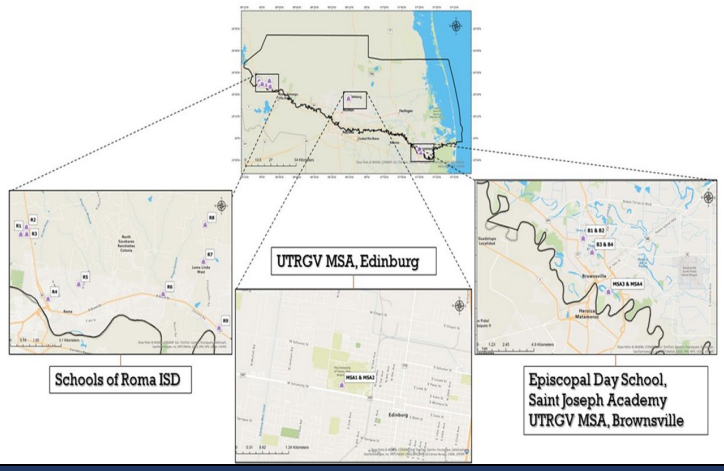
PROJECT FACTSHEET

Name of the project:	Empowering Air Quality Knowledge Base of the Lower RGV Citizenry in Brownsville - Harlingen – McAllen Metropolitan Area	**Finish date:**	September 30th, 2024.
Location:	Region 6. Rio Grande Valley, South Texas	**Identification number:**	
Goal 1:	Reduce air pollution. Border 2025 program	**Technical representative:**	
Project responsible	Dr. Amit Raysoni, Assistant Professor – Air Quality, School of Earth, Environmental, and Marine Sciences, The University of Texas Rio Grande Valley, Office 956-882-8835, amit.raysoni@utrgv.edu	**EPA:**	
		NADBANK:	

Pre-Project Conditions

The Rio Grande Valley (RGV) region of South Texas is an under-studied, under-resourced, and under-served area on the US – Mexico border. It experiences high economic activities and high environmental exposures due to traffic emissions, agricultural and trash burning, and high diesel emissions near the ports of entry. The region's inadequate air quality monitoring is also a concern for the local citizenry. The majority of the RGV neighborhoods fall within the 90–100 national percentile range for individuals with less than a high school education. 24.7% of the families live below poverty, and more than 90% of the population is Hispanic/Latino.



Project Objective

To empower the knowledge base on the overall air quality and associated health impacts among elementary, middle, and high school students at selected schools in Roma, Edinburg, and Brownsville, TX.

Project scope

1. Conduct air pollution educational training sessions for 1200 children in the RGV area.
2. 500 elementary, 250 middle, 250 high school, 200 The University of Texas Rio Grande Valley Math and Science Academy (UTRGV MSA) students.
3. Characterize the $PM_{2.5}$ concentrations at multiple schools in RGV region.
4. Determine the major sources of $PM_{2.5}$ at schools in the RGV.
5. Recommend actions to reduce the children's exposure to poor air quality in school environments.

Project cost

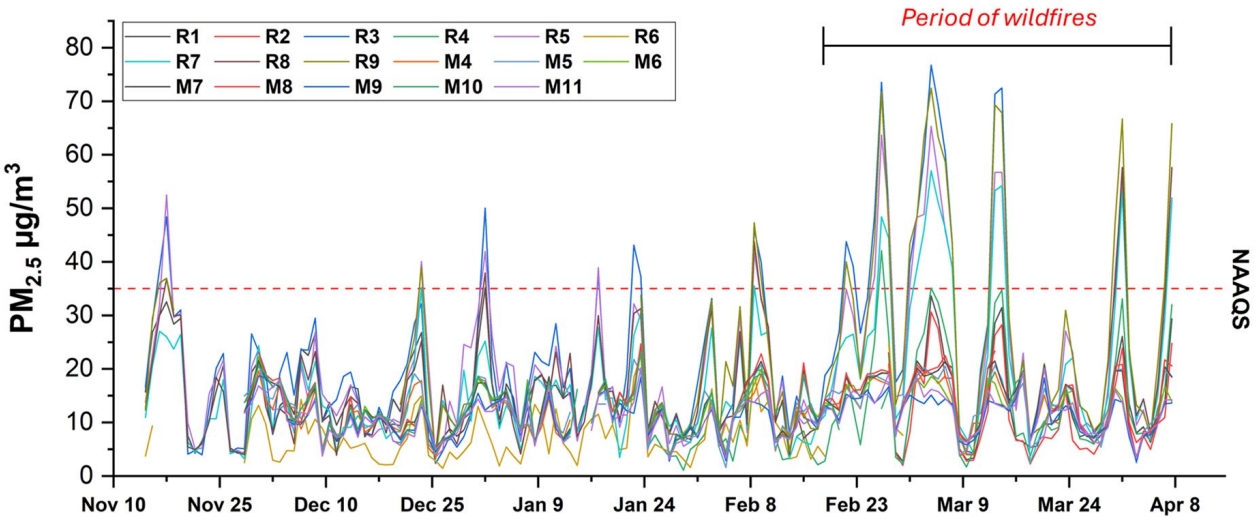
Contribution of Border 2025:	$84,000.00
Total project cost:	$84,000.00
Project duration:	23 months
Benefited population:	1474 students from the cities of Roma, Edinburg, and Brownsville directly through training activities.

