerable to the health effects of inhaling elevated levels of PM_{2.5} (California Air Resources Board n.d.).

The communities living near the Salton Sea have an especially high incidence of asthma. Farzan et al. reported that, although U.S. children of Mexican heritage have a lower prevalence of asthma overall when compared to other ethnicities, children living in the Imperial Valley, including the U.S.-Mexico border region, have double the rate of asthma-related hospital visits as compared to children living elsewhere in California (Farzan et al. 2019). Asthma prevalence also varies between populations living in either Imperial or Riverside counties. For 2019-2020, CDPH reported that 12.2% of people living in Riverside County had been diagnosed with asthma at some point during their lifetime, while 15.9% of people living in Imperial County had received an asthma diagnosis, higher than the 15.1% reported for the state (Environmental Health Investigations Branch 2019). This increased prevalence suggests that proximity to the Salton Sea, rather than the desert environment, may be a factor in asthma prevalence (Farzan et al. 2019). Superimposed on these conditions are several additional factors that are more commonly correlated with disparities in health outcomes, including socioeconomic status (SES), occupation, living conditions, and reduced access to healthcare. These factors may also contribute to the rate of asthma-related emergency room visits, including hospitalizations, which is also significantly higher for people living in Imperial County, with a county rate of 60.2 events per 10,000 persons per year compared to only 39.0 events among people living in Riverside County and a California state average of 42.6 (Environmental Health Investigations Branch 2019).

Besides the increased asthma prevalence, particularly in children, residents of Salton Sea-area communities also report concerns about unusual childhood nosebleeds, skin rashes, pesticide exposures and health effects from extreme heat. Upon this background of environmental degradation and increasing climate change impacts, residents are actively seeking information about potential public health impacts from exposure to emissions from the Salton Sea, including ways to reduce or mitigate these (Gewin 2023).

I.C. Community and Tribal Activities Related to Salton Sea

In response to the decline of the Salton Sea ecosystem, community-based and tribal organizations have been organizing residents and leading engagement efforts with legislators and government agencies. Tribes have direct engagement with state and federal agencies to address long-term, regional air quality issues. Examples of these activities include outreach from Torres Martinez Desert Cahuilla Indians to US EPA regarding the non-attainment status for PM₁₀, increased dust emissions of PM from the Salton Sea, and concerns about air monitoring data (Torres Martinez Desert Cahuilla Indians Chairman Thomas Torte 2020). The Twenty-Nine Palms Band of Mission Indians formed a Tribal Environmental Protection Agency in 1997 and received a CARB Assembly Bill (AB) 617 Community Air Grant in 2018 to develop an air quality monitoring program that monitors PM concentrations and educates people about air quality issues and potential health risks (Twenty-Nine Palms Band of Mission Indians n.d.).

Community groups have also organized and advocated for residents impacted by environmental justice and health issues, including the decline of the Salton Sea and increasing dust emissions. For example, in the Coachella Valley to the north of the Salton Sea, Alianza Coachella Valley is an alliance of community-based organizations that brings together communities and government agencies to advocate for, as well as implement, initiatives to support clean water, access to health care, and address other environmental justice issues (Alianza Coachella Valley 2021, Comite Civico Del Valley Inc. 2023). In Imperial Valley to the south of the Salton Sea, Comite Civico del Valle has organized and served the community around environmental justice and health-related issues, including Salton Sea, for over 30 years. The organization also assists with the management of the IVAN (Identifying Violations Affecting Neighborhoods) community air monitoring network that enables residents to report environmental problems and obtain information about current air monitoring results (Comite Civico Del Valley Inc. 2023).

II. US EPA 105 Project – Salton Sea Community Webinars

To help address the urgent environmental health crisis at the Salton Sea, the California Air Resources Board (CARB) applied for and was awarded a US EPA 105 grant of \$75,000 in 2021. Through these funds, CARB's primary goal was to conduct a project to assess community health concerns and promote collaboration between environmental and public

health researchers, community groups, and residents to address these concerns. This involved:

- Assembling a planning committee consisting of CARB staff, community-based organizations, community members, and academic partners to develop a framework for future public meetings;
- Convening public meetings focused on soliciting input from community groups on public health concerns related to emissions from the Salton Sea, by involving presentations from researchers and discussions about policy and research needs to better support environmental health goals for residents of the Salton Sea area;
- Identifying areas where collaboration and joint research planning could improve research efforts and better address community health goals; and
- Preparing and disseminating a document that summarizes the results of the project and includes recommendations for next steps.

II.A. Planning Committee and Production of the Community Events

For the initial stage of the project, CARB reached out to several Salton Sea-area community groups and indigenous Native American tribes, as well as researchers involved in Salton Sea environmental and public health issues. CARB staff met one-on-one with these representatives between September and October 2020 to discuss their concerns related to environmental and health issues, their community/research activities, and their willingness to participate further with CARB as a member of the Planning Committee to help develop the series of public meetings. From these individual meetings, a Planning Committee was established with a broad range of community stakeholders, including community organizations in Coachella Valley and Imperial County, local Indigenous Native American tribes, and academic institutions:

- Alianza Coachella Valley
- Comite Civico del Valle
- Leadership Counsel
- Loma Linda University
- Torres Martinez Desert Cahuilla Indians
- Tracking California
- Twenty-Nine Palms Band of Mission Indians
- United for Justice
- University of California, Riverside

The Planning Committee began meeting with CARB staff in late 2020. At the meetings, members spoke on the impact of the Salton Sea on residents (**Figure 2**), their current work in the area, as well as thoughts on topics for the public meetings and how they should be held to maximize interest from the local communities (such as including Spanish translation, holding the meetings in the evenings, and allowing ample time for dialogue between

presenters and attendees). Some Salton Sea topics identified as high priority by the members included pesticides, health effects in children, agricultural chemicals, and odors. Based on these and other high priority topics, the following themes for the Salton Sea public meetings were developed: emissions, health effects, and community actions.

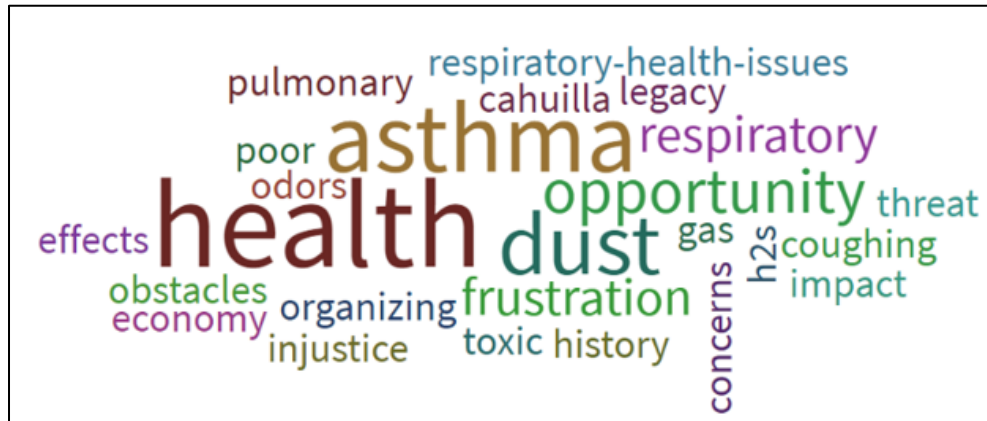


Figure 2: Word cloud of responses from the Planning Committee when asked, "What comes to mind when you think about the impact of the Salton Sea on local people?"

