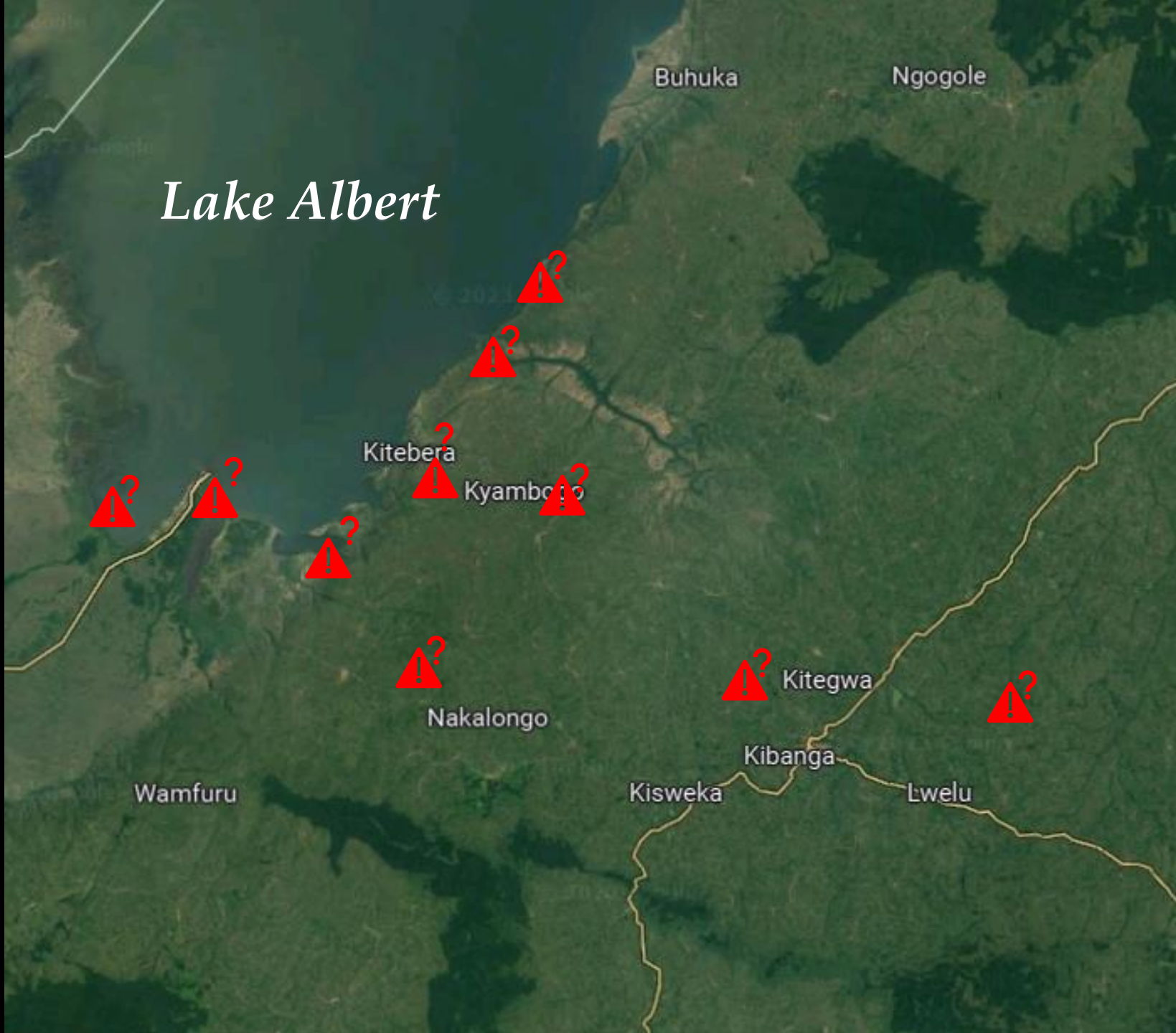




80% > schistosomiasis prevalence



Lake Albert







AFRICA
museum



Action Towards Reducing Aquatic snail- borne Parasitic diseases

Noelia Valderrama Bhraunxs

noelia.valderrama@africamuseum.be

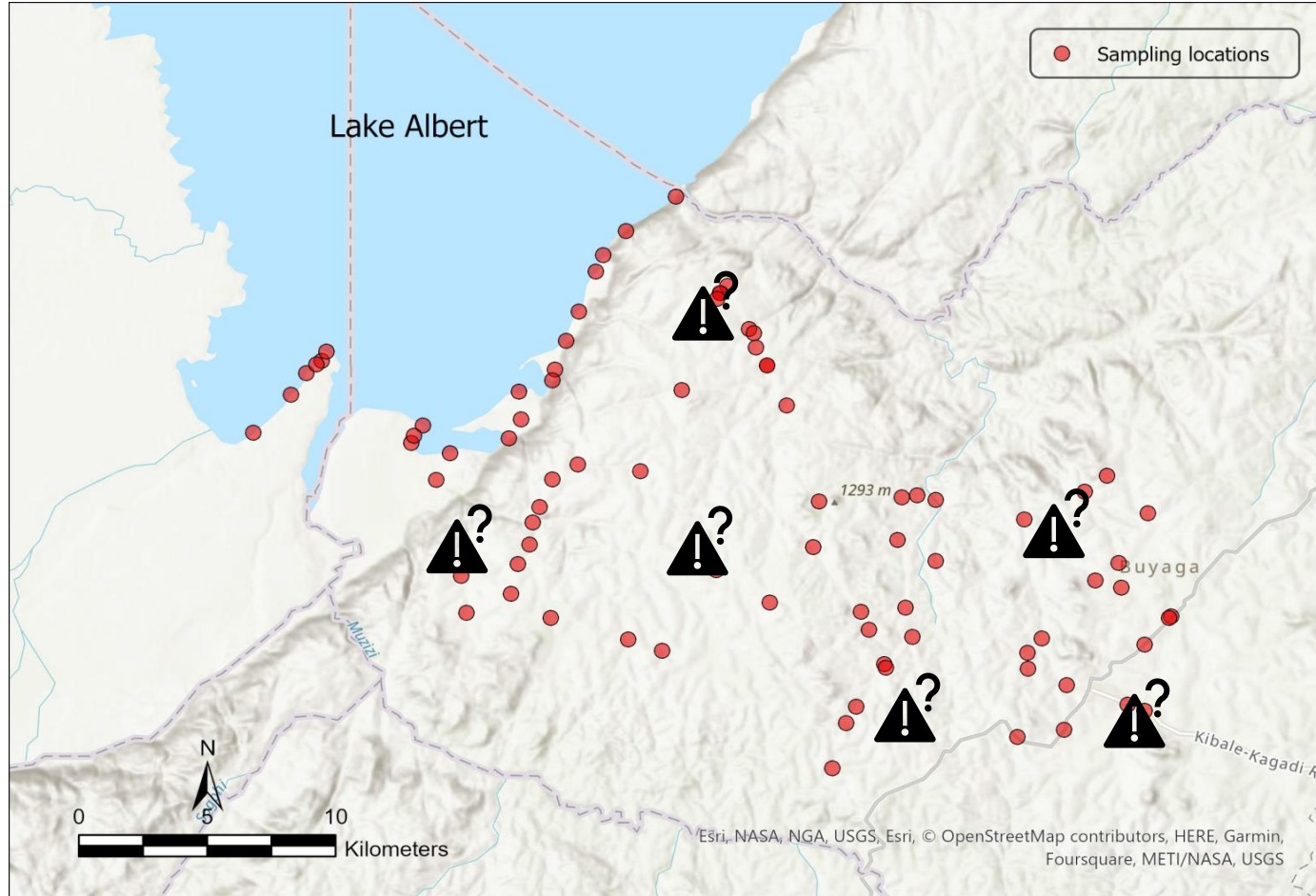
KU LEUVEN



Belgium
partner in development



What do we want to know?



