

GEO WEEK & MINISTERIAL SUMMIT 2023

Earth Observations and Smartphones:
Water and Health Risk for Decision Makers and Grassroots

Flash Talk

#TheEarthTalks



science & innovation

Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA



GEO WEEK
2023 MINISTERIAL
SUMMIT

GEO GROUP ON
EARTH OBSERVATIONS



From Space to Village: Disease Early Warning for the Masses



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>2 billion
drink water from faecally contaminated water sources

2.4 billion
are without basic sanitation facilities

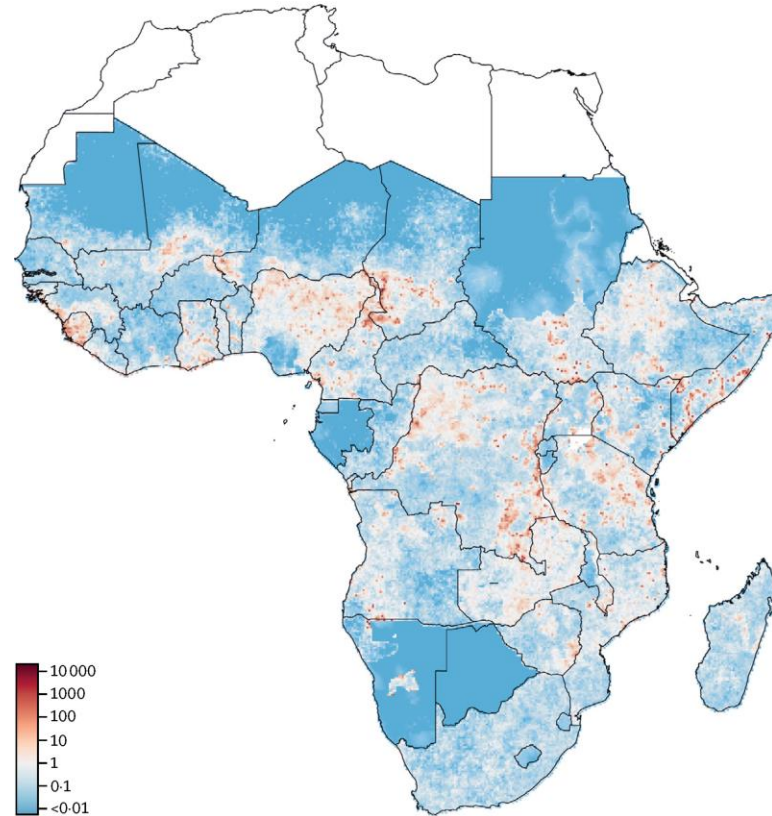
GLOBAL TASK FORCE ON
CHOLERA CONTROL



Global Cholera cases:
1.3 to 4.0 million/year
Global death due to
Cholera: 21,000 to
143,000 [3]

#TheEarthTalks **GEO WEEK & Ministerial Summit 2023**

A Annual incidence per 100000 people



B Annual incidence >1 case per 1000 people



C Annual incidence >1 case per 10000 people



D Annual incidence >1 case per 100000 people

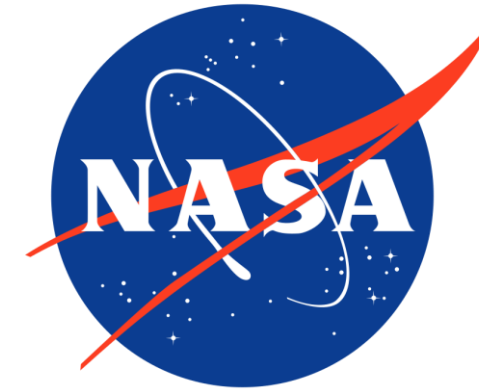




- **Cholera, a waterborne diarrheal disease, remains a major threat to global health**
- **Cholera is fatal, if untreated for 24-48 hours**
- **Cholera can thrive in environment and humans**
- **Disease burden is severely underreported.**
- **Originated in South Asia, but have become endemic in many parts of Sub-Saharan Africa in late 1900s**
- **Cholera is preventable with early warning, with data on climatic, environmental, societal drivers**

Projects:

1. Multi-Mission Cholera Forecasting for Bangladesh (2015 – 2019)
2. CholeraMap Bangladesh (2019 – 2022)
3. Global Cholera Forecasting System – Focus: Africa (2022 – 2025)

