INFECTIOUS DISEASES

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GEO HEALTH
COMMUNITY OF PRACTICE

KEY OBJECTIVES

- Improve prediction and prevention systems for environmentally-sensitive infectious diseases to help reduce risks for human health by application of EO to decision-relevant risk monitoring, with particular focus on underserved communities.
- Two overarching goals are to:
  - Develop a generalization framework for incorporating climatic and environmental data for enhancing predictive and decision-making mapping capacity to serve as the EO backbone for water- air- and vector-borne diseases; and
  - Develop platform for the monitoring and prediction of emerging pathogens and toxins risk in marine and coastal environments coupled with critical EO-derived coastal and inland water quality parameters.

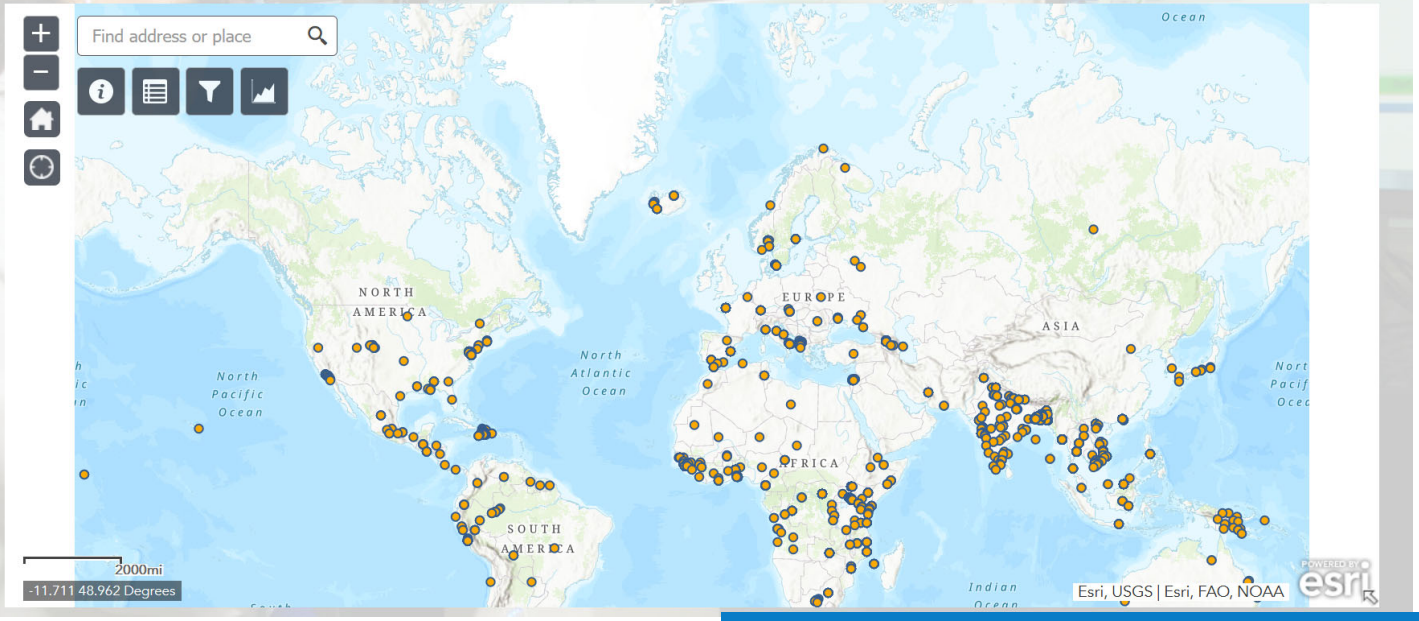
OUTCOMES

WHERE IS GOING TO BE NEXT DISEASE OUTBREAK?

- Build global health risk maps, develop health interpretation/risk prediction of subseasonal and seasonal climate outlooks.
- Enhance integrated modeling of disease risk or prediction of environmental drivers of disease and other health outcomes.
- Use hydrometeorological parameters and environmental sensitivity to characterize the impact of climate on pediatric enteric infections (e.g. rotavirus, Shigella, Cryptosporidium) in low- and middle-income countries. Assess local risk of exposure to vector-borne or water-related diseases due to the effects of climate change and support public health intervention actions.
- Explore influence of environmental and climate drivers on pathogens genetic diversity and development of anti-microbial resistance.
- Promote open resource databases and models via the Internet, with training courses, to other investigators interested in mapping and modeling other vector-borne diseases.

V. cholerae Presence Map

This interactive map compiles *Vibrio cholerae* detected from environmental sampling and clinical diagnoses. This effort will be extended to global *V. parahaemolyticus* and *V. vulnificus* detection.