The Results

Outcomes	**Outputs**

• 1474 students (524 elementary, 271 middle, 456 high school, and 223 MSA students) directly through training activities. • Outdoor $PM_{2.5}$ measurements at 13 schools across the RGV region. • Identification of major sources of air pollution at schools in the region.	• Satellite imagery identifying the Mexican wildfire activities and smoke plumes. • Statistical analysis of $PM_{2.5}$ measurements in comparison with Texas Commission on Environmental Quality (TCEQ) measurements. • Time series and box plot visualization of $PM_{2.5}$ measurements at all schools. • Training activities and materials for all levels of students (Elementary, Middle, and High) • Recommendations to reduce exposure to $PM_{2.5}$ during school hours.

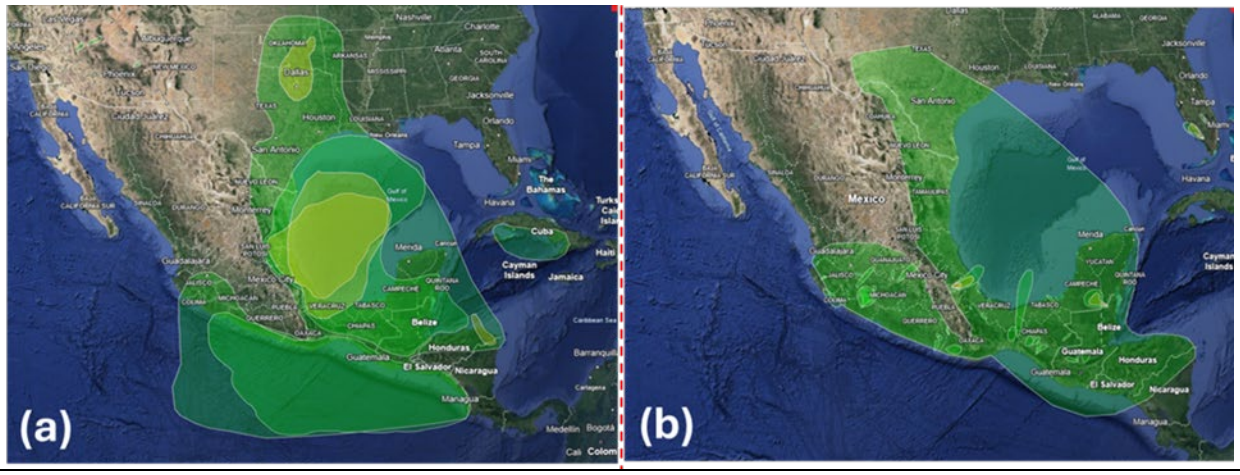
The time series shows the 24-hour average $PM_{2.5}$ concentration data collected. Although the concentrations were mostly below NAAQS (National Ambient Air Quality Standards), they significantly increased during wildfire events in the Mexican region, as shown in the graph. Different lines indicate data at respective schools.



- These wildfire events are naturally occurring. Hence, precautionary steps need to be taken to decrease pollution exposure.