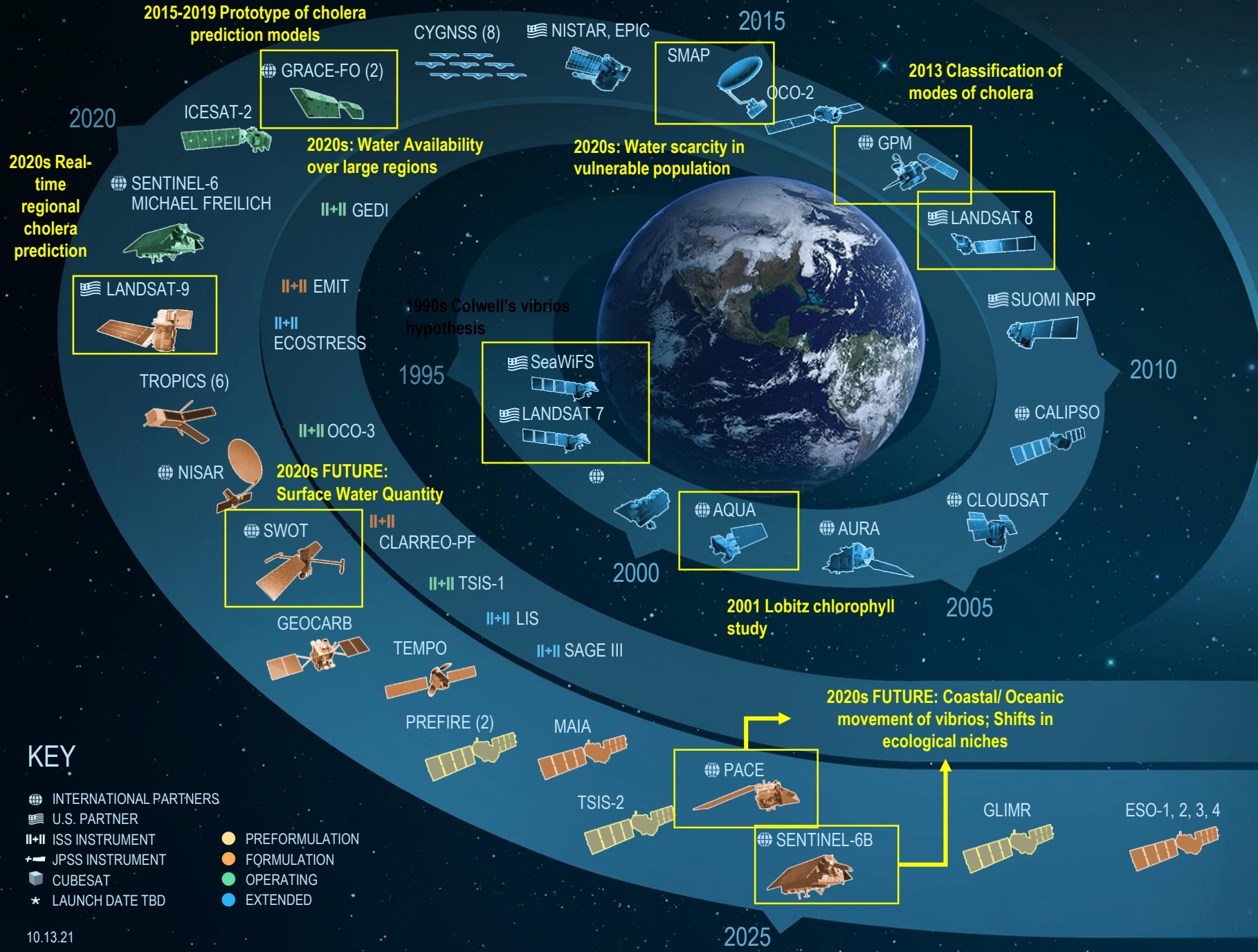


PennState





EARTH FLEET



INVEST/CUBESATS

- CSIM-FD 2023
- HARP 2022
- CIRIS 2023
- CTIM* 2022
- HYTI* 2022
- SNOOPI* 2022
- NACHOS* 2022
- NACHOS2* 2022

JPSS INSTRUMENTS

- OMPS-LIMB 2022
- LIBERA 2027

ISS INSTRUMENTS

MISSIONS

KEY

- INTERNATIONAL PARTNERS
- U.S. PARTNER
- ISS INSTRUMENT
- JPSS INSTRUMENT
- CUBESAT
- LAUNCH DATE TBD
- PREFORMULATION
- FORMULATION
- OPERATING
- EXTENDED

*Existing EO-based warning systems target high-end technical users
The remote populations are typically outside information umbrella*

*Women, who typically make household water and health decisions in
most of the developing world, rarely have access to such information*

The reality is:

**Ultimate end-users of water and health related information
in South Asia and Sub-Saharan Africa are outside our reach**



CholeraMap

- An inclusive dissemination approach via smartphone application
- Geospatial water quality and cholera risk directly for grassroots
- Influence decision-making for safe water and health behavior

This is a sustainable development issue! [#EO4SDG](#)

