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# Real-time Monitoring System for water level - SENTINEL

AUGUST 2023

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*During the floods in 2020 and 2021  
in south Mexico - Tabasco and USA -  
Louisiana, New York city, it was  
necessary to know the precise level of  
water in **strategic points within the city**.*

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PhD Understanding and Managing Extremes

# Citizens need fast and punctual information to make right decisions

09/Nov/2020 18h

Río	Nivel (18:00 h) (m)	Nivel de desbordamiento (m)	Diferencia (m)	Observaciones
Tapijulapa	17.50	24.63	7.13	ríos <b>abajo</b> del nivel de desbordamiento
Puyacatengo	25.45	29.65	4.20	
Tacotalpa (Oxolotán)	35.92	39.53	3.61	
Carrizal (González)	7.28	9.50	2.22	
Teapa	35.17	36.50	1.33	
Pichucalco (San Joaquín)	22.28	23.12	0.84	
Grijalva (El Muelle)	7.61	8.25	0.64	
Grijalva (Gaviotas)	7.71	8.25	0.54	ríos <b>arriba</b> del nivel de desbordamiento
San Pedro	9.06	9.01	0.05	
De la Sierra (Pueblo Nuevo)	8.18	7.49	0.69	
Samaria	15.17	14.00	1.17	
Usumacinta (Boca del Cerro)	20.49	19.21	1.28	
Puxcatán (Macuspana)	11.36	9.85	1.51	
Grijalva (Porvenir)	6.41	4.74	1.67	
Tulijá (Salto del Agua)	14.10	10.99	3.11	

Fuente CONAGUA [https://twitter.com/conagua\\_mx](https://twitter.com/conagua_mx)

