Predictive assessment of transmission conditions of cholera in the environment and human population using earth observations

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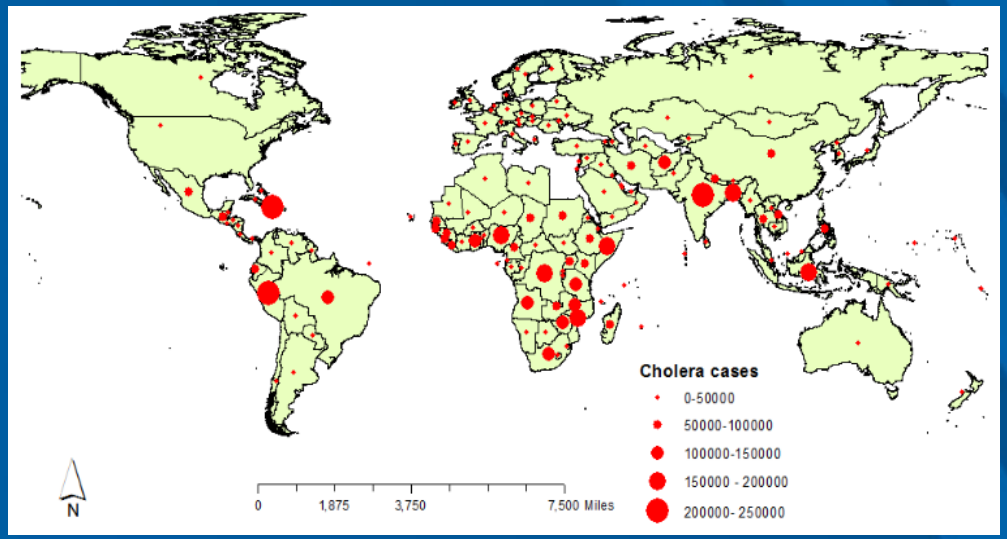
DfID, UK-Africa operations
UNICEF
WMO
Red Cross

Goal of Research Project

We thematically envision "Cholera Ready Nations" where satellite based prediction (of risk of trigger and likelihood of transmission of cholera in the human population) will provide sustainable and resilient readiness to prevent outbreak of disease, saving human lives and improving quality of life.