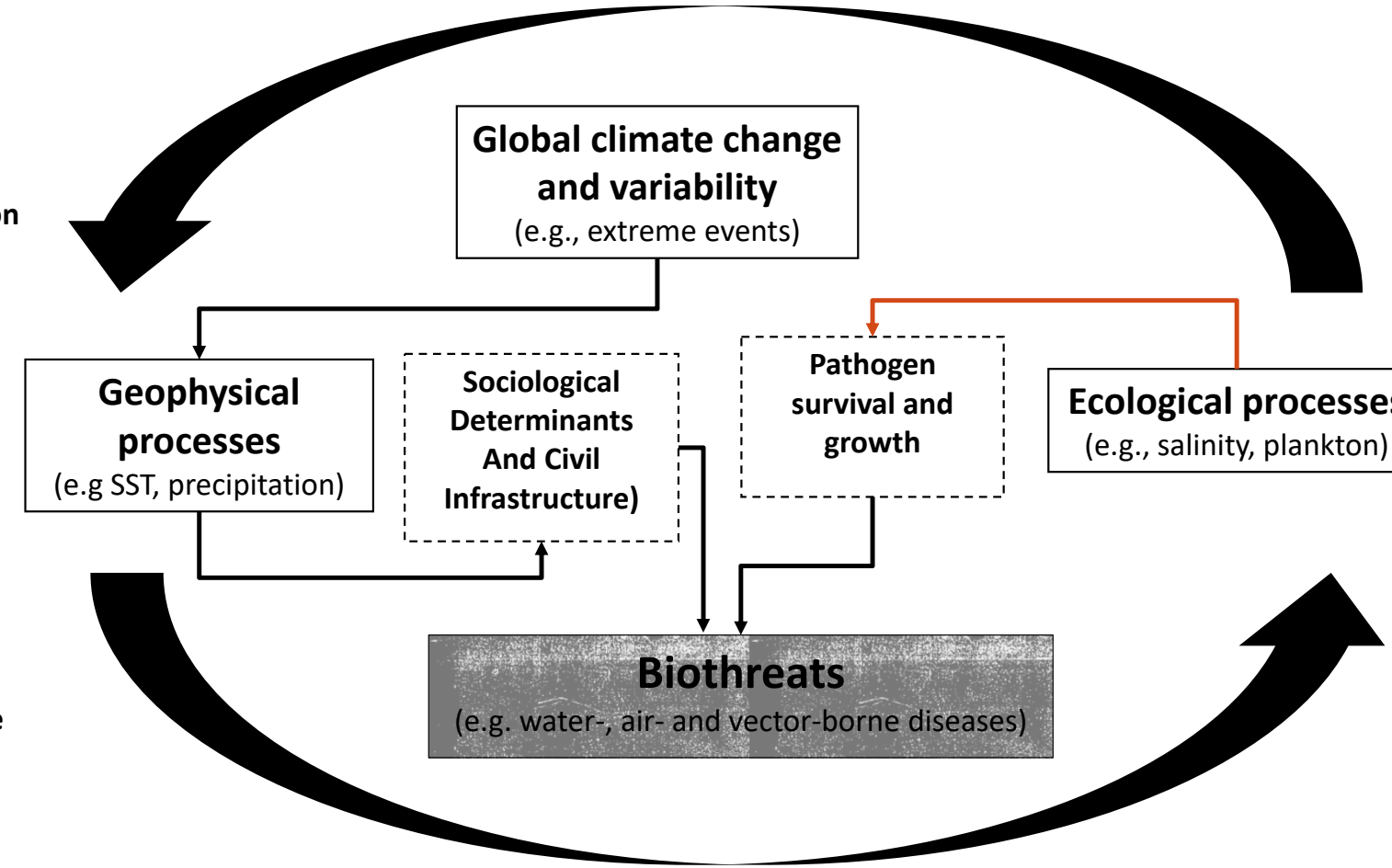
SAMPLE DASHBOARD- IN PROGRESS

Annual Human and Economic Costs of *Vibrio* Infections

V. cholerae	*V. parahaemolyticus*	*V. vulnificus*
2.86 million	*34,000*	*200-300*
global infections	*U.S. infections*	*U.S. infections*
95,000	*$40 million*	*$320 million*
global cases	*U.S. economic cost*	*U.S. economic costs*

Infrastructure
- **Rural**
- **Urban**
- **Water and Sanitation**
- **Food production & supply chain**
- **Dams**
- **Rivers**
- **Transportation**
- **Bridges and roads**

Sociology
- **Decisions**
- **Stress**
- **Psychology**
- **Return of value**
- **Behavior**



Ecology
- **Genome sequencing**
- **Advanced detection methods**
- **Biosensors & sensing**

Artificial Intelligence, Machine Learning
Drones, Remote Sensing, Virtual Reality-assisted inspection

FEW GAPS IDENTIFIED

- More consistent in situ weather and hydrological monitoring coordinated with epidemiological studies, in order to evaluate EO in context.
- Improved Subseasonal to Seasonal (S2S) hydrological forecasts.
- Examine feasibility of using sub-meter resolution Worldview 2 and Worldview 3 data is develop Habitat-Household scale risk models.
- Promote increased utilization of the GLOBE Observer Mosquito Habitat Mapper to identify mosquito larvae, eliminate breeding sites, and combine these data with satellite data to help predict outbreaks.
- Engage international public health organizations (WHO, PAHO, WHO South-East Asia, Africa CDC) to help expand network of public health officials, organizations and schools in the GLOBE Zika Education and Prevention Project. GLOBE will introduce public health officials to GLOBE Country Coordinators so they can explore collaboration on the project to help support national and local public health objectives. In the local communities, public health officials can work with organizations and schools to understand and help mitigate local sources of disease-carrying mosquitoes using the GLOBE Mosquito Habitat Mapper app. Public health officials can present the project and availability of its crowd-sourced data to their colleagues at international, regional and national conferences and other meetings, in efforts to enable them to benefit from the project data and to partner with participants in the project.

QUESTIONS, CURRENT ENGAGEMENTS, RECOMMENDATIONS FOR NEXT STEPS