Lake Tanganyika Floating Health Clinic / WAVE

PROGRAMMATIC SUMMARY

2022 - 2023

Our work to improve human health and well-being in the Lake Tanganyika Basin.

LAKE TANGANYIKA
FLOATING HEALTH CLINIC

WAVE
Water Based Aid, Value, Engagement

Table of contents

3 Executive Summary

4 Introduction

6 Innovation in Last-Mile Supply Chains

8 Critical Human Health & Biodiversity Surveys

14 Achievements & Data

21 Challenges & Lessons Learned

24 Outlook & Funding Needs

27 Partnerships & Collaborations

LAKE TANGANYIKA
FLOATING HEALTH CLINIC

WAVE
Water Based Aid, Value, Engagement

EXECUTIVE SUMMARY

For 15 years, our guiding purpose has been and continues to be about improving human health and well-being in the Lake Tanganyika Basin — all the while recognizing that true "health" means that we must look at the environment and context in which communities are living. Throughout this time, we have worked closely with both local governments and local communities to seek solutions to thorny and complex problems at a health-systems level. For all these years, malaria incidence and mortality has been a guiding theme for us, as it continues to be the number one cause of death in the country where we have been principally working, the Democratic Republic of the Congo (DRC). Our full-time, DRC-based staff have years of experience working with us in public health systems-building and survey work that covers the Health-Environment-Security nexus in the lake basin, all the while doing this work in an extremely operationally complex context. Their local expertise is a crucial element of our effectiveness working within last-mile communities.

The other key to our effectiveness has been to collaborate across sectors with organizations and researchers working in environmental conservation/biodiversity protections, human security dynamics, and fisheries management, as we work to untie a Gordian knot of complexity that has defied conventional aid and development strategies since the outbreak of the First and Second Congo wars in the mid-1990's. We approach these partnerships as equals, understanding that to succeed, we all must succeed together.

We began our major program "Critical Human Health & Biodiversity Surveys" in 2022, targeted at gathering multi-sectoral indicators about the health, livelihoods, and physical security of those living in lakeshore fishing communities. These data guide our own future programs and inform other local stakeholders. So far, we have surveyed over 329 households on multi-sector indicators, interviewed 23 key informants who are local chiefs & leaders, conducted 18 focus group discussions with 182 fishers, collected over 500 mosquito vectors, and collected over 250 fish samples.

Upon completion of this program, our goal is to initiate a multi-year operational research protocol, where we deploy an alternative vector control device, which we believe will perform better than the standard tool currently being used, the bed net. This activity could be a major stepping-stone towards more widespread deployment of new malaria control interventions, if we are able to demonstrate decreased malaria morbidity and mortality, cost-effectiveness, and logistical feasibility. Last-mile communities, who have the highest burdens of poverty, insecurity, and disease, have a right to the interventions that are best tailored to truly address their needs. Your financial support of our data-driven work is our fundamental engine that powers authentic impact for these communities.

329

Household surveys

500+

Mosquito vectors collected

16

Villages surveyed

Introduction

Riparian South Kivu along Lake Tanganyika in the eastern Democratic Republic of the Congo (DRC) is where some of the most vulnerable populations in the world live. Burdened with one of the highest malaria incidences in the world, along with many other preventable diseases, the population is comprised of a significant number of both refugees and Internally Displaced Persons (IDPs) due both to the epicenter of the current predominating conflict lying to the north, as well as decades of regional instability. Tanganyika Province to the south is an area filled with returned refugees from the two Congo wars, and has even worse road and communication infrastructure, as well as its share of local conflict.

Since our organization's inception, we have looked critically at the kind of aid and interventions that have been deployed in our catchment area and asked hard questions of ourselves as well as others: do we know what the biggest problems are, what causes them, and which interventions have the greatest chance of success (and why certain interventions haven't worked as well as we would like)? These answers are incredibly difficult to obtain due to the deep complexity of this region, and as a result, we decided to pivot our focus towards obtaining as authentic a ground-truth as possible, in order to then build better solutions from the ground up. We believe this is the only way to longitudinally and durably reduce suffering, while promoting resiliency and well-being. Notably, in 2016 we began our robust data-collection program to identify root causes as well as novel interventions for true impact in the malaria space. We have chosen to focus primarily on the goal of malaria reduction with this work, given the DRC's shocking contribution to worldwide malaria mortality (above 13% of all deaths).

Introduction cont.

