

Engaging Community to Design Data Communication for the Ysidro Air Quality Study



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OEHHA

SCIENCE FOR A HEALTHY CALIFORNIA

OEHHA

Office of
Environmental
Health Hazard
Assessment



CalEPA

California Environmental
Protection Agency

CalEPA

California
Environmental
Protection
Agency



CASA FAMILIAR
A COMMUNITY DEVELOPMENT AGENCY

CF

Casa Familiar

UW

University of
Washington



San Ysidro Community-Based Air Monitoring Study

SDSU

San Diego State
University



SAN DIEGO STATE UNIVERSITY

CSC

Community
Steering
Committee

TAG

Technical
Advisory Group



Casa Familiar Community Partner

A Community Development Agency serving San Ysidro and South San Diego County residents since 1971. (501c3 Non-Profit)

30 Bilingual Services & Programs, including:

- Social Services, Forms Assistance, and Immigration Services
- Education and Youth Development Programs
- Arts and Culture Events, Exhibits & Programs
- Civic Engagement, Advocacy, and Resident Leadership Development
- Health, Wellness, and Fitness Classes, Programs & Support Groups
- Affordable Housing Development (1,100 units)



CASA FAMILIAR SERVICE AREA MAP

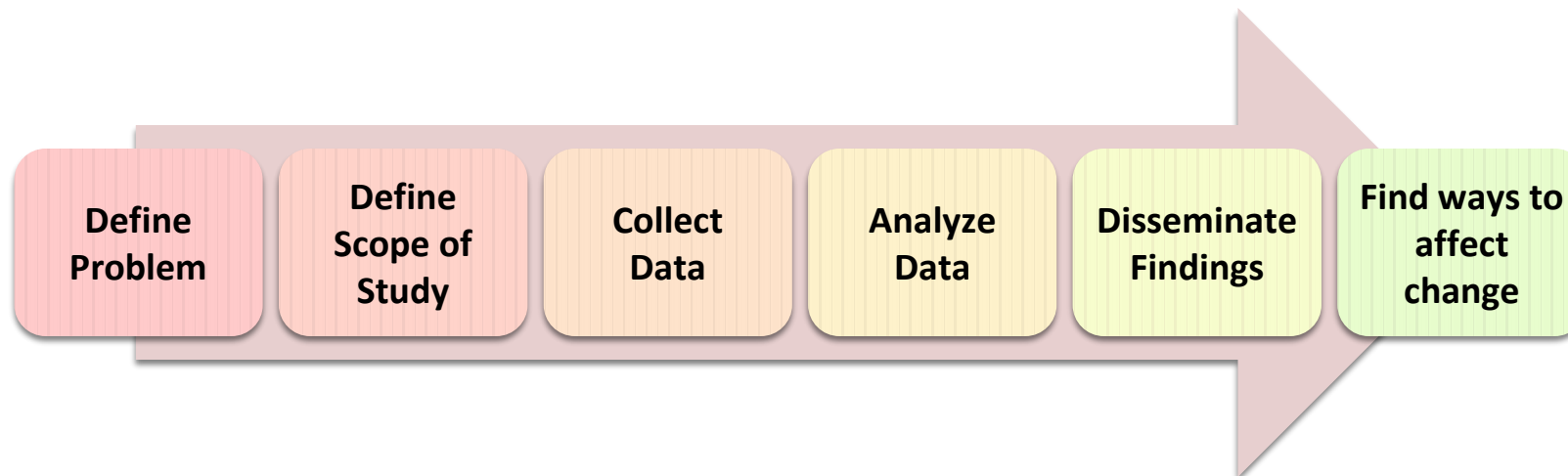
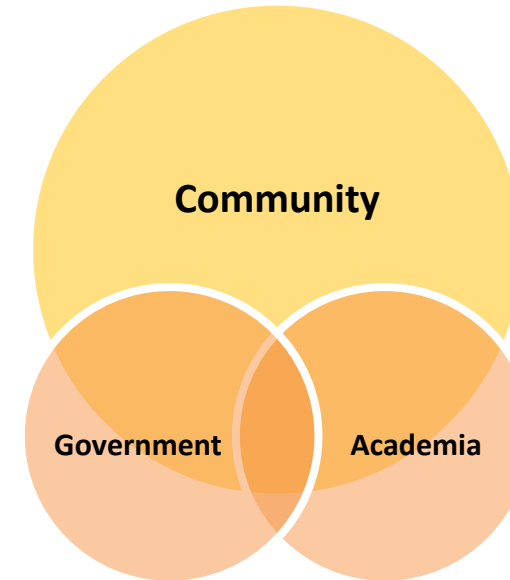
The Mission of Casa Familiar allows the dignity power and worth within individuals and families to flourish, by enhancing the quality of life through, education, advocacy, service programming, housing, and community economic development.