CARB and the Planning Committee planned to host facilitated public meetings on these themes in 2021. However, the COVID-19 pandemic significantly delayed the implementation of the community events. In Spring 2022, a collaboration was established between CARB and the Center for Health Disparities Research at the University of California, Riverside (HDR@UCR) to hold a series of four events based on input from the Planning Committee. These events, titled "[Salton Sea Community Webinars | Foros Comunitarios de la Laguna del Salton](#)," were held online through Zoom between June and August of 2022 (**Figures 3 and 4; Table 1**), with attendees representing communities around the Salton Sea region. Each event consisted of brief presentations (in English with simultaneous Spanish translation) from researchers, community leaders, and other stakeholders in the Salton Sea region. The presentations were then followed by a moderated community discussion. The meetings were recorded in English and Spanish and are posted online (Table 1).

CALIDAD DEL AIRE EN LA LAGUNA SALTON SEA
Hablemos de ello

Ecología de la laguna Salton Sea - ¿qué sabemos?
Extracción de litio: ¿qué son las emisiones?
Calidad del aire: lo que sabemos y lo que no sabemos
Retroceso de la costa: ¿cómo afecta a la calidad del aire?
Pesticidas: ¿qué hay en el polvo?

Miércoles | 15 de Junio | 6:00 - 8:00 p.m. PST | En Zoom
Regístrese aquí atu.cr/saltonseair
1 hora sesión informativa + 1 hora para preguntas

UC RIVERSIDE School of Medicine
CALIFORNIA AIR RESOURCES BOARD

SALTON SEA AIR QUALITY
Let's talk about it

Lithium Extraction - what are emissions?
Air Quality - what we know and what we don't know
Salton Sea Ecology - what do we know?
Receding Shoreline - how does it affect air quality?
Pesticides - what's in the dust?

Wednesday | June 15, 2022 | 6:00 - 8:00 p.m. PST | Zoom
Register at atu.cr/saltonseair
1 hour webinar + 1 hour community discussion

UC RIVERSIDE School of Medicine
CALIFORNIA AIR RESOURCES BOARD

Figure 3: Spanish and English language flyers promoting the first webinar in the series.

CALIDAD DEL AIRE EN LA LAGUNA SALTON SEA
Hablemos de ello

SALTON SEA AIR QUALITY
Let's talk about it

Emisiones: ¿qué son?
Calidad del aire: ¿por qué importa?
Calidad del aire: ¿Qué acciones podemos tomar para mejorar nuestra salud?
Miembros de la comunidad: haga preguntas y participe en una conversación

Emissions - what are they?
Air Quality - why does it matter?
Air Quality - what actions can we take to improve our health?
Community Members - ask questions

June 15, 2022 – Virtual Community Forum
Foro virtual comunitario

Figure 4: Screenshot of the opening for the first webinar on June 15, 2022, with slides presented in Spanish and English.

Table 1: Summary of the presentations and speakers for each of the four events (“Community Forums”) of the *Salton Sea Community Webinars | Foros Comunitarios de la Laguna del Salton*, including links to the online recordings.

<u>Community Forum</u>	<u>Presentation Title</u>	<u>Speaker and Affiliation</u>
Community Forum #1: Emissions (What is in the air?) (June 15, 2022) (link to recording)	“Air Quality in the Imperial Valley: What we know and what we don’t know”	Roya Bahreini, UCR
	“Pesticides in Salton Sea Dust”	Nathan Sy, UCR
	“What’s in the air and why we care: Chemistry of the Salton Sea and its impact on lake ecology and human health”	Tim Lyons, UCR
	“Balloon mapping used to map shoreline reduction and forecast air quality at the Salton Sea”	Ryan Sinclair, Loma Linda University
	“Emissions from geothermal plants and lithium extraction facilities near the Salton Sea”	Michael A. McKibben, UCR
Community Forum #2: Health Effects (July 6, 2022) (link to recording)	“The Salton Sea, Air Quality, and Children’s Health”	Shohreh Farzan, USC
	“Existing Health Burdens and Cumulative Environmental Hazards in Salton Sea Communities”	Paul B. English, Tracking California
	“Salton Sea Aerosols and Health Effects: Environmental Toxins and Asthma?”	David Lo, UCR
	“Why controlling and treating asthma is so important”	Ahmad Husari, UCR
Community Forum #3: Community Actions to Monitor and Improve Air Quality (July 27, 2022) (link to recording)	“IVAN (Identifying Violations Affecting Neighborhoods): Environmental Reporting and Community Air Monitoring Network”	Edgar Ruiz, Comite Civico del Valle
	“Air Monitoring Network Expansion Project - Twenty-Nine Palms Tribal EPA Air Station”	Alexandria Putz, Twenty-Nine Palms Band of Mission Indians
	“Windblown dust events, indoor air quality, and benefits of low-cost air filtration for Salton Sea communities”	William Porter, UCR

	"Indoor Air Filtration Options"	Pat Wong, CARB
Community Forum #4: Perspective and Overview (Salton Sea Past, Present, and Future) (August 17, 2022) (link to recording)	"The Salton Sea: Past, Present, and Future"	Daniel Polk, HARC
	"Engaging with Agencies and Legislators"	Elizabeth Romero, UCR
	"Needs Assessments Overview"	Chris Morin, HARC
	"Alianza Coachella Valley"	Patricia S. Carrillo, Alianza Coachella Valley

II.B. Summaries of the "Salton Sea Community Webinars" ("Foros Comunitarios de la Laguna del Salton")

This synopsis section presents an overview of the presentations and the main points discussed in the community conversations during each event. These summaries are intended to serve as a useful information resource for those who were not able to attend the events, and a reference for future community discussions and actions. The presenters shared important detailed information on aspects of local air quality and potential health impacts from exposure to pollutants, along with community actions and perspectives that will help hopefully guide future public health and environmental research, as well as inform policymakers. Previous discussions of the Salton Sea region hosted by others and that had been attended by members of the Planning Committee had focused on topics such as aerosol dust, environmental impacts of Salton Sea retreat, and targeted mitigation projects. In contrast, these 2022 Salton Sea Community Webinars provided more emphasis on the health concerns of the community and raised questions about how future policies and practices may be assessed with respect to measurable improvement in health outcomes.

These summaries represent a brief overview of the information shared in each public meeting and do not represent the views of the Center for Health Disparities Research at UCR or of CARB.

II.B.1. Community Forum #1: Emissions (What is in the air?)

At this forum, presenters discussed air quality at the Salton Sea, its components, and the role of local air chemistry and ecology. They also discussed community engagement in understanding the role of exposed playa in dust generation, and the recent question of the potential impact of proposed lithium extraction on air quality and health.

II.B.1.a. Presentation: "Air Quality in the Imperial Valley: What we know and what we don't know"

Speaker: Roya Bahreini, Ph.D., Professor of Atmospheric Science, Environmental Sciences Dept., UCR

Summary of Presentation: "Pollutant" as a general term includes a variety of different types of components in the air that are irritating or can cause negative effects on health or can have other impacts on our lives. These can include gases and other chemical components, such as ozone, carbon dioxide, and carbon monoxide, which are considered pollution when present at higher than normal levels. Another major component of polluted air is the particulate component, or aerosols, and these are characterized as Particulate Matter or PM, and they are measured by the concentrations of particulates of specific size. Thus PM_{2.5} refers to particles suspended in the air that are 2.5 microns or smaller, and PM₁₀ includes particle 10 microns in size or smaller. Particles in this size range are of significance because they are easily inhaled and reach deep into lung tissues where they can affect your health.

In the Salton Sea region, particulates can be added to the air by natural phenomena, including dust storms, especially in areas where exposed soil, including lakebed, or playa, makes it easier for winds to pull dust into the air. Analysis of dust collected near the sea showed that much of the dust originated from the Salton Sea playa, so as the sea dries, increasing exposure of the lakebed adds to particulate production.

