



# Emerging Trends in Climate Tech Innovations

The GSMA Innovation Fund for  
Climate Resilience and Adaptation

The GSMA is a global organisation unifying the mobile ecosystem to discover, develop and deliver innovation foundational to positive business environments and societal change. Our vision is to unlock the full power of connectivity so that people, industry, and society thrive. Representing MNOs and organisations across the mobile ecosystem and adjacent industries, the GSMA delivers for its members across three broad pillars: Connectivity for Good, Industry Services and Solutions, and Outreach. This activity includes advancing policy, tackling today's biggest societal challenges, underpinning the technology and interoperability that make mobile work, and providing the world's largest platform to convene the mobile ecosystem at the MWC and M360 series of events.

We invite you to find out more at [gsma.com](https://gsma.com)

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## The GSMA Innovation Fund

The GSMA Innovation Fund drives innovative digital solutions with positive socio-economic or environmental impact in low- and middle-income countries and supports local entrepreneurs on their journey to scale. We believe digital solutions have the power to sustainably reduce inequalities within our world.

To find out more about our past innovation funding, please visit: [gsma.com/mobilefordevelopment/the-gsma-innovation-fund/](https://gsma.com/mobilefordevelopment/the-gsma-innovation-fund/)



This initiative has been funded by UK Aid from the UK Government and is supported by the GSMA and its members.

The views expressed do not necessarily reflect the UK Government's official policies.

The GSMA ClimateTech programme unlocks the power of digital technology in low- and middle-income countries to enable their transition towards a low-carbon and climate resilient future. We do this with the collective support of the mobile industry, as well as public and private actors. Through our research and in-market expertise, we catalyse strong partnerships, facilitating innovative digital solutions that address key challenges. Our work spans climate mitigation, adaptation and resilience strategies across the globe.

For more information about the ClimateTech programme, visit [gsma.com/mobilefordevelopment/climatetech/](https://gsma.com/mobilefordevelopment/climatetech/)

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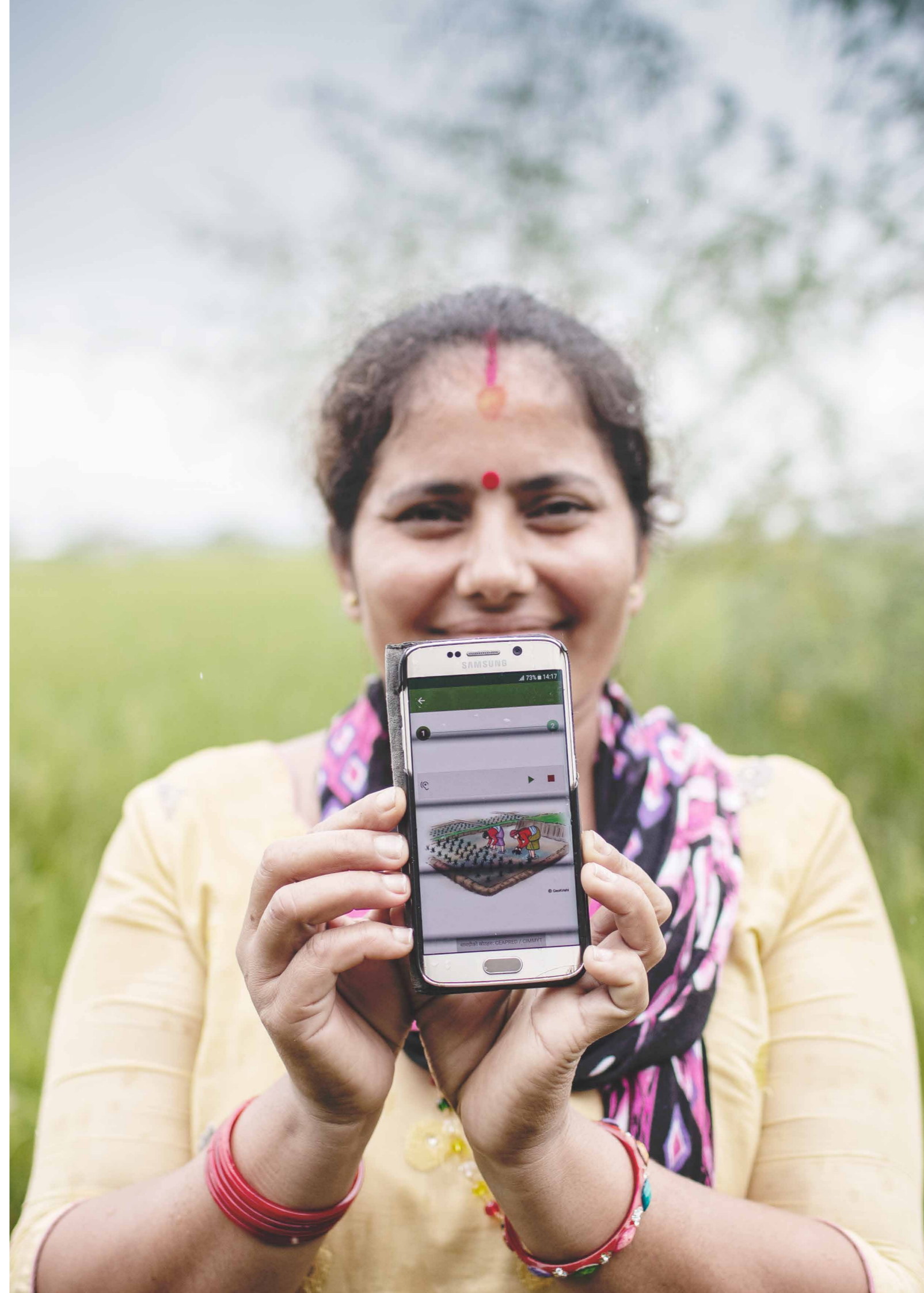
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## Executive summary

### Tackling climate change with mobile and digital solutions

Climate change is having severe impacts across the globe, especially in low- and middle-income countries (LMICs). Research from the GSMA ClimateTech programme shows that mobile and digital technology is uniquely placed to provide and enable tools that help communities not only survive climate shocks, but thrive in spite of them.<sup>1</sup>

However, there is still much to learn about the types of technologies and use cases that can strengthen climate resilience and adaptation most effectively, as well as the partnerships and ecosystems needed to create sustainable change.

With this in mind, in 2021 the GSMA, UK Foreign, Commonwealth & Development Office (FCDO) and the Swedish International Development Cooperation Agency (Sida) announced the launch of [The GSMA Innovation Fund for Climate Resilience and Adaptation](#).

The objective of the fund is to help accelerate the testing, adoption and scalability of digital innovations that enable the world's most vulnerable populations to adapt to, anticipate and absorb the negative impacts of climate change.

From more than 500 applicants, **12 successful organisations** from across Africa and Asia were selected. They will receive between £100,000 and £250,000 in grant funding, as well as technical assistance and dedicated support from the GSMA in their journey to scale.