Potential transmission sites for schistosomiasis



**SNAIL
PRESENCE**

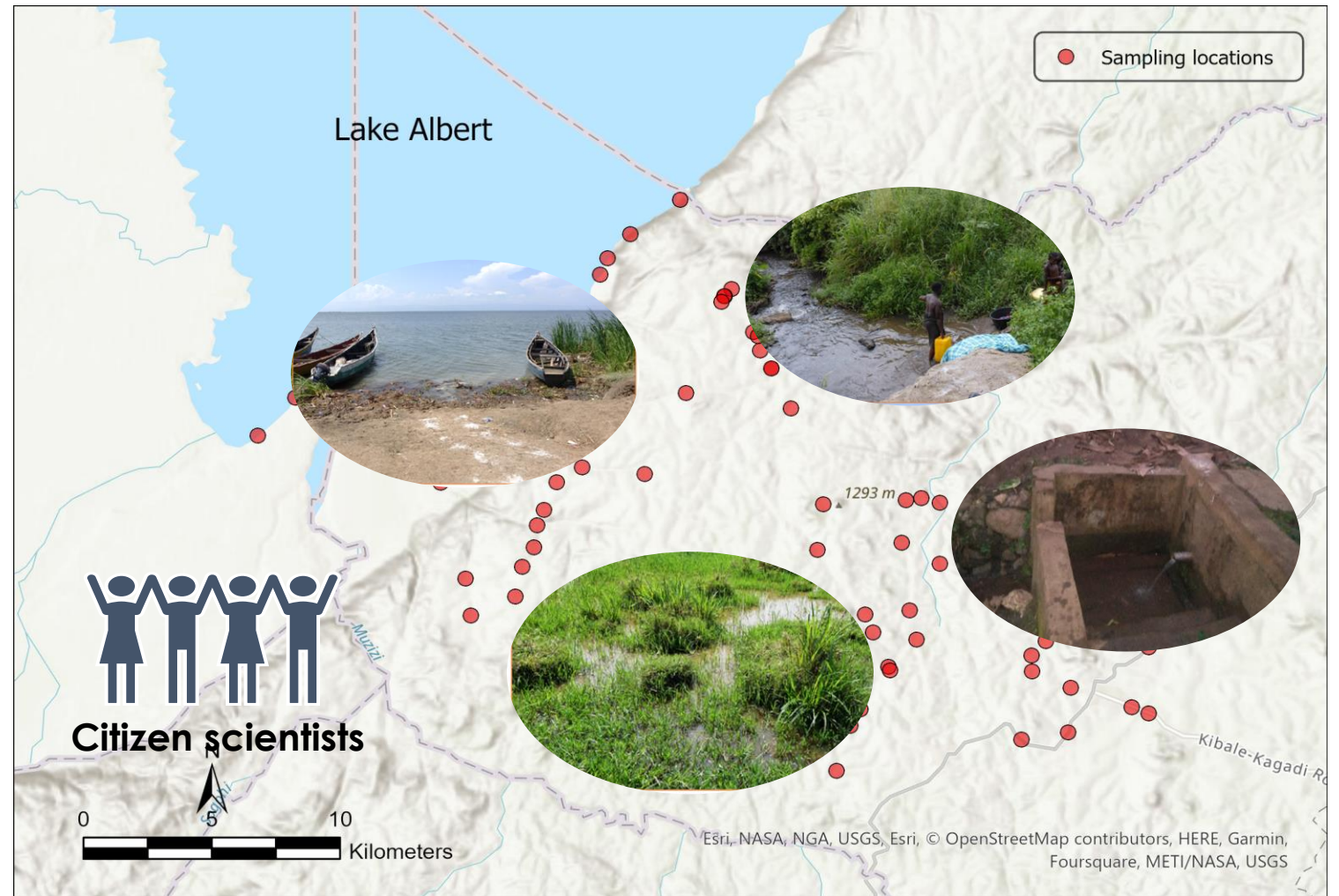


**RISKY WATER
PRACTICES**

How?



sNailed it: Unlocking the potential of citizen science to control and prevent snail-borne diseases