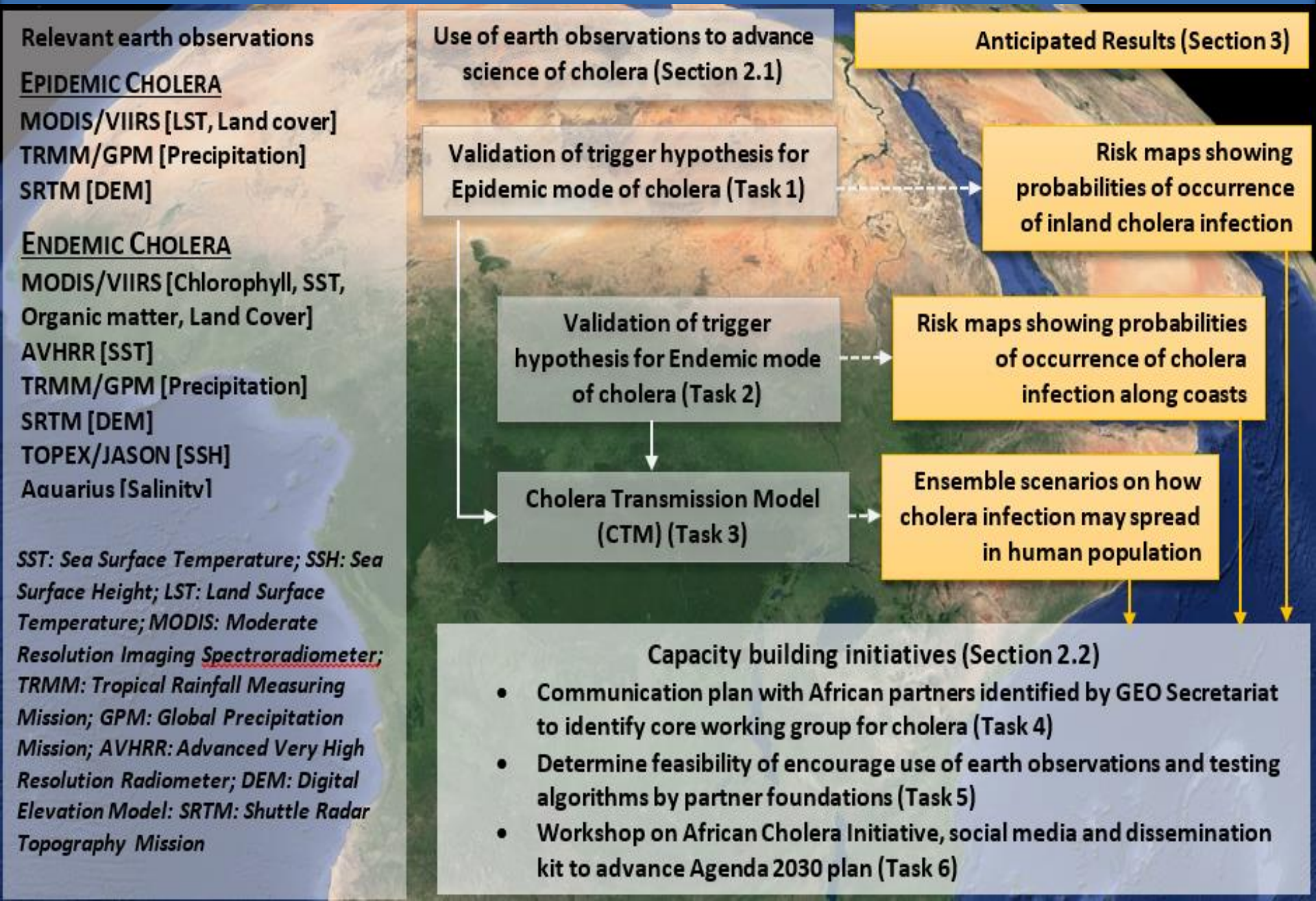
Objectives

- Systematically validate the epidemic and endemic cholera hypothesis for trigger component of cholera in Africa
- Develop, calibrate, and validate predictive model for transmission component of cholera.

