GSMA



CASE STUDY

Powering Up Sustainable Fishing in Tanzania

The GSMA Innovation Fund for Climate Resilience and Adaptation



Simusolar

The GSMA Innovation Fund grant for Simusolar has supported fishers in Lake Victoria, Tanzania, with livelihoods, adapting to weather changes and sustainable fisheries management, through Internet of Things (IoT)-enabled productivity and activity-tracking equipment.

Country: Tanzania

Sector: Fisheries

Business model: B2C

Resilience capacity: Climate adaptation, preparedness and planning

Digital channels: IoT, mobile app

Problem addressed: Providing farmers in Nigeria with access to agricultural advisory and financial services

Stakeholders: Fishers, boat owners

Find out more: simusolar.com

SIMUSOLAR PROJECT OUTCOMES, NOVEMBER 2022–APRIL 2024

1.7k **people reached**

340 **fishers supported** to adapt to climate change shocks

160 **fishers switched** from kerosene lamps to **solar-powered lights**

100% of lost or stolen **lights recovered**

About Simusolar

Simusolar is a Tanzania-based social enterprise working to transform agriculture and fisheries in East Africa through affordable solar-powered technology. Its mission is to empower rural livelihoods by providing smallholder farmers and fishers with accessible tools designed to increase productivity and income, such as solar water pumps and fishing lights. Simusolar's inclusive model features pay-as-you-go (PAYG) financing, after-sales support and tailored products for off-grid communities. Through a combination of clean energy innovation and user-focused design, Simusolar helps build resilience to climate change while promoting sustainable growth and rural development.

Introduction

Impacts of climate change on fishers in Tanzania

Lake Victoria, Africa's largest freshwater lake, is shared by Tanzania, Uganda and Kenya, with its fisheries playing a vital role in the economies of all three East African nations.[1] However, climate change is increasingly threatening the lake's ecosystem and the livelihoods of fishers who depend on it. Rising temperatures, shifting rainfall patterns and environmental degradation are disrupting the lake's delicate balance while fishing communities struggle with lost income and food insecurity.

For the predominantly rural, low-income households in these communities, such shocks can be devastating. Incomes drop and food insecurity rises as families struggle to afford alternative protein sources or offset lost earnings from fishing. Some surveys of these fishing communities have found that households have very limited capacity to adapt financially to the environmental impacts of climate change and, although they are aware of changing conditions, lack effective strategies to secure reliable income and food.[2]

Due to the introduction of large predatory fish species, Lake Victoria's fisheries are dominated by three species: the Nile perch, the Nile tilapia, and the native silver cyprinid, a sardine-like fish known as "dagaa" in Tanzania.[3] Dagaa fishers in Lake Victoria fish at night, using kerosene lamps or LED lights suspended just above the water to draw phototactic zooplankton and other small aquatic organisms to the surface, which in turn attracts dagaa to the surface to prey on these organisms.[4] This nightly constellation of boat lights has become a hallmark of the lake's fishing culture. However, the use of kerosene lamps has several negative effects: it contributes to pollution of the lake; emits black carbon; exposes fishers to risks of burns; and has relatively higher operational costs for fishers compared to LED lighting.

Unsustainable practices, such as illegal use of fine mesh nets that trap juvenile dagaa, and spoilage and contamination from sun drying on beaches, are placing fish stocks under pressure. Cage aquaculture presents new challenges as fish farmers and wild-capture fishers compete for space and cages are placed in sensitive breeding areas, which risk disturbing dagaa reproduction.[5]

Addressing these challenges is crucial to safeguarding Lake Victoria's dagaa fishing economy and the livelihoods of the fishers and fish processors or traders, most of whom are women.