### Emerging trends in climate innovations

The GSMA ClimateTech programme analysed the Innovation Fund applications to explore and identify trends. This exercise revealed that:

- **Climate concepts can be challenging.** Key terms were often misunderstood by applicants, highlighting the need to strengthen knowledge among digital innovators and broader stakeholders on this topic.
- **Agricultural solutions dominated the applications,** a sign there is growing awareness of the linkages between agriculture and climate change. There is scope for more testing and support for impactful projects across additional sectors.
- **The most popular technologies used by start-ups were traditional ones** like mobile apps or mobile money. The **use of innovative technologies**, such as artificial intelligence (AI) or the use of big data, is emerging but still nascent.
- **A minority of start-ups had women in leadership roles.** However, we were encouraged to find that **42% of all projects had women or girls as their primary target user.**
- **Solutions focused on building individual resilience.** Few projects targeted government or local authorities, and those that did indicated challenges in generating revenue. Given the importance of collective action, there is scope for more evidence on successful business models that can effectively engage public and private institutions.

1. GSMA (2021). *The Role of Digital and Mobile-Enabled Solutions in Addressing Climate Change*.

# The GSMA Innovation Fund for Climate Resilience and Adaptation

The GSMA Innovation Fund for Climate Resilience and Adaptation was launched at COP26 in November 2021.

The fund was designed to support start-ups, small and medium enterprises (SMEs) and social enterprises in leveraging mobile and digital technology to build the climate resilience of vulnerable low-income communities and marginalised groups in Africa, Asia-Pacific, the Caribbean, Latin America and Eastern Europe.<sup>2</sup>

The 12 successful start-ups will receive an equity-free grant of between £100,000 and £250,000 to pilot and scale their innovation over 18 months, with additional benefits such as GSMA-facilitated industry partnerships, mobile and digital technical assistance, monitoring and evaluation and market expertise from GSMA staff, as well as a platform to raise the profile of their organisation to potential investors.

In this context, **climate resilience**<sup>3</sup> is defined as supporting communities and vulnerable groups to:

- **Adapt** to multiple, long-term and evolving climate change risks (e.g., through precision agriculture and long-term weather forecasting)
- **Anticipate** climate variability and risks from extreme climate events, thus supporting preparedness and planning (e.g., through early warning systems)
- **Absorb** adverse conditions, emergencies or disasters (e.g., through access to credit and insurance in the event of a climate disaster)

The GSMA ClimateTech programme seeks to unlock the power of mobile and digital technology for climate action. The programme has adapted the United Nations Sustainable Development Goal (SDG) definition of **climate action**<sup>4,5</sup> for its own work to include:

- Actions taken to reduce greenhouse gas emissions and thus **mitigate climate change**
- Actions taken to **build the resilience** of the most vulnerable communities to climate change stressors and threats
- Actions that **drive sustainable use, management and protection of natural resources** and the environment in areas most vulnerable and exposed to climate change stressors

12 successful start-ups will receive an equity-free grant of between **£100k - £250k**

2. Please see the [Terms and Conditions](#) for details on the types of organisations the Innovation Fund sought to support and the eligibility criteria for applications.  
 3. ODI (2015). *The 3As: Tracking Resilience Across BRACED*.  
 4. UNDP (2022). *Climate Action from the Ground Up. Supporting Cities and Local and Regional Governments to Achieve the Paris Agreement*.  
 5. United Nations Sustainable Development Goals (2022). "Climate Action".

# The cohort

12 start-ups, 10 countries



# Innovation Fund application trends

In February 2021, the ClimateTech programme published *The Role of Digital and Mobile-Enabled Solutions in Addressing Climate Change*. This report discusses seven areas in which digital technologies can be used to combat climate change: clean energy and energy efficiency; transport, mobility and logistics; natural resource management and forestry; agriculture; managing water solutions; waste management and circular economy solutions; and disaster preparedness and response. It also explores the use of mobile and digital solutions for climate finance, and the application of frontier technologies. Within these themes, we identified high-potential interventions based on their impact on climate change mitigation, adaptation and resilience, as well as the extent to which mobile and digital solutions promise transformational change.

Through the GSMA Innovation Fund for Climate Resilience and Adaptation, we set out to find and select innovative grassroots solutions to address climate change. While it is merely indicative, the pool of applicants offers valuable insight into the digital innovations that start-ups, SMEs and social enterprises are currently using. The GSMA ClimateTech programme analysed the eligible<sup>6</sup> applications to observe trends and study the range of local solutions being used to build climate resilience and adaptation in LMICs. These are detailed in the following chapter.

6. The GSMA Innovation Fund for Climate Resilience and Adaptation received a total of 524 applications. Of this total number, 341 (65%) from 59 countries clearly articulated their contribution to climate action in their application - a key eligibility criteria. The trends analysis focuses only on the 341 eligible climate action-related submissions received.

## KEY TAKEAWAYS



**HIGH REPRESENTATION OF LOCALLY LED INNOVATION, PARTICULARLY FROM AFRICA**



**CLIMATE TERMINOLOGY CAN BE CHALLENGING**



**STRONG FOCUS ON AGRICULTURE AND SERVING SMALLHOLDER FARMERS**



**MOBILE APPS ARE THE MOST COMMONLY USED TECHNOLOGY**



**MOST PROJECTS FOCUS ON CLIMATE ADAPTATION**



**APPLICATIONS ADDRESS WOMEN AND GIRLS AS USER GROUPS, BUT MORE FEMALE INNOVATORS ARE NEEDED**



**MOST BUSINESS MODELS USE DIRECT SALES TO CONSUMERS**



**SOLUTIONS FOCUS MORE ON INDIVIDUAL RESILIENCE THAN ENABLING ENVIRONMENTS**



**NEEDS AND ADDED VALUE MUST BE CLEARLY ARTICULATED TO SECURE MOBILE OPERATOR PARTNERSHIPS**

# High representation of locally led innovation, particularly from Africa

# 90%

solutions designed and delivered locally



The fund particularly encouraged applications from local entrepreneurs, seeking strong representation of homegrown talent at all levels of the organisation.



The vast majority (90%) of projects were being developed in-country. This is a positive trend as locally led adaptation solutions in which community actors are closely involved in the design, planning, implementation and key decision-making of the projects, are critical to effective and sustainable climate resilience and adaptation solutions.



Although the Innovation Fund was open to applicants from Africa, Asia-Pacific, the Caribbean, Latin America and Eastern Europe...