One crucial finding in 2016 was the decidedly mixed performance of the most common tool to prevent malaria, the insecticide-treated bed net. We found issues around the appropriateness of its design (in an area where most people do not have bedrooms or bedframes), ease and comfort of use, and most importantly, a potentially environmentally devastating and unforeseen consequence: bed net fishing. This practice addressed pressing food insecurity and issues around grinding poverty in the immediate term, but portended dire consequences for the lake, livelihoods, and the food system's mid to long-term sustainability. We now know that shoreline bed net fishing is extremely destructive to both commercial species, as well as unique, biodiverse shoreline dwelling species, and has likely contributed to a cratering of the Lake Tanganyika artisanal fishery upon which many millions of people rely. Moreover, the tool is not achieving its malaria prevention goals in this context.

In 2022, we deepened our data work as we began to explicitly collaborate with conservation and biodiversity focused organizations — and it was an important validation of our work and our approach when we received funding from these sorts of organizations. Our updated survey work included various critical datapoints such as mosquito identification, multiple disease prevalence, household socio-demographics, and indicators around the health of local fish stock. These data lay a critical foundation for identifying the root causes of complex livelihood and food security challenges and pointed to important potential policies as the riparian countries around Lake Tanganyika seek to jointly protect its unique ecosystem. We aim to finish this updated and very detailed dataset in 2025, as well as lay certain logistical foundations for the subsequent operational research work.

Innovation in Last-Mile Supply Chains

The Challenge

Last mile delivery difficulties have been a consistent barrier to how the aid and development space thinks about what products/medications/equipment to make available for hard-to-reach communities.

As a result, many products are never considered for deployment, despite promising evidence of their use and efficacy.

Large organizations are good at shipping to ports and warehouses and along highway systems; however, that is not the challenge we must face to reach communities with the greatest disease and socioeconomic burdens.

Our Solutions

Since 2018, LTFHC has been actively collaborating with operations management researchers at the University of Chicago Booth School of Business using our robust data sets to develop a robust supply chain model for household distribution of a spatial emanator (an alternative vector control tool) in South Kivu Province. In this setting, the profound lack of infrastructure, limited warehousing options, insecurity, and seasonal weather variations affecting distribution routes pose significant barriers for private companies and international organizations delivering lifesaving supplies to reach the people most in need. Our model includes more informal transportation methods which include local workers and their small businesses (which include private motorbikes, pirogues, and simply walking certain distances). Incorporating this informal sector is a key to successful and affordable household delivery and helps to promote community resiliency. Only actors with deep local knowledge and connections to the communities served know how to implement a supply chain using local resources — we are proud to count ourselves in this group.

This model formed the basis of John Montgomery's PhD dissertation work (awarded in June of 2023) and will be published in the preeminent academic journal for operations management science, "Operations Research" — one of the first of its kind for this field, where highly technical and math-driven models are united with on the ground, life-saving humanitarian efforts. Our work together has catalyzed additional research in this field, looking at long standing problems of operations in aid and development settings, and where we are being asked to serve as expert reviewers for new work being submitted to academic journals.

Critical Human Health & Biodiversity Surveys

We have advocated such an approach in the Lake Tanganyika Basin (LTB) since our inception; that is, to work collaboratively across sectors to:

- Understand complex, fragile environments where the environment/health/conservation/security nexus is most manifest, and
- Help to create programming and policies that are appropriate for this reality. We know that we cannot make an impact alone, but instead in partnership with our subject-matter colleagues.

Overlapping issues

Shoreline fishing with mosquito bed nets is an area of significant overlap between issues around biodiversity conservation, fisheries management, and appropriate/effective malaria vector control. Our research prior to 2022 was focused on analyzing that baseline household data to understand better the malaria disease burden as well as to develop a cost-effective, sustainable model for warehousing and delivery of alternative vector control products, with the aim of both lowering the malaria mortality rate and decreasing the adverse use of bed nets on the fishery. Our model can also inform how to deploy other health products, including those for water purification, family planning methods, medications, and vaccines.

Cross-sectoral collaboration

In 2022, we collected data on human health and biodiversity in the LTB along the shores of the Ubwari Peninsula and Baraka to better understand the cross-sectoral context that these community challenges are situated in, which will help us better identify and tailor solutions to deliver the most meaningful impact. We know that current malaria prevention strategies aren't working and causing unintended harms to biodiverse species and commercial catches. We have an opportunity to pool knowledge and resources to achieve better outcomes for all.