The seasonal changes in wind direction also influence what people are exposed to during the year. For example, in summer the winds coming from the southeast can carry significant amounts of material coming off the Salton Sea into the Coachella Valley, including dust particles from exposed Salton Sea playa, and these will also be in the air people breathe.

Research is continuing on what these components are in the dust particles as well as other gases and compounds from the Salton Sea. Assessment of which of these are most significant in potential for health effects is still ongoing.

II.B.1.b. Presentation: "Pesticides in Salton Sea Dust"

Speaker and Collaborator: Nathan Sy, Graduate Student Researcher, Environmental Chemistry, UCR; Jay Gan, UCR

Summary of Presentation: Because of the major agricultural activity in the region, large quantities of pesticides have been in use in the region for a variety of applications, most notably for pest control. These include organic chlorines, such as DDT. Many of the pesticides require careful control, since they have such potential for human and environmental toxicity, and their ability to enter the ecosystem food chain. Unfortunately, even though many of the most toxic pesticides including DDT have been banned from use, they are quite environmentally stable, and can concentrate in the tissues of animals higher in the food chain.

Recent studies have been done to assess the presence of pesticides and their derivatives in the Salton Sea region, including studies on their persistence in the sediment of the sea. Significantly, DDT and its derivatives made up over 70% of all pesticide residues detected in the sediments, and air-exposed sediments proved to be more contaminated than submerged sediments.

Studies of the dusts collected near exposed playa detected significant levels of the pesticides. While the ability to absorb the compounds from the inhaled dust particles needs further study, it is clear that pesticides used in the region have potential for long term exposure to the communities through their persistence in exposed sediments and dusts generated at exposed playa.

II.B.1.c. Presentation: "What's in the air and why we care: Chemistry of the Salton Sea and its impact on lake ecology and human health"

Speaker and Collaborators: Tim Lyons, Ph.D., Distinguished Professor of Biogeochemistry, UCR; Caroline Hung and Charlie Diamond, UCR

Summary of Presentation: The Salton Sea is a terminal lake, which means that it collects runoff from the surrounding agricultural regions, but with no outflows the nutrients or fertilizer will accumulate in the sea as the water evaporates. These high levels of nutrients lead to high levels of algae growth during the summer months. However, as these blooms die and sink to the bottom of the sea, the bacteria in the sea will decompose the algae, deplete available oxygen, and produce hydrogen sulfide (responsible for the rotten egg smell).

As the sea dries, and as the temperature of the water continues to rise, especially during summer months, the production of hydrogen sulfide is readily detectable. While its odor is easily detected, it is still well below toxic levels, but it can be an irritant of the mucosal and respiratory tissues.

The geochemistry of the region also contains several heavy metals of interest, including selenium and molybdenum. While low levels of these metals can be important for life processes, they can also be quite toxic above a specific concentration. Surveys around the Salton Sea showed that both Selenium and Molybdenum were found a higher concentration in lakebed sediments near the middle of the sea.

It is important to note that the Salton Sea is a rather shallow lake, and sediments are a rich mix not only of organic material but also pesticides from agricultural runoff, as well as toxic heavy metals. As we noted, these chemicals in the sediments can be pulled into aerosol dusts ("entrained") and inhaled by residents in the communities closest to the Salton Sea. Thus, it will be important to follow the course of the drying Salton Sea; ongoing work to monitor the distribution of metals in sediment throughout the lake floor provides important information on their potential exposure as the lake dries.

II.B.1.d. Presentation: "Balloon mapping used to map shoreline reduction and forecast air quality at the Salton Sea"

Speaker and Collaborators: Ryan Sinclair, Ph.D., MPH, Associate Professor, School of Public Health and Assistant Professor, Earth and Biological Sciences, Loma Linda University; Patricia Leal-Gutierrez, Alianza Coachella Valley; William Porter, Assistant Professor of Atmospheric Dynamics and Modeling, UCR

Summary of Presentation: A large proportion of the region's communities are well within the wind range of dusts from the Salton Sea playa. Thus, it is important to enhance the community's understanding of the exposure of the playa as the Salton Sea dries. To generate data in a format that is easily compiled, a community science project used a simple system composed of a large helium-filled balloon and camera tethered to a volunteer researcher who walks along the shoreline. Images from the balloon system were collected over several years and merged using computer software.

The images were mainly collected near the North Shore Yacht Club, which is a location familiar to the residents. The change in freshwater agriculture runoff was reduced significantly in 2017 as a result of the Quantification Settlement Agreement, so changes in the rate of shoreline retreat could also be viewed. At one point along the shoreline, the retreat was about 620 feet in 15 years, from 2002 to 2017. Notably, in only three years from 2018 through 2021, there was an additional 348 feet of playa exposed in that location. With community projects like this, residents can see directly in a very visual manner, how the drying Salton Sea will impact local air quality in years to come.

II.B.1.e. Presentation: "Emissions from geothermal plants and lithium extraction facilities near the Salton Sea"

Speaker: Michael A. McKibben, Ph.D., Research Professor of Geology, UCR

Summary of Presentation: One recent development of concern is the proposal to expand geothermal plant facilities in Imperial Valley at the southern end of the Salton Sea, and to extract lithium from the geothermal brines. Lithium is a major component of the latest generation of batteries used in electric vehicles. Significant lithium reserves have been identified in the Salton Sea Geothermal Field at the southern end of the Salton Sea, and so there are proposals from three groups to expand or build new geothermal facilities to extract this lithium. All the groups propose to use geothermal brines to extract lithium, using energy from the geothermal fields to power the extraction.

It should be noted that the conventional approaches to lithium extraction can involve large mining pits for hard rock extraction, or large evaporation ponds to concentrate lithium salts for further refinement. The extraction and refining process often relies heavily on fossil fuel sources to power the process. By contrast, proposed lithium extraction at the Salton Sea will be using a process in which the geothermal brines are used in a closed loop where the

brines are reinjected into the geothermal plant system. Energy needs will be provided by the geothermal plants themselves.

The southern end of the Salton Sea is already home to several geothermal power plants, in which the earth's heat is used to produce steam from salt water (brine). Since no fossil fuels (oil, natural gas, or coal) are used in the process, geothermal plants emit only about 5% of the amount of CO₂ in comparison to fossil fuel power plants. Since the brines are reinjected into the system during geothermal power production, water loss is also minimized. Pilot studies will test the use of absorbing material to filter lithium from the brines.

The proposed work will potentially add minimal fossil fuel pollutants to the local environment. However, other factors not yet counted include the potential development of battery manufacturing in the region, raising the possibility of industrial contaminants and the emissions associated with manufacturing, transportation, and other activities. These issues will presumably be under state and federal EPA regulation and will have to be addressed as well.

II.B.2. Community Forum #2: Health Effects

The impact of air quality on the health of residents near the Salton Sea is beginning to be addressed by research studies in the region, but an important first step is an overall assessment of the health in the communities, and the relationship to environmental hazards.

II.B.2.a. Presentation: "The Salton Sea, Air Quality, and Children's Health"

Speaker and Collaborator: Shohreh Farzan, Ph.D., Assistant Professor of Population and Public Health Sciences; Jill Johnston, Ph.D., Associate Professor of Population and Public Health Sciences, USC

Summary of Presentation: Imperial Valley is significantly impacted by the effects of air quality on asthma among children in these communities. A recent study with children in northern Imperial Valley illustrates the magnitude of the problem. The prevalence of asthma among children in Imperial County is estimated to be at least 22 percent, significantly above the prevalence in the rest of California, and possibly as much as three times higher than the rest of the US.