Community-Led Air Monitoring

“Make the invisible visible”

- Community members engaged as decision makers in scientific research
- Community participation in scientific research leads to citizen science to support improvements in public health and environment
- Co-learning, leverage strengths and experience, community empowerment, capacity building, and sustainability



2nd Community Meeting

Name 3 things or activities that you think may create air pollution in San Ysidro.



Border Traffic
Smog
Smell

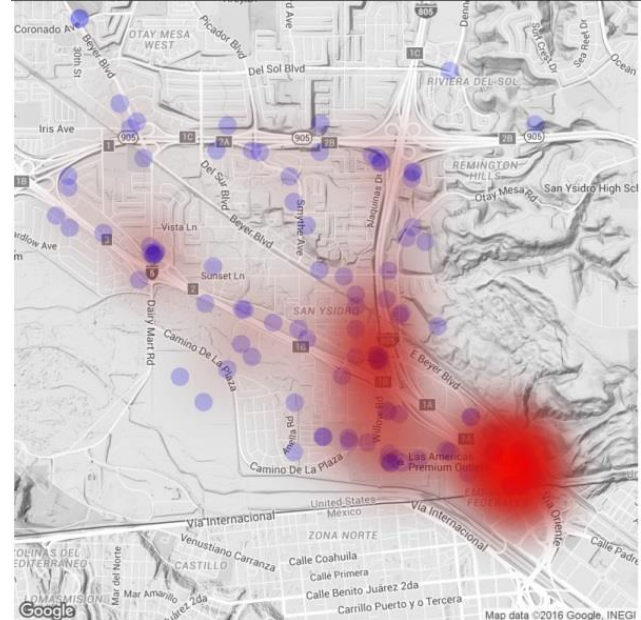


Automobiles
Trucks
Cars
Buses

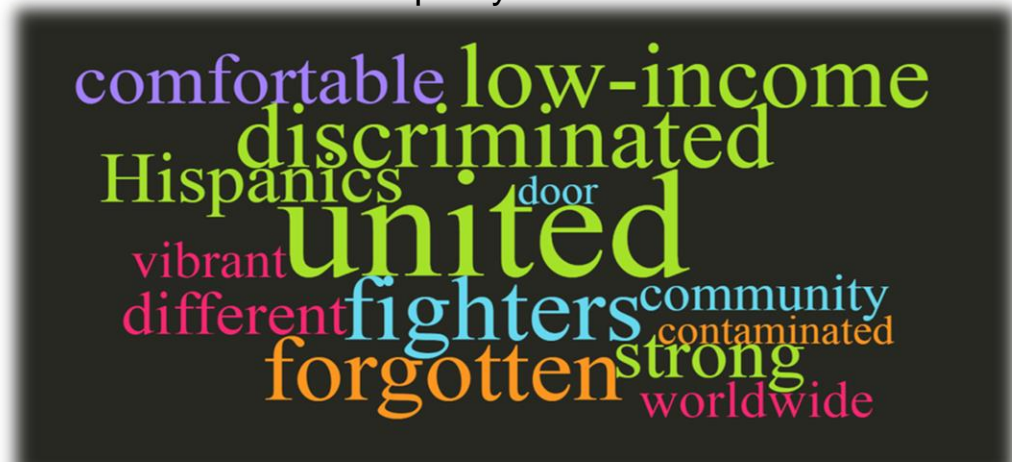
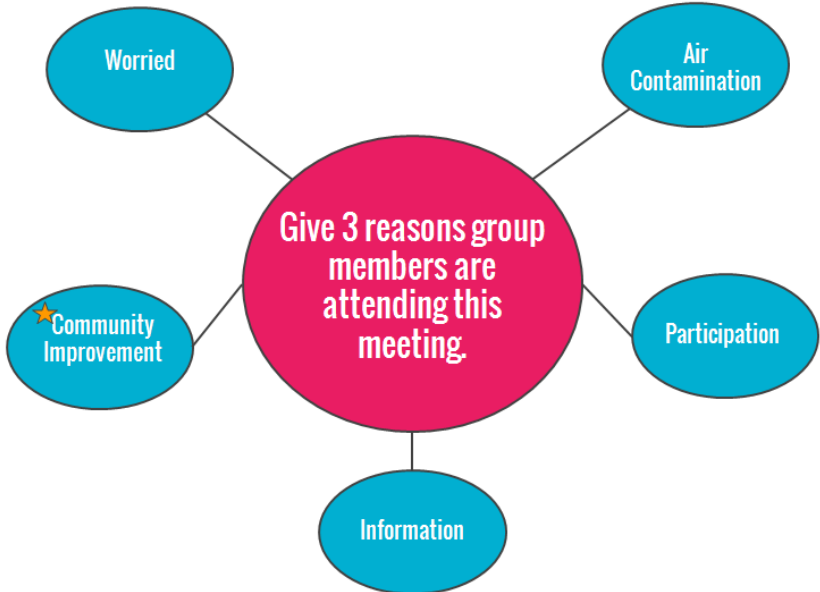


Trash