This work has been performed in partnership with the Rustandy Center for Social Sector Innovation at the University of Chicago Booth School of Business. The LTFHC has regularly collaborated with academics and field practitioners from other sectors since its inception in 2008, including academics studying security dynamics in the African Great Lakes (in particular, Dr. Judith Verweijen at the University of Groningen), since this has such an enormous impact on access to areas along Lake Tanganyika and the Ruzizi River, and the ability to establish effective programming in health and environmental conservation. Another crucial collaborator is Dr. Neil Lobo, a medical entomologist from the University of Notre Dame. Dr. Lobo plays a critical role in this work through his identification of malaria parasite-carrying mosquitoes in the region and disease transmission dynamics. Furthermore, the LTFHC has benefited from a decade-long relationship with the African Fresh Water Program at The Nature Conservancy with whom we have engaged in regular knowledge sharing and with whom we look forward to potential collaboration opportunities in the future on a multi-country UNEP-GEF program on Lake Tanganyika in 2024 and beyond. The International Union for the Conservation of Nature (IUCN) has recently identified a series of Key Biodiversity Areas (KBAs) along the Congolese coastline, and the LTFHC is one of very few organizations that can access and work inside those areas. Throughout our long experience in the LTB, we have maintained productive working relationships with the relevant Congolese governmental authorities, INGOs/Local organizations, as well as the regional body, the Lake Tanganyika Authority.

Communities under pressure

This activity is needed now more than ever, as pandemic conditions of the last three years have slowed understanding of the complex interactions of climate change, conservation, socioeconomic, and health effects upon human and animal populations through decreased data monitoring. Rainy seasons are changing with increasing incidents of flooding, destroying infrastructure around waterways, with dire effects to ecosystems, human health, and livelihoods.

As we found during our 2022 deployments, fish species diversity is changing and diminishing, and local fisheries are extremely stressed. This in turn causes food and income insecurity to the hundreds of thousands of artisanal fishers and may drive adoption of slash and burn agriculture as an alternative, as well as increased vulnerability to armed group recruitment. Destruction of forest canopy contributes to disruptive temperature change in African inland lakes, altering range distribution of key biodiversity taxa. New zoonotic disease emergence is a risk, as well as observed increases in topsoil run-off into lakes and rivers. These effects, along with widespread shoreline bed net fishing, are having a negative effect on lake biodiversity and ecosystems. To effectively counter these destructive cycles, we need more up-to-date and granular data sets that cover multiple indicators that will allow us to address both the needs of humans and the needs of the environment. Greater insight is required for successful management and regulatory initiatives, as well as rational program development.

Our immediate objectives are:

a) To provide regional & local policymakers with access to crucial data, which can inform UNEP-GEF program design, decision-making, and local policy.

b) To continue to contribute to an open-access database (GBIF), which will be an important tool for conservation and fisheries groups.

c) To assess the health, socio-economic, and security states of communities so that we can identify the roots of key local challenges and match them with contextually tailored solutions that are congruent with biodiversity protection and fisheries management goals.

d) To use this up-to-date baseline data in order to launch a multi-year operational research program which would bring a new vector control tool — spatial emanators — to the neediest populations and allow us to rigorously follow the outcomes.

The need for more data

Detailed studies on key fish-species diversity and related fishing activities are still quite limited in the LTB. Local people living along the lake and relying on its fisheries for daily survival have intimate knowledge of fish-species diversity and ecology. We will continue surveying to systematically assess local attitudes and fleet statuses about fisheries' activities through local catches, as well as household surveys to better understand the nexus between fish biodiversity, malaria incidence, environmental degradation, the incidence of endemic diseases, and food insecurity in newly identified KBAs. By carrying out this extensive surveying, we will (a) be able to provide these scare data to regional & local policymakers, (b) add these data to GBIF-an open-access database, and (c) gain insight on the causes of and potential solutions for key local challenges. This work will enable more effective fisheries and conservation strategies which operate in greater harmony with local community health and livelihood needs, while taking into account the actual operational conditions of the region.

We believe our particular "sweet spot" in the region is both effective data collection, operations management of various programming in other sectors, as well as the specific design, management, and oversight of a spatial emanator distribution program, which has the potential to significantly drive down malaria morbidity and mortality, while paving the way for other health-care related products that aren't reaching the neediest.