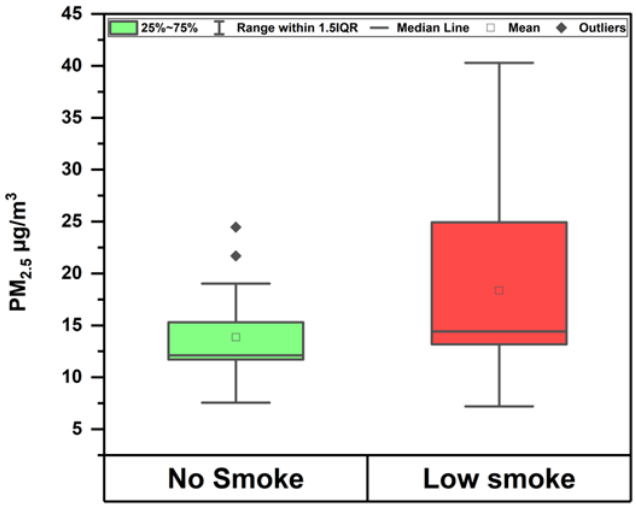
The images show smoke plumes from Mexican Wildfires covering the RGV region. A series of NOAA/NASA satellites detect these smoke plumes, which produce a blended product called a Hazard Mapping System.

- Smoke plumes from wildfires on (a) 03/05/2024 and (b) 04/09/2024



It is important to understand how much of the increase in $PM_{2.5}$ was caused by these wildfire activities. The image shows the $PM_{2.5}$ values range at the selected schools in the region, with no smoke and low smoke.

- Low smoke conditions have a higher mean (18.36 µg/m^3) than no smoke (13.86 µg/m^3), indicating increased exposure levels during low smoke events.



Training activities were conducted to empower the air quality knowledge base of stakeholders including 1474 students

- Elementary students learned the basics: what air is, sources and effects of pollution, and ways to reduce risk.
- Middle school students delved more deeply, exploring specific pollutants, health impacts, global and local pollution sources, and data from monitoring tools like AirNow.
- High schoolers received expanded content on air quality monitoring through various sensors and satellites and were introduced to environmental justice using tools like EJ Mapper.
- MSA students covered similar topics at a more advanced level, focusing on low-cost sensor functionality, NASA satellite data through Worldview, and practical applications of tools like Airnow.gov for monitoring regional air quality.

Proposed actions to reduce children's exposure to PM2.5 and access real-time data to take action

The impact of wildfire smoke on air quality near schools, such as the emissions from Mexican wildfires affecting the Rio Grande Valley, is significant. Schools in these areas experience significant impacts from this smoke, which can lead to visible haze, an acrid smell, and a decline in air quality. Since schools are integral community spaces where children spend 8 to 9 hours of their day, developing and implementing strategies that reduce exposure to these airborne pollutants is of paramount importance. In addition, creating educational opportunities around air quality issues empowers children and the community to make informed decisions to protect their health.

The following actions were proposed to achieve safe exposure levels for children at schools:

- Utilizing Technology to Track and Monitor Air Quality
  - Using tools such as AirNow and PurpleAir dashboard, school administrators can monitor air quality before planning daily outdoor activities. For instance, when data indicates elevated $PM_{2.5}$ levels, school officials can implement protective measures such as limiting outdoor activities, notifying parents of air quality issues, or recommending that students with respiratory conditions take additional precautions.

- Limiting Outdoor Exposure During Smoke Events
    - During poor air quality, especially when $PM_{2.5}$ levels are high due to wildfire smoke, an effective measure to decrease exposure is to adjust outdoor activity schedules.
- Educational Initiatives to Raise Awareness and Foster Engagement
    - By integrating air quality lessons into the curriculum, children can better understand pollution's sources and health effects and learn ways to protect themselves. This knowledge can instill a sense of responsibility and empower children to become informed advocates for clean air in their communities.
- Increase in Green cover
    - Preliminary findings showed elevated $PM_{2.5}$ levels around schools in the Rio Grande Valley, which did not have green cover. Increasing green cover could be a key intervention to mitigate these impacts of pollution. Tree plantation drives by the school administration will shield the school environment from air pollutants and foster a relationship between trees and children.

Significant project contributions

- First air quality dataset characterizing $PM_{2.5}$ concentrations at schools in Rio Grande Valley.
- First research project and air quality monitoring in the region of Roma, which is 45 miles from the nearest TCEQ - CAMS (Texas Commission on Environmental Quality - Continuous Ambient Monitoring Station) in Mission.
- Possible role of Mexican wildfires impacting the local air quality in Rio Grande Valley.
- Project results were shared with the school principals.
- Development of an air quality training curriculum for elementary, middle, and high school students.
- Ellicited interest in high school students to pursue future careers in environmental and air pollution science.
- Empowerment of air quality knowledge base for 1474 students, including elementary, middle, and high school students.
- Continuation of $PM_{2.5}$ monitoring to deliver real-time air quality level information to school administration.