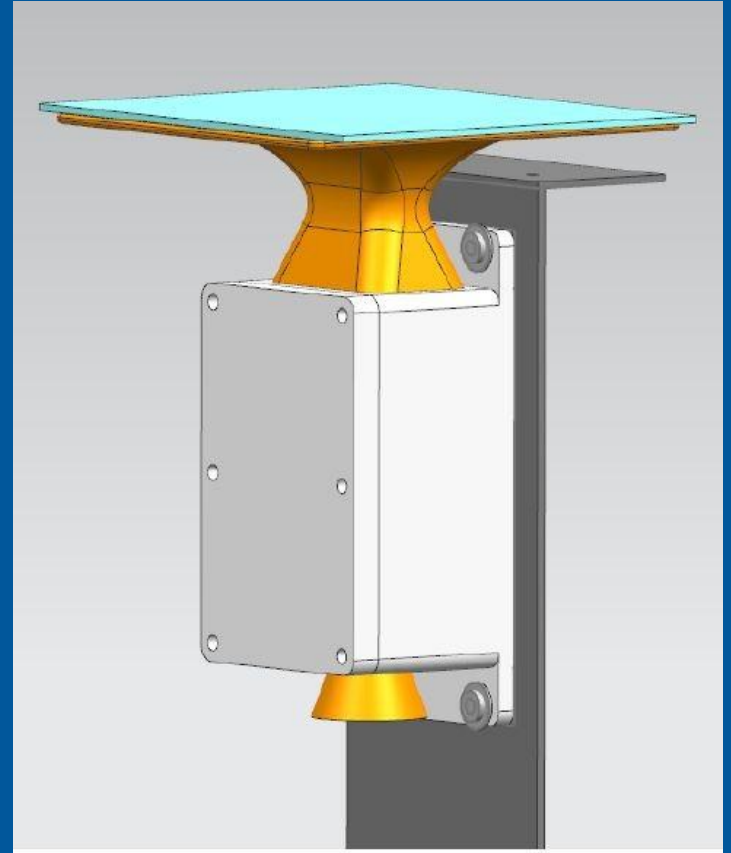


Fuente <https://twitter.com/ProcivilTabasco/>

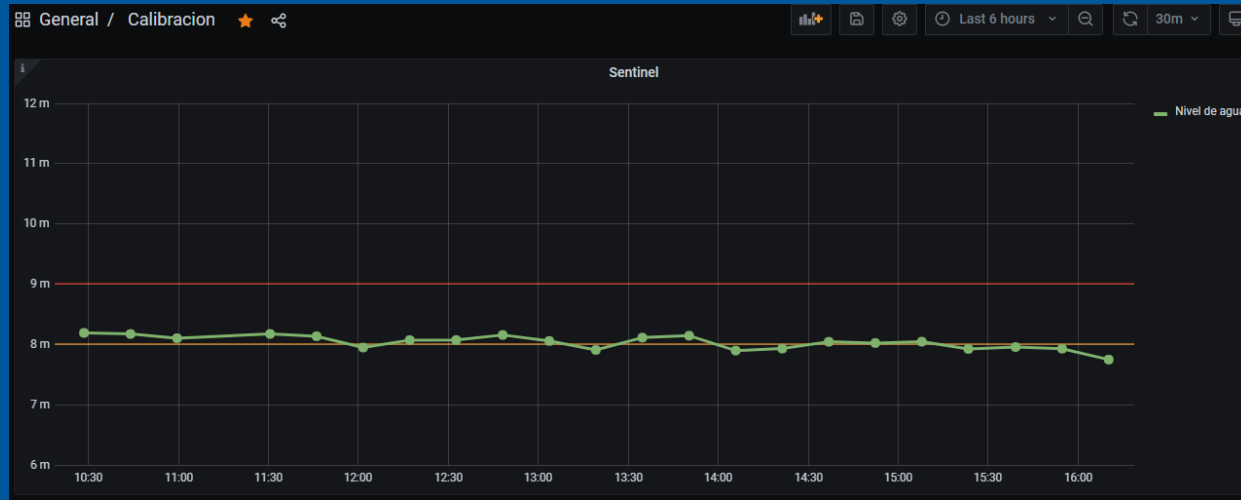
19/Jun/2021 8h

# Solution

## Real time Monitoring