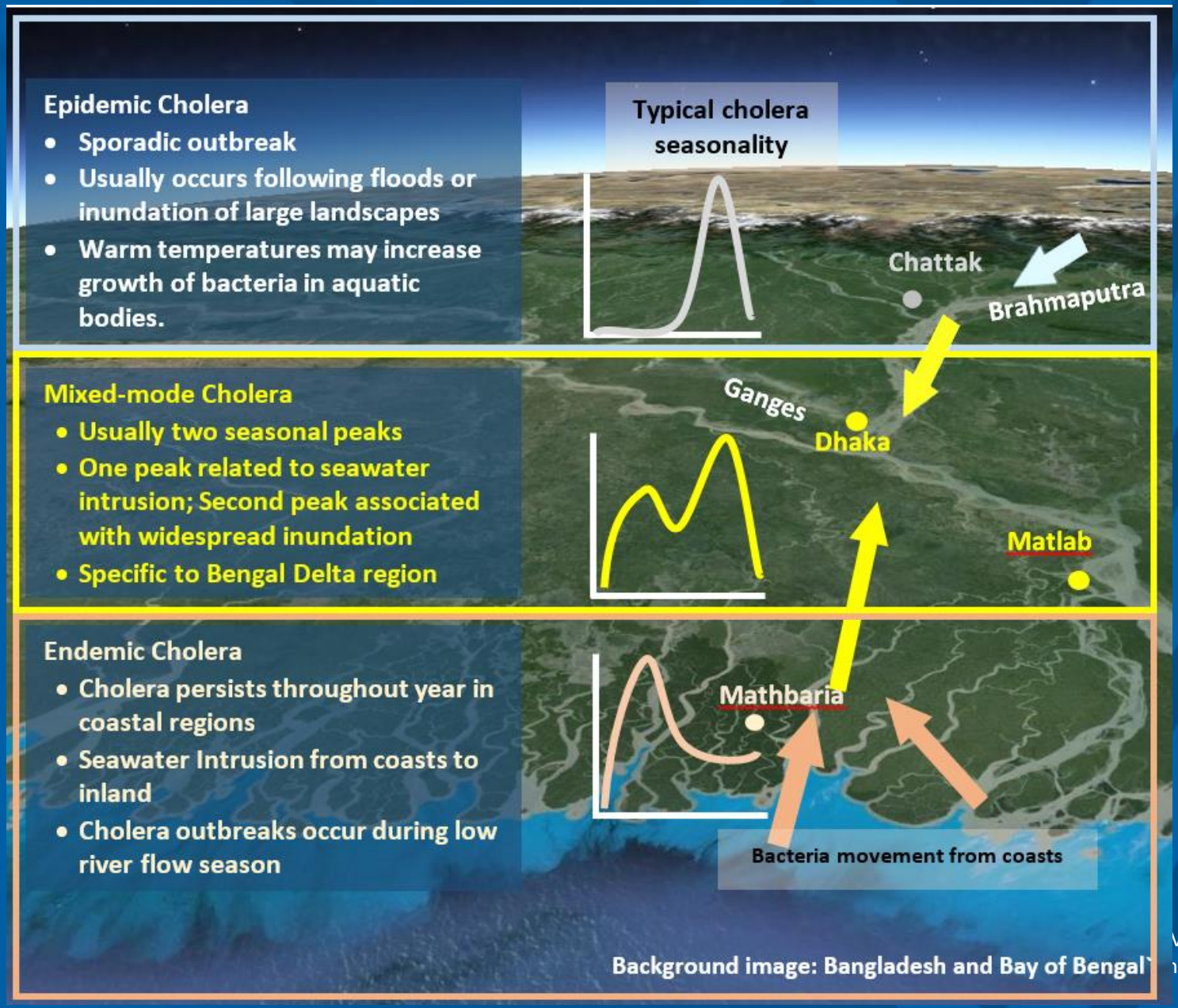


West Virginia University
Civil and Environmental Engineering

Research Pathway



Knowledge transfer from ending project

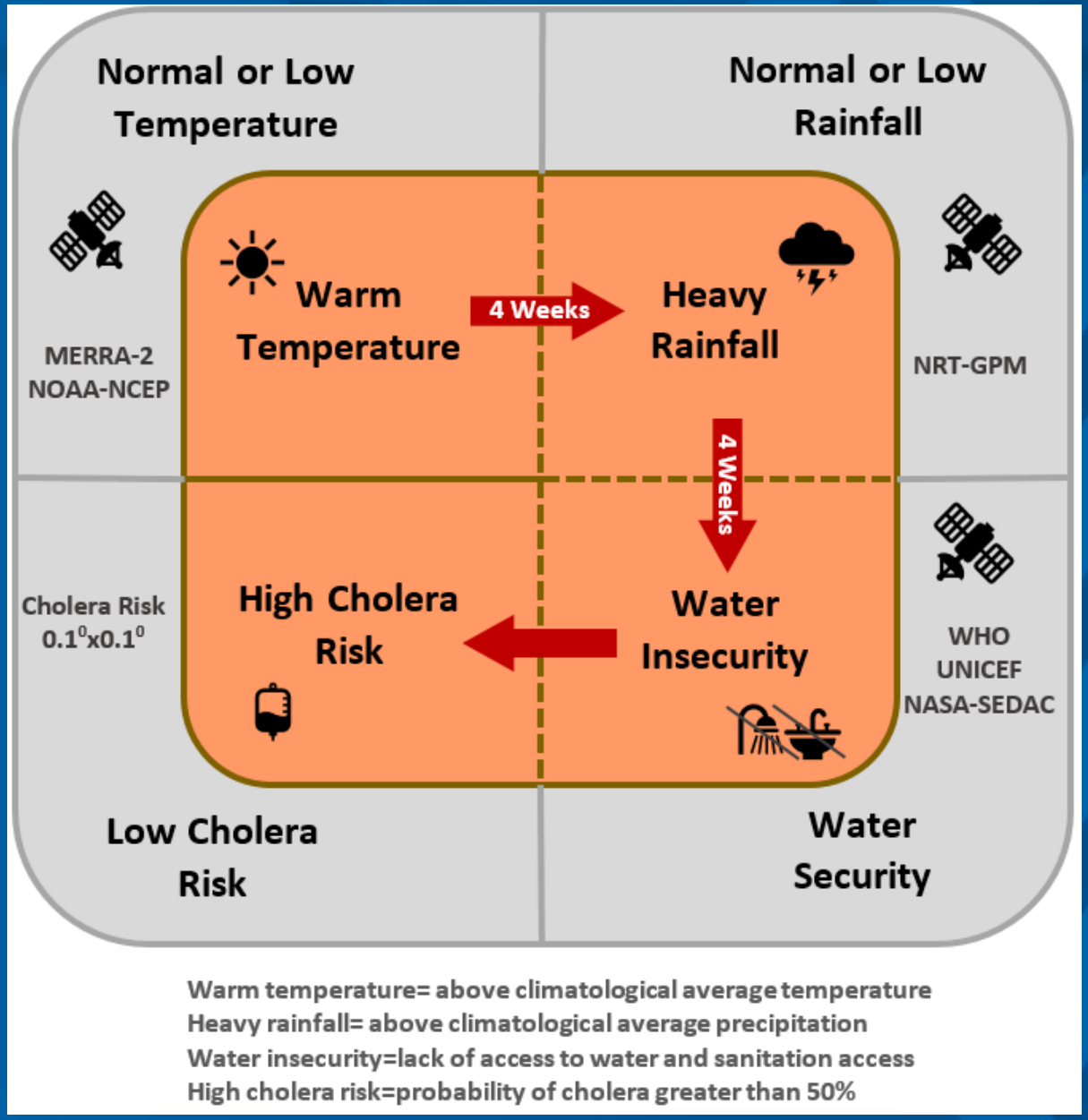


Overall timeline for research objective and activities at end user organization

Timeline of proposed activities and key milestones												
	Year 1				Year 2				Year 3			
Activity		Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Kick off meeting (Skype)	C											
Task 1: Epidemic cholera		C	C	X								
Task 2: Endemic cholera				X	X	X	X					
Task 3: CTM							X	X	X	X	X	
Task 4: Core group formation	C	X	X	X	X	X						
Task 5: Training/ dissemination plan with foundations					X	X	X					
Task 6: Workshop								x^1	x^1	x^1	x^1	x^2
PI meeting	Third week of every month											
Veolia/Health Initiatives Foundation/Kirschbaum/ Thiaw/ Jutla/Colwell meeting				C				X				X