Achievements & Datasets

329
HOUSEHOLDS SURVEYED ON MULTI-SECTOR INDICATORS

23
KEY INFORMANTS INTERVIEWED WHO ARE LOCAL CHIEFS & LEADERS

18
FOCUS GROUP DISCUSSIONS WITH 182 FISHERS

500
MOSQUITO VECTORS COLLECTED

16
VILLAGES SURVEYED

250+
FISH SAMPLES COLLECTED

Extreme Poverty

- We are serving some of the poorest populations on the globe. The average annual income of the world's poorest as defined by the World Bank was $586 USD in 2022. In the areas where we work, the average annual income was $376 USD – nearly half.

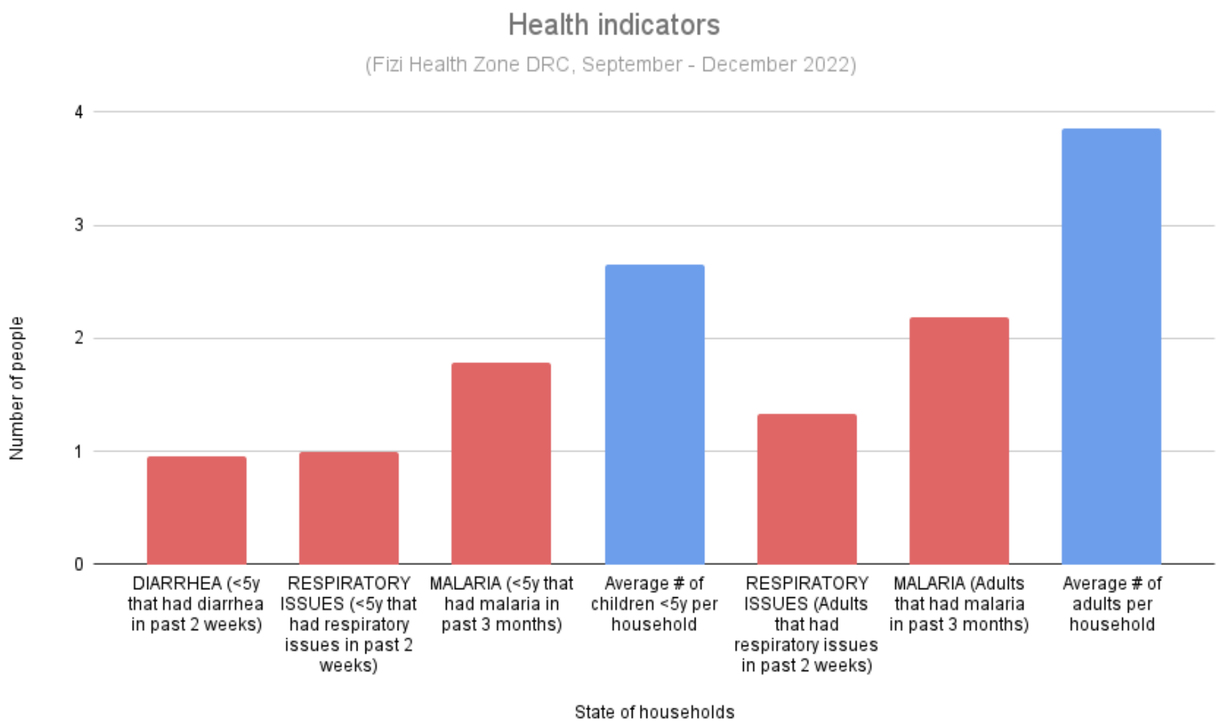
- 77% of DRC's population earns less than $1.90 per day, according to the 2021 Global Multidimensional Poverty Index (MPI). In our catchment, the amount earned was $1.03/day.

- Given decades of conflict, political instability, and high numbers of internally displaced persons (IDPs) and refugees in eastern DRC, it is likely this percentage of people living in extreme poverty is higher in areas in South Kivu and Tanganyika Provinces.

- At the end of 2022, of the 5.2 million IDPs in DRC, 4 million were in South Kivu Province.