1. Lake Victoria Fisheries Organisation. (2022). *A Report of the Lake Victoria 2021 Hydro-Acoustic Survey and Reanalysis of Historical Data (2007–2021)*.
2. Nyober, E. et al. (2022). "Climate change adaptation and adaptive efficacy in the inland fisheries of the Lake Victoria basin". *People and Nature*. Vol. 4, Issue 5.
3. Marshall, B.E. (2018). "Guilty as charged: Nile perch was the cause of the haplochromine decline in Lake Victoria". *Canadian Journal of Fisheries and Aquatic Science*. Vol. 75, No. 9.
4. Proud, R. et al. (2020). "Automated classification of schools of the silver cyprinid *Rastrineobola argentea* in Lake Victoria acoustic survey data using random forests". *ICED Journal of Marine Science*. Vol. 77, Issue 4.
5. One Earth Future. (2018). "Photo Essay. Dagaa. Tiny Fish. Major Impact".

About the GSMA Innovation Fund project

Simusolar is one of the startups supported by the GSMA Innovation Fund for Climate Resilience and Adaptation, which was launched in 2022. This initiative is funded by the UK Foreign, Commonwealth & Development Office (FCDO), the Swedish International Development Cooperation Agency (Sida) and is supported by the GSMA and its members.

The project spanned 21 months from November 2022 to July 2024. With the support of the Innovation Fund, Simusolar launched an IoT-enabled fishing light, called Nuru, to support more sustainable fishing practices. Nuru is an energy-efficient, trackable and remotely controlled light that integrates with a mobile app to manage fishing operations, monitor weather and track usage. The solution, which provides anonymised data, was designed to support efforts by Tanzania's Ministry of Fisheries to digitalise fishing activities.



How does the solution work?

Simusolar's Nuru fishing lights are IoT-enabled, solar-powered LED systems designed to replace kerosene lamps for night fishing on Lake Victoria. Each system includes four waterproof LED lights, a 200-watt (W) solar panel and float stands. The lights operate for up to 11 hours overnight and feature adjustable brightness (6–9.2 W) to attract dagaa. A digital display shows device status and a wireless interface enables automatic payment updates. By eliminating fuel costs and reducing maintenance, Nuru lights enhance safety, increase fishers' income and mitigate environmental impacts.

An accompanying mobile app enhances the functionality of Nuru fishing lights by allowing fishers to remotely control and monitor their equipment. Simusolar provides packages that include a smartphone for fishers who do not currently own one, albeit at a higher cost.

Key features of the app:

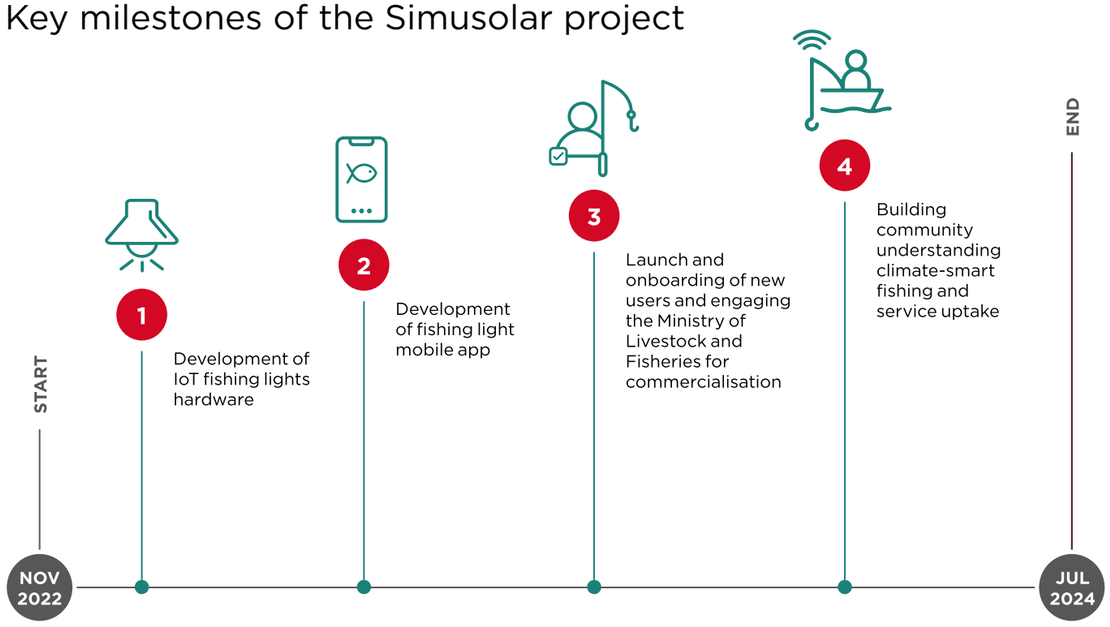
- Users can turn lights on or off and adjust brightness levels directly from their smartphone
- Enables lights to flash, helping fishers easily locate their equipment among many on the lake
- Fishers can make payments and manage their accounts through the app using a PAYG system
- Multiple devices can be grouped for bulk payments, simplifying financial management for fishers operating several lights
- AirLink technology helps users locate their devices via a network of compatible devices
- Fishers can access a weather forecast feature