Citizen science for monitoring schistosomiasis



Benefits



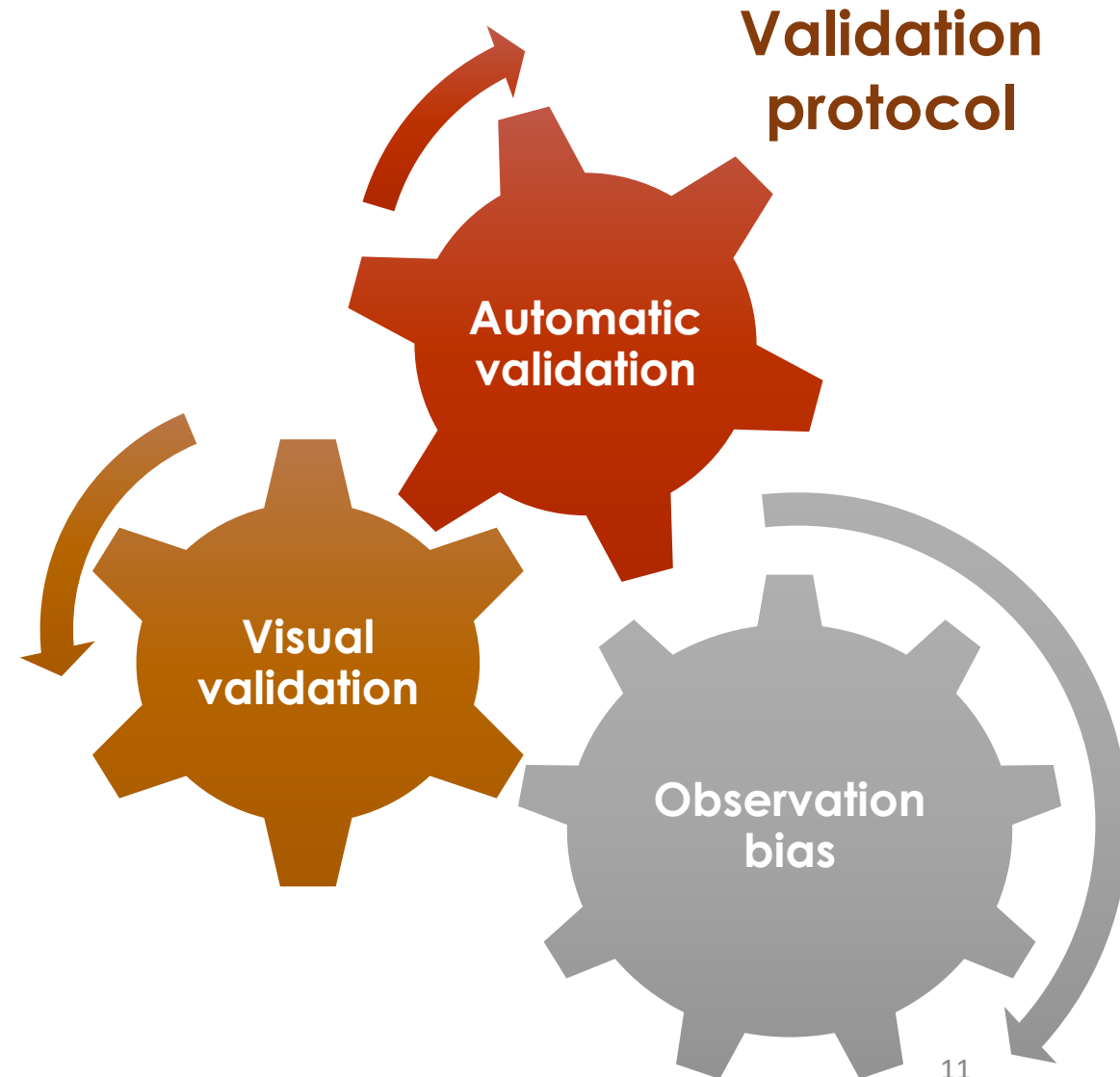
Benefits: Extensive data collection



2+ years

6492 reports

82438 snails





Automatic validation



