A small globe of the Earth is positioned on the left side of the image, resting on a stethoscope. The stethoscope is a medical instrument with two earpieces and a chest piece, symbolizing health and medicine. The globe shows the continents of North and South America. The background is a dark, textured blue-green color.

A planetary health solution for disease, sustainability, food, water, and poverty challenges in West Africa

Jason R. Rohr

Galla Family Professor of Biology

Chair of the Department of Biological Sciences

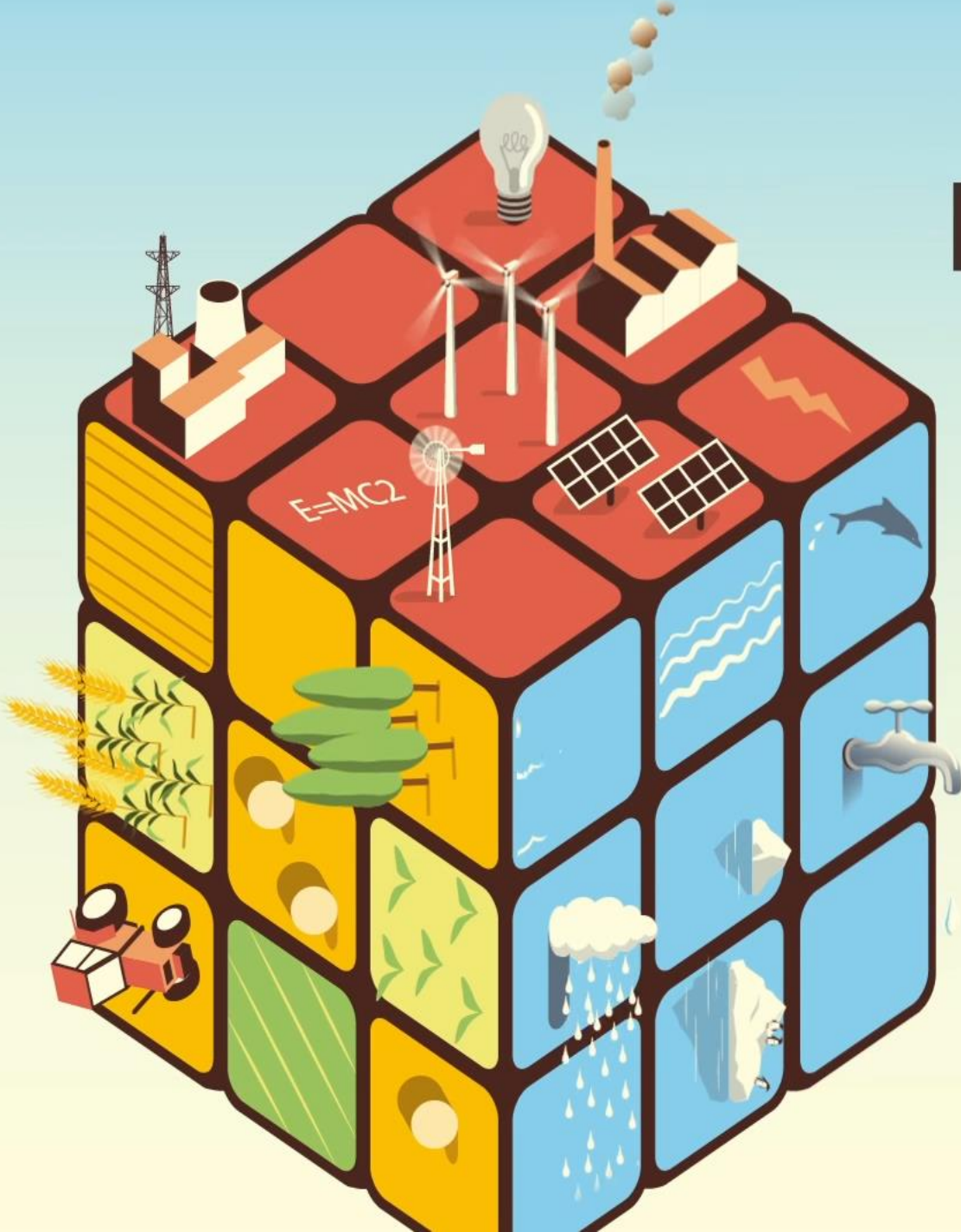
**Interim Director of the Center for Rare and
Neglected Diseases**

jrohr2@nd.edu

DISEASE

ENERGY

FOOD



WATER

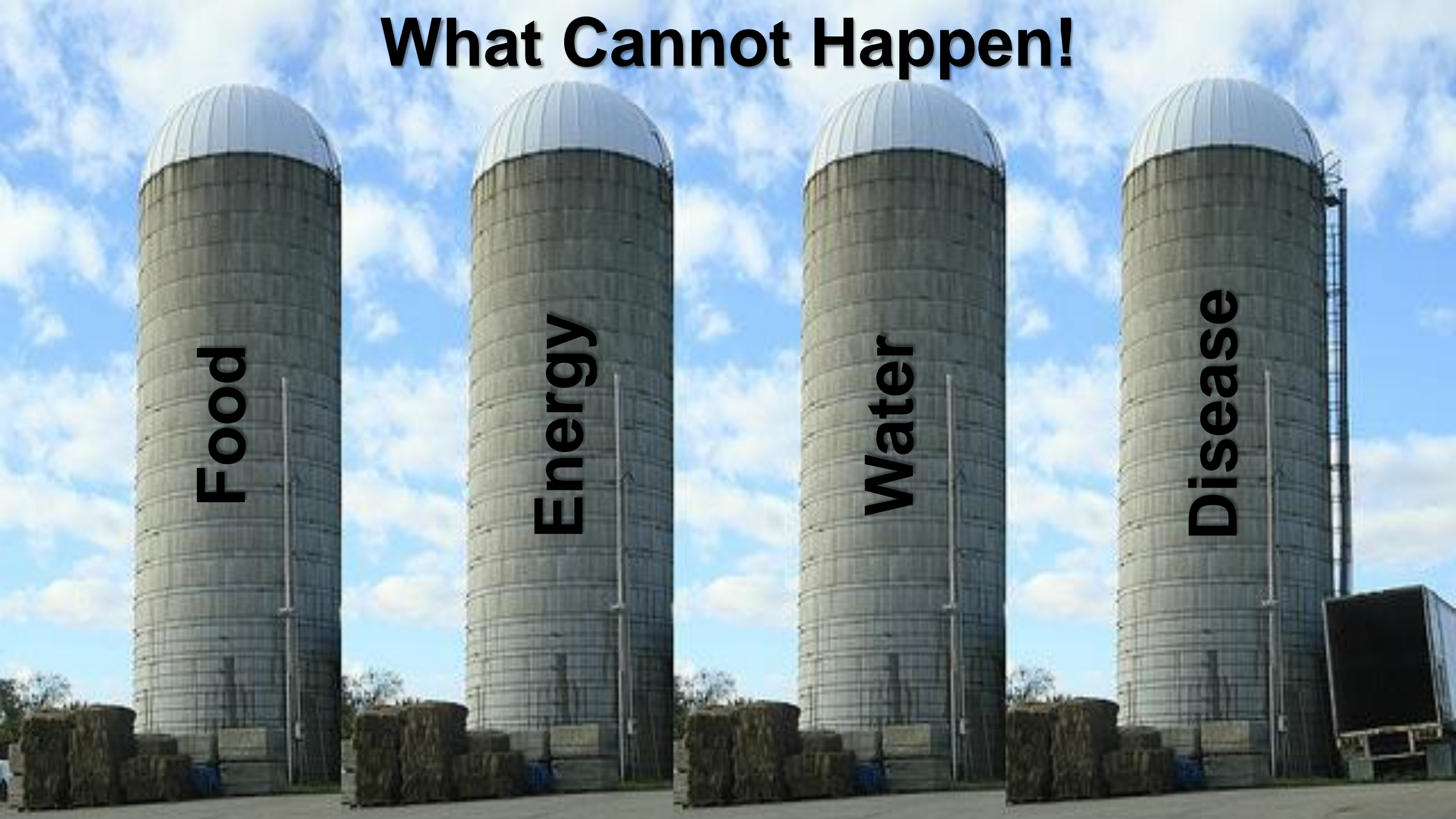
What Cannot Happen!