Together, these features aim to improve the efficiency, safety and economic viability of night fishing operations for communities around Lake Victoria.

Key project activities

Figure 1

Key milestones of the Simusolar project



Launching solar fishing lights and mobile app

Simusolar's strategy was to distribute solar fishing lights to fishers, particularly around Lake Victoria. It introduced its Nuru lights, continually improving the product based on feedback from users. Issues such as overheating and water ingress were resolved, and features like AC charging for the hardware and weather forecasting on the mobile app were added.

The startup partnered with Vodacom Tanzania, Airtel Tanzania and Tigo Tanzania to enable mobile money API integration and bulk SMS services. These partnerships, which were in place prior to GSMA Innovation Fund support, were vital in enabling fishers to make PAYG payments for fishing lights and communicating effectively with fisher clients via SMS. As highlighted in past GSMA research, PAYG drives mobile money use and digital inclusion, making PAYG service providers an attractive partner for mobile network operators (MNOs).[6]

6. GSMA. (2020). "What is the value of pay-as-you-go solar for mobile operators?".

Lesson 1

Disruptive technologies can encounter regulatory scrutiny and challenges

The project encountered regulatory challenges that affected its progress. Lead acid battery lights have gained traction locally as an alternative to kerosene lamps, which meant bringing in a disruptive alternative required close stakeholder engagement. Initially, Simusolar aligned with the Tanzanian Ministry of Livestock and Fisheries regulations, but subsequent changes introduced additional testing requirements and restrictions, leading to delays. The price of the fishing light compared to competitors, alongside a seasonal ban on fishing lights, affected market reach.

During this period of regulatory uncertainty, Simusolar shifted its focus to building a stronger foundation for long-term adoption. This included gathering clear quantitative evidence of Nuru's effectiveness in catching dagaa, educating fishers on its economic benefits and improving affordability and functionality through a design iteration.

Despite the setbacks, Nuru proved its value. Once on the market, the lights sold quickly to more than 1,000 fishers. Simusolar's experience highlights the challenges of navigating local regulatory and political dynamics when deploying disruptive technologies. Simusolar plans to refine its strategies to align more closely with regulatory frameworks and expand its market presence, while continuing to support sustainable fishing and enhance rural incomes in Tanzania and beyond.

Simusolar also conducted market research in regions such as Lake Nyasa in Tanzania and Lake Victoria in Uganda, where recent legal changes have opened new opportunities. These efforts have begun to yield results, as fishers on 10 beaches who saw Nuru in use expressed strong interest. While fishing practices vary across regions, the adaptability of the Nuru light makes it a practical and relevant tool for fishers across East Africa.

Lesson 2

Designing for trust and connectivity in low-digital contexts

Responses to the mobile app were mixed. While some fishers appreciated features like remote light control and weather updates, others expressed discomfort with the app, citing concerns with surveillance or feeling a loss of control. Many users were unfamiliar with map-based interfaces and preferred simple written lists of beach names for weather tracking. In areas with limited or unreliable mobile data connectivity, certain app functions, like token delivery, were inconsistent. To address this, Simusolar developed an SMS-based workaround to ensure reliable access to essential services and payment verification. This highlighted the importance of user trust, familiarity and offline functionality.