This study on children in northern Imperial Valley includes a population that is predominantly Latinx (94%), and lower socioeconomic status, with 77% on public health insurance. The prevalence of symptoms that may be indicators of asthma is remarkably high, with 33-35% reporting wheezing or coughing, and similarly high prevalence of related symptoms such as bronchitis and allergies. These symptoms have been reported even among those not diagnosed as asthmatic, suggesting that asthma is in fact underdiagnosed.

What factors contribute to this remarkably high incidence of asthma and asthma-like symptoms? Environmental factors are likely to be more important. To determine the role of environmental factors, community monitoring is ongoing to follow PM levels, so that

respiratory symptoms can be correlated with dust levels. Preliminary analyses suggest that higher dust levels are associated with more wheezing, with associations that may be even stronger among non-asthmatic children.

Finally, these studies serve additional purposes in the affected communities. By accumulating data on the symptoms prevalent among the children, this work helps communities identify critical health needs. Most importantly, the data generated can provide important information to support community stakeholders in their discussions with schools, and local and state governments and agencies, to help guide relevant and responsive policies.

II.B.2.b. Presentation: “Existing Health Burdens and Cumulative Environmental Hazards in Salton Sea Communities”

Speaker: Paul B. English, Ph.D., MPH, Director, Tracking California, Public Health Institute

Summary of Presentation: The Eastern Coachella Valley and Imperial Valley communities are both witness to a long history of poor health. The incidence of illnesses such as cardiovascular disease (heart attack) is consistently at least 25% higher in Imperial County than in California statewide. Heat illness in Riverside County is double the incidence in the rest of California and in Imperial Valley it is nearly five times higher. Since we are discussing air quality and health effects, we note that the rates of emergency department visits due to asthma in Imperial County are consistently more than 30% higher than the rest of California.

Environmental factors are clearly associated with these poor outcomes. In both Riverside and Imperial Counties, and including the tribal lands, ozone and PM_{2.5} levels are commonly above US EPA limits. Pesticide use is high in both regions as well, and this usage is also close to the most populated communities in the Salton Sea region, including Mecca at the northern end, and Brawley at the southern end.

Water quality is another contributor to environmental hazards, and in areas such as Eastern Coachella Valley, water systems serving poorer communities such as trailer parks have significantly low-quality water supplies. Groundwater is already notably contaminated with toxic heavy metals, so there are few water options available. Compounding this problem, these communities also suffer from poor water accessibility, or vulnerability to water outages.

When these various factors are all taken into consideration, the cumulative burden can be tallied to provide an index of risk to residents. The CalEnviroScreen is a method used to weight these factors and indicate which communities are subject to disproportionate burden by multiple sources of pollution or hazards. Not surprisingly, communities at both the northern and southern end of the Salton Sea were assessed to be within the highest two deciles relative to the rest of California with regard to burdens from multiple factors. The presence of conditions that promote asthma are among several health-related factors affecting these communities.

II.B.2.c. Presentation: “Salton Sea Aerosols and Health Effects: Environmental Toxins and Asthma?”

Speaker: David Lo, M.D., Ph.D., Senior Associate Dean of Research, UCR School of Medicine, and Director for the Center for Health Disparities Research

Summary of Presentation: This synopsis summarizes work which has identified the aerosols near the Salton Sea as a potential major factor in the health effects in the community, especially its role in the high incidence of asthma. Recent studies with Salton Sea dusts now suggest that previously unrecognized biological mechanisms may be at work in driving lung inflammation and asthma-like symptoms, distinct from other mechanisms of asthma development. It remains unknown whether specific components are enriched in the dusts. Such enrichment may concentrate uniquely toxic substances that affect the lungs of those inhaling the dusts, especially if inhaled consistently over long periods.

To test the likelihood of unique patterns of toxicity from inhaled dusts, material was collected from several sites around the Salton Sea as well as from distant sites. Extracts of this material were then used to generate aerosol injections into an environmental chamber, where laboratory mice were exposed to study their response. Interestingly, dust collected from sites near Salton Sea playa induced an inflammatory response in the lungs of exposed mice, while material collected from distant sites had no effect. The pattern of inflammation resembled the immune response to microbial components rather than any environmental allergen which suggests that the asthma-like symptoms observed in residents near the Salton Sea are due to the effects of chronic inhalation of microbial (bacterial) material from the changing Salton Sea ecology.

These results suggest that the changing ecology of the Salton Sea deserves closer attention as these processes may be occurring at other drying lakes where increasing rates of asthma are also observed. While these results do not offer immediate clues to strategies to reduce the negative health impacts of the drying lake, they may suggest new approaches to mitigation projects that may be more appropriately directed toward improving the ecology of the lake, rather than toward short term attempts only aimed at reducing dust production.

II.B.2.d. Presentation: “Why controlling and treating asthma is so important”

Speaker: Ahmad Husari, M.D., Associate Clinical Professor, Dept. of Internal Medicine, UCR

Summary of Presentation: Pediatric admission rates for asthma in Imperial County are among the highest in the state of California, so clearly this is a disease of high significance in the region. To help understand this disease from both a medical and policy perspective, it is important to understand the consequences of a child developing asthma, both for the near term and long-term impacts. Asthma is a clinical condition characterized by attacks of narrowing of the bronchial airways due to contraction of the smooth muscle surrounding these airways. These attacks can be triggered by a variety of conditions, including respiratory infections, inhaled irritants (cigarette smoke, wood smoke, or irritating chemical

fumes), inhaled allergens (most asthmatics have known allergies), or cold air or exercise. Irritating fumes can include chemicals such as hydrogen sulfide, such as that produced at the Salton Sea from decomposing algae during the summer months.

Asthma is a chronic disease, in which persistent inflammatory responses in the tissues lead to changes in the lung tissue, including thickening of the airway walls and proliferation of the smooth muscles surrounding airways, resulting in progressive narrowing of the airways. As these chronic changes accumulate, asthma attacks become more frequent and symptomatic. Over time, persistent inflammation results in accumulated irreversible changes. These changes result in loss of lung capacity and function, which accelerates with age and chronic disease.

Unfortunately, asthma remains a chronic disease without a cure. Thus, early diagnosis and treatment, and a lifetime of management is still our main medical approach. In this community, it is also important that we identify the environmental factors leading to asthma, and, if possible, mitigate these factors, and prevent exposure among the children growing up in the region.

II.B.3. Community Forum #3: Community Actions to Monitor and Improve Air Quality

Providing information on the topics of air quality and health impacts is only the start to community engagement and action. Communities have begun to be directly involved in monitoring air quality as well as taking steps to reduce the effects of dust exposure.

II.B.3.a. Presentation: “IVAN (Identifying Violations Affecting Neighborhoods): Environmental Reporting and Community Air Monitoring Network”

Speaker: Edgar Ruiz, Air Monitor Technician, CCV

Summary of Presentation: IVAN (Identifying Violations Affecting Neighborhoods) is an air monitoring network launched in 2007, as a partnership between Comite Civico del Valle (CCV), the California Environmental Health Tracking Program, and the University of Washington School of Public Health, with collaborators at UCLA and George Washington University, and funded by the National Institute of Environmental Health Sciences. Members of the network support each other in quality control improvement as well as public health messaging, for example through the Tracking California program.

The network was initiated in response to community concerns about air quality in the Imperial Valley near the Salton Sea, and it engages communities to help provide neighborhood level data on air quality. Community air quality concerns include the effects of pesticide use in this active agriculture region. By involving communities directly in the IVAN work, they are empowered to not only know the details of the data but also to take action in response to the information.

The work of IVAN and their community network continues as the problem of dust generation at the Salton Sea is only increasing as the lake retreats and exposes more and more playa.