# 78%

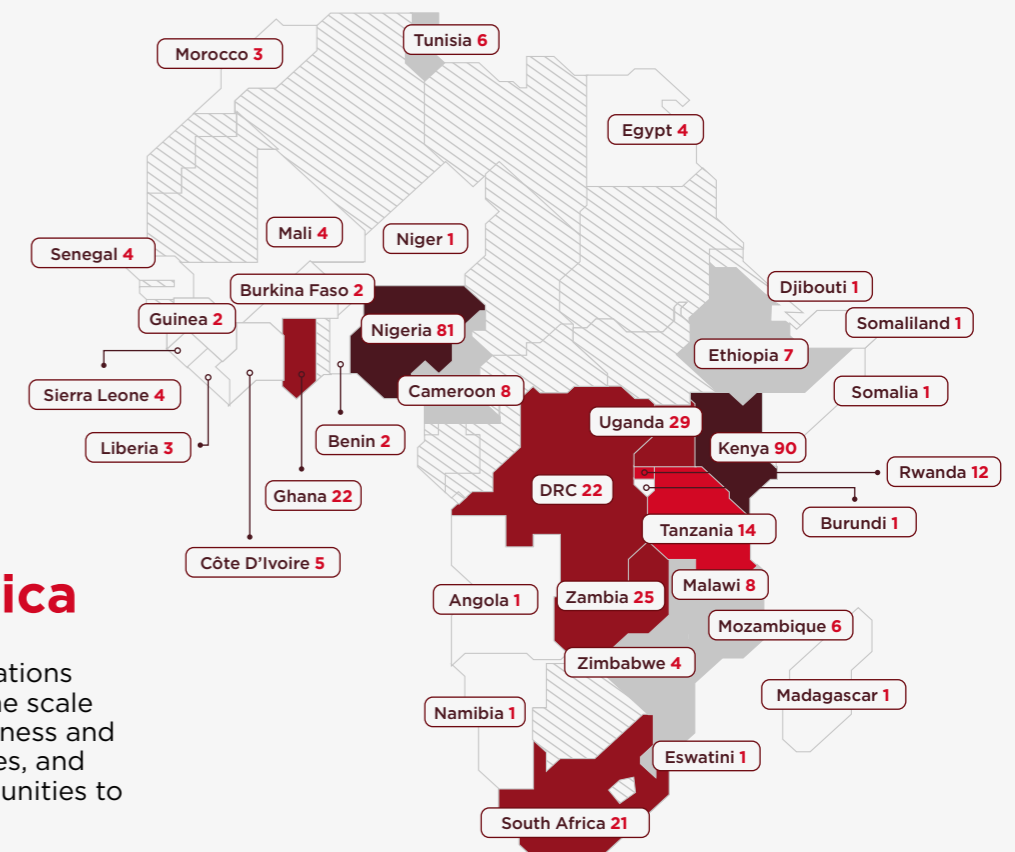
of the projects were based in Africa while

# 19%

were based in Asia.



There were fewer applications from Latin America, the Caribbean and small island states. This is not a reflection of a lack of climate vulnerability and can be attributed to lower GSMA outreach in these regions.

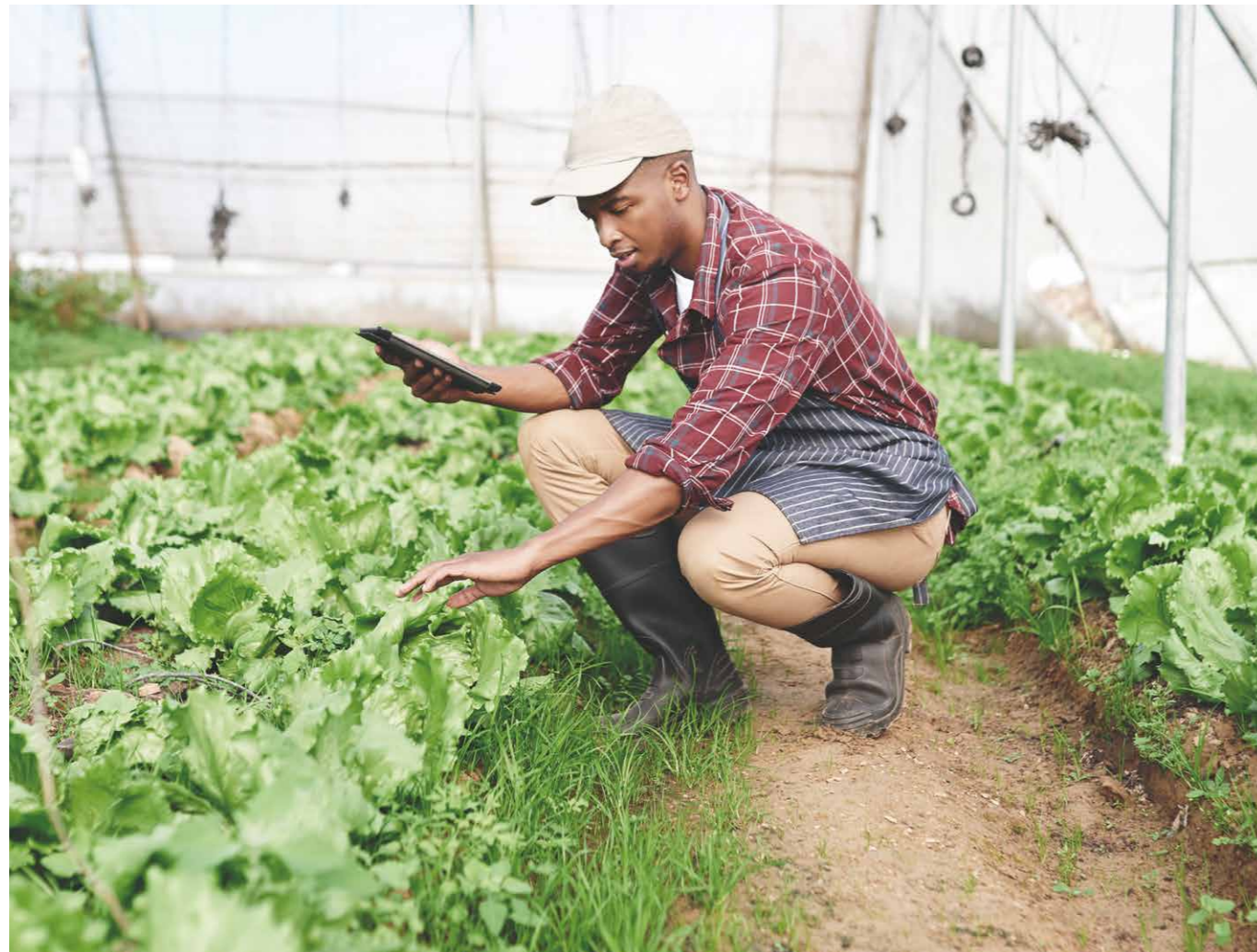


## Pitches from Africa

The high number of applications from Africa also point to the scale of entrepreneurship, awareness and recognition of climate issues, and the need for African communities to prepare and adapt.

## Climate terminology can be challenging

- While we seem to have come a long way from climate denial to recognising climate change as an urgent issue, the language surrounding climate action is less well understood. Climate resilience and adaptation are particularly challenging to understand, and **in the applications key concepts and terminology were often misunderstood.**
- Many projects addressed multiple climate action issues. **However, applicants often misjudged or overreported the capacity of their project to strengthen climate resilience.**
- For example, while 52% of applicants stated that their project aimed to improve “anticipatory capacities”, the GSMA’s evaluation revealed that only 14% specifically targeted capacity building in this area.
- This points to a **need for better understanding of key climate concepts among digital innovators and other stakeholders.**
- It also highlights considerations for ongoing funding in this area, as well as an **opportunity to close the gap between donor and implementer language when talking about climate resilience and adaptation.**