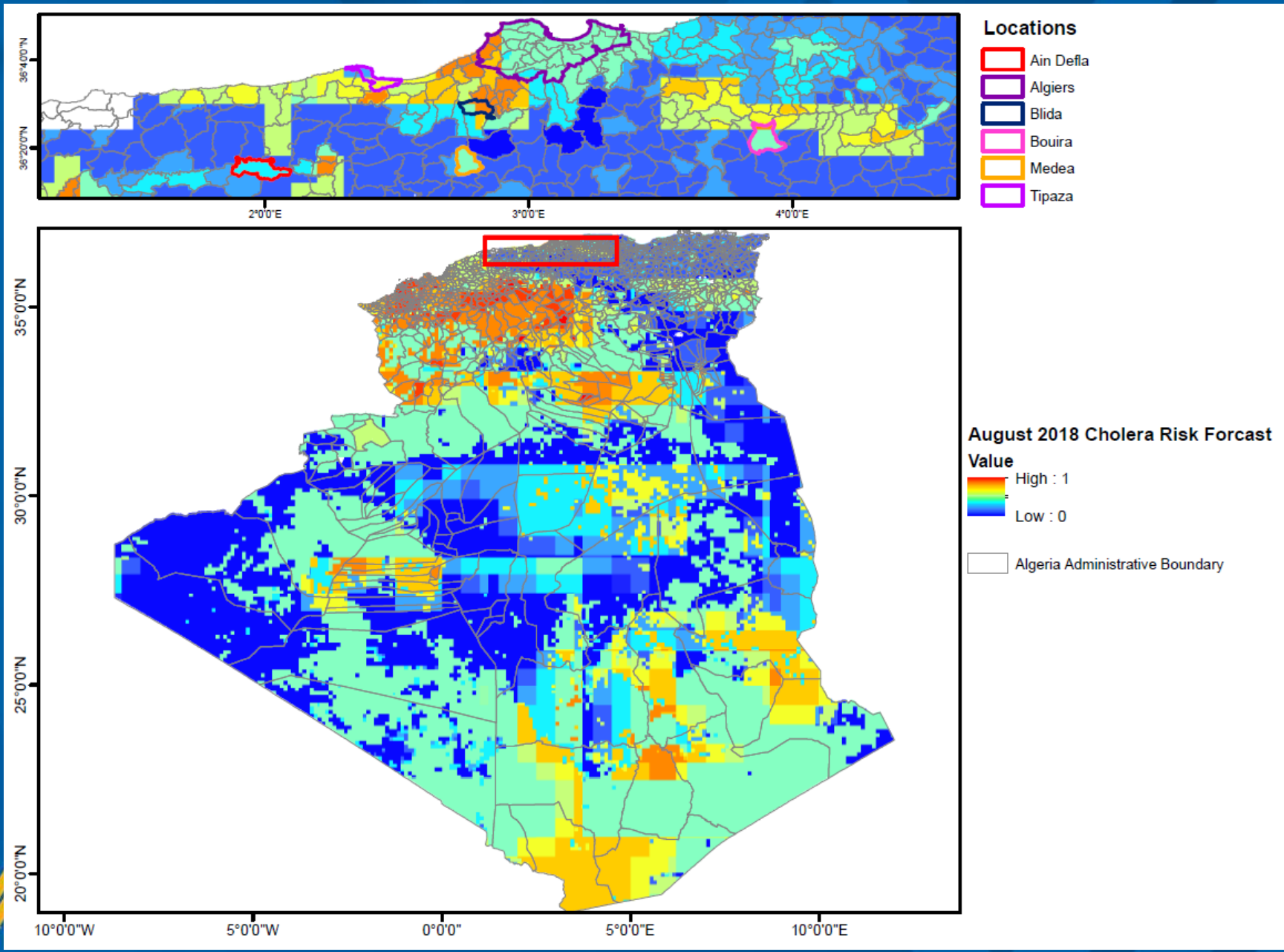
#initiate discussion with GEO Secretariat; x^1 : planning; x^2 : workshop at WVU Morgantown campus, WV; Q1, Q2, Q3, Q4 represent quarter in a given year.