II.B.3.b. Presentation: "Air Monitoring Network Expansion Project – Twenty-Nine Palms Tribal EPA Air Station"

Speaker: Alexandria Putz, Twenty-Nine Palms Tribal EPA Air Technician, Twenty-Nine Palms Band of Mission Indians

Summary of Presentation: The Twenty-Nine Palms Band of Mission Indians' Tribal EPA Air Station was established in 2018 and is located on the Cabazon reservation. This station monitors PM_{2.5} and PM₁₀ levels, and Cabazon also includes an ozone monitor. The station also collects PM_{2.5} samples every 6 days, and these filters are shipped to a lab for weighing, and recording.

As part of a quality control study, starting in December 2021, five different low-cost air monitoring sensors were compared. During the period of the study, the monitors were compared for their accuracy, data management, as well as cost and customer service. The most effective sensor will be selected for use across the Coachella Valley, establishing a network of monitors of air quality. The benefit of this network will be not only to continuously monitor particulate counts, but also to follow dust events, and over time identify areas where dust emissions are most problematic. Consequently, specific areas can be targeted for dust suppression, reducing the exposure hazards for residents in the area. This project is in its early stages, so there will be more to come.

II.B.3.c. Presentation: "Windblown dust events, indoor air quality, and benefits of low-cost air filtration for Salton Sea communities"

Speaker and Collaborators: William Porter, Ph.D., Assistant Professor of Atmospheric Dynamics and Modeling, UCR; Ann Cheney, Associate Professor, Director of HABLAMoS, Faculty Director of Coachella Valley Free Clinic, UCR; Maria Pozar, Coachella Valley

Summary of Presentation: Despite the accumulation of data on outdoor air quality, it is also important to study patterns of exposure in the indoor environments where people live, work, and go to school, since so much of the day is spent in these environments. This can be a complex question, since indoor environments may vary widely, so to study these questions, monitors were placed in the homes of volunteer families near the northern end of the Salton Sea.

The indoor air quality will be compared to outdoor air quality, using the nearby Indio and Mecca stations as reference sites. The air during outdoor high dust level days, medium, and low-level days are being compared to indoor patterns. There appear to be two major peaks in particulate counts, with one in the morning, and another in the evening. Interestingly, the

patterns suggest that outdoor air quality conditions strongly influence indoor air quality, especially in the afternoons.

Strategies that may directly improve indoor air quality will be important to consider, such as effective air filtration systems. Many efficient air filtering systems can be rather costly and may be out of the reach of most residents in the Salton Sea region. Fortunately, one innovative approach is a homemade high efficiency filtering system, known as a Corsi-Rosenthal Box. This can be easily assembled from an inexpensive box fan, four low-cost MERV 13 filters, and duct tape, all of which can be obtained at a total cost of about \$80. Not only is this a low-cost filtration system, it has a high Clean Air Delivery Rate at all fan speeds, making this a worthwhile community-level approach to providing clean healthy air in homes.

II.B.3.d. Presentation: “Indoor Air Filtration Options”

Speaker: Pat Wong, Ph.D., Manager, Buildings and Indoor Environments Section, Health Branch, Research Division, CARB

Summary of Presentation: Many people are considering the use of air purifiers to improve their indoor air quality. Multiple factors must be considered to determine which type of air purifier will be most effective. An important factor in this region is the ability of the air cleaner system to effectively filter out the smallest particulates as well as hydrogen sulfide, which is a gas. The most cost-effective method of cleaning the air in the whole house is the use of air filters with a MERV rating of 13 or higher on the HVAC system. HVAC air filters do not remove gases, though. Hydrogen sulfide can be removed through the use of portable air cleaning devices that use specific types of filters that remove gases. Ultimately, when PM levels outdoors are high, it is recommended to keep windows closed, and to use a portable air cleaner and/or an HVAC system with a MERV 13+ filter.

There are also multiple websites where people can check the outdoor air quality. Some resources include [AirNow](#), CARB’s [AQMIS](#), SCAQMD’s [Current Air Quality](#) and [Hydrogen Sulfide Monitoring](#), ICAPCD’s [Imperial Valley Air Quality](#), and CCV’s [IVAN-Coachella](#) and [IVAN-Imperial](#) air monitoring networks.

II.B.4. Community Forum #4: Perspective and Overview (Salton Sea Past, Present, and Future)

The future of the Salton Sea will depend on an appreciation of the history of lake’s cultural and economic importance, as well as the critical habitat it provides migratory birds. In response to changing conditions, it will be increasingly important for community members to be informed about how to protect their health. Importantly, community leaders are developing strategies for engaging with legislators and agencies so that projects and initiatives can begin to provide solutions at the Salton Sea.

II.B.4.a. Presentation: “The Salton Sea: Past, Present, and Future”

Speaker: Daniel Polk, Ph.D., Research and Evaluation Associate, Health Assessment and Research for Communities (HARC)

Summary of Presentation: Many discussions of the Salton Sea have emphasized its recent origins from the flooding event in 1905, but it is important to note that the local indigenous peoples have lived in the area for thousands of years and fished the waters of the lakes that came and went over millennia. Thus, the recent problems at the Salton Sea, including the receding shoreline, are specifically the result of contemporary political decisions surrounding the recent boom in large scale agriculture with its associated exploitation of immigrant workers. This legacy has a great deal to do with the persistent inequities in economic status and health outcomes, including the high incidence of asthma noted throughout this series. Keeping with this pattern, the recent 2003 Quantification Settlement Agreement transferring water unused for irrigation from Imperial Irrigation District to San Diego County, was aimed at promoting coastal urban development, without full assessment of its long-term impacts on the Salton Sea and surrounding region. Any environmental mitigation was left to be the responsibility of the State of California, but very few projects have been initiated, and the overall activities are underfunded. With the increasing impacts of chronic drought throughout the state, the Salton Sea will continue to retreat with increasing health impacts.

From the perspective of the coastal cities such as Los Angeles and San Diego, the sea is only seen as an environment in decline, with familiar images of dead fish and birds at the shoreline. On the other hand, the Salton Sea can be viewed as an important natural resource, a vital habitat for migratory birds. However, the moral imperative remains to protect the health of the residents of the region. How will the policymakers choose, and how can the communities advocate for racial equity so that the state and federal government prioritizes their needs?

II.B.4.b. Presentation: “Engaging with Agencies and Legislators”

Speaker: Elizabeth Romero, Assistant Vice Chancellor, Governmental Community Relations, UCR

Summary of Presentation: Enacting change in the community depends on effective advocacy. Ultimately it is the ability to lead system-level change in public policy, moving from an area of interest and concern to taking effective action. How can individuals participate in engagement and advocacy? There are several levels of engagement, starting with observing and creating a level of awareness that there is a problem. This comes from finding reliable sources of information to find out what is happening. The next level of engagement can be more direct action, including endorsing actions, sharing information with others, signing petitions, and donating to the activities. More active engagement includes investment of time, participating in events where you can engage with others. At the highest levels, advocacy includes active engagement with elected officials and

policymakers on these issues of concern. Keep in mind that the general public is at the forefront of making change, as elected officials, agency leaders, and organizations depend most on community support. An effective grassroots advocacy can be more influential than corporations or lobbyists.

The tactics involved in grassroots advocacy include broad campaigns such as letter writing and social media. In addition, mass movements including protests, boycotts, and marches can be effective visible actions. Effective advocacy depends on knowing the process. The California budget process expresses our values and priorities, while the state constitution establishes the rules of the game. This is an annual process, with decisions being made throughout the year, and during this process public input is an important part. As we learn from the research going on around the Salton Sea, and as communities begin to work together to identify priorities, change can happen.