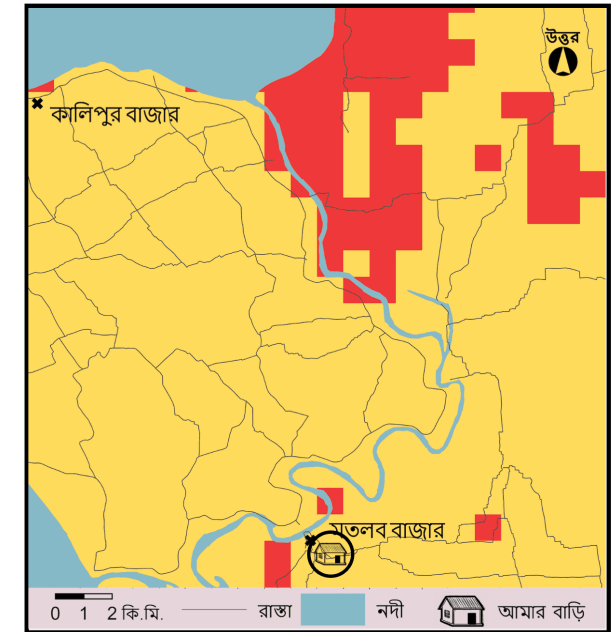
This is also a gender empowerment issue! [#EO4SDG](#)

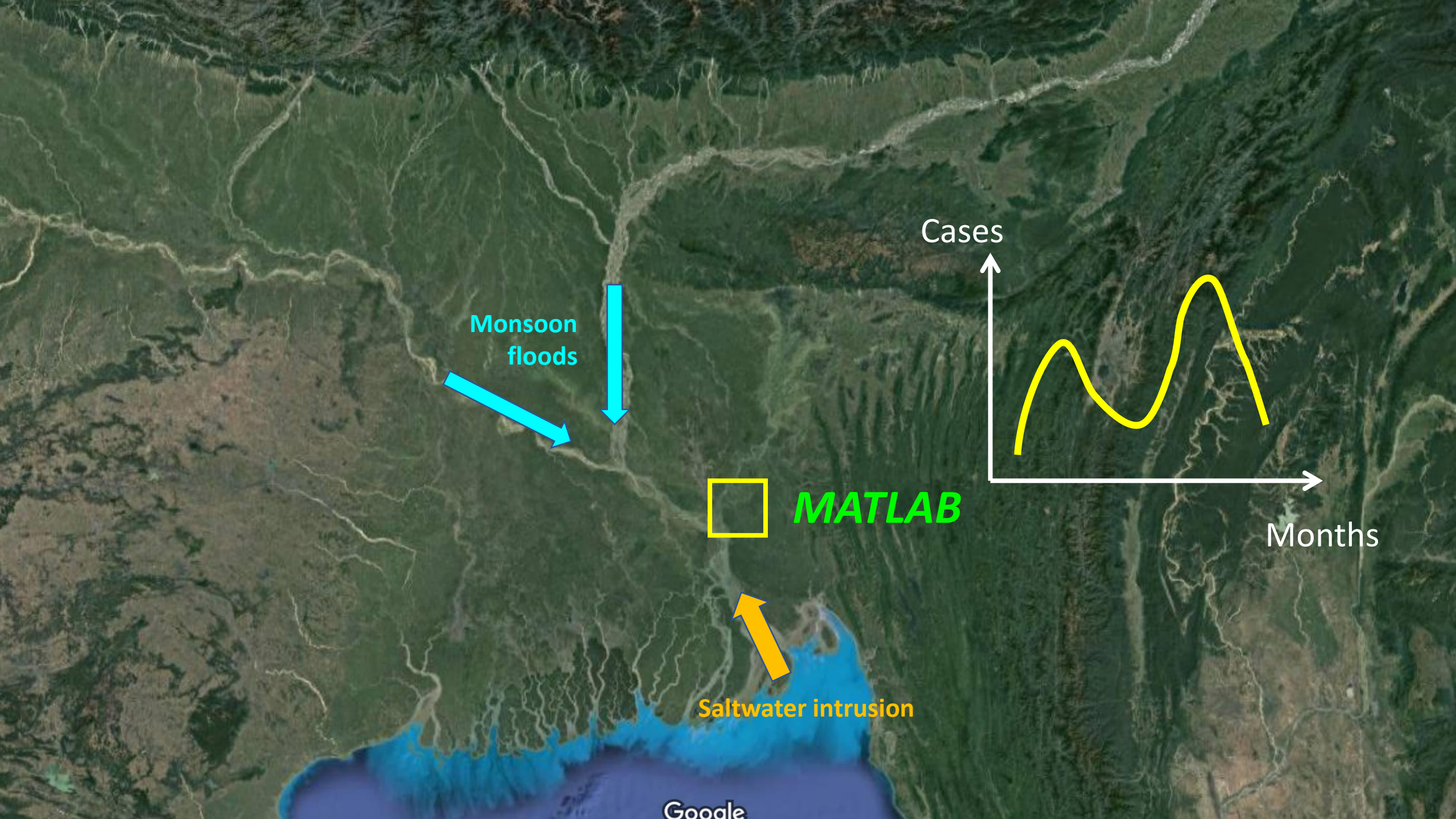
This is an information inequality and access issue!

[@GEO](#) [Open EO Data](#)

This is an environmental and climate justice issue!