Epidemic cholera model

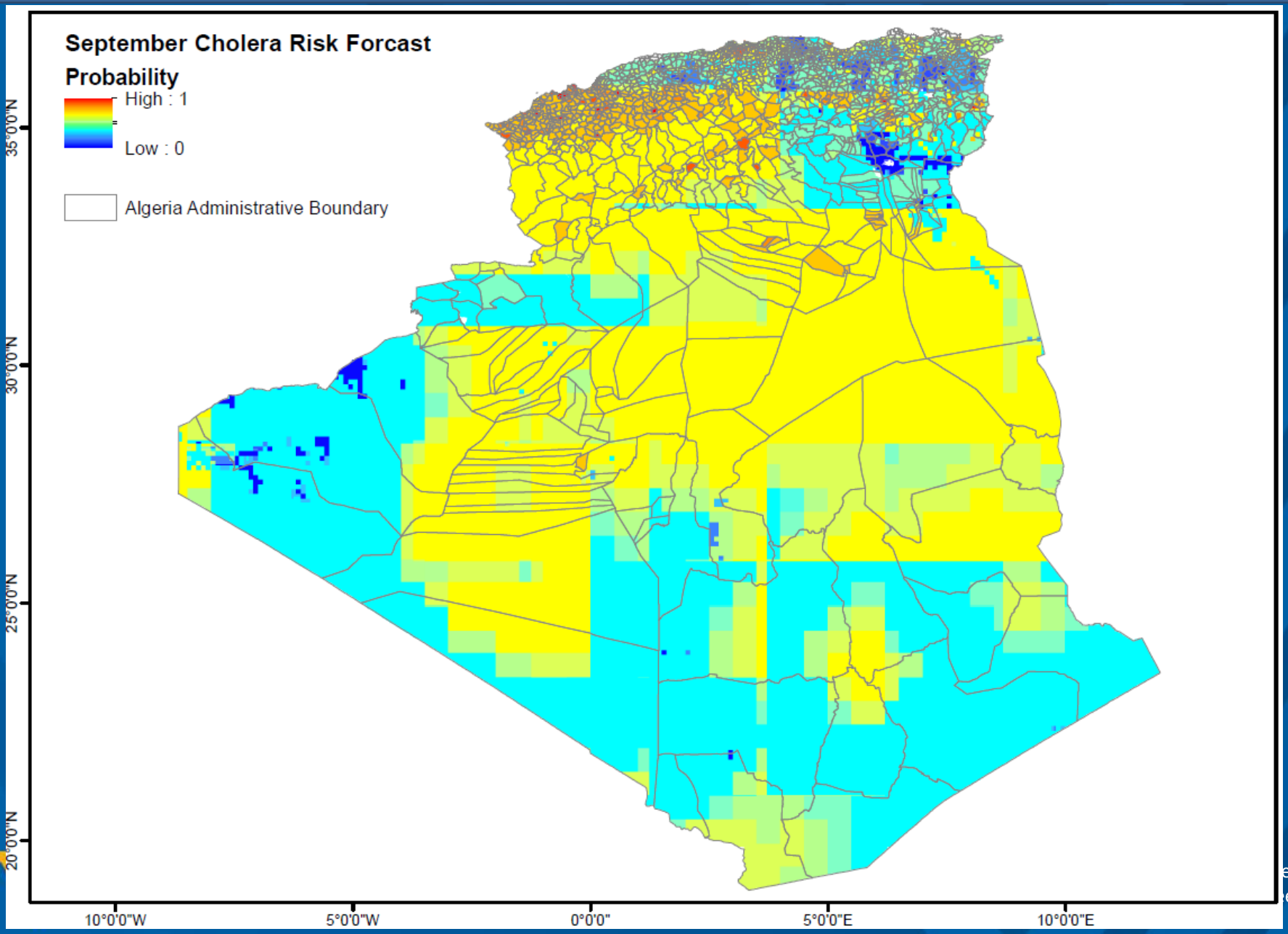


Warm temperature= above climatological average temperature
Heavy rainfall= above climatological average precipitation
Water insecurity=lack of access to water and sanitation access
High cholera risk=probability of cholera greater than 50%