Food

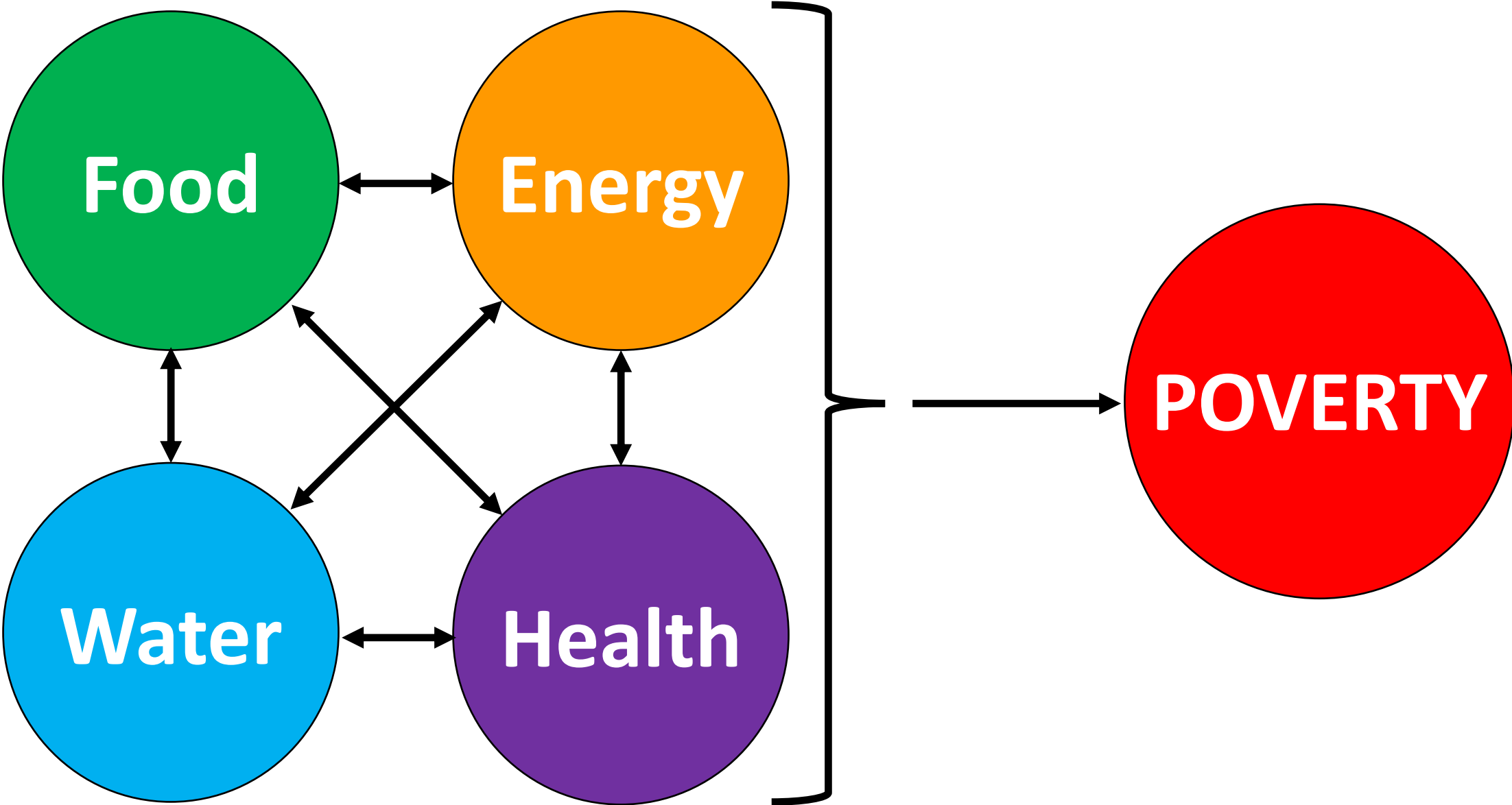
Energy

Water

Disease



Challenges to Sustainable Development





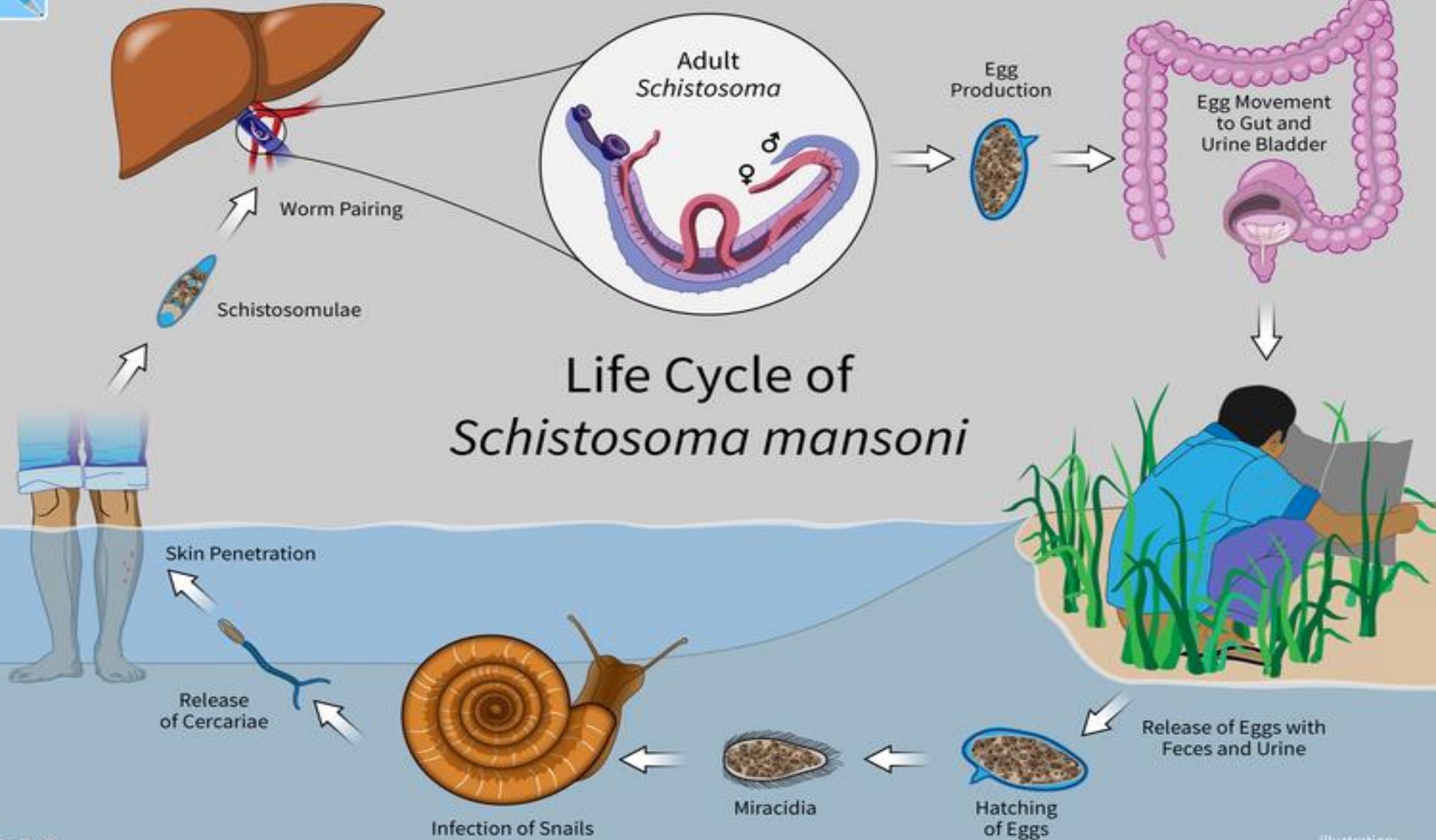
—
Think Win-Win!