[#EO4HEALTH](#) [@NASA Earth Science](#)





Monsoon
floods

Cases

MATLAB

Months

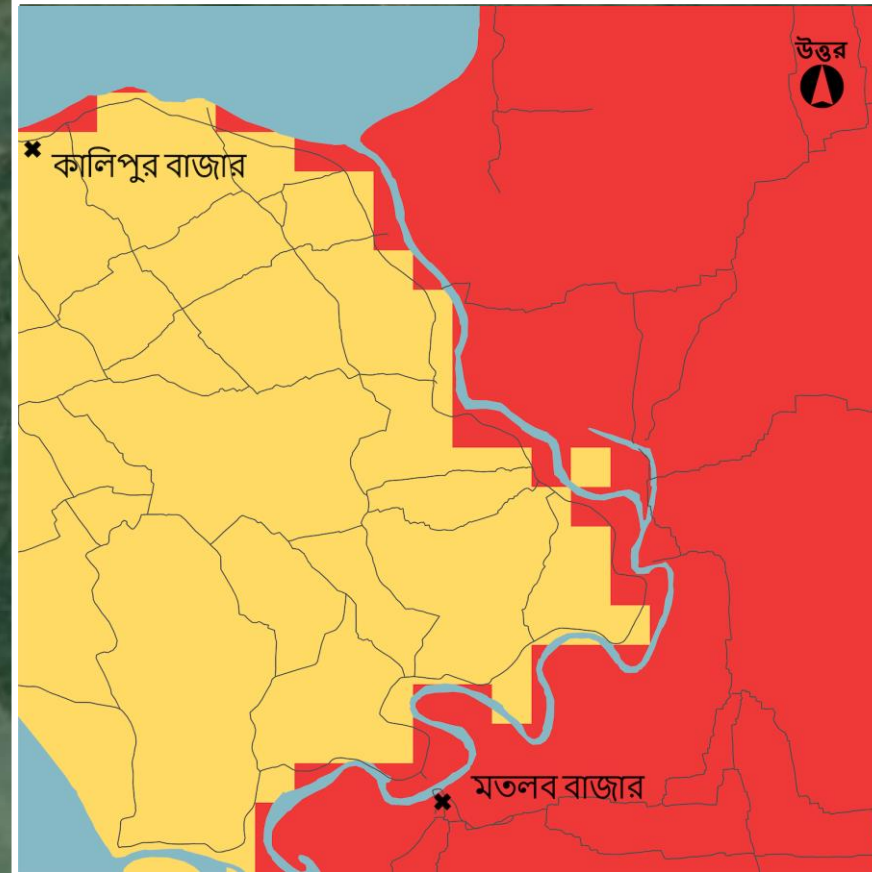
Saltwater intrusion

Google

MATLAB sub-district
Population: 500,000

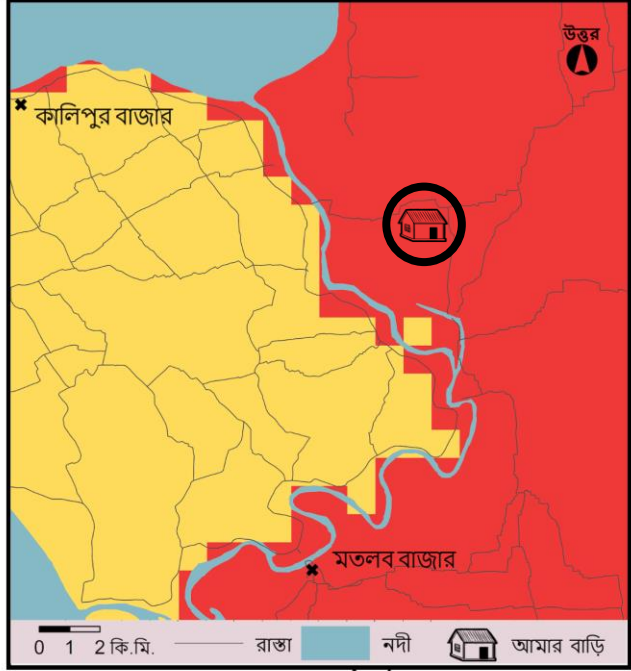
- Field workers visited 2000+ households
- Explained cholera risk and project goals
- Surveyed members on water/sanitation
- Got agreement with smartphone owners
- Registered 1500 application users
(750 control and 750 treatment)

Validated with:
ECBS Cholera Surveillance data
Bill and Melinda Gates Foundation



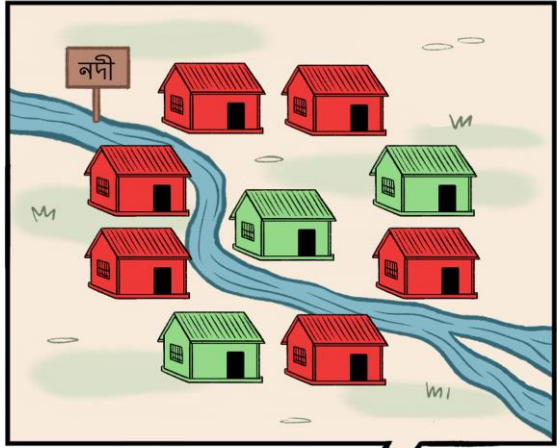
1 x 1 km cells
Updated monthly
Biweekly SMS text
Local languages