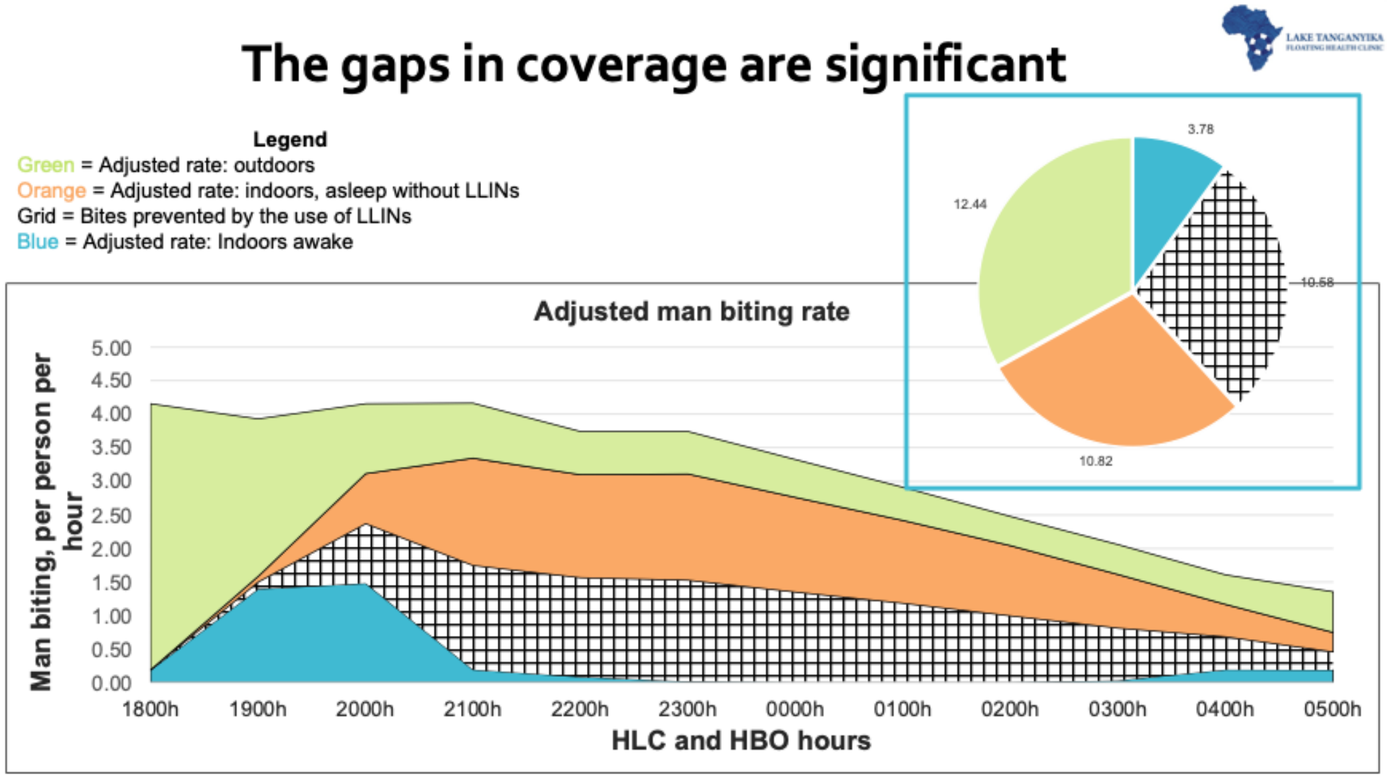
Malaria: a continued scourge

- From the key informant interviews, 100% of participants (local leaders) identified malaria as the #1 health concern, and this was further validated by the household surveys which reported 67% of children under 5 years of age had malaria at least once within the previous three months.
- According to the 2022 World Malaria Report, there were an estimated 229 million malaria cases worldwide in 2019, with 94% of cases occurring in Africa.
- Of those deaths, children under 5 years of age accounted for roughly 80%.
- The Democratic Republic of Congo (DRC) alone accounted for 13.2% of global deaths.
- Further data emphasizes the general health challenges (diarrhea and URI/pneumonia) faced by these communities.