Burning trash
Fires

- Present questionnaire and mapping results to community
- Conduct needs assessment



Density map of where residents would like more data about air quality.



SAN YSIDRO COMMUNITY AIR MONITORING STUDY - AIR MONITORS LOCATIONS MAP - Nov. 2017

on Map

- 1-San Ysidro Middle School
- 2-Willow Elementary School
- 3-SY McDonalds/Bus Terminal
- 4-Casa Familiar - El Salon
- 5-Outlets at the Border
- 6-The FRONT Gallery - SY Blvd.
- 7-SYHealth Ctr. - Adult Ctr.
- 8-Nicoloff Elementary School
- 9-Tijuana Border

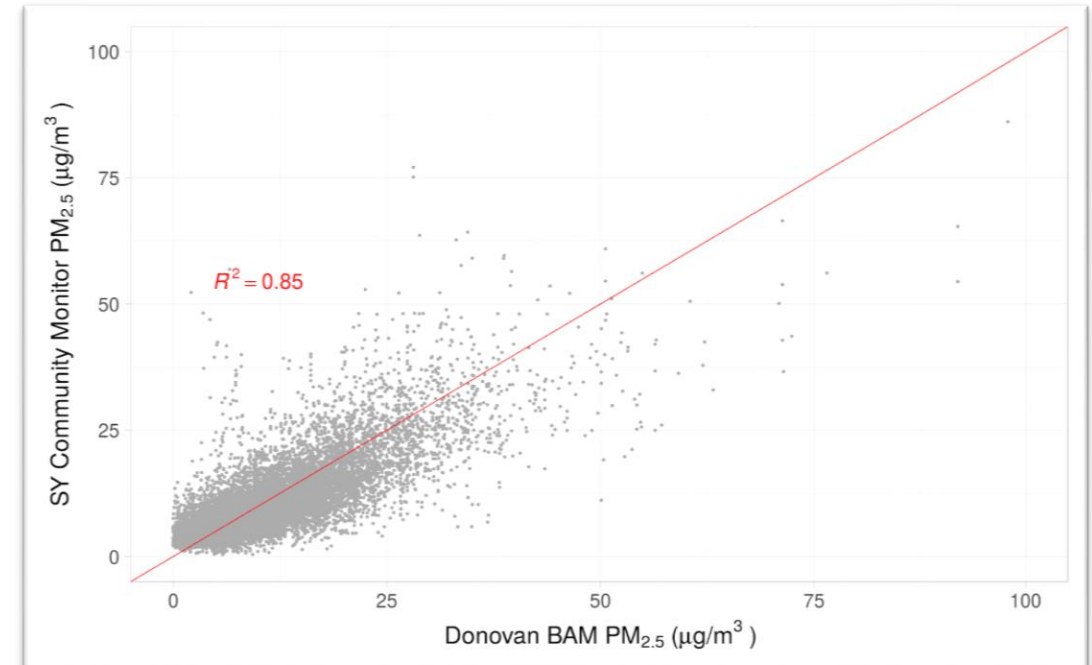
- 10-Tijuana River Valley Estuary/Imperial Beach (Off Map)
- 11-Donovan/Otay Colocation (Off Map)

