# Eliminating public health scourge schistosomiasis can also benefit agriculture

July 13 2023, by Deanna Csomo Ferrell

Researchers from the University of Notre Dame, in a study recently published in *Nature*, found that removing invasive vegetation at water access points in and around several Senegalese villages reduced rates of schistosomiasis by almost a third. Credit: University of Notre Dame

Schistosomiasis, a parasitic disease that causes organ damage and death,

affected more than 250 million people worldwide in 2021, according to the World Health Organization.

One of the world's most burdensome neglected tropical diseases, schistosomiasis occurs when worms are transmitted from freshwater snails to humans. The snails thrive in water with plants and algae that proliferate in areas of agricultural runoff containing fertilizer. People become infected during routine activities in infested water.

Researchers from the University of Notre Dame, in a study recently published in *Nature*, found that removing invasive vegetation at water access points in and around several Senegalese villages reduced rates of schistosomiasis by almost a third. As a bonus, the removed vegetation can also be used for compost and livestock feed.

"Disease, food, energy, water, sustainability and poverty challenges intersect in many ways, but are typically addressed independently," said lead author Jason Rohr, the Ludmilla F., Stephen J. and Robert T. Galla College Professor and Department Chair in the Department of Biological Sciences at the University of Notre Dame. "We sought to break down these silos and identify win-win solutions, while demonstrating their cost effectiveness so that residents would hopefully adopt them widely."

Rohr and his team spent seven years on the project, with research conducted in 23 villages and clinical trials in 16. They found that villages with substantial fertilizer use had more submerged vegetation. These villages had more snails and a higher prevalence of schistosomiasis infection in children, said Rohr, who is affiliated with the Notre Dame Environmental Change Initiative and the Eck Institute for Global Health.

Researchers hypothesized that removing vegetation could reduce infections while providing greater access to the open water that is crucial

for daily activities and recreation. So, they conducted a three-year randomized controlled trial in 16 communities, where children were treated for their infections and the researchers removed more than 400 metric tons of vegetation in water access points from half the villages. These removals resulted in a decline in snail abundance as well as schistosomiasis infection rates being nearly a third lower than those observed in control villages.

Rohr's team also tried to profitably improve food production by partly closing the nutrient loop, returning nutrients captured in the removed plants back to agriculture. So, they worked with local farmers to compost the vegetation for use on pepper and onion plants, increasing their yields, and demonstrated that the vegetation could be effectively used as cattle, sheep and donkey feed. Alexandra "Lexi" Sack, who worked as a postdoctoral researcher in Rohr's lab from 2021 to 2023, assisted Senegal's in-country team with the care and design of the sheep-feeding trials, and performed much of the analysis of the vegetation removal results.

"This is important work because it encompasses many different disciplines by combining schistosomiasis prevention and food security," Sack said. "Often these interventions are separate when the neglected tropical diseases, which includes schistosomiasis, are contributing both to and resulting from poverty."

With the expertise of co-authors Christopher B. Barrett, an economist at Cornell University, and Molly Doruska, a doctoral student also at Cornell, the research team demonstrated that the benefits of removing the vegetation and using it in agriculture were nearly nine times higher than the costs.

"We took this public nuisance, which is reducing health, and converted it into a private good that improves income," Rohr said.

The team was also able to illustrate how to scale the project using artificial intelligence and satellite imagery to identify snail habitat and thus hotspots for schistosomiasis, which will allow them to target their intervention training to areas that need it the most.

Villagers helped with removing vegetation once they understood the public health benefits of the intervention, but in the long run, relying on voluntary labor may not be as effective as the researchers removing the vegetation.

"In the next steps, sociologists and economists on the project will quantify how the innovation affects quality of life and whether it is biased based on wealth, gender and/or age," Rohr said.

The team will also investigate how biodigesters might be implemented to turn the aquatic vegetation into fertilizer and gas that can be used for cooking or to fuel generators for electricity production. Rohr said they hope to leverage investments by the Swiss government, which has committed to installing 60,000 biodigesters in Senegal for carbon credits.

The ongoing research could not be accomplished without all of the partners who contributed, especially the Senegalese citizens, Rohr said.

**More information:** Jason R. Rohr et al, A planetary health innovation for disease, food and water challenges in Africa, *Nature* (2023). DOI: 10.1038/s41586-023-06313-z

Provided by University of Notre Dame

July 13) retrieved 2 May 2024 from
https://phys.org/news/2023-07-health-scourge-schistosomiasis-benefit-agriculture.html