Visual Validation



Observation bias

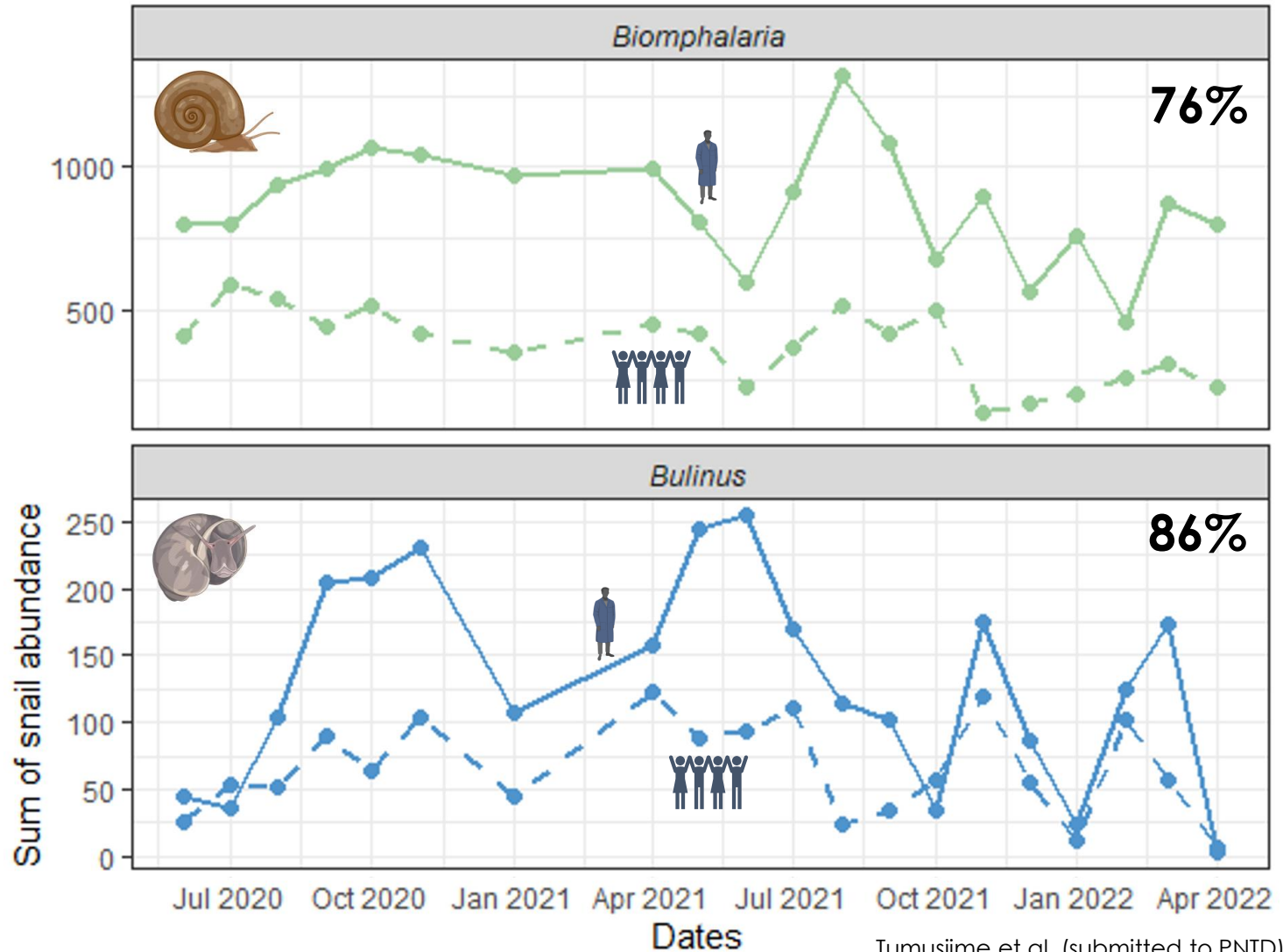


Biomphalaria spp.



Bulinus spp.

Same trend in snail abundance, but CS report lower numbers



Tumusiime et al. (submitted to PNTD).