Cholera risk includes:
IMERG rainfall observations
TRMM/GPM rainfall anomaly
SERVIR NMME rainfall forecast
MODIS land surface temperature
SRTM land surface elevation
SEDAC population density



- High Risk
- Med Risk
- Low Risk

The risk of cholera outbreak in your locality is very high



To save yourself from high risk of cholera:



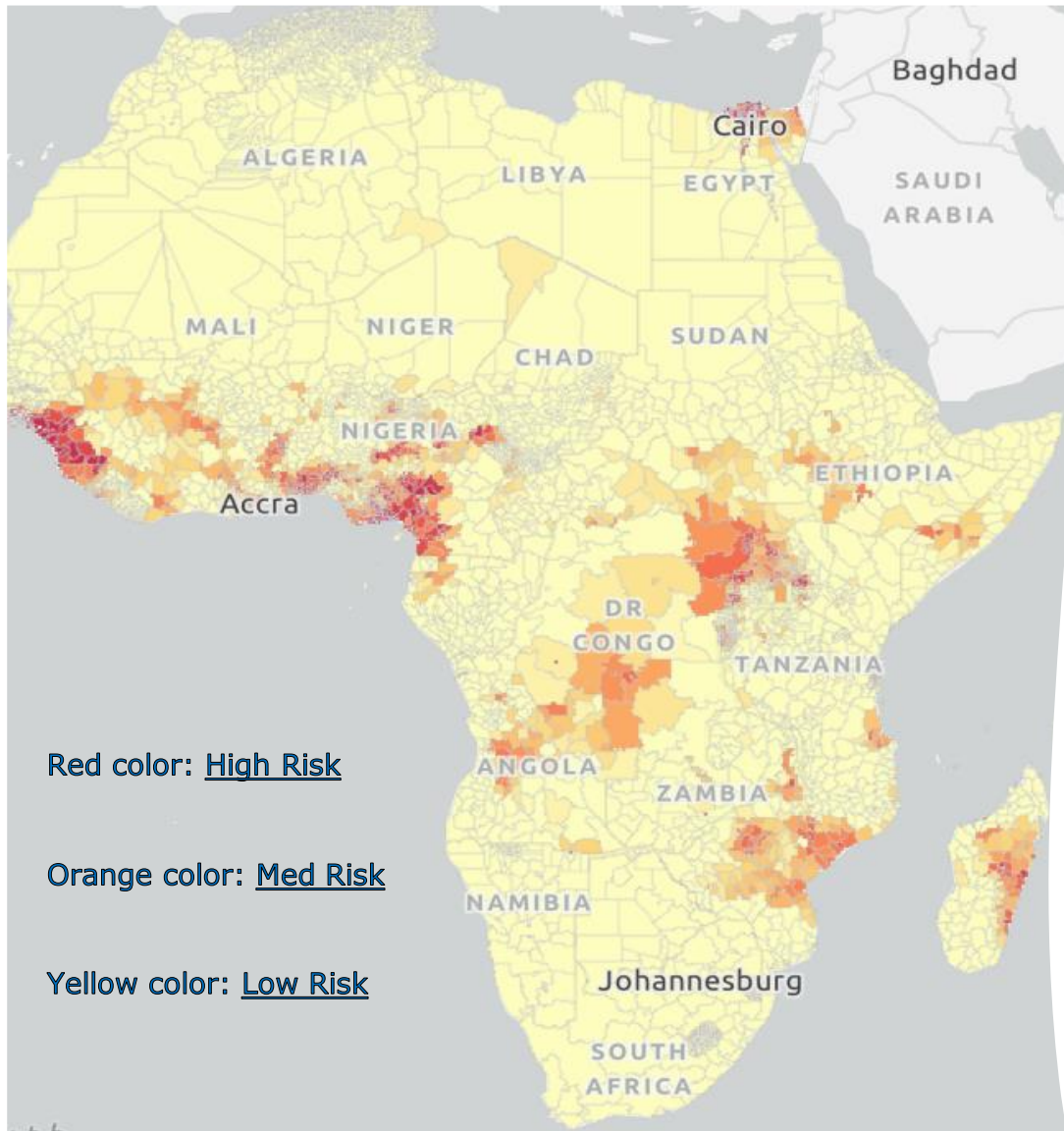
<p>পরিষ্কার পরিচ্ছন্ন থাকবো</p>	<p>হাত ধোবো</p>	<p>সবজি ধোবো</p>
<p>পানি ফুটাবো</p>	<p>ওরস বাড়িতে রাখবো</p>	