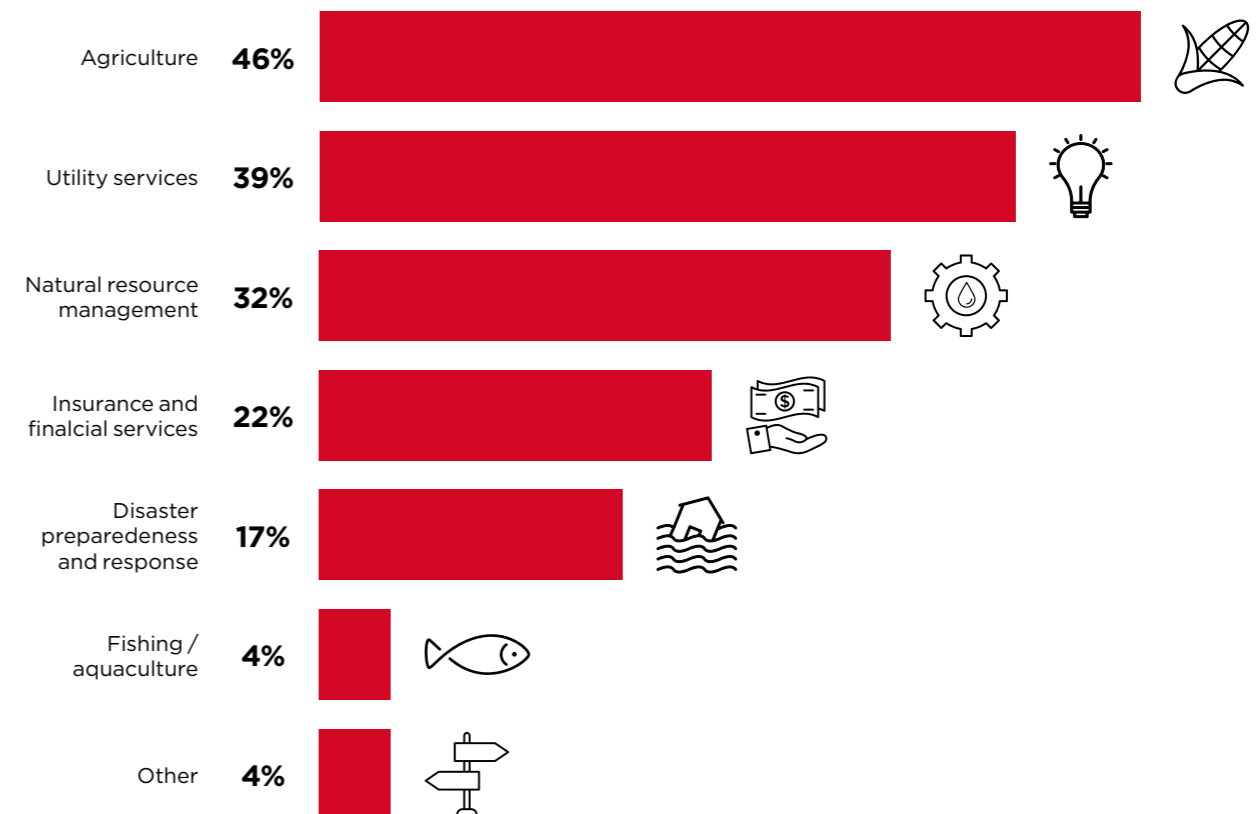


## High prevalence of agricultural solutions serving smallholder farmers

- Agricultural solutions dominated the pool of applications, with 46% of projects focusing on this sector** (Figure 1), particularly in North, East and West Africa and South Asia. This ranged from projects that offered climate-smart agricultural services to improve efficiencies, to weather forecasting or credit and insurance to help absorb the risks of climate shocks and stressors.
- Consequently, **smallholder farmers were the most common target user group** across the projects submitted.
- This highlights a **growing awareness of the linkages and dependencies between agriculture and climate change.**
- However, it also suggests there is **scope for additional support and testing for other sectors** that can build climate resilience, mitigate climate change or safeguard natural resources and the environment in areas with climate-vulnerable communities. The interconnectedness of these issues needs to be better understood and explored, particularly in complex projects addressing multiple areas of climate action.

Figure 1

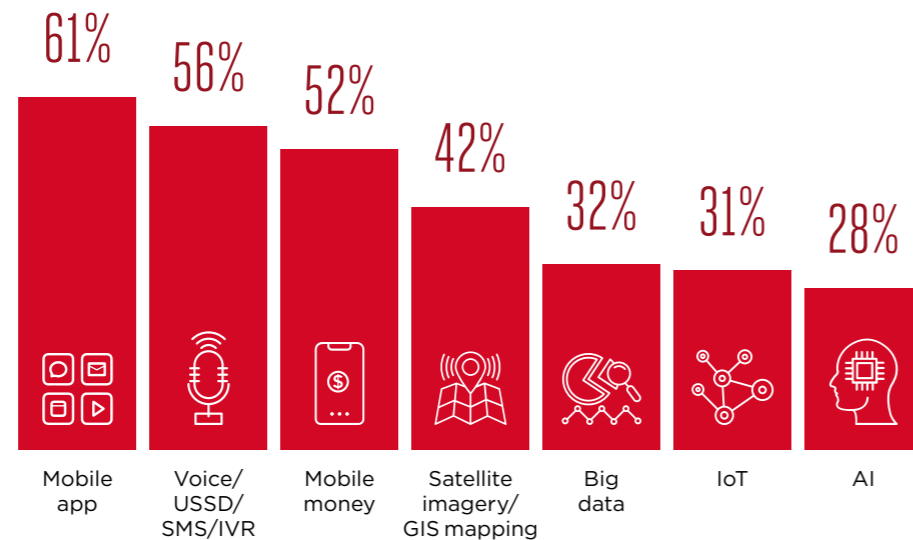
### Applications, by sector



## Mobile apps are the most commonly used technology feature

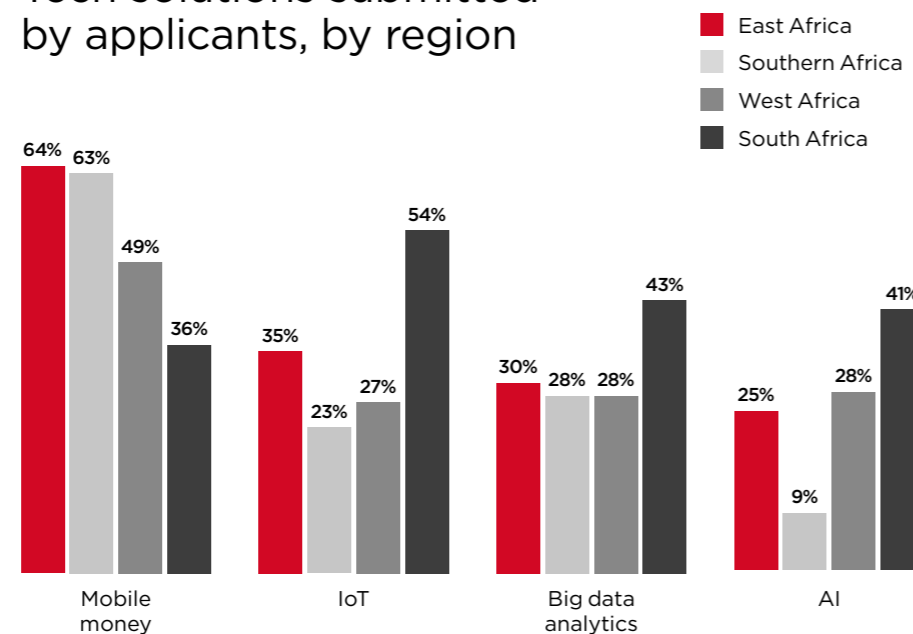
- Most of the applicants planned to use a combination of innovative technologies as part of their projects (Figure 2).
- The most popular solutions were more traditional ones, such as mobile apps (61%) and mobile money (52%).
- The use of emerging technologies, such as blockchain, big data analytics and AI, were proposed by less than a third of applicants.
- Regionally, more projects in Asia used frontier technology, while there was greater interest in the use of mobile money in Africa (Figure 3).