II.B.4.c. Presentation: "Needs Assessments Overview"

Speaker: Chris Morin, M.S., Research and Evaluation Associate, HARC

Summary of Presentation: Looking forward we will need to identify future public health needs in the community. This comes from a "Needs Assessment" defined by the Centers for Disease Control and Prevention as a "process of identifying key health needs through systematic, comprehensive data collection and analysis." This can be simplified as just trying to identify the existing health problems. This can be done by understanding the perceptions of the issues among community members, local organizations, and other community leaders. It also includes gathering the recommendations by community members, local organizations, and leadership for addressing the health issues identified.

This needs assessment can start with reflection: is there previous work on the subject, and have other organizations conducted similar analysis? It is important to identify and engage the stakeholders and form an advisory council, consisting of local organizations, residents, and any other stakeholders in the community. This next step also defines the community and its geography. In the case of pulmonary health, the question is to define the region and the affected population.

Once the community and geography are defined, data collection can begin to paint a picture of the community and the issues, so that the issues can be prioritized. Prioritization can produce a prioritization matrix, which looks at the magnitude of the problem (how widespread is the problem), the severity (how serious are the health consequences), disparities (are some populations more vulnerable), and feasibility (is this a problem that can be addressed). As we go forward, understanding the use of tools such as a needs assessment can help identify the ongoing and emerging health needs at the Salton Sea, and focus new efforts toward new research and actions.

II.B.4.d. Presentation: “Alianza Coachella Valley”

Speaker: Patricia S. Carrillo, Director of Developmental and External Relations, Alianza Coachella Valley

Summary of Presentation: Since 2010, Alianza has been bringing together community members, non-profit organizations, and government, with the mission to transform the socio-economic conditions of the Coachella Valley so that people in all communities can prosper. The aim is to attain big systematic shifts that will improve the community’s socioeconomic and physical health for generations. To achieve this goal, this union of people and organizations is organized around an environmental justice campaign, a community justice campaign, and youth leadership. As an alliance, it is also important to recognize the range of important community and institutional partners involved in the work in Coachella Valley. It is the environmental justice campaign that focuses on the Salton Sea, and its air and water quality, built from a team bringing together broad ranging expertise.

To achieve the goals of Alianza, they focus on four components: shape, elevate, advocate, and lead. “Shaping” refers to shaping the systems to remove barriers to economic and physical health. Second, “elevate” local resident leadership, providing opportunities for civic engagement. Next, “advocating” through resident led issue-based campaigns to foster the growth of new leadership and collective impact. Finally, “lead” by providing comprehensive policy solutions for our region.

An ongoing question is, as an organization and collaborative, what does it take to transform the socio-economic conditions of the most marginalized people to achieve optimal economic and physical health? The framework here is to achieve empowerment through self-sufficiency. This includes recognizing both the importance of a strong safety net as well as its limitations. Self-sufficiency includes identifying the underlying causes of poverty and addressing them through changes in the policies and systems that reinforce these inequities. It is further achieved by engaging the impacted community by increasing their capacity to be full stakeholders in decision-making.

III. Conclusion: Ongoing and Future Needs for Research and Actions at the Salton Sea

The presentations and discussions among the speakers, as well as additional discussions among our planning committee partners, have identified several ongoing and emerging needs for information, actions, and research projects listed below to address the issues of air quality and health impacts at the Salton Sea. The needs identified in these discussions can be set into three general categories: (1) environmental science, including water ecology and geochemistry research, and studies on pollutants including the dust itself; and (2) medical research studies, including research on the specific physiological impacts and underlying causes of asthma experienced by community residents, as well as data on the

epidemiology of a range of health issues in the region; and (3) data communication and policies (**Figure 5**). Further work needs to be done to better define the types of studies that would be most effective and to develop these ideas from concepts into fundable research projects.

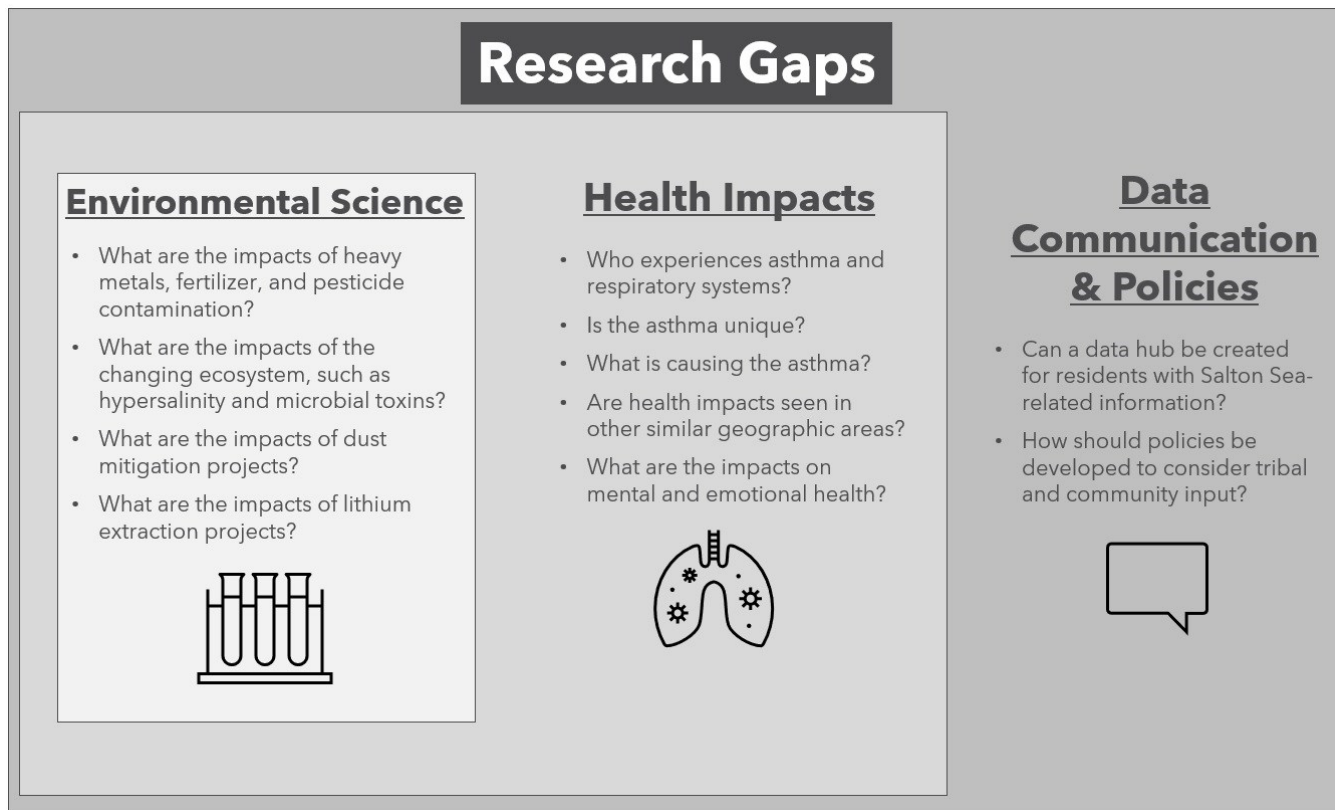


Figure 5: Diagram of key needs related to the Salton Sea that emerged from this project.

Environmental science questions can lead to further studies on health impacts. Both environmental and health studies can lead to data/results that should be communicated to residents, as well as a need to further develop policies that take tribal and community input into account.