DISEASE, FOOD, ENERGY, AND WATER SOLUTIONS • DEFUSING A GLOBAL CRISIS

<https://dfews.nd.edu>

Life Cycle of *Schistosoma mansoni*



Outline

- Studies on the interplay between schistosomiasis and agriculture



- Scaling up
- Next steps





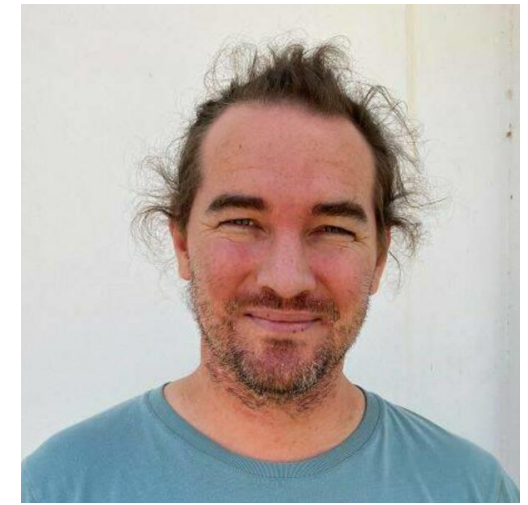
Giulio De Leo



Justin Remais



Gilles Riveau



**Nicolas
Jouanard**



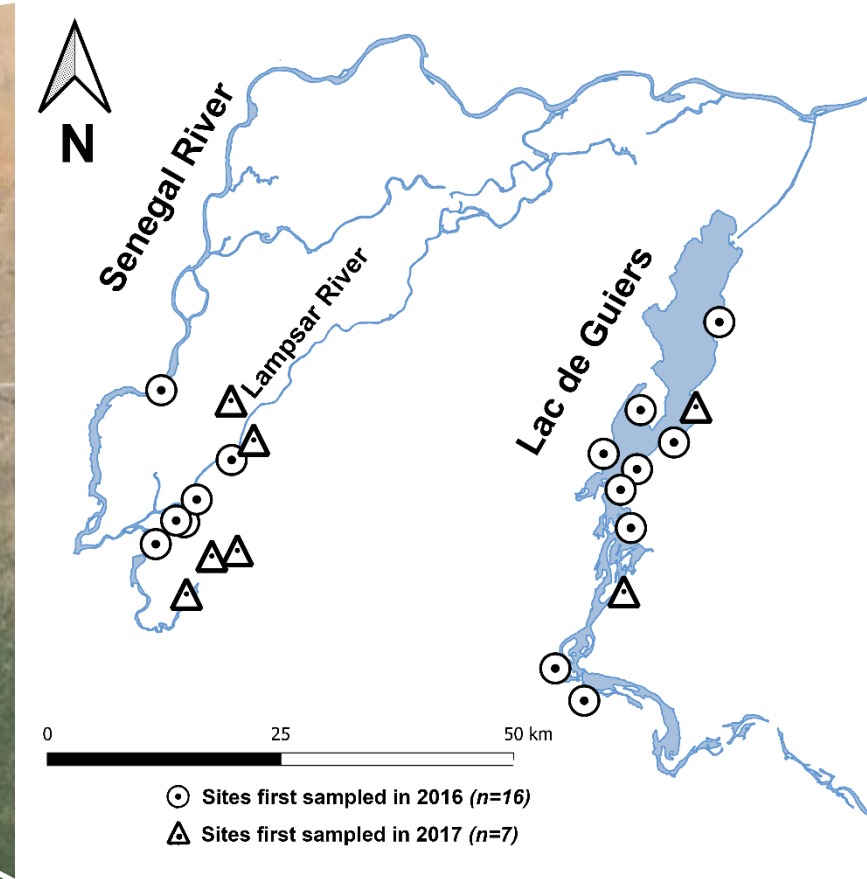
Sanna Sokolow



Chris Barrett



Amadou Tidjani Ly, M.D.



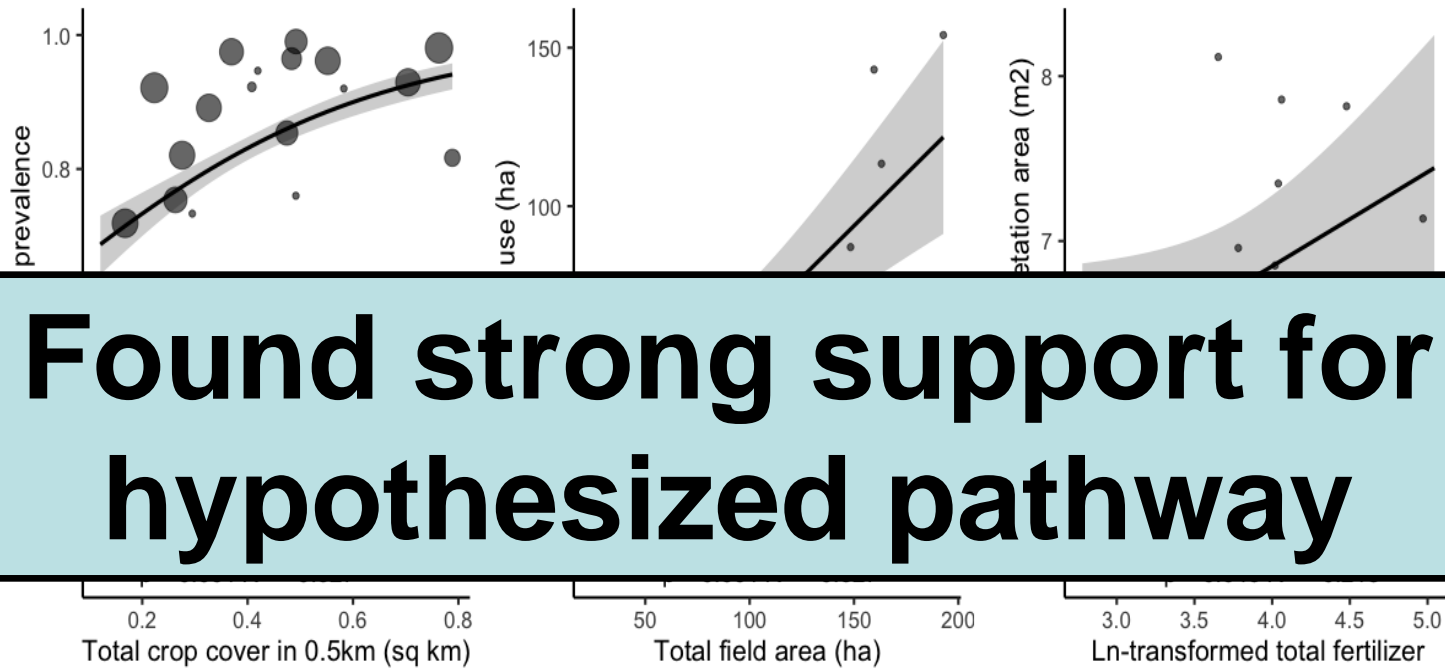
Working Hypothesis