***Talk at ASTMH – Sunday 22 (13:00)**

Benefits: Extensive (low-cost) data collection



Expert



Citizen scientists

Item	COST € (20 months)	Item	COST € (20 months)
Fuel	5,010	Monthly compensation	9,000
Vehicle hire	18,000	Smartphones	4,800
Per diem - expert	9,000	Scoop nets	600
Per diem – driver	9,000	Gum boots	300
Scoop net	25	Disposable gloves	1,200
Monthly facilitation lumpsum	3600	Data validation cost	210
Gum boots	25	Annual trainings on data collection and safety	7,365
Disposable gloves	300		
TOTAL*4 sampling times per site per month	178,640	TOTAL*4 sampling times per site per month	23,475

Tumusiime et al. (submitted to PNTD).

~ 8x

Benefits: Community empowerment - engagement



Door-to-door campaigns



Drama and songs

+25000 people engaged



Educational material



Football match

Benefits: Community empowerment - knowledge



- **91%** as opposed to **73%**, think it is important to avoid contact with contaminated water
- Incite local actions and by-laws

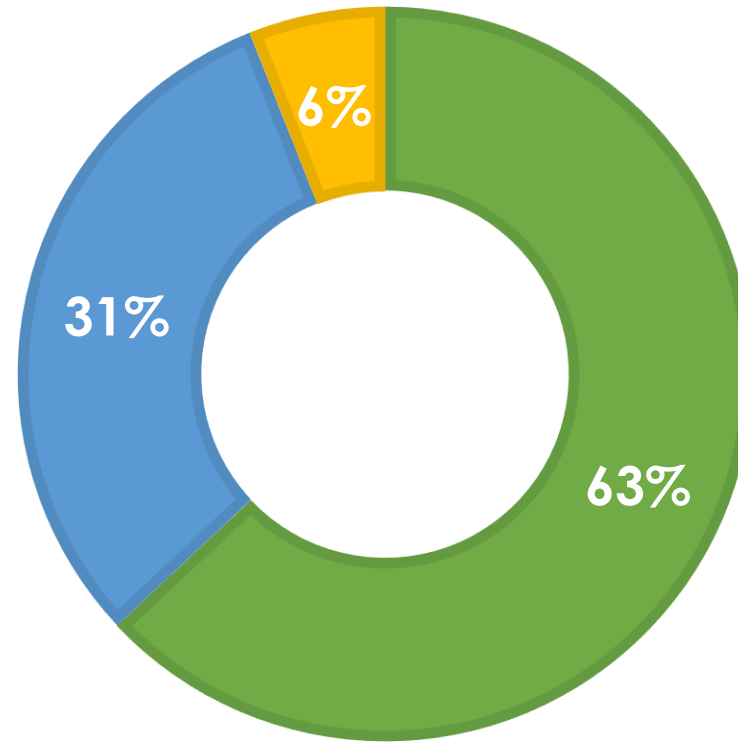
Anyolitho et al. (2023)



But will this CS generated data be used by policy actors?

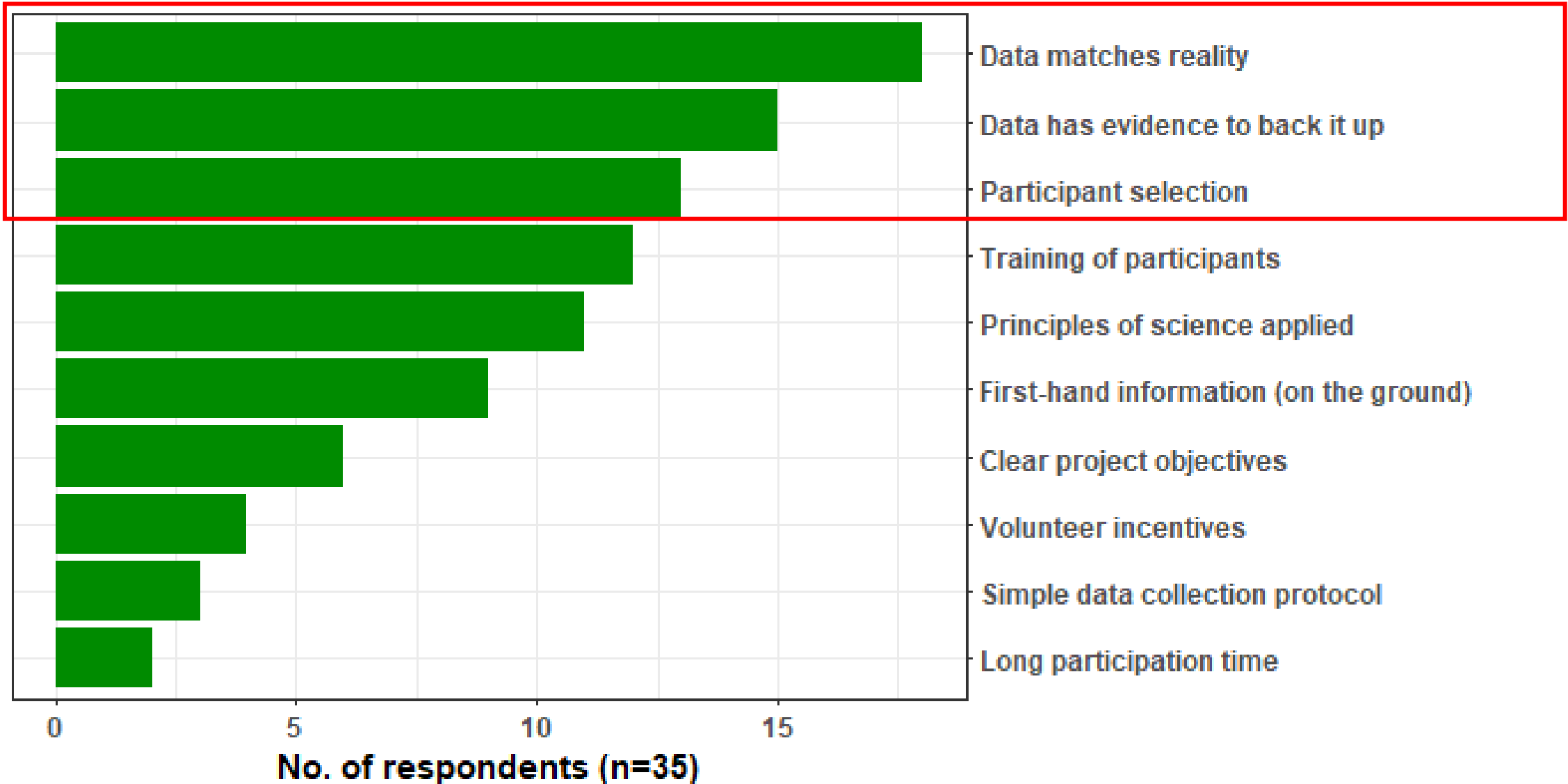
Would you trust data collected by local community members on snail vectors for policy making?