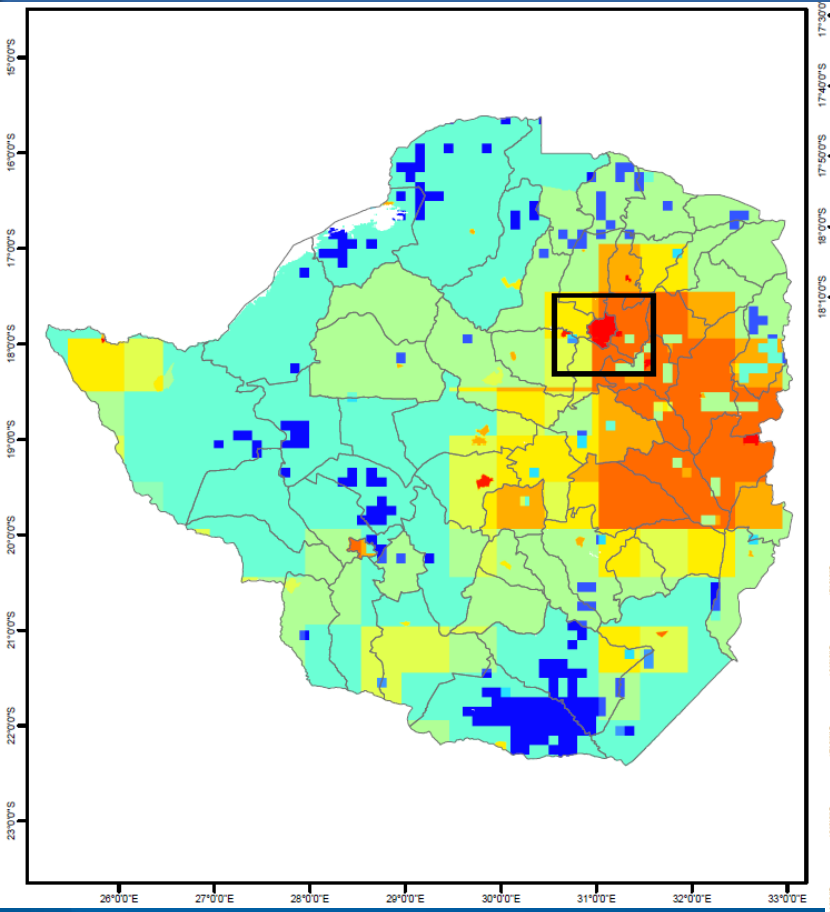
Epidemic Cholera-Algeria

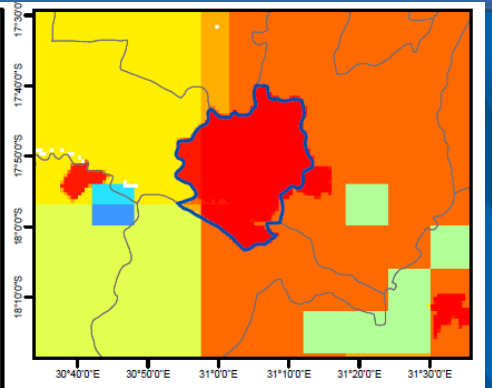


Epidemic Cholera-Algeria

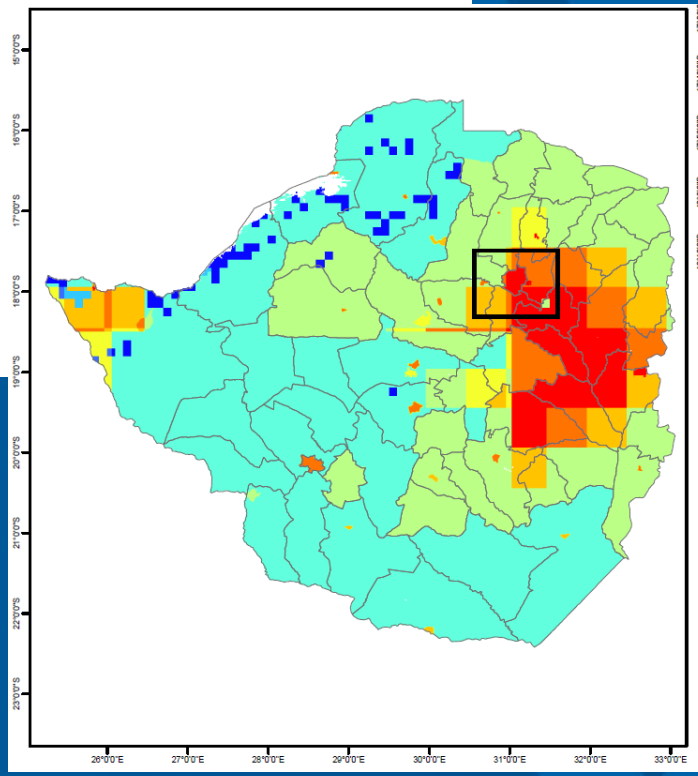


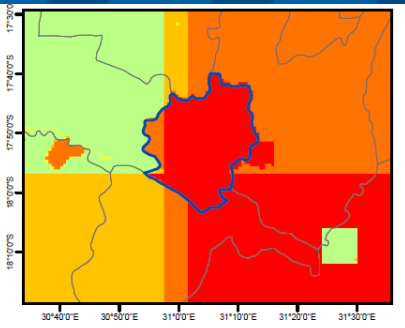
Epidemic Cholera-Zimbabwe





August 2018 Cholera Risk Forecast
Value





September 2018 Cholera Risk Forecast
Value

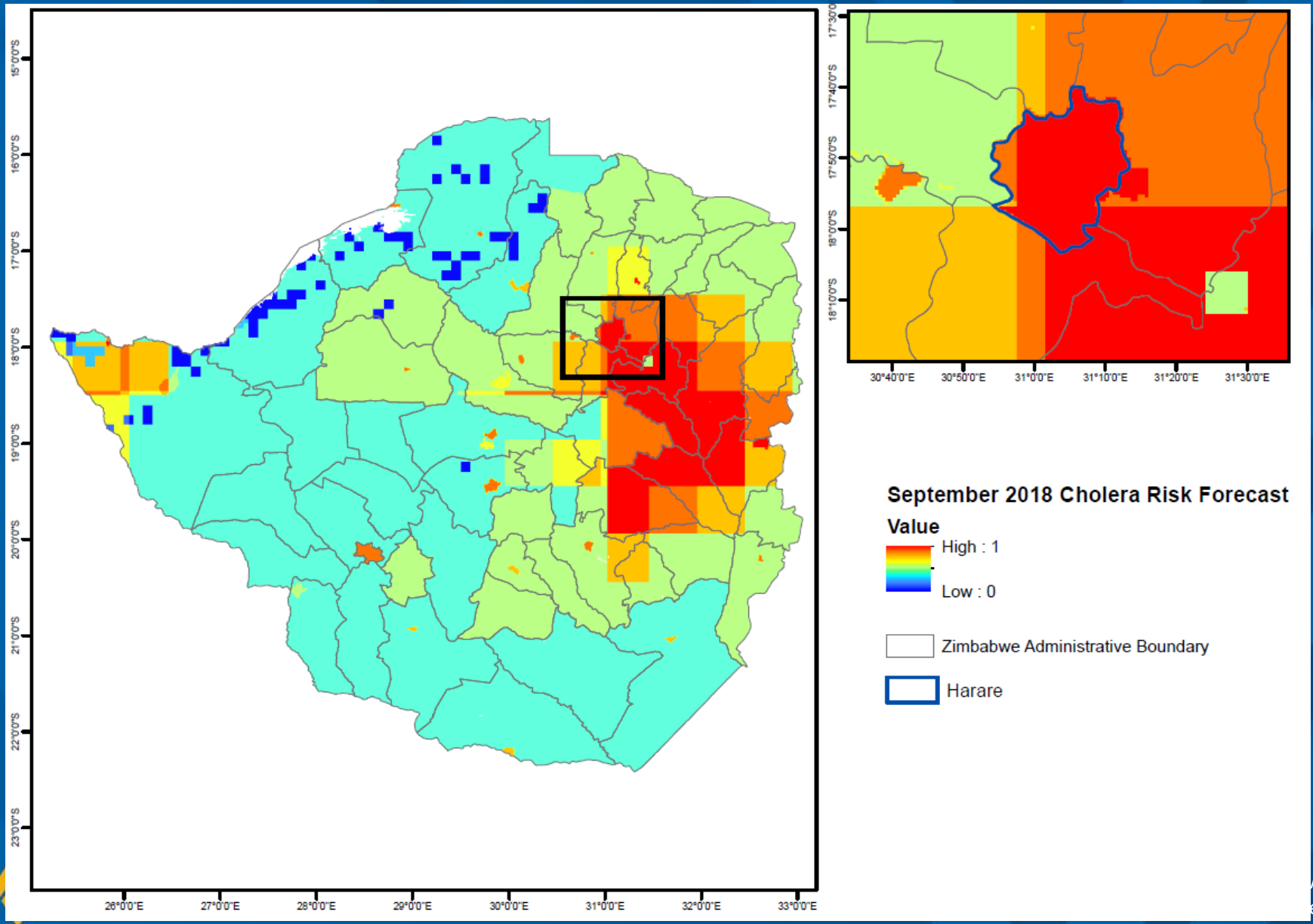
High : 1

Low : 0

Zimbabwe Administrative Boundary

Harare

Epidemic Cholera-Syria



Flood Models

https://www.dropbox.com/s/lr0yz1owxk7gn0d/Jacksonville40in.mp4?dl=0

ARL information

Starting ARL: 3

Current ARL: 4+

Components of eventual application system brought together and technical integration issues worked out

Organizational challenges and human process issues identified and managed

Target ARL: 8

Ongoing work

- Epidemic cholera models
  - Weekly scale
- Synthesis of vibrio dataset
- Development of core working group

Thank you