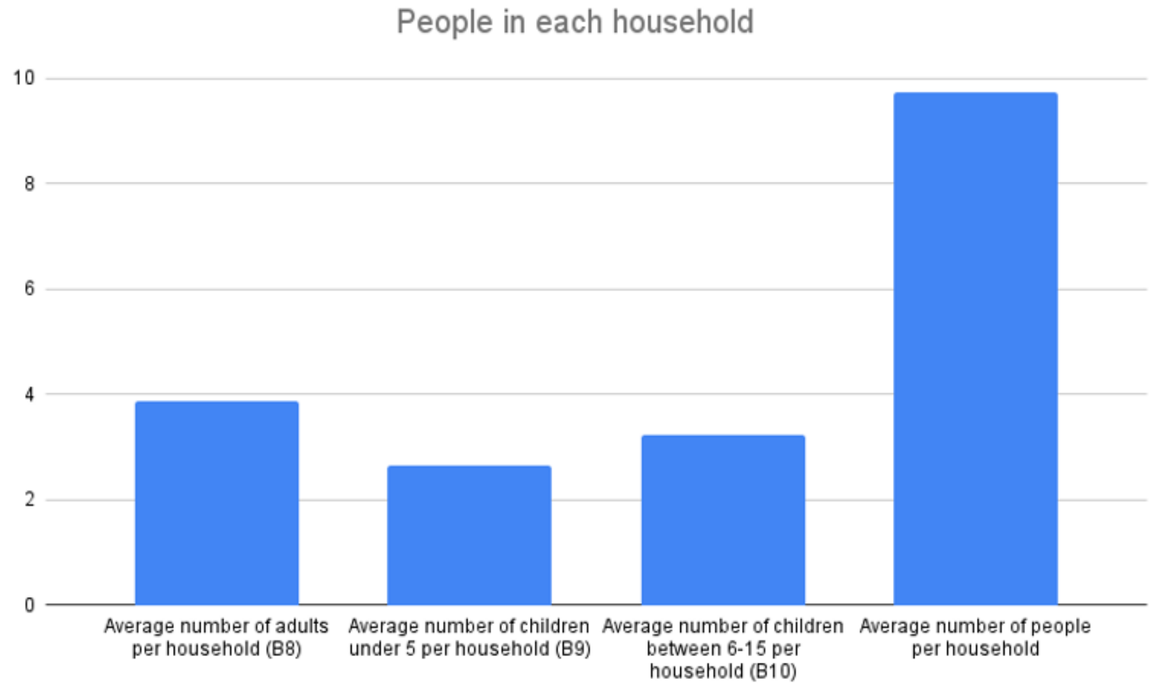
Malaria: a continued scourge

Even with regular bed net use, people are susceptible to mosquito bites before they go to sleep under the net. There are significant gaps in protection from mosquito bites and little to no protection from other vector-borne diseases. The below graph shows these gaps based on our transmission and entomological data. See below for our analysis of these gaps in protection identified from the household survey, which shows that bed nets prevent bites only ~11% of the time.



Large households in small indoor spaces

Small, vulnerable structures are sheltering large households. The average number of people in each house is 10 across all age groups. Most houses have only two to three small rooms, where there is no designated bedroom, and where people do not sleep on beds with frames but instead use rolled mats. The standard treated bed net is designed to fit on a rectangular bed frame. From a design perspective alone, it's easy to see why this tool does not work well for these communities. Additionally, it gives us insight as to why people spend so much time outdoors.



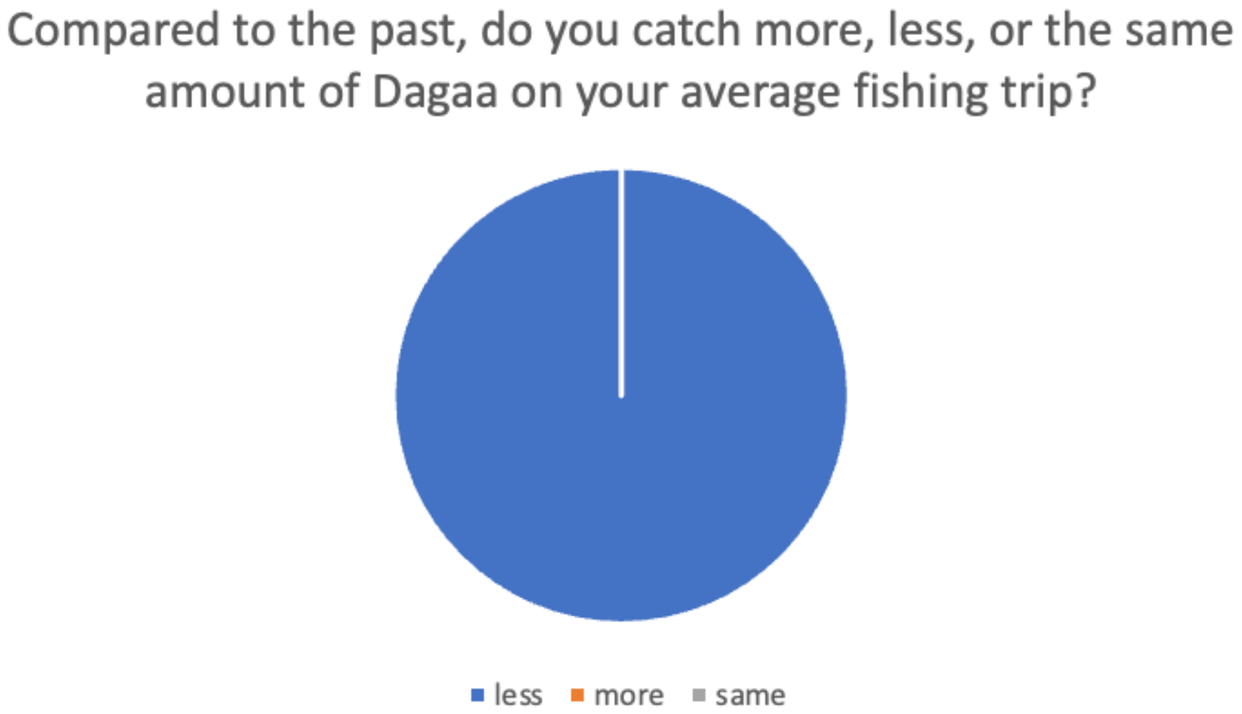
Environmental pressures and dwindling fish stock