III.A. Environmental Science – Water Ecology, Geochemistry, and Pollutant and Dust Studies

There are multiple known pollutants impacting Salton Sea water, sediment and playa. The following research questions highlight the need for studies on contamination of the Salton Sea:

1. *What are the potential impacts of heavy metals, fertilizer, and pesticide contamination of Salton Sea?* Heavy metals, fertilizers and pesticides are known to be present in the water and sediments in Salton Sea. As the sea retreats and exposes increasing amounts of lake sediments, studies are needed to determine whether people are being exposed to contaminants in air and dust emissions.
2. *What are the potential impacts of the changing ecosystem, such as hypersalinity and presence of microbial toxins?* As the Salton Sea continues to become increasingly hypersaline, studies are needed to understand the changing ecosystem in the Salton Sea water, especially the ability to produce microbial toxins and their potential impact on human health.
3. *What are the impacts of current dust mitigation projects?* Although dust mitigation projects are underway, a cost-benefit assessment of their impact needs to go beyond simple measures of dust production and include assessments of impacts on the health of the local community.
4. *What are the potential impacts of lithium extraction projects?* As the lithium extraction projects are implemented, monitoring programs should be started with a focus on new potential impacts on the region, including impacts on the ecology of the Salton Sea.

III.B. Research on Health Impacts

Presenters discussed what's known about asthma and other respiratory issues in the Salton Sea region and highlight unknowns about dust emissions and their effects on respiratory health, as well as who is most affected. There is general information on the incidence of health effects such as childhood asthma, but there is little detailed information beyond that. More public health research is needed to define the range of medical issues involved, including a few major themes:

1. *Which populations experience asthma and respiratory symptoms in the Salton Sea region?* A detailed epidemiological study throughout the region is very much needed to identify the communities and neighborhoods where asthma and other respiratory symptoms are most prevalent.
2. *Is the asthma experienced around the Salton Sea unique?* Clinical studies are needed to determine whether the asthma-like symptoms represent a distinct type of asthma that can be clearly diagnosed and should include an assessment of whether existing medical approaches are effective.
3. *What from the Salton Sea is causing the asthma? Are these materials produced by microbial ecosystem sources in the Salton Sea?* If Salton Sea dusts are responsible for the pulmonary symptoms in residents, studies are needed to identify the toxins, chemicals, or other triggers that can be directly connected to the asthma-like symptoms seen in residents.

4. *Are health impacts at the Salton Sea also seen in other similar geographic areas?* The impacts of chronic drought and climate change are not unique to the Salton Sea, so the health impacts are also unlikely to be unique to this region. Studies should be started to determine whether similar effects on health are seen in other regions with receding lakebeds, such as Owens Lake and Mono Lake further north in California, the Great Salt Lake in Utah, or other regions around the world impacted by climate change.

5. *What are the mental and emotional health impacts of the decline of the Salton Sea on local residents?* The ecological collapse of the Salton Sea, including the mass die-offs of fish and birds due to the salinity of the water and pollution, affects local residents in diverse ways. An assessment of mental and emotional health effects from experiencing the collapse of the Salton Sea ecosystem is needed, with specific inclusion of tribal community members in the research process.

III.C. Data Communication and Dissemination

Several events have been held in the Salton Sea region that included presentations on relevant research. However, available information and resources are scattered, and tend to be highly technical and narrowly focused, thus, not easily understood by lay persons. As a result, general information of the highest relevance to the community is not readily available in a format that is easily understood. As new questions arise, such as the new concerns about emissions from proposed lithium extraction, there is no place for community members to ask their questions and get scientifically reliable answers.

Community members have expressed the need for a central “data hub” that brings together accessible information in a single site that community residents can refer to on a regular basis to familiarize themselves with information and keep up to date on new developments. The information provided in such a site could include dust emissions data, air quality monitoring, and public health alerts for the region. In addition, a site like this could also provide a forum where residents can ask questions that may go deeper than the information presented on the site. For researchers in the region, this data hub could also be a valuable site for engaging with the community to discuss their priority concerns, as well as a site for recruiting participants in new research studies in the region.

III.D. Other Impacts and Policy Considerations at the Salton Sea

Other diverse topics emerged from discussions at the community forums and with the planning committee members:

1. As the Salton Sea shoreline recedes, it may reveal archaeological sites of cultural importance to the indigenous community. Culturally sensitive policies and processes will need to be developed to determine how will this be managed.

2. With the potential lithium extraction projects coming on-line in the near future, their impact on the economics of the communities in the region needs to be examined closely. Policies will need to integrate meaningful community input on these projects.

IV. References

Acero Triana, J. S. and H. Ajami (2022). "Identifying Major Hydrologic Change Drivers in a Highly Managed Transboundary Endorheic Basin: Integrating Hydro-Ecological Models and Time Series Data Mining Techniques." Water Resources Research **58**(8).

Alianza Coachella Valley. (2021). "Our Work." Retrieved August 4, 2023, from <https://www.alianzacv.org/our-work/>.

Audubon California. (n.d.). "Salton Sea." Retrieved July 27, 2023, from <https://ca.audubon.org/salton-sea>.

Bernstein, J. (2022) "Why the Salton Sea is turning into toxic dust."

Bureau of the Census (U.S. Census Bureau) (1920). Population: California: Number of Inhabitants, By Counties and Minor Civil Divisions. Fourteenth Census of the United States: 1920: Bulletin: 14.
<https://www2.census.gov/library/publications/decennial/1920/bulletins/demographics/population-ca-number-of-inhabitants.pdf> Accessed August 9, 2023.

California Air Resources Board (2018). Staff Report: 2018 State Implementation Plan for the Imperial County 12 μ g/m³ PM_{2.5} Annual Standard. Sacramento, CA: 25.
<https://ww2.arb.ca.gov/sites/default/files/classic/planning/sip/planarea/imperial/staffreport.pdf> Accessed August 8, 2023.

California Air Resources Board. (n.d.). "Inhalable Particulate Matter and Health (PM_{2.5} and PM₁₀)." Retrieved August 4, 2023, from <https://ww2.arb.ca.gov/resources/inhalable-particulate-matter-and-health>.

California Department of Fish and Wildlife Inland Deserts Region (Region 6). (2023). "Background Information on the Salton Sea." Retrieved July 12, 2023, from <https://wildlife.ca.gov/Regions/6/Salton-Sea-Program/Background>.

California Department of Pesticide Regulation (2021a). Total Pounds, Applications, and Acres Treated by County and Chemical: 2021. Pesticide Use Reporting (PUR). C. D. o. P. Regulation.
https://www.cdpr.ca.gov/docs/pur/pur21rep/2021_chemical_subtotals_by_county.pdf Accessed August 9, 2023.

California Department of Pesticide Regulation (2021b). Total Pounds, Applications, and Acres Treated by County: 2021. Pesticide Use Reporting (PUR). C. D. o. P. Regulation.
https://www.cdpr.ca.gov/docs/pur/pur21rep/2021_county_total_pounds_applied_agricultural_applications_and_acres_treated.pdf Accessed July 27, 2023.

California Water Boards. (2000, September 13, 2022). "The Salton Sea Transboundary Watershed Staff Report." Retrieved July 17, 2023, from

https://www.waterboards.ca.gov/coloradoriver/water_issues/programs/salton_sea/salton-sea-watershed-staff-report.html.

California Water Boards. (n.d., March 30, 2023). "Salton Sea." Retrieved July 17, 2023, from https://www.waterboards.ca.gov/coloradoriver/water_issues/programs/salton_sea/.

Caltrans (2021). Imperial County Economic Forecast. 2021 County-Level Economic Forecast. <https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/data-analytics-services/transportation-economics/socioeconomic-forecasts/2021/2021-pdf/imperial-profile-a11y.pdf%20Accessed%20on%207/25/23> Accessed August 4, 2023.

Center for Health Disparities at UCR. (n.d.). "Exposing the Desert: Environmental justice in California's Desert Wetland." Retrieved July 28, 2023, from <https://storymaps.arcgis.com/stories/b0eafb481a3a48c7943fa4164ebfaadf>.