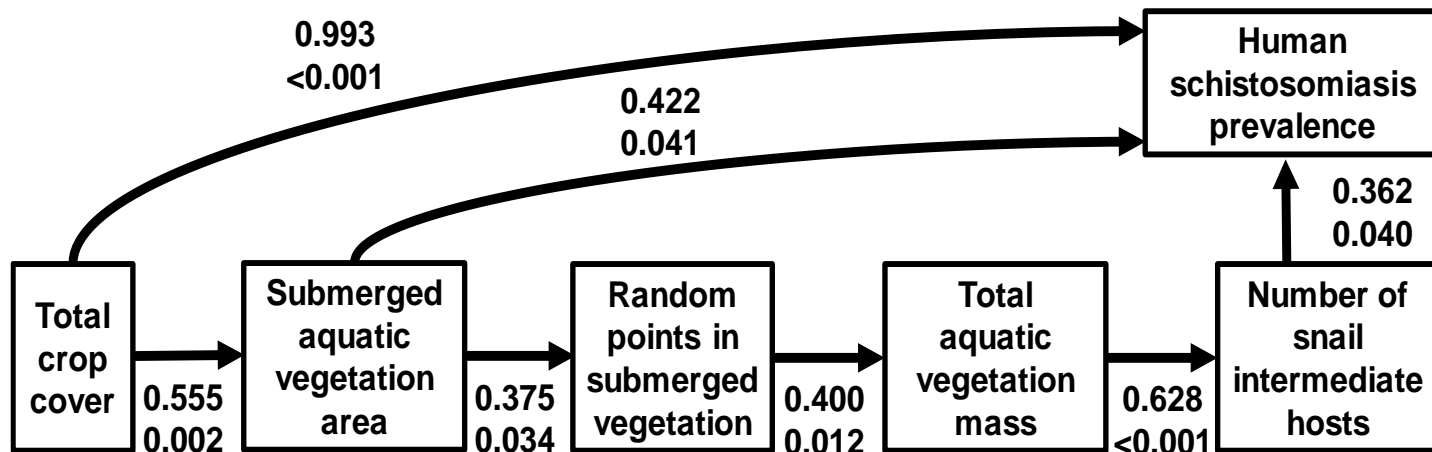
Methods

- In 23 villages in the St. Louis and Richard Toll region, we quantified:
 - submerged invasive vegetation
 - snail abundance
 - agriculture fields in a 0.5 km radius
 - fertilizer use
 - schistosomiasis levels in schoolchildren

Agriculture Increases Schistosomiasis



Found strong support for hypothesized pathway



Hypothesis



closing the
nutrient loop can
increase food
production



Gathered Baseline Data: RCT in 16 villages





**Drug Administration after
Fecal and Urine Testing**

Methods (cont.)