■ High Trust: No doubt ■ Medium Trust: Conditions apply ■ Low Trust: doubtful

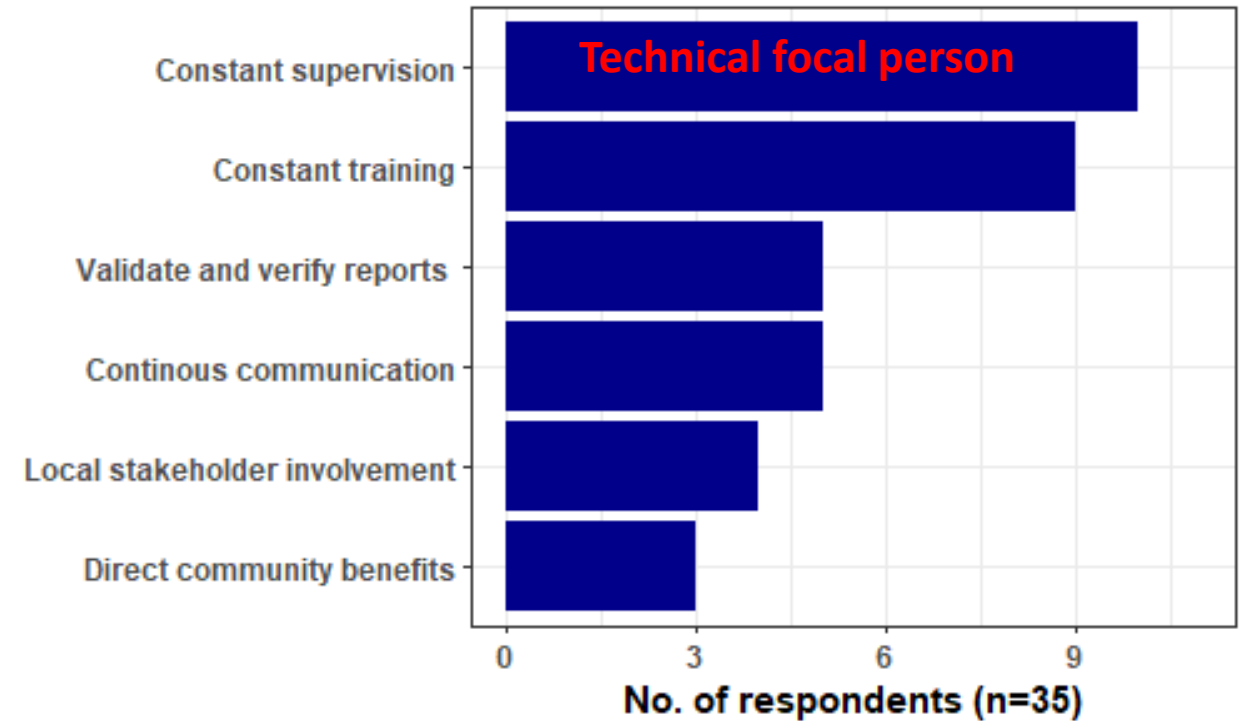
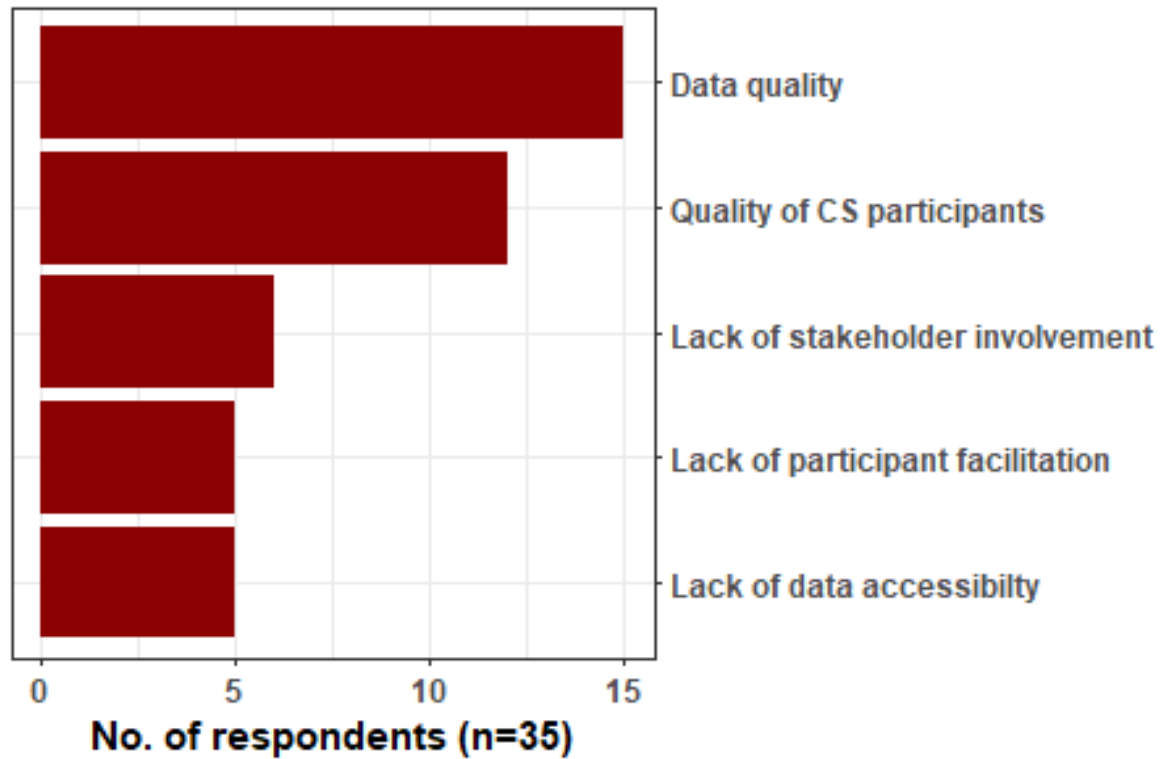