Figure 2  
Tech solutions submitted by applicants



Source: Applications for GSMA Innovation Fund for Climate Resilience and Adaptation, 2022

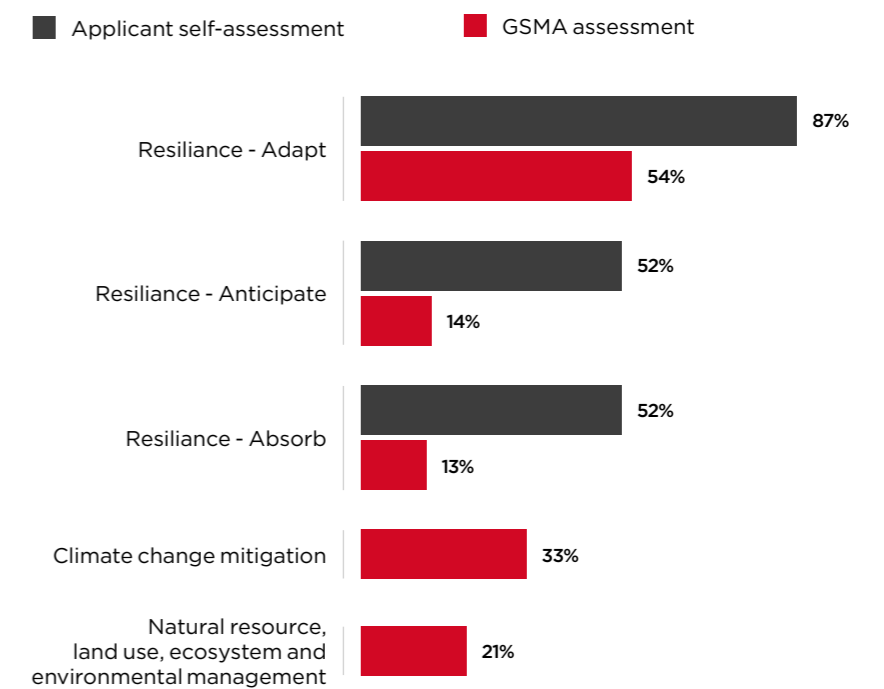
Figure 3  
Tech solutions submitted by applicants, by region



## Most projects focus on climate adaptation

Applicants were asked to identify which resilience capacities their project sought to improve, with the option to select more than one (Figure 4). Alongside their own assessment, we reviewed each submission to evaluate which of the three climate resilience capacities the project was targeting. As highlighted on page 10, GSMA and applicant evaluations often differed.

Figure 4  
Resilience capacity of applications



Source: Applications for GSMA Innovation Fund for Climate Resilience and Adaptation, 2022

### START-UP SPOTLIGHT

EXPLORE HOW **SIMUSOLAR** IS STRENGTHENING CLIMATE RESILIENCE AND ADAPTATION IN TANZANIA.

- Most (87%) projects sought to improve people's capacity to adapt to climate change.
- Regional trends were consistent with the global picture. However, applicants from South Asia placed greater emphasis on improving anticipatory capacities, due to the region's high exposure to extreme weather events.
- A third (32%) of projects sought to mitigate climate change through solutions related to clean renewable energy, the circular economy and waste management, efficient and green transport or carbon sequestration.
- One in five (21%) applications had a full or partial focus on sustainable natural resource, land use, ecosystem or environmental management.
- Projects focusing on ecosystem and species conservation often struggled to articulate the linkages to climate change or make a detailed connection to how these interventions could improve the lives of vulnerable local communities living in or near the project area. Some also conflated the climate crisis with wider environmental issues.

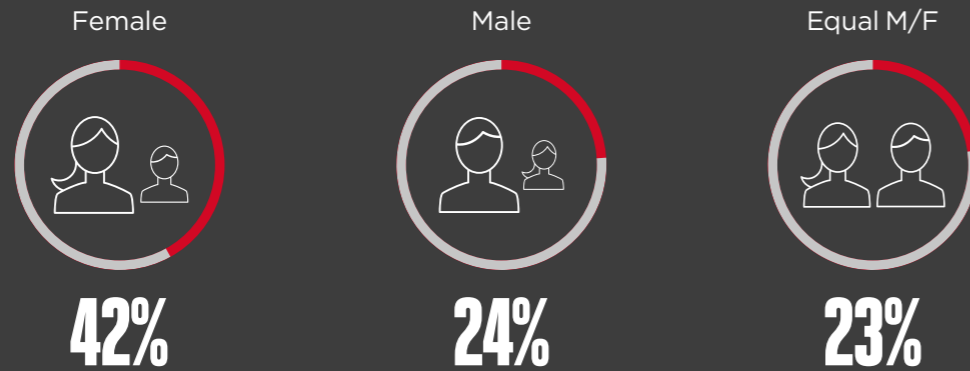
### START-UP SPOTLIGHT

SEE HOW **HELLO TRACTOR** USES FRONTIER TECHNOLOGY TO HELP FARMING COMMUNITIES IN NIGERIA.

# Applications address women and girls as user groups, but more female innovators are needed



Key target users across applications



**Women and girls are disproportionately impacted by climate change** due to existing socio-economic inequalities.



It is essential that mobile and digital technological solutions consider the needs of women and girls



and design solutions that are gender sensitive or transformative.



We analysed the gender balance of both the users of the tech solution and the organisations designing them.



**42%**

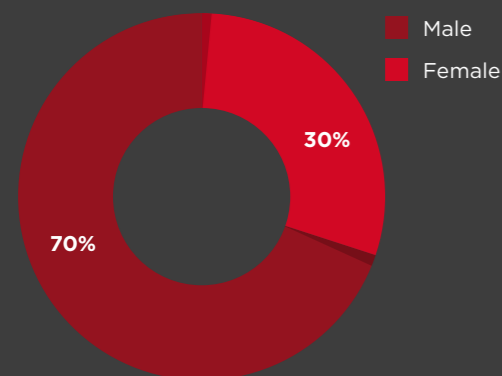
We were encouraged to see that of all projects had women as their primary target user.

START-UP SPOTLIGHT

SEE HOW **AQUARECH** IS HELPING TO BUILD THE RESILIENCE OF FEMALE FISH TRADERS IN KENYA.

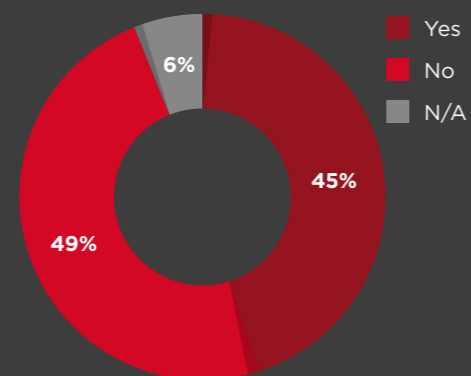
Less than a third (30%) of the leadership roles across all submissions were occupied by women (Figure 5).