- Tracked schistosomiasis re-infections, snail and aquatic plant abundances, and water quality in
 - 8 villages where submerged, **invasive** aquatic vegetation was removed **quarterly** and
 - 8 villages left as controls
- Also tracked effort to remove the vegetation
- Converted the vegetation to compost or livestock feed
 - tested it on crops and livestock

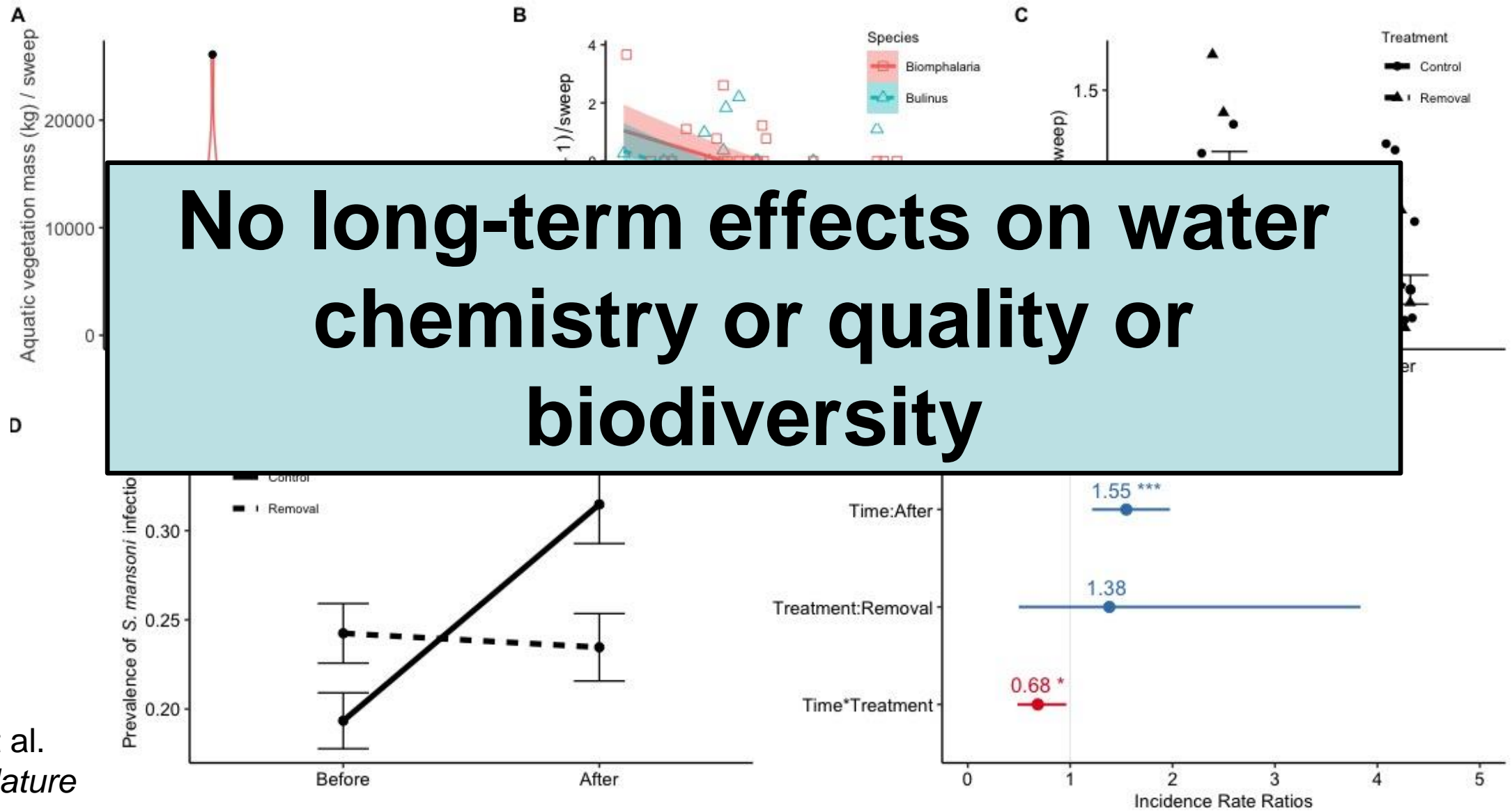
Community Engagement



Community Engagement



Control sites had 1.46 times higher *S. mansoni* infections and lower open water access than removal sites



Aquatic Vegetation to Compost!