- The environment and fisheries are under tremendous strain. Previously, generations of local people were able to support themselves and their families by fishing, but this is no longer true. Local people are turning more and more to subsistence agriculture, but without the technical knowledge and support to do so in this mountainous region, and in areas of increased physical insecurity. This often results in clear-cutting of forests, topsoil run-off, which is an added stress on fish breeding areas, as well as results in only 1-2 seasons of cultivation potential. Loss of forest canopy is devastating at both the local and global level in terms of climate stabilization.
- Of the households we surveyed, roughly 1 out of every 4 households stated that someone in their household used a bed net to fish. This indicates how widespread bed net fishing is, which negatively impacts the fisheries as well as has unintended environmental harms.
- Local fishers report significant changes and challenges. During our focus groups, one reported:

"This year the fishing has not been normal because we often fish sardines from August until February, but for three consecutive months the catches have not been present. Since our childhood we always fished and the fish were abundant every day, especially the sardines, but today there are none. And we think that this scarcity of fish may be due to the recent introduction since 2010 of the ring net (or air up net) which would have considerably reduced the fish stocks in the north of the lake by fishing on several meters of depth and by destroying the lake habitats. Since the advent of this fishing technique, fish catches have considerably decreased in the lake because the net targets fish of all sizes, especially juveniles and larvae."

Environmental pressures and dwindling fish stock

- Household surveys showed that people are catching less commercially valuable and nutrient-rich fish species than ever before. When already very poor households earn even less, this can drive desperation measures, including shoreline fishing with bed nets and other illegal gears which target juvenile fish, and particularly harmful for both commercial open-water species as well as unique and valuable biodiverse cichlid species that conservation organizations are seeking to protect.
- Of the households who fish for "Dagaa" (the Lake Tanganyika Sardine, a commercially and dietarily important fish), 100% stated that they now catch less Dagaa on their average fishing trip.



Challenges & Lessons Learned

Security & Safety Concerns

The eastern and south-eastern portions of the DRC have been conflict-heavy for decades, which can pose a significant safety challenge for us as we operate on the ground. We very carefully monitor the presence of armed groups and incidents of banditry, and our close contact with local leaders and communities help us to remain safe. However, disruptions can flare at any time, which can hinder data collection, and or any deployment activity. We continue to overcome these sorts of challenges due to our 15 years of experience operating in this context, and the continued rigor with which our team plans for our activities and monitors the local circumstances.

Lack of Infrastructure

Traveling into parts of this region to reach the most isolated, last-mile communities can pose massive logistical challenges. Road and mobile infrastructure continue to significantly lag behind other sub-Saharan countries, and as climate change intensifies in the LTB, rainy seasons bring hard and fast deluges which can overwhelm the already weak system. Flooding is very common, which can render main transportation routes unusable for months at a time. As a result, few organizations carryout programming or attempt to deliver needed health products, let alone collect the cornerstone data from these households to guide strategy. We have honed our operations for years, understanding and meeting these sorts of logistical challenges by using the waterway on boats during various seasons, as well as motorbikes and establishing relationship with local transporters to reach communities.