Yellow - School Grounds
Green - Parks



Next-Gen Community Air Monitor

- Non-regulatory research instruments
- Modified Dylos particle counter with 4-size bins measuring between PM 0.5 – 10 μm .
- Alphasense electrochemical for traffic-related gas pollutants (CO , NO , NO_2 , O_3)
- Temperature and RH
- Cellular data transmission
- Internet server for storing and sharing data
- Data is calibrated in real-time
 - Sensor Specific
 - Mixed Effects Additive Models
 - Accounts for non-linear effects of humidity and temperature



Community Steering Committee (CSC) Activities

- CSC made up of 10 community residents
- Serve as community experts and guide the study
- Act as liaisons between community residents and study team
- Worked with study team to finalize 13 monitoring sites



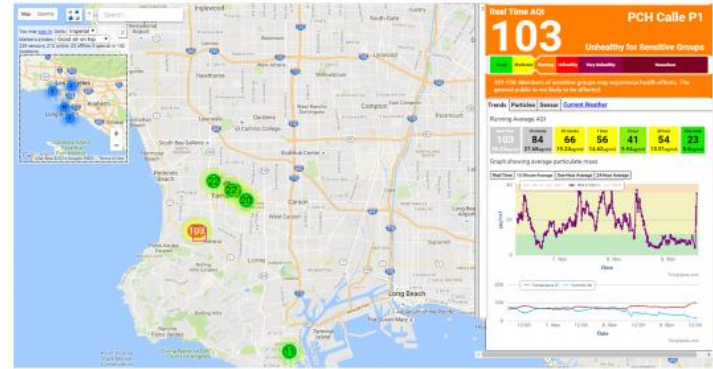
Data Visualization Discussion with CSC

- We need to make decisions about how this data will be presented to the community
 1. How clear is the presentation?
 2. Does it answer the main questions that the community has regarding air pollution?
 3. Are we correctly representing the data as a 'supporting' data from government monitors?

Example Visualizations for CSC Discussion

- How much information should be displayed?
- What sort of people will visit the site?
- What frequency of data should be displayed?

Example 2:



<https://map.purpleair.org>

Example 4



<https://www.arb.ca.gov/aqmis2/ARBAqmap.php?param=ozone&switchF=1>

Example 3

The screenshot shows a 'Daily Parameter Report' table. The table has columns for 'Station', 'Date', and 'AQI'. The data is organized into rows for different stations and columns for different dates. The AQI values are displayed in a grid format, with some cells containing numerical values and others being empty.