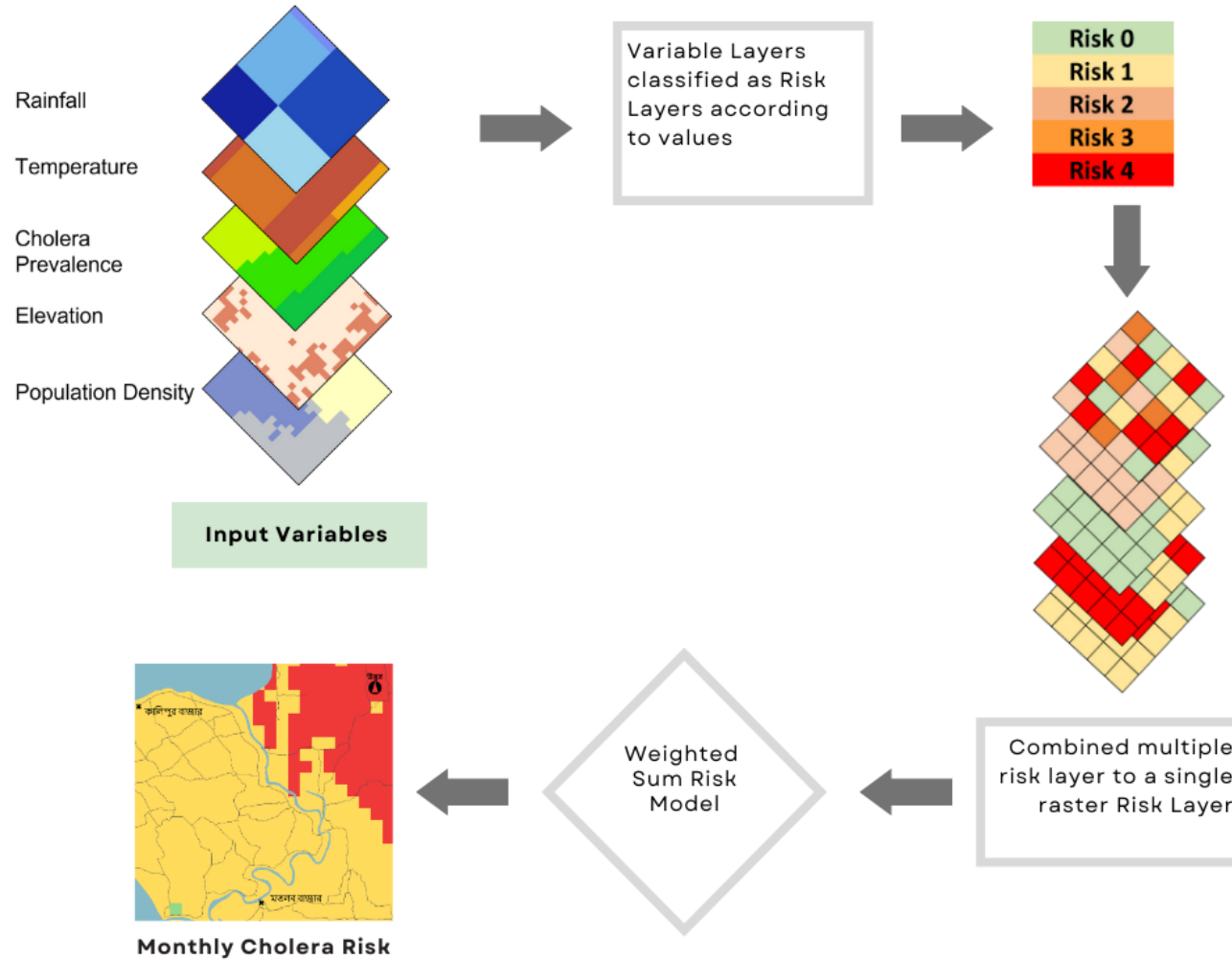
Cholera Prediction Hub (<http://cholerahub.ufl.edu>)

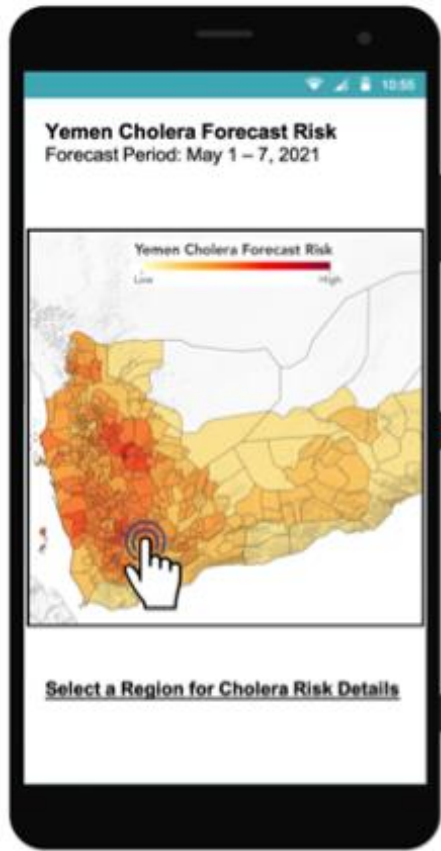
The Cholera Prediction Hub is a web-based platform that helps users worldwide see the potential risk of cholera outbreaks affecting individual countries and regions within.