Lesson 3

Investing in education is crucial for long-term behaviour change

One major lesson was that many fishers lacked a clear understanding of their operational costs. Since fuel accounts for most of their expenses, the relative cost and benefit of the lights were often unclear. Educational efforts were crucial in shifting perceptions, helping fishers see the value of modest increases in catch. Interestingly, perceived value often mattered more than price itself. Simusolar will need to actively engage with its market to improve financial literacy, tailor how it communicates the value of its product and support behaviour change over time.

Building climate resilience

Overall impact

Simusolar supported Tanzania's dagaa fishing communities to build resilience to climate change. A typical user of its fishing light services is a male fisher or boat owner who is approximately 46 years old and educated to primary school level. By providing IoT-enabled solar fishing lights and a weather information service, the startup improved both the capacity of fishers to adapt to changing climate conditions and the environmental sustainability of dagaa fishing. The following achievements were noted during the grant period:

- **1,700 people** reached
- **340 fishers supported** to adapt to climate change shocks
- **160 fishers switched** from kerosene lamps to **solar-powered lights**
- **100%** of lost or stolen **lights recovered**

A separate effort to engage fish dryers, primarily women, through smartphone use and collaboration with fishers saw limited success. Dryers do not fish, own lights or use smartphones, and fishers prioritised catch volume over post-catch activities. Despite these challenges, Simusolar's own study revealed that 38% of fishers reported catch increases of more than 50%.

A nine-day fish catch comparison across 12 lake locations showed that Simusolar's fishing lights outperformed competitors by 15% in bucket count of dagaa. Even the lower powered 6 W version outperformed others at times. Conducted in front of fishers, the tests helped shift perceptions and increased demand, with some fishers making advance payments even before the lights were in stock.

During the GSMA project, 340 fishers purchased solar light IoT kits. A baseline study found that 47% of users had previously used kerosene lamps, signifying a major shift to Simusolar's lights and the potential impact of targeting kerosene users, especially in remote areas. Fishers on smaller water bodies may also be an untapped market, as fishers on Lake Victoria appear to be relatively advanced in technology adoption.

What's next?

Strengthening commercial viability

To better align with the cash flow of small-scale fishers, Simusolar piloted a daily payment plan. While the total cost of the solar light remains unchanged, the flexible pricing structure, combined with improved product durability, has increased both perceived value and adoption. This mirrors broader trends in pay-as-you-go (PAYG) sales, where increased flexibility has been shown to benefit both customers and providers.[7] Simusolar is also looking at reducing its design costs to make its pricing more competitive, as well as a rental model to reduce credit risk and offer more flexible pricing. It also launched an in-house light in response to declining third-party product quality – vital for maintaining the integrity of its brand.

Simusolar's growth strategy remains centred on its core offerings, such as solar irrigation systems and water pumps. To scale these solutions, the company is seeking equity investment in 2025 and is exploring mergers and franchising opportunities to enter new markets. In addition, Simusolar is preparing to expand into Uganda, where recent regulatory changes around fishing light usage have opened a promising opportunity to introduce its Nuru lights to local communities.

7. Lang, M. (2025). "Sunny prospects for remote and low-income households: The next generation of PAYGo solar contracts". World Bank.

Endnotes

1 Lake Victoria Fisheries Organisation. (2022). *A Report of the Lake Victoria 2021 Hydro-Acoustic Survey and Reanalysis of Historical Data (2007–2021)*.

2 Nyober, E. et al. (2022). "Climate change adaptation and adaptive efficacy in the inland fisheries of the Lake Victoria basin". *People and Nature*. Vol. 4, Issue 5.