http://airquality.sdapcc.org/air/data/web_report.htm

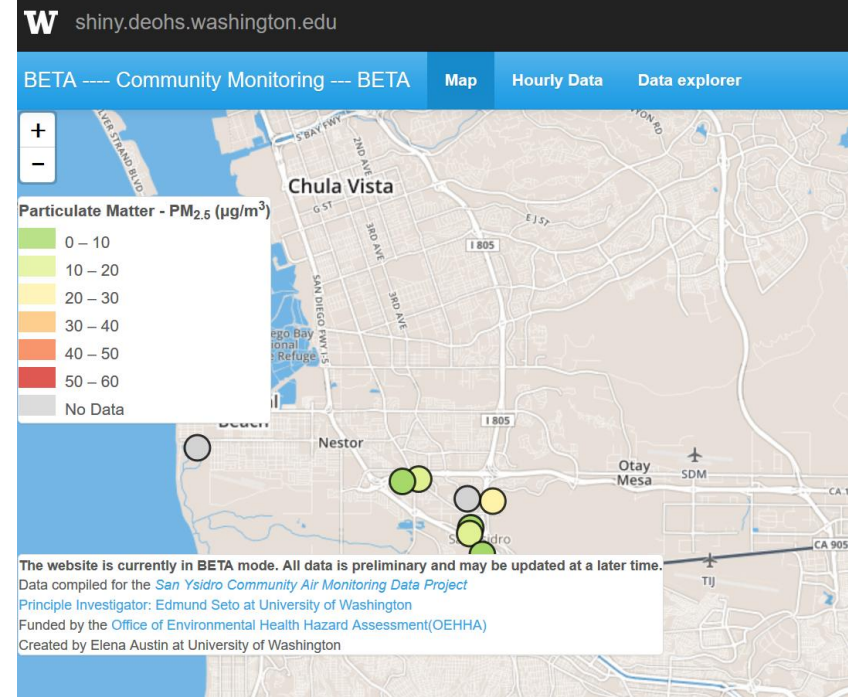
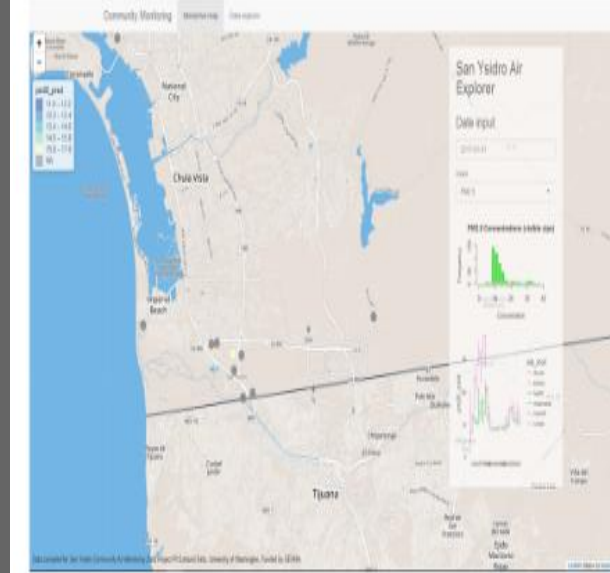
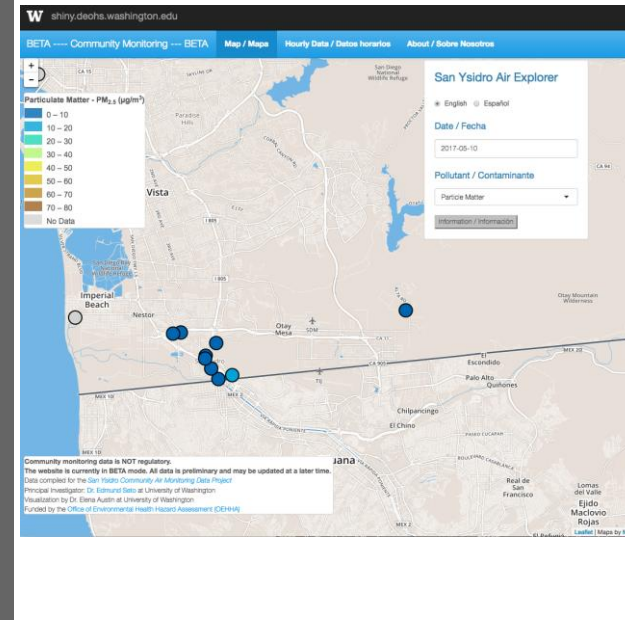
Example 1 – PM_{2.5} (as AQI)