Cohen, M. J. (2014). Hazard's Toll: The Costs of Inaction at the Salton Sea. Oakland, CA, Pacific Institute: 50. https://pacinst.org/wp-content/uploads/2014/09/PacInst_HazardsToll-1.pdf Accessed July 13, 2023.

Comite Civico Del Valley Inc. (2023). "Comite Civico Del Valley, Inc." Retrieved August 4, 2023, from <https://ccvhealth.org/>.

Environmental Health Investigations Branch. (2019, May 26, 2022). "California Asthma Dashboard." Retrieved August 4, 2023, from <https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/EHIB/CPE/Pages/CaliforniaBreathingCountyAsthmaProfiles.aspx>.

Farzan, S. F., M. Razafy, S. P. Eckel, L. Olmedo, E. Bejarano and J. E. Johnston (2019). "Assessment of Respiratory Health Symptoms and Asthma in Children near a Drying Saline Lake." Int J Environ Res Public Health **16**(20).

Formation Environmental LLC, p. f. l. l. D. i. c. w. t. C. o. l. (2022). Salton Sea Emissions Monitoring Program: 2020/2021 Annual Report and PM10 Emissions Estimates. https://saltonseaprogram.com/aqm/docs/2020_2021_Annual_Report_and_Emissions_Estimate.pdf Accessed August 4, 2023.

Frie, A. L., J. H. Dingle, S. C. Ying and R. Bahreini (2017). "The Effect of a Receding Saline Lake (The Salton Sea) on Airborne Particulate Matter Composition." Environ Sci Technol **51**(15): 8283-8292.

Gewin, V. (2023, February 22, 2023). "As the Salton Sea shrinks, is enough being done to protect public health?" Retrieved August 4, 2023, from <https://centerforhealthjournalism.org/our-work/insights/salton-sea-shrinks-enough-being-done-protect-public-health>.

- Goolsby, D. (2015). History of Salton Sea solutions tends to repeat itself. The Desert Sun. <https://www.desertsun.com/story/news/environment/2015/05/14/salton-sea-history-repeats/27316763/> Accessed August 18, 2023.
- Johnston, J. E., M. Razafy, H. Lugo, L. Olmedo and S. F. Farzan (2019). "The disappearing Salton Sea: A critical reflection on the emerging environmental threat of disappearing saline lakes and potential impacts on children's health." Sci Total Environ **663**: 804-817.
- Llamas, R. (2020). "What's wrong with the Salton Sea?" Salton Sea <https://ca.audubon.org/news/whats-wrong-salton-sea> Accessed July 27, 2023.
- Moreau, M. F., J. Surico-Bennett, M. Vicario-Fisher, D. Crane, R. Gerads, R. M. Gersberg and S. H. Hurlbert (2007). "Contaminants in tilapia (*Oreochromis mossambicus*) from the Salton Sea, California, in relation to human health, piscivorous birds and fish meal production." Hydrobiologia **576**(1): 127-165.
- Orlando, J. L., K. L. Smalling and K. M. Kuivila (2008). Pesticides in Water and Suspended Sediment of the Alamo and New Rivers, Imperial Valley/Salton Sea Basin, California, 2006-2007. Reston, VA. **Data Series 365**: 31. <https://pubs.usgs.gov/ds/365/pdf/ds365.pdf> Accessed July 15, 2023.
- Ronayne, K. (2022). California's depleted, drying Salton Sea to get \$250 million in federal drought funding. Los Angeles Times. <https://www.latimes.com/california/story/2022-11-28/california-salton-sea-federal-drought-funding> Accessed August 18, 2023.
- Salton Sea Authority (2018). Prop 68 passage accelerates progress at Salton Sea Indio, CA, The Salton Sea Authority. <https://saltonseaauthority.org/wp-content/uploads/2018/06/2018-06-06-NR-Prop-68-passage-accelerates-progress-at-Salton-Sea.pdf> Accessed July 13, 2023.
- Salton Sea Authority. (n.d.). "Salton Sea Facts." Retrieved July 13, 2023, from <https://saltonsea.com/get-informed/facts/>.
- Salton Sea Restoration Project (n.d.). The History and Culture of the Sea, Salton Sea Restoration Project. <https://nrm.dfg.ca.gov/> Accessed August 4, 2023.
- San Diego-Imperial Center for Excellence for Labor Market Research (COE) (2021). Imperial County: Regional Profile: July 2021. <https://www.imperial.edu/docs/research-planning/labor-market-reports-1/10997-imperial-county-regional-profile-july-2021/file> Accessed August 9, 2023.
- Taylor, M. (2018). The Salton Sea: A Status Update. Sacramento, CA: 18. <https://lao.ca.gov/reports/2018/3879/salton-sea-082918.pdf> Accessed July 13, 2023.
- The Center for Land Use Interpretation. (n.d.). "Salton Sea Test Base, California." Retrieved July 19, 2023, from <https://clui.org/ludb/site/salton-sea-test-base>.

Torres Martinez Desert Cahuilla Indians Chairman Thomas Tortez (2020). Re: Imperial PM10 Re-Designation. U. S. EPA: 2.

Tracey, C. (2022). The West's hottest county is also its most Latino. *High Country News*. Paonia, CO, High Country News. <https://www.hcn.org/articles/south-climate-change-the-vests-hottest-county-is-also-its-most-latino> Accessed August 4, 2023.

Trevet (2013). Second Five-Year Review Report: Former Salton Sea Test Base: Imperial County, California. San Diego, CA, Naval Facilities Engineering Command. https://media.defense.gov/2022/Mar/31/2002967774/-1/-1/0/FINAL%20ND%205YR_SSTB_6-3-2013.PDF Accessed July 25, 2023.

Twenty-Nine Palms Band of Mission Indians. (n.d.). "EPA - Air Quality." Retrieved August 4, 2023, from <https://www.29palmstribes.org/epa-air-quality>.

U.S. Bureau of Labor Statistics: Local Area Unemployment Statistics (2023a). Labor force data by county, not seasonally adjusted, May 2022–June 2023 p. Washington, DC, U.S. Bureau of Labor Statistics. <https://www.bls.gov/lau/tables.htm> Accessed August 8, 2023.

U.S. Bureau of Labor Statistics: Local Area Unemployment Statistics (2023b). Over-the-Month Change in Unemployment Rates for States. Washington, DC, U.S. Bureau of Labor Statistics. <https://www.bls.gov/web/laus/laumstcm.htm> Accessed August 8, 2023.

U.S. Census Bureau (2020a). 2016-2020 American Community Survey 5-Year Estimates, U.S. Census Bureau. https://data.census.gov/table?q=imperial+county+california+income&g=040XX00US06_050XX00US06065&tid=ACSST5Y2020.S1902 Accessed August 9, 2023.

U.S. Census Bureau (2020b). 2020 Census Demographic and Housing Characteristics File (DHC), U.S. Census Bureau. https://data.census.gov/table?t=Race+and+Ethnicity&g=040XX00US06_050XX00US06025,06065&tid=DECENNIALDHC2020.P9 Accessed August 9, 2023.

U.S. Environmental Protection Agency. (2023, July 31, 2023). "Current Nonattainment Counties for All Criteria Pollutants." Retrieved August 8, 2023, from <https://www3.epa.gov/airquality/greenbook/ancl.html>.

Xu, E. G., C. Bui, C. Lamerdin and D. Schlenk (2016). "Spatial and temporal assessment of environmental contaminants in water, sediments and fish of the Salton Sea and its two primary tributaries, California, USA, from 2002 to 2012." *Sci Total Environ* **559**: 130-140.