Features and Use

- Indicates regions with high risk of cholera at least 4 weeks in advance.
- Integrates climate, weather, societal, demographical, and environmental factors in geospatial algorithm.
- Provides a clear understanding of how disease risk is calculated and derived to better inform end users of the risk in their current areas.
- Users include researchers studying water-borne diseases, public and non-government decision-makers, and individuals wanting to learn the current disease risk in their location.





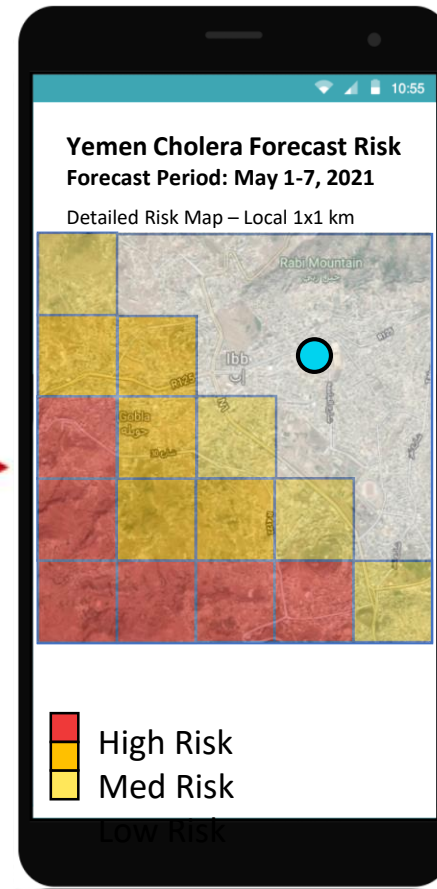


Select a Region

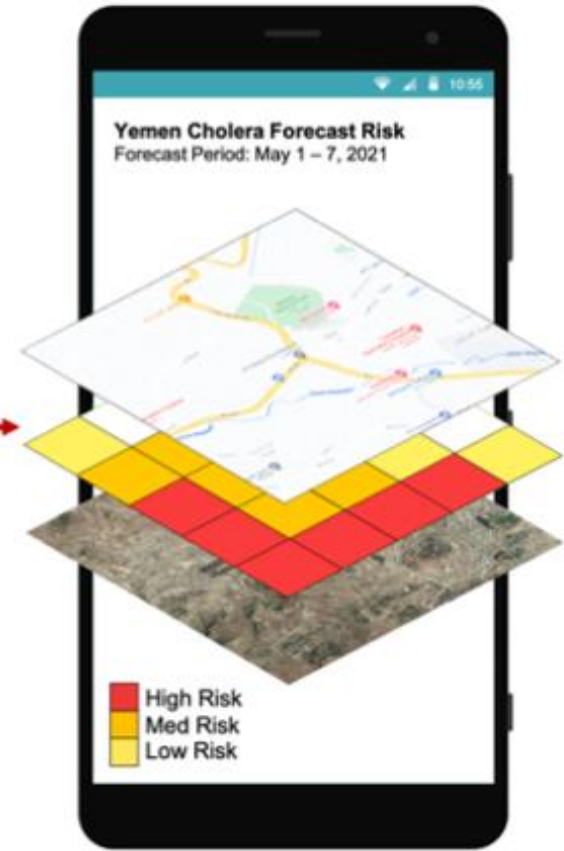
Local Healthcare and Demographic Info via API Request



View High Resolution Cholera Risk Distribution



View Earth Observations and Geospatial Risk Info



Information Flow Chain for Global Cholera Risk Communication to Decision-Makers and NGOs