Figure 5 Gender balance of leadership roles across all applications



However, almost half (45%) of the start-ups and SMEs had at least one woman in a leadership position (Figure 6).

Figure 6 Start-ups with at least one woman in a leadership role



Sustained efforts are needed to encourage female founders in technology and climate sectors.

Source: Applications for GSMA Innovation Fund for Climate Resilience and Adaptation, 2022

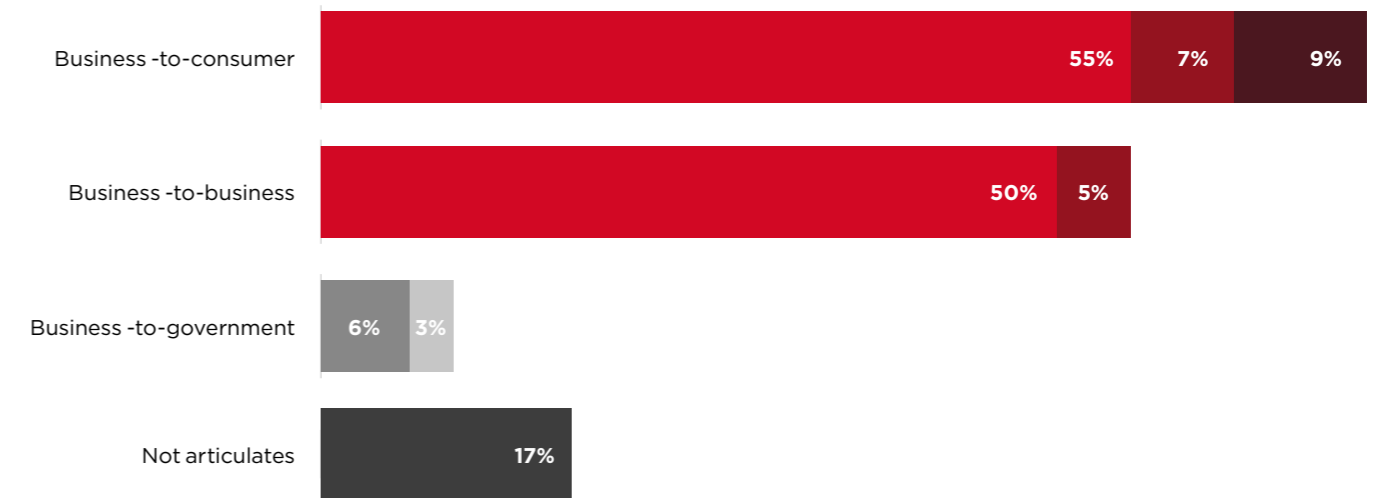
## Most business models use direct sales to consumers

- Start-ups and SMEs were asked to outline the business models they would use to ensure innovative digital solutions can be adopted sustainably and at scale.
- More than half of the applicants had more than one business model.** For example, one for direct-to-consumers and another for businesses.
- Subscription services were the second most-pitched business model, both to individual customers and to businesses.
- 24 applications explicitly mentioned applying a pay-as-you-go (PAYG) model.
- Start-ups and SMEs less than two years old often adopted an initial freemium service to build a user base,** indicating a focus on attracting and retaining customers in the early stages of their business over short-term revenue.
- In 17% of the applications, there was a lack of clarity on what business model was to be adopted or how the start-up or SME planned to generate revenue** through their proposed solution. This highlights the need for more study of the types of business models that can best serve sustained, impactful climate solutions.

Figure 7

### Business models

Direct sales PAYG Subscription service B2G service provision



Source: Applications for GSMA Innovation Fund for Climate Resilience and Adaptation, 2022



## Solutions focus more on building individual resilience than enabling environments

- Our analysis found that most solutions sought to strengthen climate resilience at an individual or household level.
- Building community, city or institutional resilience was less of a focus.
- As shown on page 15, very few start-ups proposed solutions targeting governments. Those that did highlighted challenges in generating revenue through this approach.
- We know that the participation of many different stakeholders, including local and national authorities, are critical to addressing climate resilience and mitigation at scale. However, the willingness and capacity to engage in such partnerships can vary

significantly depending on the sector, the maturity of the start-up and the government entity involved.

- It would be valuable to create more evidence on successful business models to demonstrate how start-ups and larger institutions can work in partnership effectively.

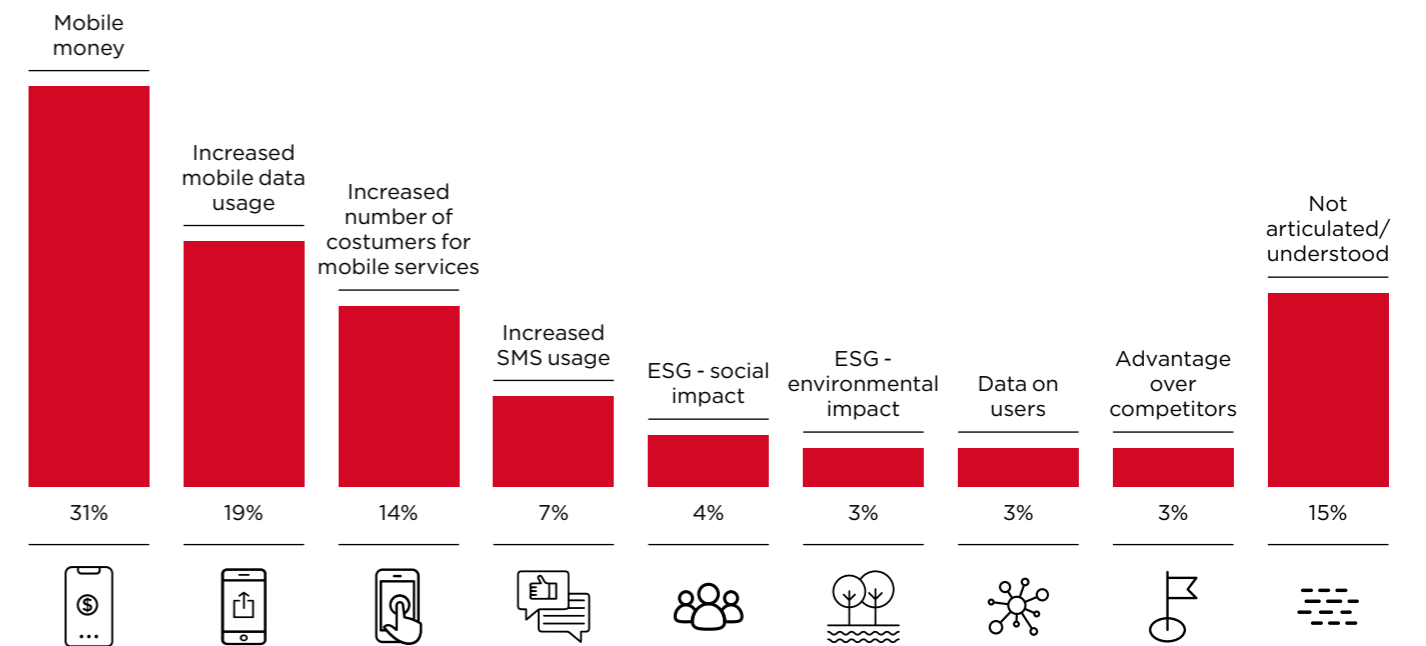
**START-UP SPOTLIGHT**

**SEE HOW KOMUNIDAD IS WORKING WITH THE LOCAL GOVERNMENT IN THE PHILIPPINES TO BUILD CAPACITY TO ANTICIPATE CLIMATE SHOCKS.**