Ashepet in prep.

Why trust CS generated data?



Trust inhibitors and solutions





Extra research

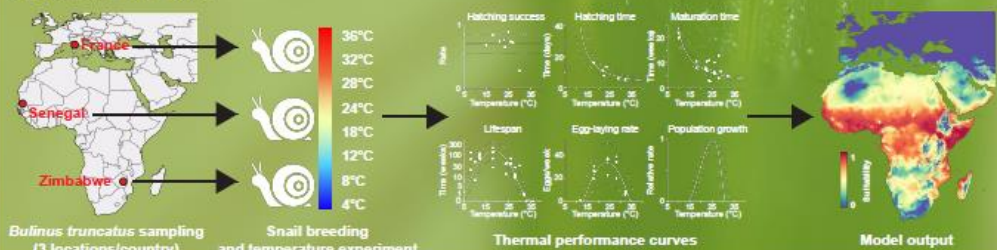
Assessing distributional changes of *Bulinus truncatus*, intermediate host of *Schistosoma haematobium*



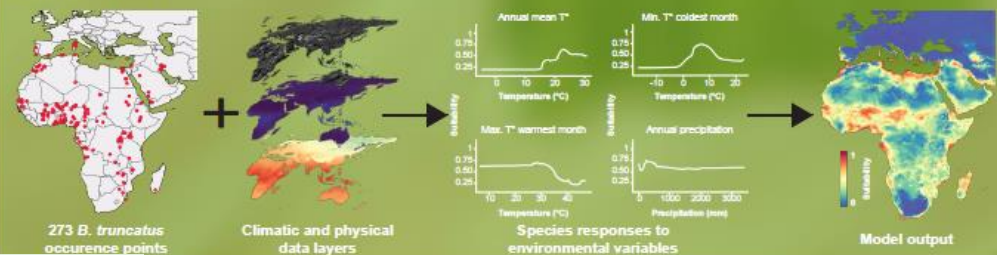
Background

- Bulinus truncatus* is one of the main snail hosts for human urogenital schistosomiasis.
- The current distribution of this species is largely unknown.
- The future distribution of this snail can inform schistosomiasis risk assessment in the future.
- We applied a combination of two modeling techniques to obtain reliable estimates of the species' current and future distribution ranges.