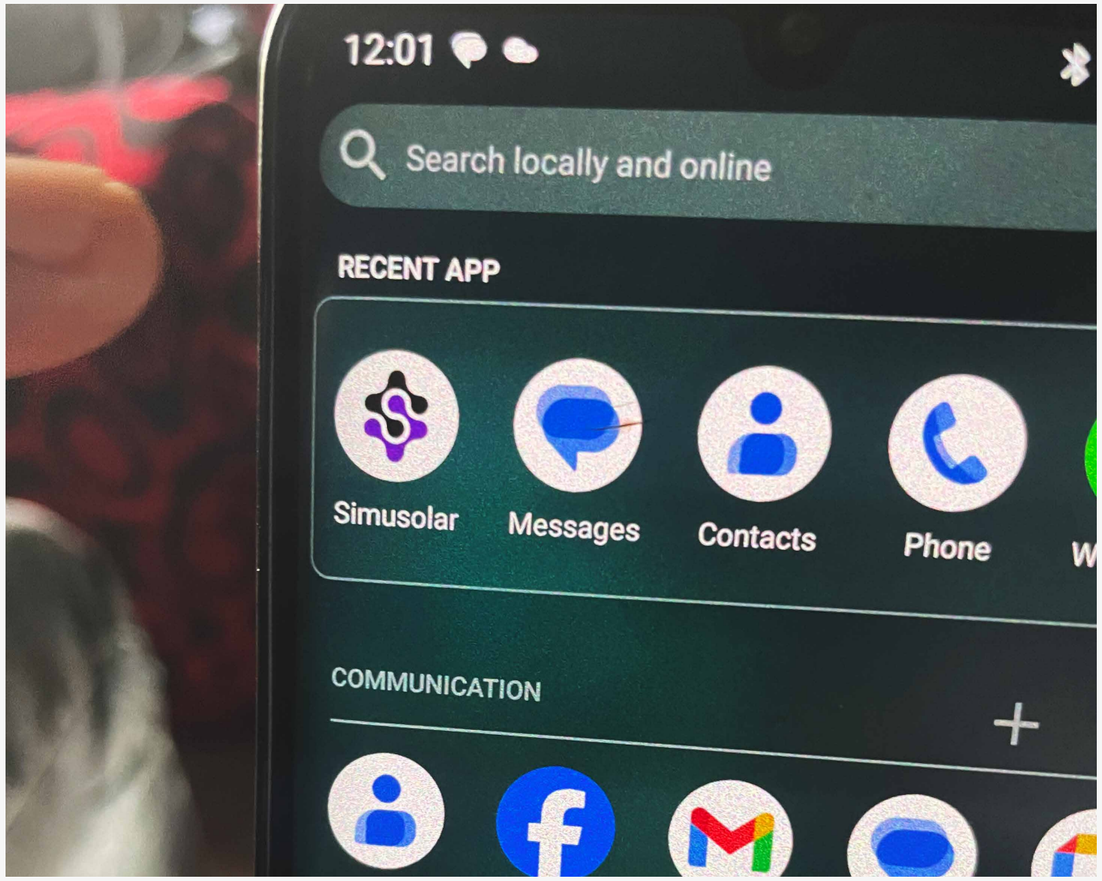
3 Marshall, B.E. (2018). "Guilty as charged: Nile perch was the cause of the haplochromine decline in Lake Victoria". *Canadian Journal of Fisheries and Aquatic Science*. Vol. 75, No. 9.

4 Proud, R. et al. (2020). "Automated classification of schools of the silver cyprinid *Rastrineobola argentea* in Lake Victoria acoustic survey data using random forests". *ICED Journal of Marine Science*. Vol. 77, Issue 4.

5 One Earth Future. (2018). "Photo Essay. Dagaa. Tiny Fish. Major Impact".

6 GSMA. (2020). "What is the value of pay-as-you-go solar for mobile operators?".

7 Lang, M. (2025). "Sunny prospects for remote and low-income households: The next generation of PAYGo solar contracts". World Bank.





Conclusion

With the support of the GSMA Innovation Fund for Climate Resilience and Adaptation, Simusolar has made significant progress in tackling the climate-related challenges faced by fishers on Lake Victoria in Tanzania. By introducing IoT-enabled solar fishing lights and an accompanying mobile app, Simusolar has helped fishers reduce reliance on kerosene, lower operational costs and improve safety during night fishing. The solution has also supported sustainable fisheries management and provided a foundation for digitalising fishing activity through data collection and weather-informed planning.

Despite regulatory hurdles and mixed responses to digital tools, Simusolar has demonstrated the potential of inclusive, clean energy innovations to strengthen rural livelihoods and enhance climate resilience in the fisheries sector.

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