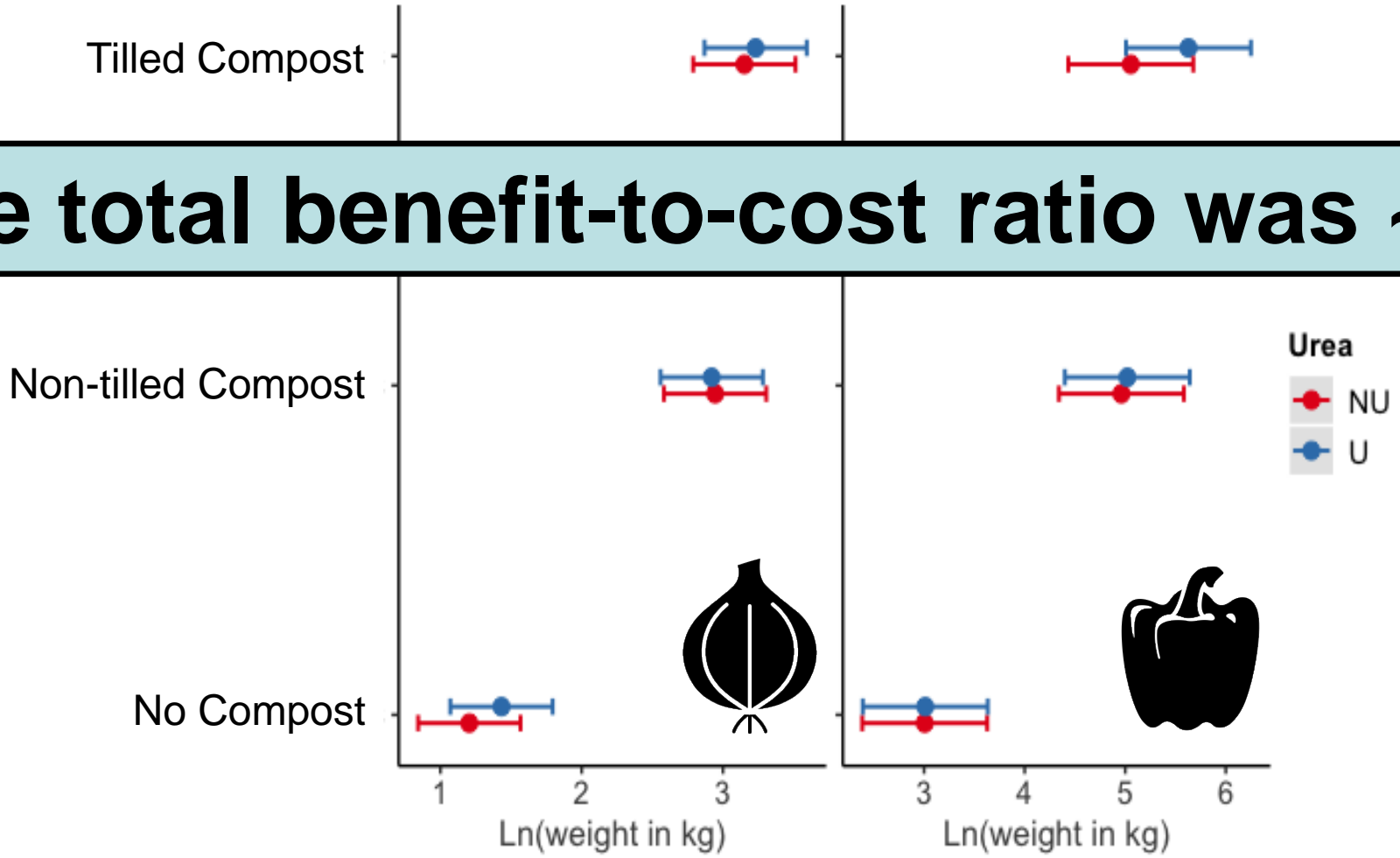


Crossed Compost and Fertilizer Additions on Pepper and Onion



Compost Increased Crop Yields Independent of Fertilizer and Tilling Treatments!

The total benefit-to-cost ratio was ~9!



Livestock Feed



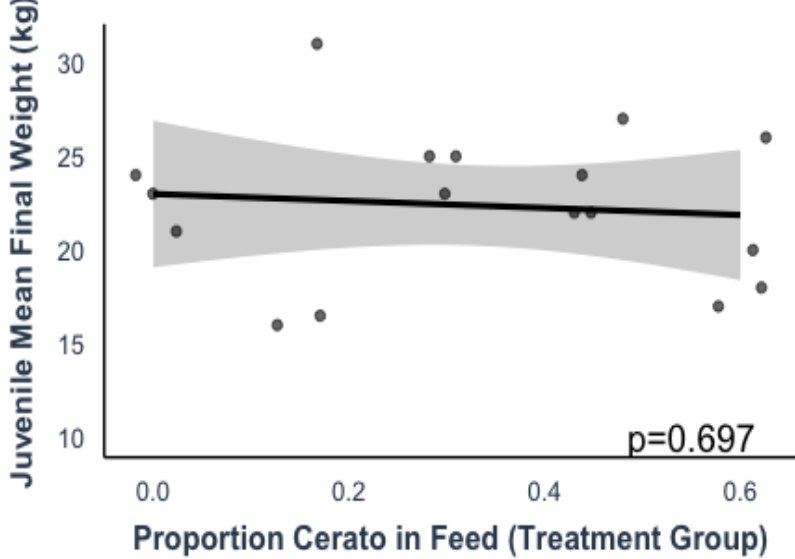
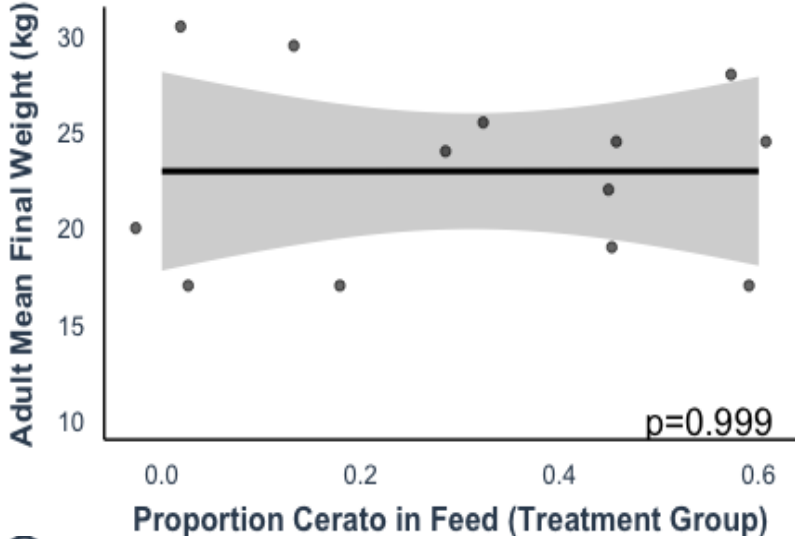


Momy Seck
Manager

Isocaloric substitution of vegetation was as effective as traditional livestock feed but 41-179 times cheaper!



Lexi Sack
postdoc



Homepage » SENEGAL: 60,000 biodigesters to produce biogas from faecal sludge

SENEGAL: 60,000 biodigesters to produce biogas from faecal sludge

By Inès Magoum - Published on July 15 2021 / Modified on July 15 2021



The Swiss government is supporting a project to develop 60,000 biodigesters in Senegal. The installations will be used to produce biogas from cattle dung and faecal sludge in rural areas.

Reducing deforestation in rural areas of Senegal. This is the objective of the biogas production project supported by the Swiss government. The partnership agreement for this project was signed on July 6th, 2021 between the head of the Swiss Federal Department of the Environment, Transport, Energy and Communications (Detec), Simonetta Sommaruga, and the Senegalese Minister for the Environment and Sustainable Development, Abdou Karim Sall.