## Needs and added value must be clearly articulated to secure mobile operator partnerships

Figure 8  
Value propositions for mobile operators in applications



Source: Applications for GSMA Innovation Fund for Climate Resilience and Adaptation, 2022

- By facilitating partnerships between start-ups, mobile network operators (MNOs) and other stakeholders, the GSMA Innovation Fund seeks to leverage their resources, expertise and networks to support innovative solutions with the potential to scale and create a greater impact. Start-ups and SMEs were asked to articulate the value they could bring to an MNO in a potential partnership.
- **For 15% of the applications, the value proposition for MNOs was not articulated or we were unable to identify it.** This was closely linked to the maturity of the organisation; of those that offered no clear value proposition, 40% had been operating for less than two years.
- This indicates that **more support and guidance may be needed for early-stage start-ups to understand the expectations and requirements of potential partnerships**, and to help them develop clear and compelling selling points for future engagements.
- **Most applicants proposed the benefit of an increase in either volume of mobile money transactions, use of mobile data, or number of customers for mobile network service** (Figure 9). A smaller number also suggested that supporting the projects could tie in with MNOs' environmental social and governance commitments.



## The cohort

On 22 November 2022 at COP27, the GSMA, together with FCDO and Sida, announced the 12 organisations that had been awarded a grant under the GSMA Innovation Fund for Climate Resilience and Adaptation. This section provides a summary of the innovations and start-ups within this cohort.

**AQUARECH**

**BAKHABAR KISSAN (BKK)**

**BENAA**

**COAMANA**

**CROP2CASH**

**DAYAXA FRANKINCENSE EXPORT COMPANY (DFEC)**

**GEOKRISHI**

**HELLO TRACTOR**

**J-PALM**

**KOMUNIDAD**

**LESHA**

**SIMUSOLAR**



LOCATION:  
Kenya

FIND OUT MORE:  
Aquarech website

## Aquarech

Improving fish farmers' productivity, enabling market access and creating an inclusive aquaculture value chain through the use of mobile technology and IoT sensors.

DIGITAL CHANNELS: IoT, mobile app, digital platform  
BUSINESS MODEL/S: B2C, B2B  
RESILIENCE CAPACITY: Adapting, absorbing



### Organisation

Aquarech is Kenya's first fish farming platform to enable fish farmers, fish feed manufacturers and buyers to trade and create trusted relationships. Their goal is to power fish farming for small- and medium-sized fish farmers by developing creative and modern fish farming methods with cutting-edge technology.



### The problem

In Kenya, fluctuating water temperature due to climate change has made it difficult for fish farmers to know when and how much to feed their stock. Fish are sensitive to water temperature and only eat when the temperature is within a certain range. Without precision farming practices, fish farmers are often left guessing, leading to longer production cycles, smaller stock and lower incomes for farmers who sell fish based on weight. This has reduced the supply of fish in the local market, particularly affecting the ability of women and youth fish farmers to access fish for trade.



### Grant summary

The GSMA is supporting Aquarech to:

- Expand the current pilot of fish farmers using IoT devices to further test and scale this solution.
- Enhance Aquarech's mobile app to enable fish farmers to better track patterns and improve output and productivity.
- Develop a USSD platform for fish farmers to purchase fish feed, sign up for aquaculture tips to support traders without smartphones to purchase fish stock and improve pricing transparency.
- Establish cold chain fish outlets to give fish traders more transparency on the volume and location of fish available for collection directly from Aquarech's fish depots.



"Aquarech is at the forefront of aquaculture innovations to transform fish farmer livelihoods across Kenya. Strengthening the fish value chain and spearheading sustainable, environment-friendly practices buoys all actors involved. Funding from the GSMA Innovation Fund will be the catalyst for us to achieve vertical coordination between our game-changing technology, fish farmers and fish traders, increasing their climate resilience."

Dave Okech,  
Founder and Chief Innovation Officer



LOCATION:  
Pakistan

FIND OUT MORE:  
BKK website

## BaKhabar Kissan (BKK)

Strengthening agricultural productivity and planning for climate-vulnerable farming communities through a network of new weather stations to provide hyperlocal weather information, as well as enabling access to agricultural expertise through digital platforms.

DIGITAL CHANNELS: Automatic speech recognition, mobile app, weather stations  
BUSINESS MODEL/S: B2C  
RESILIENCE CAPACITY: Adapting, anticipating



### Organisation

BaKhabar Kissan (BKK), a project developed by Switch Solutions, addresses challenges across the agricultural value chain to tackle the key problems farmers face. The BKK platform gives the agricultural community access to a variety of services ranging from weather information and agricultural expertise, to the latest pesticides and better farming methods.



### The problem

Pakistan ranks eighth out of 191 countries in vulnerability to climate change. There are 8.2 million smallholder farmers in Pakistan working to meet the basic food and nutrition requirements of the country's population. However, a lack of high-quality data hinders food security due to inefficient decision-making and disaster management. The country's lack of weather data stations leaves poor communities, particularly farmers, even more vulnerable to the effects of climate change



### Grant summary

The GSMA is supporting BKK to:

- Enhance the digital weather platform and provide farmers with real-time, hyperlocal weather information through the deployment of 200 weather stations, development of additional digital channels and integration of automatic speech recognition (ASR).
- Disseminate content related to agriculture and livestock practices to enhance the resilience of farmers to climate change-induced weather impacts. The platform will provide access to agriculture and weather experts who can help farmers learn and adapt to new farming techniques.



"BKK is a passion filled entity, made up of a team who is dedicated to empowering the farming community. We believe in the power of effective collaboration which is why we are delighted to partner with GSMA. Through our aligned vision, we are seeking to integrate farmers in the agri eco-system, enabling digital literacy, smart farming advisory, aiding financial inclusion, and ultimately digitizing the agri value chain - making it the perfect partnership."

Khizer Alam Khan,  
Co-founder and CEO



## BENAA

Supporting water resource management using IoT to help convert wastewater into irrigation water for small farms in rural Egypt.

LOCATION:  
Egypt

FIND OUT MORE:  
BENAA (LinkedIn)



DIGITAL CHANNELS: IoT, mobile app  
BUSINESS MODEL/S: B2C, B2B  
RESILIENCE CAPACITY: Natural resource management and environment



### Organisation

BENAA Foundation is a youth-led, non-profit organisation that seeks to build the capacities of young people to drive sustainable development projects, creating an enabling community in the MENA region.



### The problem

BENAA focuses their activities on small rural communities called Ezbas – residential clusters on the fringes of agricultural land. Often these locations lack access to central infrastructure provided by the government, such as sanitation. This contributes to soil, surface and groundwater pollution, leading to the proliferation of water-borne diseases and food contamination. They also suffer from escalating water shortages due to population growth and climate change, a particular challenge for the agricultural sector, which consumes 86% of Egypt’s water resources. With the sector employing more than 27 million people, the resilience of rural communities is increasingly under threat.