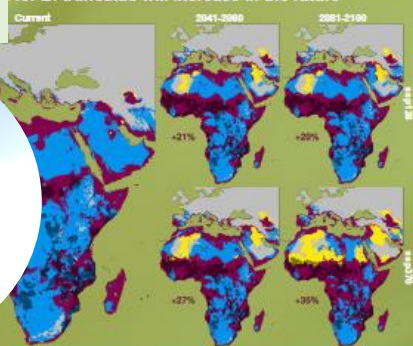
Mechanistic niche models



Correlative models



Future distribution for *B. truncatus* will increase in the future



Conclusions

- The current suitable habitat for *B. truncatus* spans much of the Sahel region, the Middle East and the Mediterranean.
- This area overlaps largely with the areas of high urogenital schistosomiasis prevalence.
- Our models predict a net increase in the area suitable for *B. truncatus*.
- This increase is mainly situated in Central Africa and Southern Europe.
- The suitable area is predicted to decrease in the Sahel region, thereby reducing future schistosomiasis risk in that area.
- An increase in suitable habitat might lead to increased schistosomiasis risk in Central Africa and Southern Europe.

Tim Maes

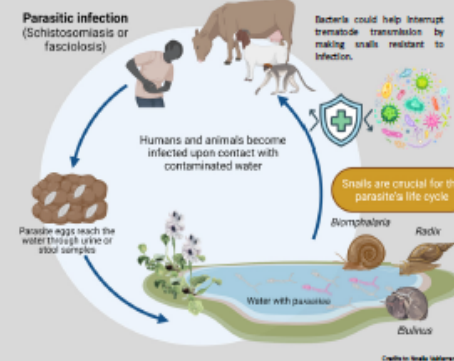


The snail-trematode-microbiome interaction: From lab manipulations to the field

Ruben Schols^{1,2}, Cyril Hammoud^{1,3}, Tim Maes², Bruno Senghor⁴, Isabel Vanoverberghe², Tine Huyse¹ and Ellen Decaestecker²
¹Royal Museum for Central Africa, Belgium; ²KU Leuven, Belgium; ³Ghent University, Belgium; ⁴UICAD de Hano, Senegal

What & Why?

- Snail-borne diseases affect people and animals across the world.
- Bacteria influence host-parasite interactions¹.
- Sustainable disease control requires a fundamental understanding of the epidemiological drivers.
- Understanding this tripartite interaction requires field and lab-based studies, including microbiome transplant experiments.

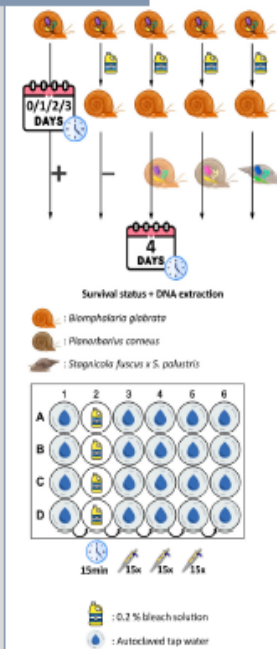


Aims

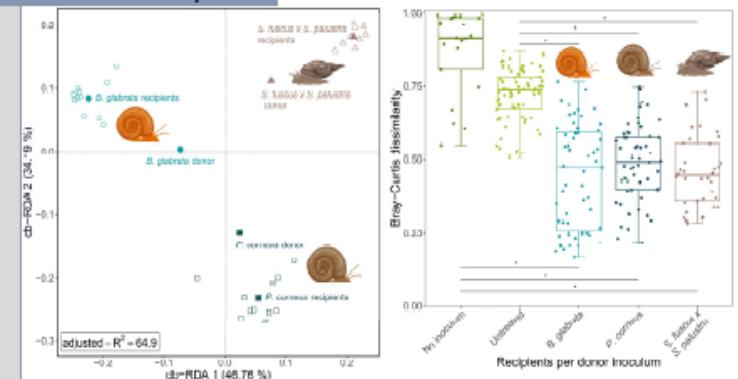
- Develop a microbiome transplant protocol.
- Track microbiome during infection development.
- Study the microbiome in a natural setting.



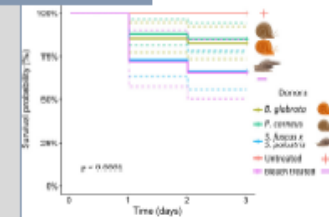
Methods



Microbiome diversity



Survival



Conclusions

- Bacteriome transplants affect freshwater snails².
- Snail survival affected by exposure to donor and recipient relatedness of phylosymbiosis³.
- Foundation to identify relevant bacteria.

Ruben Schols



¹Stock W, et al. Human impact on symbiosis between aquatic organisms and microbes. *Aquat Microb Ecol* 2021; 87: 113-38.
²Schols R, et al. Host-bacteriome transplants of the schistosome snail host *Biomphalaria glabrata* reflect species-specific associations. *PLoS Microbiology Ecology* 2023; 9(9): e101101.
³Huet C, et al. Schistosomiasis vector snails and their microbiota display a Phylosymbiosis pattern. *Front Microbiol*. 2020;10:1-10

Conclusions

- Great potential for disease control in rural, highly-endemic areas.
 - Extensive amount of data
 - Acceptable accuracy
 - Significantly cheaper
 - Empowering communities
 - Resilience and sustainability







If you want to go far, go together!