Outline

- Studies on the interplay between schistosomiasis and agriculture



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- Next steps

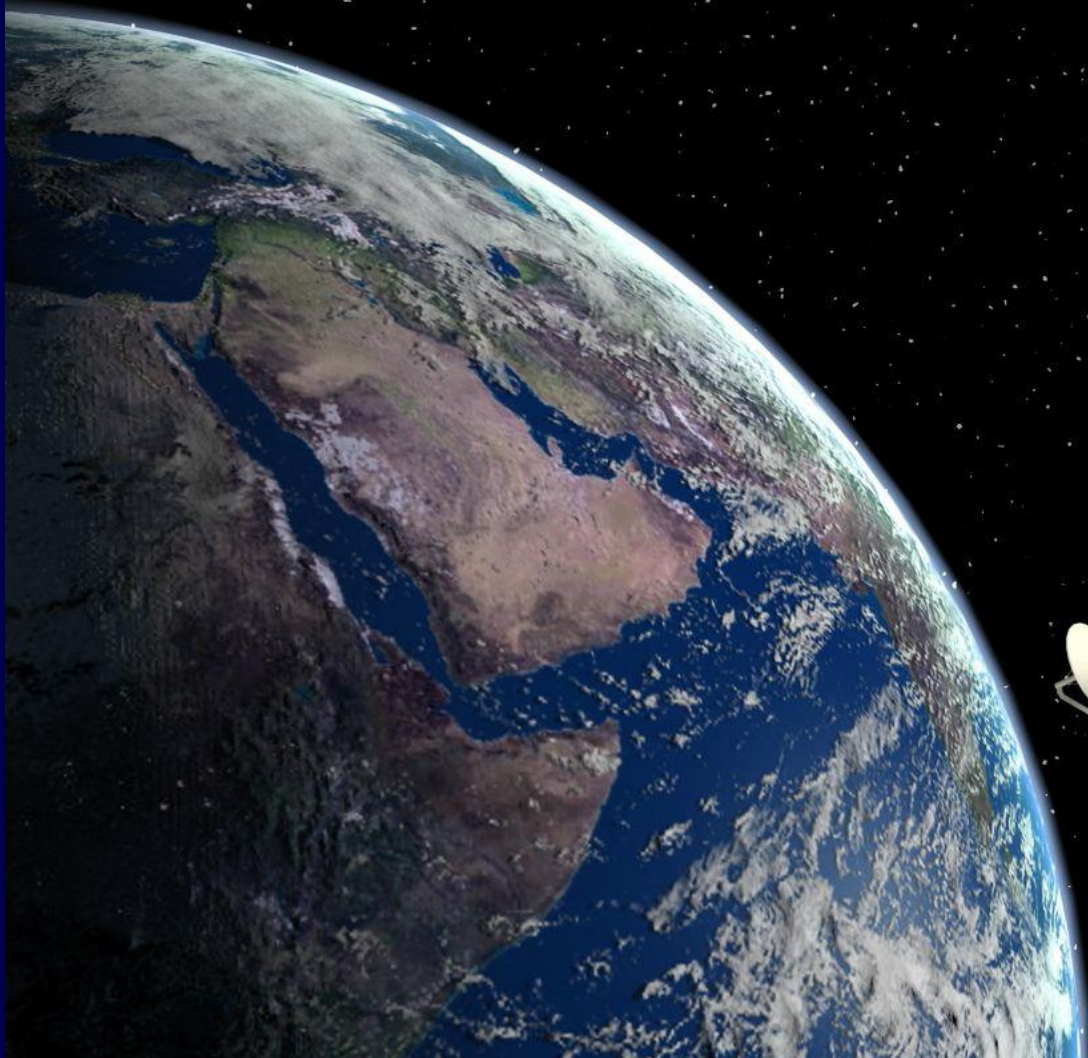




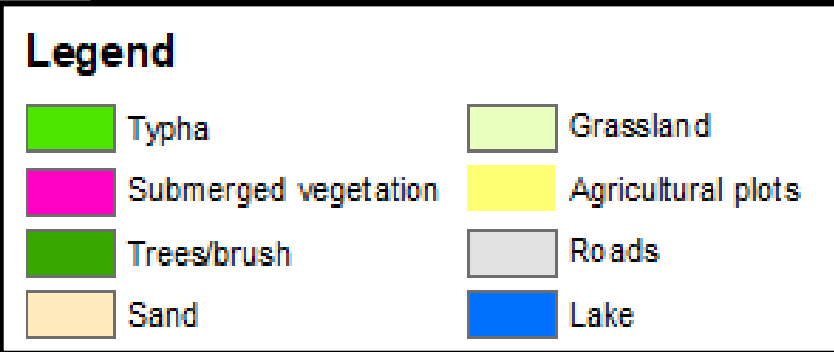
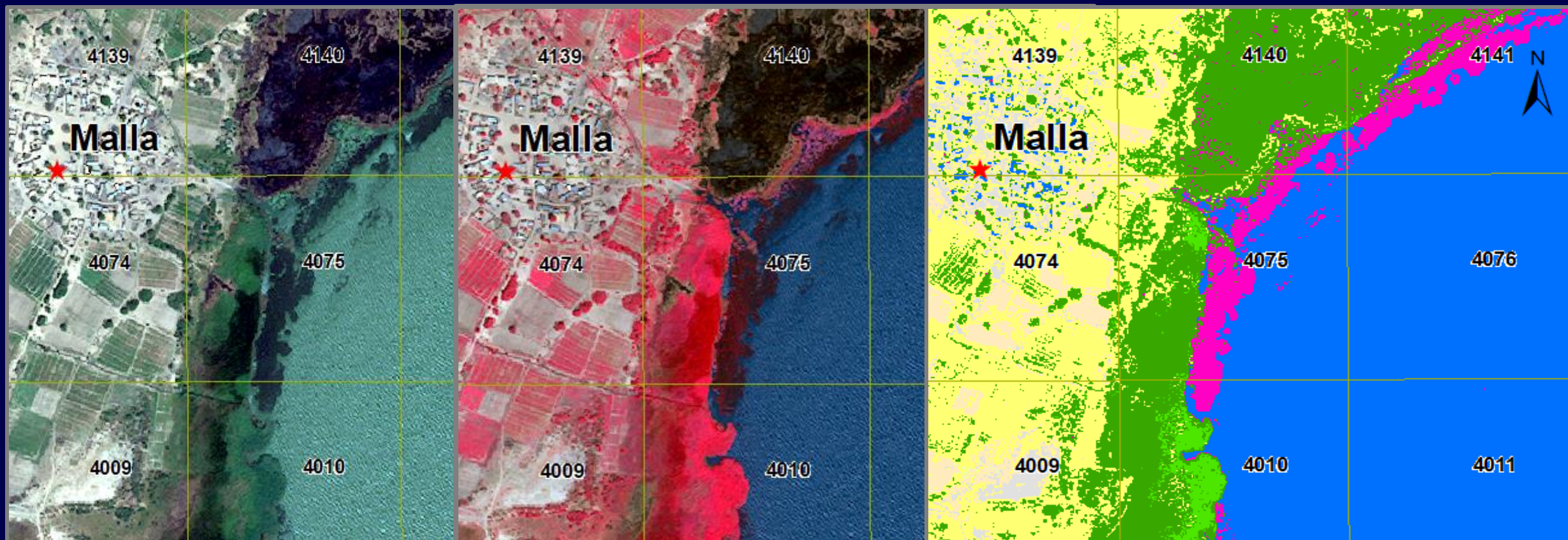
Sidy
Bakoum
postdoc