Loss of Key Board Members

A significant challenge for us has been the loss of two of our African Board members in two years due to cancers. Losing both Dr. Mwele Malecela (the former head of the Tanzanian National Institute for Medical Research as well as the WHO's section of Neglected Tropical Diseases) and the Hon. Louis Muderhwa (former Governor of South Kivu Province and practicing attorney) have been heavy on our organization from a personal as well as operational standpoint.

Community Engagement is Key

Working with local communities to address the challenges they identify and cope with on a regular basis is critical for success. Taking this approach enables our team to be knowledge-rich with contextual information that enables them to make the best decisions that are in line with expectations and needs of communities. Our DRC-based staff come from many of these communities, speak multiple local languages, and have extensive experience working in the region.

An Adaptive Approach is Necessary

This is so in both a logistical and programmatic sense. We elaborate many versions of our deployment plans because operational uncertainty is a constant condition we must face. Our team is always ready with continency plans in case of an unforeseen event so that we can continue to make progress in all but the most dangerous and disruptive conditions. But equally important is humility about what we know and don't know, how evidence from the ground sometimes challenges a hypothesis about what kind of aid or intervention is needed. Sometimes the right solutions to entrenched problems in the community require collaboration with other organizations with complementary expertise, and sometimes we can all be wrong about what is going to work.

Fragile, Complex Regions Call for a Multisectoral Approach

We have advocated for years, with our conviction growing ever-stronger as time passes and our experience grows, that fragile, transboundary regions where the health-environment-security nexus is most manifest require comprehensive, collaborative solutions that do not follow the usual siloed tracks in Aid and Development. This is why we continue to forge and nurture relationships with organizations from other sectors.

Outlook & Funding Needs

We won a second, multi-year grant from the JRS Biodiversity Foundation, which funds a significant portion of our current data collection work. We were also lucky to win a grant from the Kiphart Center for Global Health and Social Development in 2023, which is helping us to develop a local warehousing strategy for storing much-needed health products in these last-mile communities. However, not all our financial needs are met for our programs, nor for our core operational costs. Much of the gap is met via unrestricted grants from individual and foundation donors that are willing to invest in these core funds to the organization.

Every year, there are unfunded elements of our work. We fill these gaps with our unrestricted funding

Funding Areas 2024	Budget
Technical costs for maintaining our digital household survey tool and database	$12,500
Salaries for our DRC and US staff	$130,000
Board recruitment and development	$10,000
Identifying and hiring appropriate fundraising support	$85,000
Compliance: annual audit, accounting, US-based & DRC-based PEOs	$35,000
TOTAL	**$272,500**

Outlook & Funding Needs Cont.

Our data show a clear need for holistic programs. In our case, this includes making context-specific vector control tools available and which both acknowledges and diminishes the unintended negative consequences of older, less locally appropriate interventions.

To carry out that work, we are seeking significant partnership for that multi-year work. We believe the next most important step to evolve from our data collection, is to launch an operational research program to rollout better more effective vector control tools (spatial emanators), and to rigorously monitor and measure all the attendant variables to measure impact and cost-effectiveness. In addition, there is a strong need for community education, policy advocacy to local, regional, and international bodies, collaborative partnerships across sectors including sustainable agriculture programming, and pursuing scalability to similar complex and/or water-based communities with high vector-borne disease burdens.

Partnerships & Collaborations

Dr. Deo Mushagalusa, Centre de Recherche en Hydriobiologie, Uvira, DRC

University of Chicago, Booth School of Business & the Rustandy Center for Social Sector Innovation

University of Chicago, Kiphart Center for Global Health and Social Development

Dr. Neil Lobo, the Eck Institute for Global Health at the University of Notre Dame

The JRS Biodiversity Foundation

The Nature Conservancy

The Democratic Republic of the Congo National Ministry of Health, as well as their provincial offices

Programme National de Lutte contre le Paludisme (PNLP), as well as their provincial offices

Widder Brothers / PIC

CHICAGO BOOTH
Rustandy Center
for Social Sector Innovation

JRS Biodiversity Foundation

REP. DEM. DU CONGO
PNLP
Programme National de Lutte contre le Paludisme
MINISTERE DE LA SANTE

The Nature Conservancy

ECK INSTITUTE FOR
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Thank You

Your contribution to our organization will directly improve our ability to do this work by helping us meet current and ongoing unmet funding needs. We thank you for all that you do to keep us in field, doing what we do best.

Please get in touch!

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