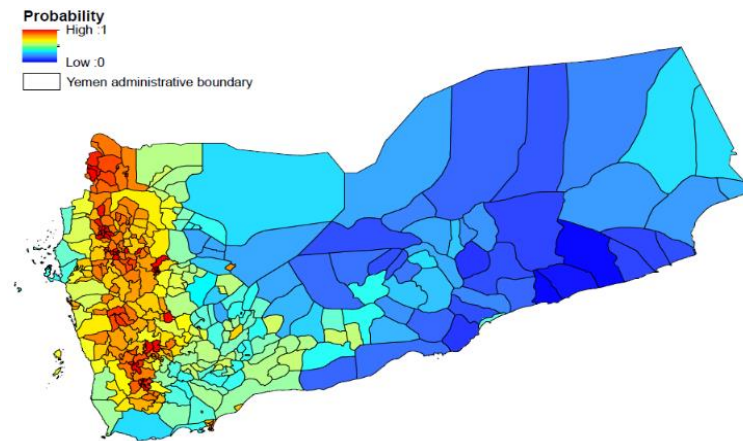
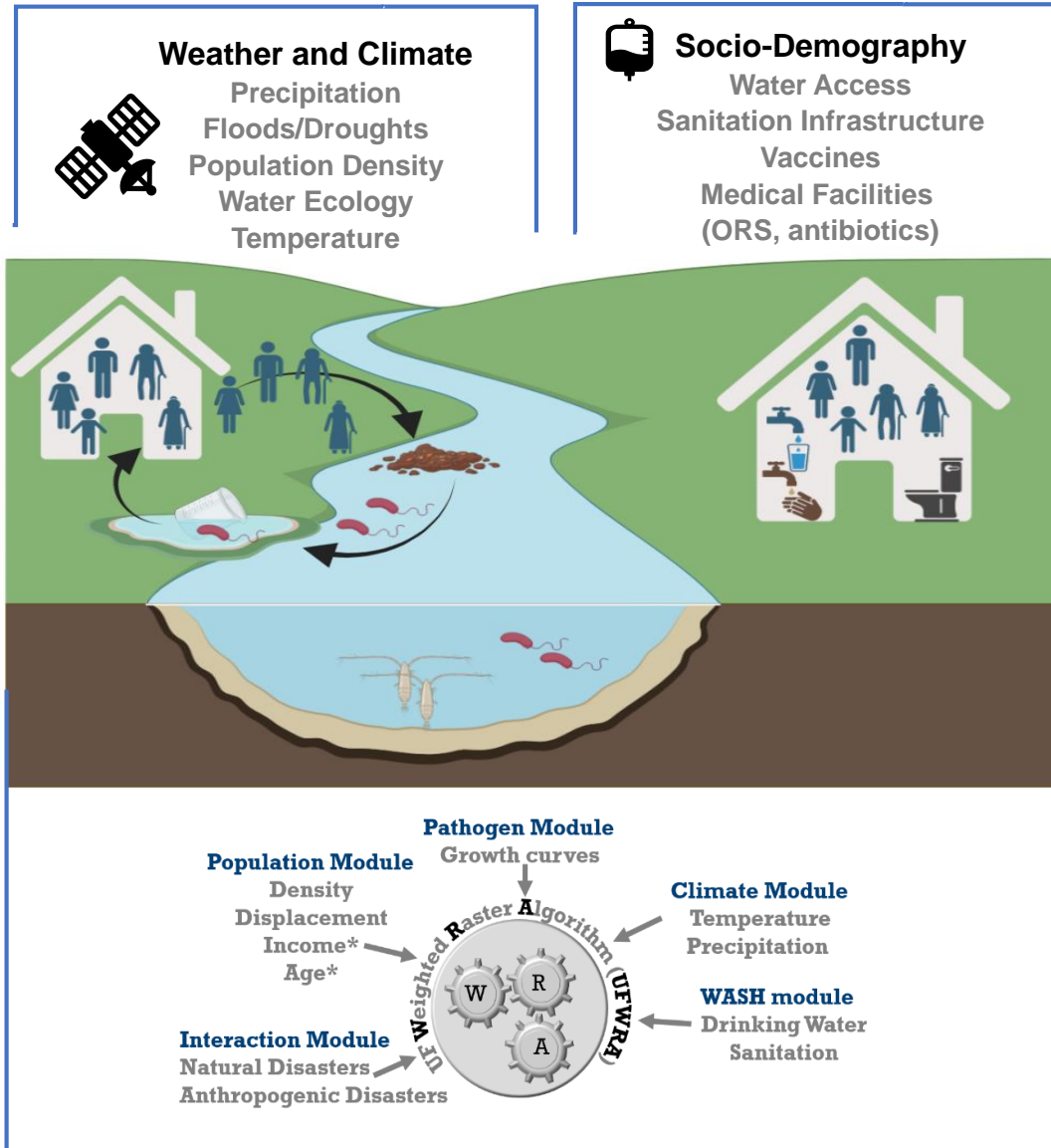
Cholera Prediction Consortia

Partner with our collaborative team to reduce global cholera burden

Help us provide critique in:

- How to make prediction accuracy better than what we have?
- What are the pitfalls in our modeling system?
- How can we improve prediction intelligence for cholera?

Send email at choleraprediction_users@lists.ufl.edu



OR Scan here





Vibrio Prediction Hub Cholera Dashboard Archive Malaria Cases About

Vibrio Prediction Hub

A decision-making initiative for protecting human health and enhancing the resilience of coastal communities under current and changing environments

GeoHealth & Hydrology Lab at the University of Florida

<https://vibrio-prediction-ufl.hub.arcgis.com/>

OUR PRIORITIES

Understand the Role of Humans in the Hydrological Cycle

We work hard to meet this goal by researching these key areas for a sustainable environment



Water-borne Diseases



Remote Sensing



COVID-19 Pandemic





#TheEarthTalks



6-10 NOVEMBER

CAPE TOWN, SOUTH AFRICA



science & innovation

Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA