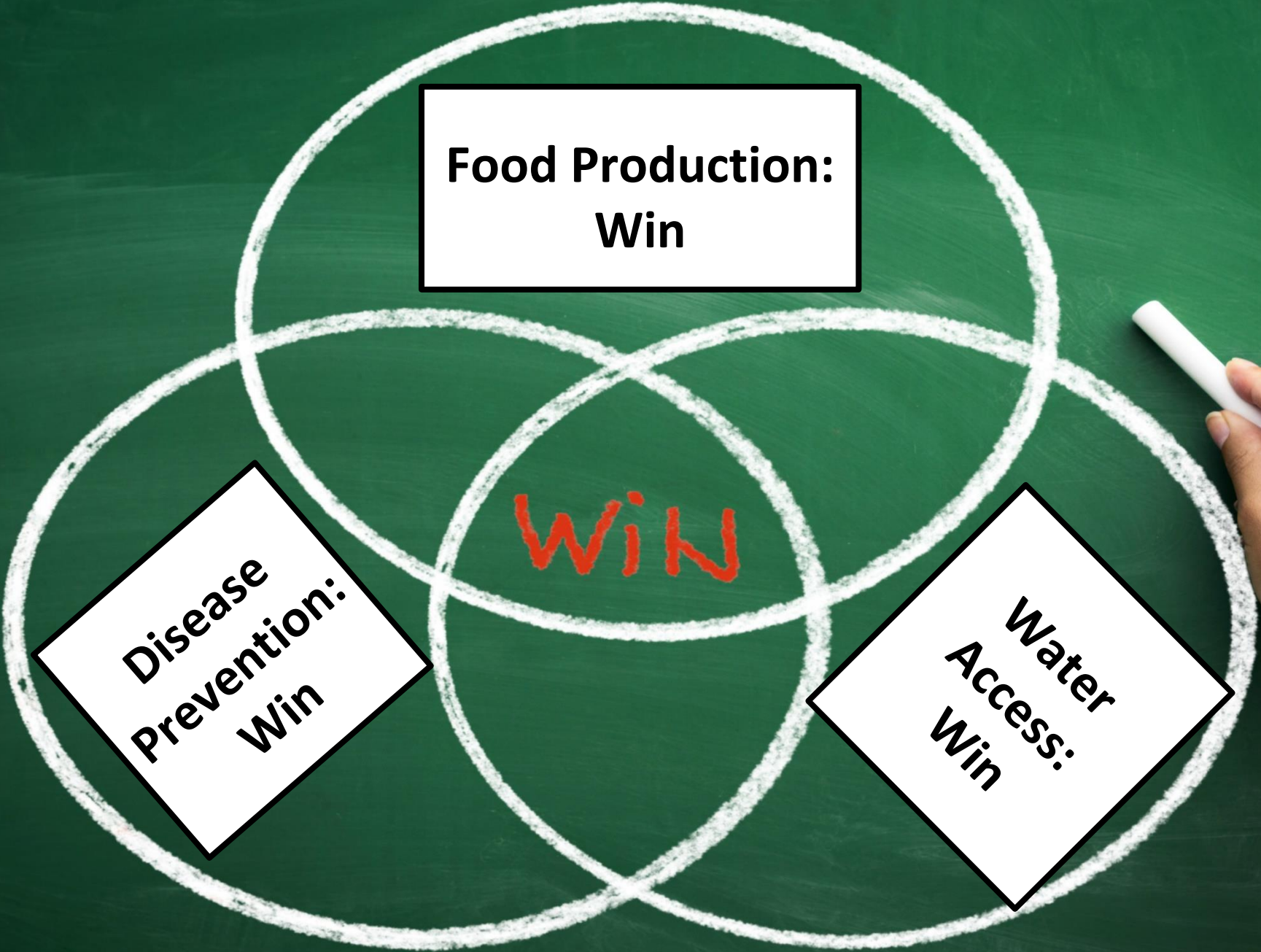


Use Remote Sensing to Identify Areas of High Schistosomiasis Risk



Identifying the spectral signature(s) of submerged vegetation





**Food Production:
Win**

**Disease
Prevention:
Win**

**Water
Access:
Win**

WIN

Outline

- Studies on the interplay between schistosomiasis and agriculture



- Scaling up
- Next steps



Next Step: Scaling

- **Honing remote sensing techniques (in progress)**
- **Testing whether villagers sustain the intervention after training (planned)**
- **Testing intervention in other parts of Africa (exploratory phase)**



UGANDA

KENYA

RWANDA

TANZANIA

Equator

Lake George

RUWENZORI NATIONAL PARK

Kagera

Lake Victoria

Winam Gulf

Mara

ERN RIFT ALLEYS

Kampala
Entebbe

Jinja

Nalubaale Dam

Kisumu

Masaka

Bukoba

Mwanza

CENTER FOR GLOBAL HEALTH RESEARCH (CGHR)-KISUMU



Dr. Maurice Odiero

Dr. Erick Muok

0 50 100 mi
0 75 150 km



Mount Elgon
4321 m

Water Hyacinth on Lake Victoria



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Questions?

<https://www.jasonrohrlab.com/>

<https://dfews.nd.edu/>