System for water level



# The level of water can be continuously monitored by PC or Smartphone

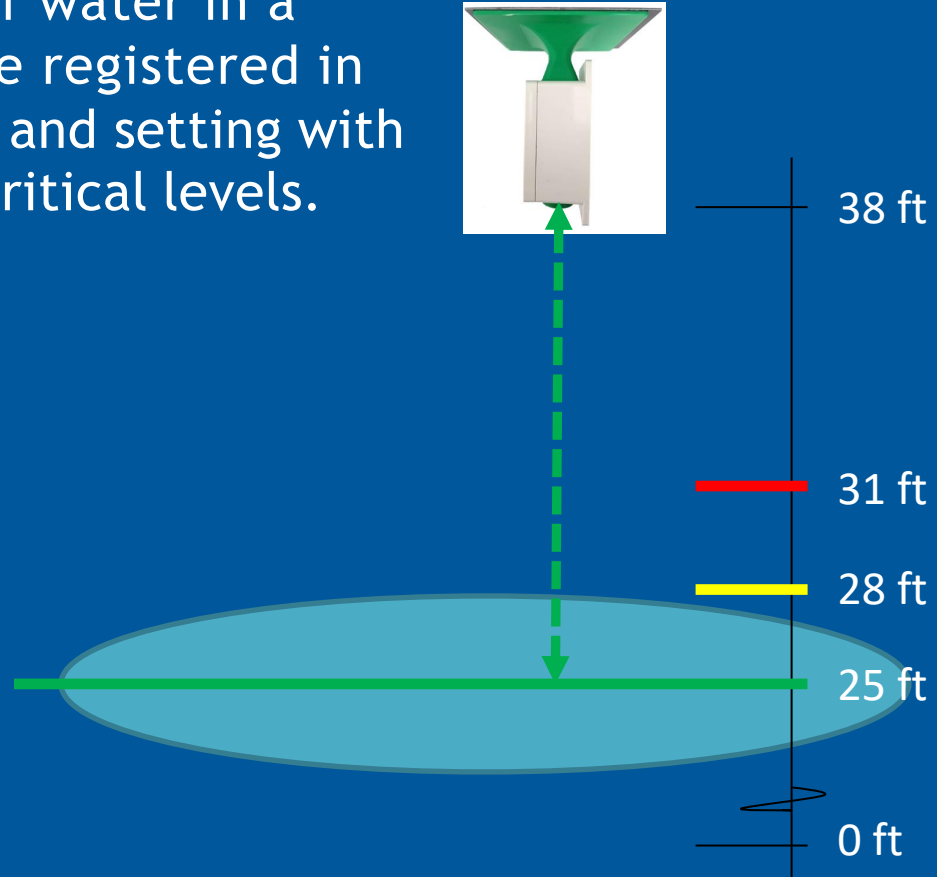
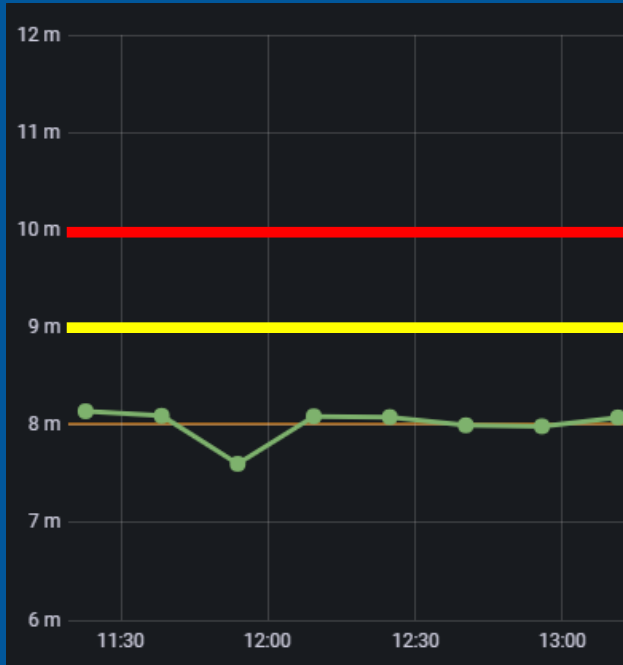


PC

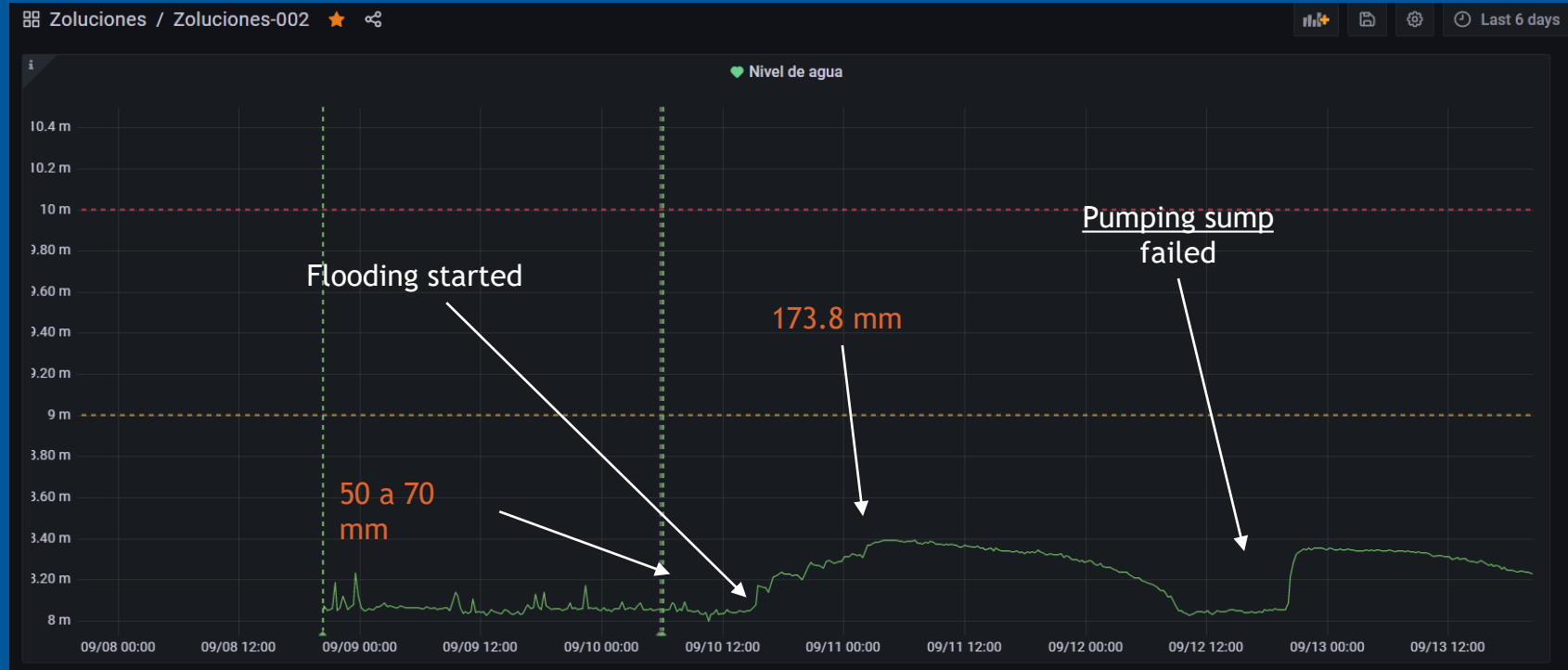


Smartphone

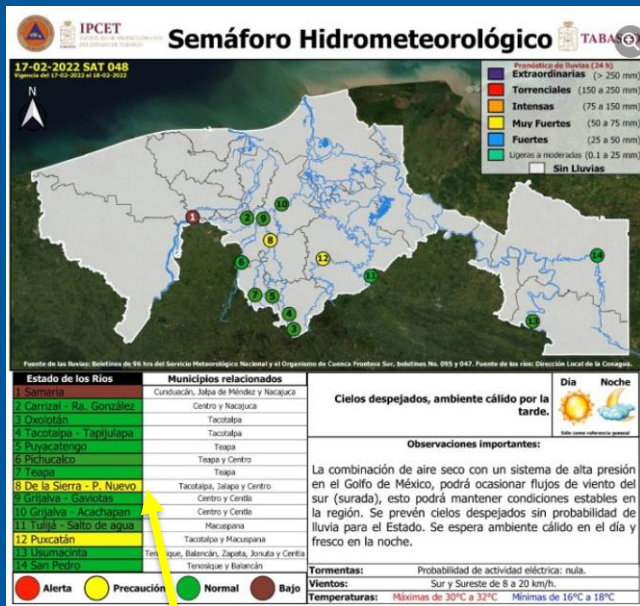
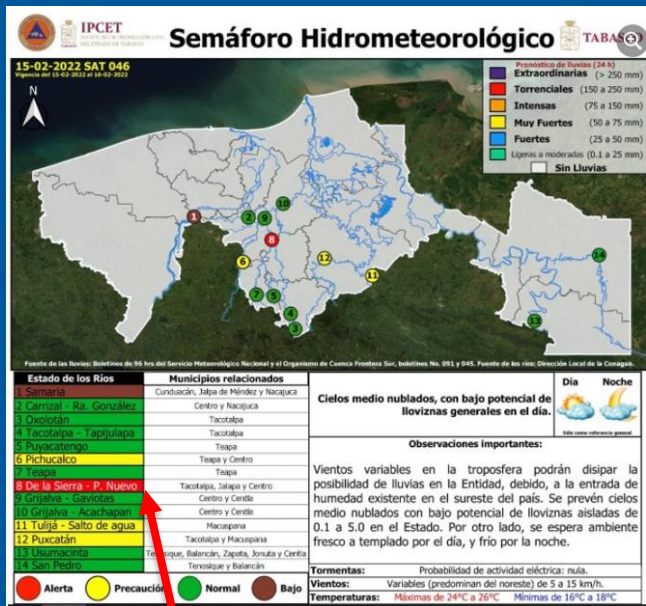
SENTINEL measures the level of water in a specific point. The level can be registered in feet above the mean sea level and setting with specific alarms when reaching critical levels.



# Event01: SENTINEL september 2021, Villahermosa, Tabasco, Mexico.



# Event02: SENTINEL february 2022, Tabasco México.



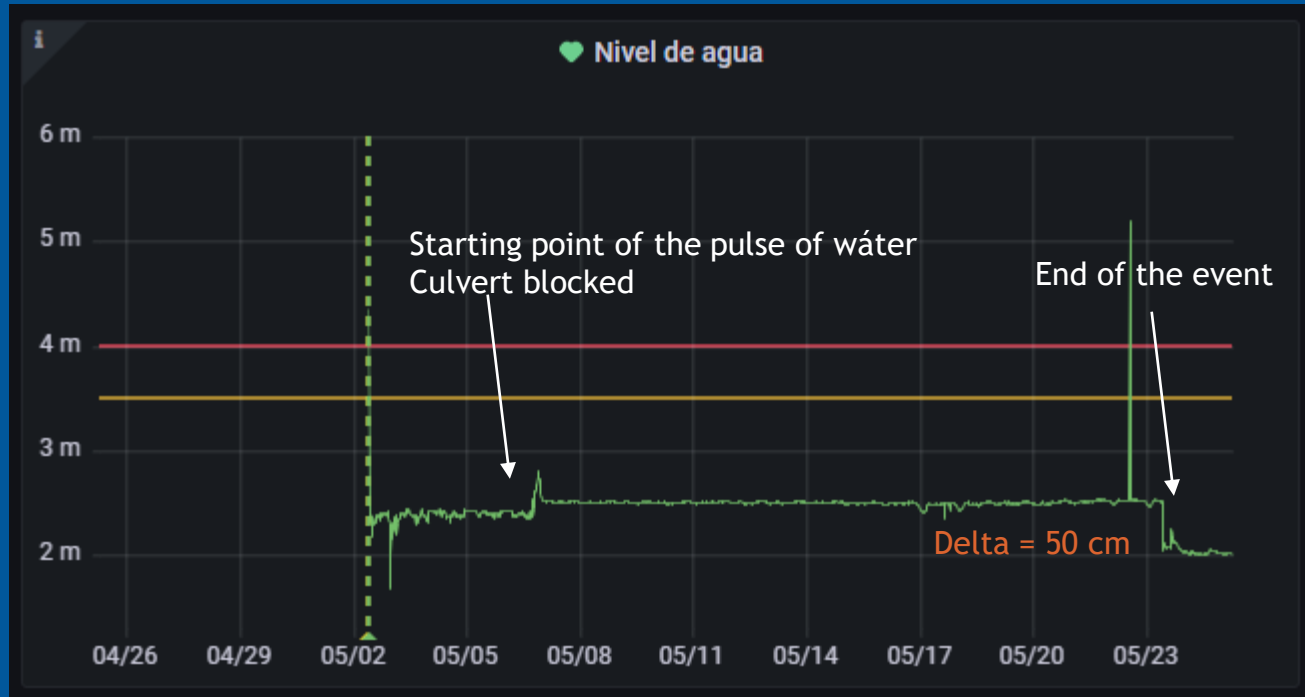
Río de la Sierra y Pueblo Nuevo



Río de la Sierra y Pueblo Nuevo



# Event03: SENTINEL may 2022, Mexico City.



# Knowing the level of water in real time makes you take timely decisions in terms of survival and cost.

## → Real time data

SENTINEL measures the water level in a specific point and sends the data to the cloud.

## → Autonomous

It works independently 24 hours per day with solar energy, even on cloudy days.

## → Effective

It provides immediate information to activate flood protocols to mitigate risks.

## → Low cost

This investment is less than the economic impact of not making decisions on time, even exponential.

## → Accesible

You can check the water level from any device connected to the internet, from anywhere in the world and with several users at the same time.

SENTINEL data allows city council to take better decisions in specific sites, in critical moments

There is no reason for city council personnel to take risks



# Where to install

1. Dams
2. Pumping sumps
3. Streets
4. Critical infrastructure points within the city such as;
  - Hospitals
  - Airports
  - Important bridges
  - Fire stations, etc.