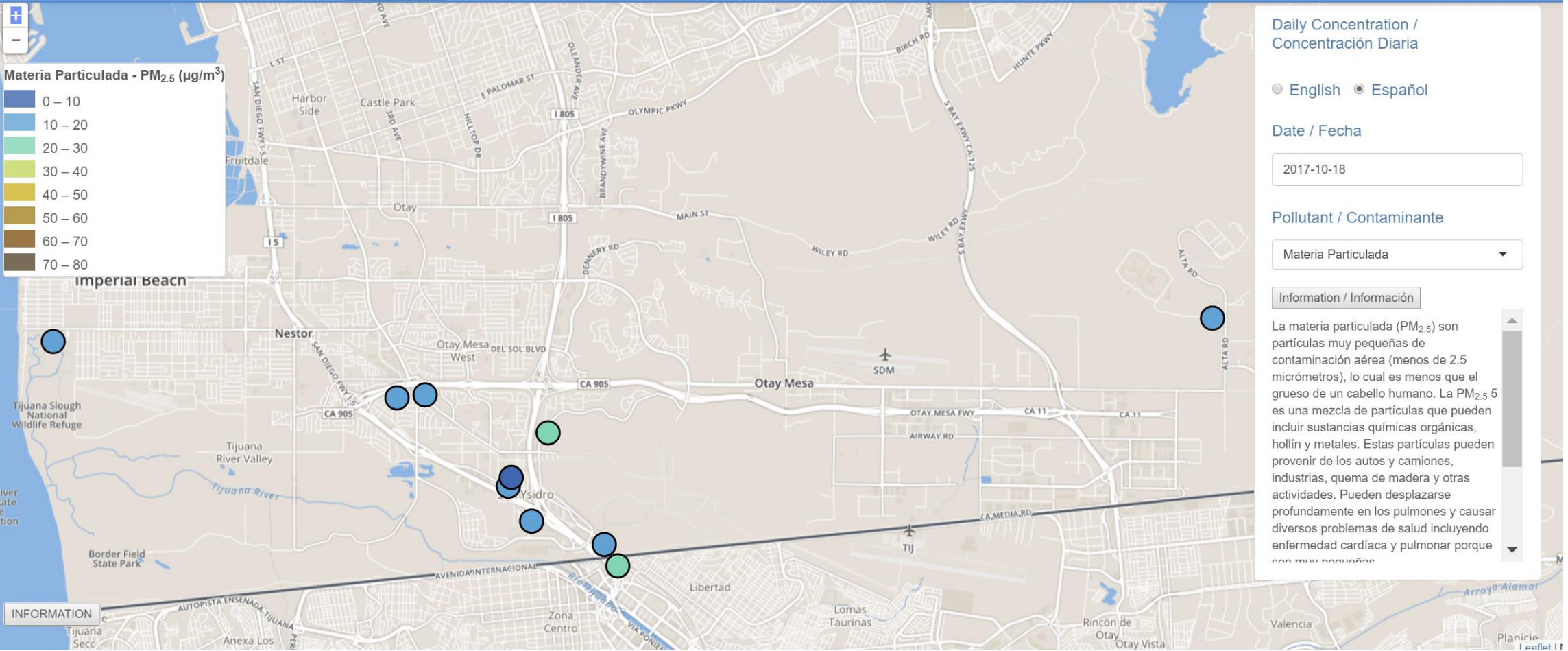


Example taken from aqicn.org

Beta Visualization and Feedback

- Data explorer unnecessary
- Plots on map page are confusing
- Color scheme is not informative/difficult to see
- Spanish language translation is imperative
- Information should be displayed hourly





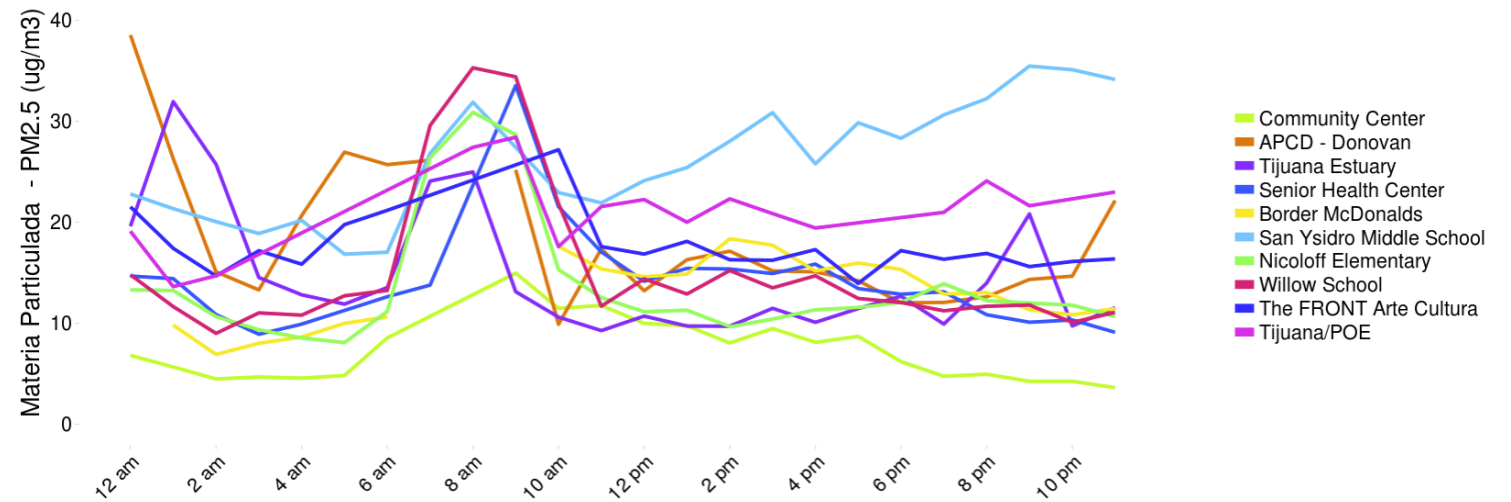
Hourly Data Plot, Select Sites and Dates

Date / Fecha

Site Selection Options:
 All
 Manual Select

Pollutant / Contaminante

Select Plot Limits








La información se interpreta en relación con los estándares gubernamentales de salud.

Para estos sitios, en este día, existen horas cuando el Materia Particulada medido por esta red de sensores exceda en 24-hora el estándar NAAQS de 35 ug/m3 establecido por la EPA.

Los datos aquí presentados NO son datos reglamentarios y pueden existir errores. [Por favor siga las recomendaciones actuales de condiciones en exteriores y de salud del APCD del Condado de San Diego.](#)

Visualization

- Built on open source software (leaflet, shiny, R, docker)
- Source code available online (https://github.com/elaustin/syvis_docker)
- Hosted online at www.syairstudy.org
- Can be used on phone, but not optimized
- TO Date: ~2 GB of data and ~1.5 million rows of data

	Country	Device Category	Users	New Users
			770 % of Total: 100.00% (770)	751 % of Total: 100.00% (751)
1.	United States	desktop	619	 80.29%
2.	United States	mobile	84	 10.65%
3.	Mexico	desktop	20	 2.53%
4.	United States	tablet	7	 0.93%
5.	South Korea	desktop	4	 0.53%

Next Steps

- Integrate additional data sources
 - Model changes in pollutant concentration as a function of border wait time
 - Model changes in pollutant concentration as a function of vehicle flow
- Plan network sustainability and community capacity
- Integrate data from multiple sensor types using ***common calibration and deployment approaches***
- Extend network both sides of the border

Acknowledgements

COMMUNITY STEERING COMMITTEE MEMBERS:

- Antonio Martinez
- Arturo Ruiz
- Bertha Ruiz
- Guillermo Cornejo
- Janett Gaytan
- Olga Espinoza
- Rudy Lopez
- Aneth Flores
- Sister Roseann Cordova
- Sister Nora Murphy