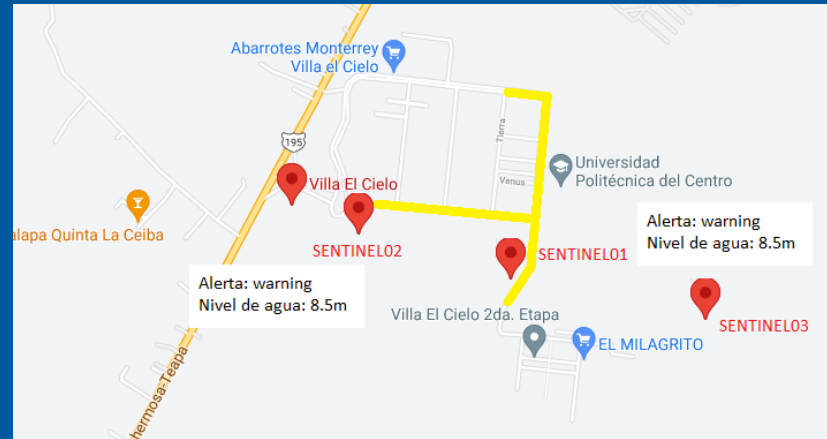
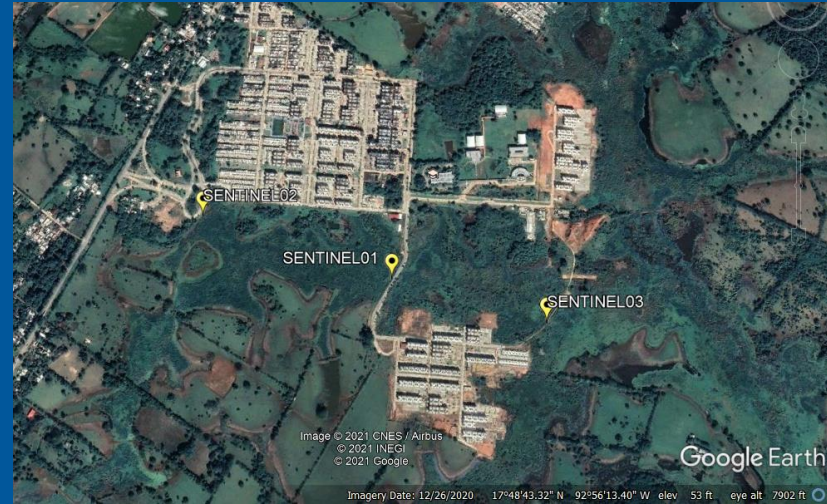


# Real Case. Villa El Cielo km 22.5 carretera Villahermosa - Teapa, Centro, Tabasco México.



# Benefits

- ✓ It is autonomous using a cellphone chip, with a rechargeable battery with solar panel.
- ✓ Historical and real time data.
- ✓ Speed of rising and decreasing of water levels.
- ✓ Accurate and reliable sensor.
- ✓ Scalable to quick deployment in different sites.





# Real Case. SENTINEL

## Protección Civil Tabasco, Centro, México



# Real Case. SENTINEL

## Protección Civil Balancán, Usumacinta, México



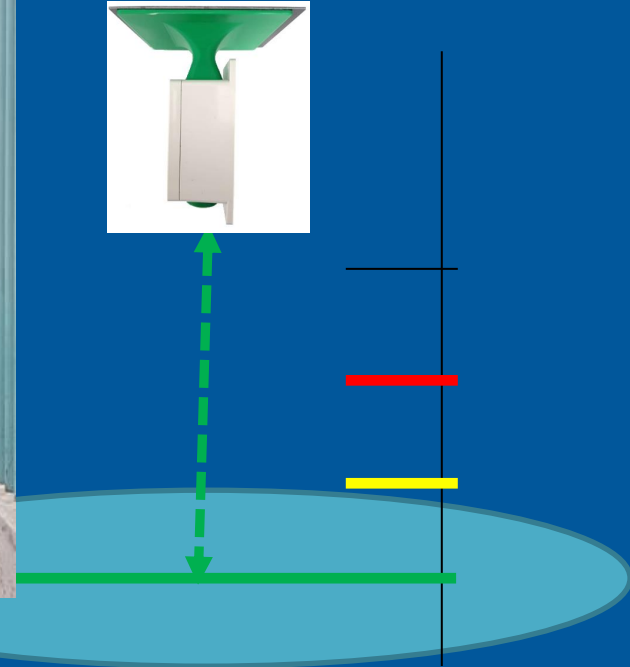


# Real Case. SENTINEL

## Protección Civil en Álvaro Obregón, CDMX



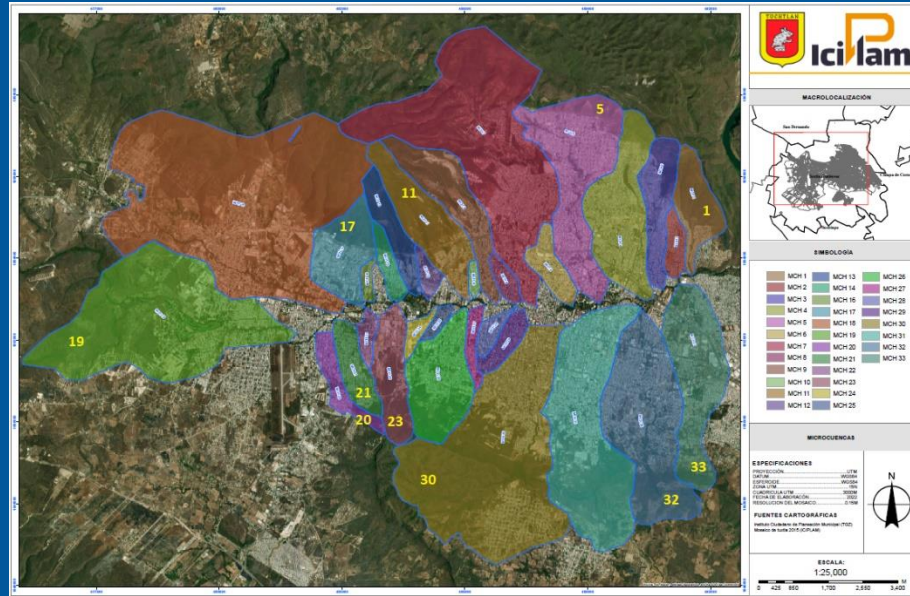
# SENTINEL transit overpass in CDMX for SACMEX



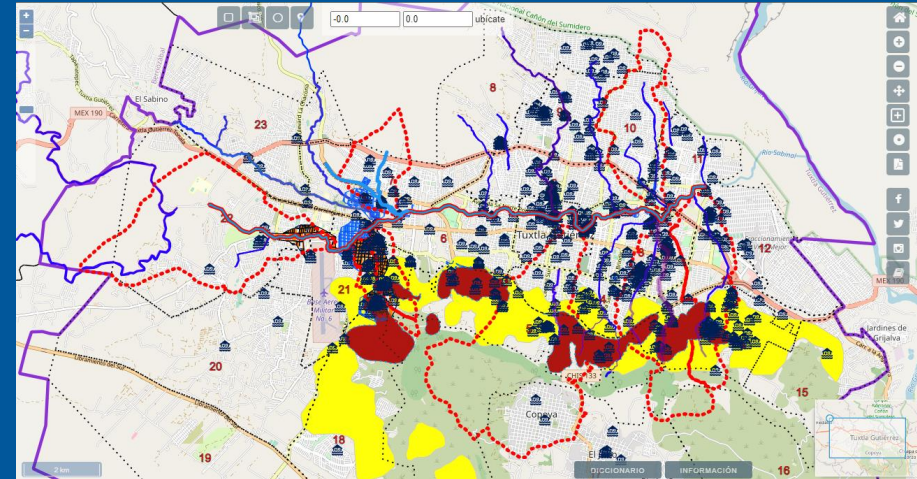
<https://goo.gl/maps/aRE7LqY34EEE9xF57>



# SENTINEL to monitor tributaries of rio Sabinal in Tuxtla Gutiérrez



60 devices distributed in 12 micro-watersheds



<https://datos.tuxtla.gob.mx/sigetux/>

# SENTINEL. Bahía de Kino, Sonora. Monitoring the level of sea water in shrimp farms



<https://goo.gl/maps/oAQAmBqZnmzhcc8>

# Investment

## → Price

2,300 USD + tax

## → Annual operation fee for 5 users

200 USD + tax

## → Total 2,500 USD + tax

Payment conditions:

**50% down payment, 50% when working**

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20x16x14 cm

# Climate change widespread, rapid, and intensifying - IPCC

GENEVA, Aug 9 - Scientists are observing changes in the Earth's climate in every region and across the whole climate system, according to the latest Intergovernmental Panel on Climate Change (IPCC) Report, released on Aug 9, 2021. Many of the changes observed in the climate are unprecedented in thousands, if not hundreds of thousands of years, and some of the changes already set in motion—such as continued sea level rise—are irreversible over hundreds to thousands of years.

<https://www.ipcc.ch/2021/08/09/ar6-wg1-20210809-pr/>