### Grant summary

The GSMA is supporting BENAA to:

- Improve the operation, maintenance and usability of decentralised sanitation units in remote rural areas of Egypt.
- Use an IoT system in the decentralised treatment units to monitor and analyse the quality of treated wastewater and the concentration of nutrients. This IoT system is designed to help the operations team respond rapidly to problems in water quality and provide farmers with the amount of nutrients in the water through a mobile app that will advise them on how to optimise fertiliser use.



*“The BENAA community is fostering social innovation for environmental sustainability. We hope to build a sustainable future by empowering, educating and enhance the skills of youth.”*

Aya Tarek Helmy,  
Co-founder



## CoAmana

Improving agricultural productivity and helping farmers manage financial risks related to drought in Nigeria, through a digital marketplace for farmers to access markets, purchase drought-resistant seeds and access information on best practices and financial services.

LOCATION:  
Nigeria

FIND OUT MORE:  
CoAmana website



DIGITAL CHANNELS: Digital marketplace, digital payments  
BUSINESS MODEL/S: B2B, peer-to-peer  
RESILIENCE CAPACITY: Adapting



### Organisation

CoAmana identifies business cases and develops commercially viable, market-enabling digital technologies to help close Africa’s largest economic gaps. In December 2019, they piloted their digital marketplace, Amana Market, to link Nigeria’s farmers and small businesses to an ecosystem of markets, information and financial services.



### The problem

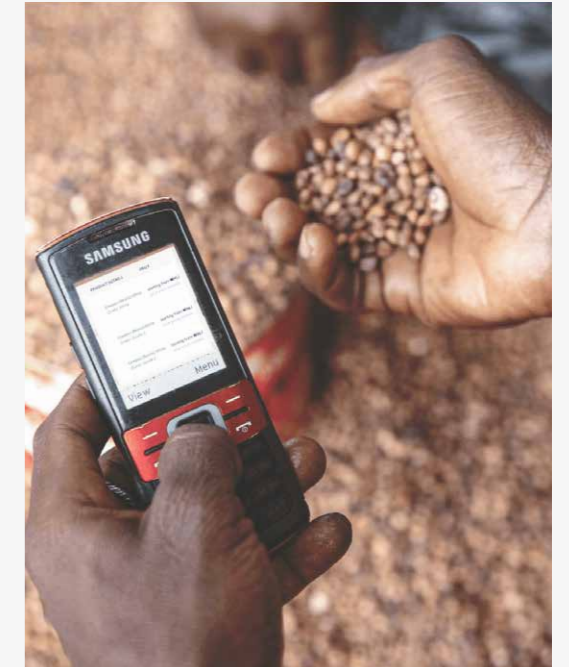
Nigeria has the largest number of people living in extreme poverty in the world, with more than 70% of the population belonging to rural agrarian communities affected by rising populations and desertification. Farm production in northern Nigeria is being disrupted by heavy rains and prolonged periods of drought. Currently, farmers lack access to information and crucial products like drought-resistant seeds. The combination of climate change, high inflation, low per capita incomes, poor education, high birth rates and high unemployment has made the region and farmers particularly vulnerable to the effects of climate change.



### Grant summary

The GSMA is supporting CoAmana to:

- Strengthen the adoption of climate mitigation and adaptation practices by improving access, knowledge and affordability via their digital marketplace, Amana Market.
- Over the grant period, they are aiming for 5,000 farmers to adopt best practices and 40,000 new users to use the Amana Market platform to explore information on adaptation to climate change and resilience, as well as access to drought-resistant seeds and other outputs.



*“What we are seeing today is tragic; the floods, the droughts, the short rains and the security crisis that is emerging from these occurrences. We can neither think slow nor small because the world is already late to act. CoAmana is and will continue to employ inclusive digital technology to accelerate the evolution of agriculture markets in Africa towards more resilience.”*

Hafsah Jumare,  
Founder



## Crop2Cash

Supporting farmers facing drought conditions in Nigeria to adapt their farming practices through climate-smart farming content and manage financial risks through their digital marketplace, connecting farmers to high-yield, drought-resistant maize seeds via USSD.

LOCATION:  
Nigeria

FIND OUT MORE:  
Crop2Cash website



DIGITAL CHANNELS: Marketplace, USSD  
BUSINESS MODEL/S: B2B, B2C  
RESILIENCE CAPACITY: Adapting



### Organisation

Crop2Cash provides smallholder farmers with access to formal financing for agricultural inputs and enables them to receive digital payments and access to other digital financial services, such as credit. Crop2Cash is also supporting access to affordable financing for smallholder farmers in Nigeria using a USSD platform.



### The problem

Although Nigeria is a top maize producer with 10.5 million tonnes per year, the average yield is among the lowest in Africa. The country requires a 50% increase in maize production to meet growing demand. However, frequent drought and high temperatures from climate variability and change negatively impact maize production. Currently, farmers in northern Nigeria lack adequate financial resources and struggle to access finance to scale and transform their operations to build resilience.



### Grant summary

The GSMA is supporting Crop2Cash to:

- Connect farmers to high-yielding drought-resistant seeds via USSD to increase their incomes and build resilience.
- Provide tailored SMS to provide weather advisory to smallholder farmers on best agricultural practices.



*"We are excited to receive this support from the GSMA Innovation Fund for Climate Resilience and Adaptation."*

Michael Ogundare, Emem Essien, Seyi Alabi, Co-founders



## Dayaxa Frankincense Export Company (DFEC)

Creating a regenerative model for positive social, ecological and economic change by working with farmers in Somaliland to harvest sustainable produce, achieve fair pricing and improve day-to-day living standards for farmer communities. seeds and access information on best practices and financial services.

LOCATION:  
Somaliland

FIND OUT MORE:  
Dayaxa website



DIGITAL CHANNELS: Blockchain, digital payments, mobile app  
BUSINESS MODEL/S: B2B  
RESILIENCE CAPACITY: Adapting



### Organisation

The Dayaxa Frankincense team operates from the Sanaag region of Somaliland and the UK. They work closely with farmers to achieve fair prices while also ensuring that daily living standards improve. Through their social enterprise initiative, Dayaxa seeks to impact the lives of farmers and their families by investing back into these communities.



### The problem

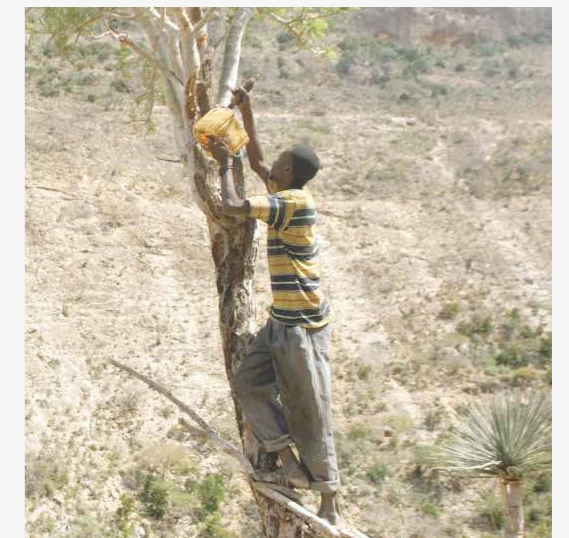
Communities in the Sanaag region that rely on frankincense resin are extremely remote, with limited access to education, health care, and alternative income streams. Resin harvesters do not have the power to set prices for the resin that they tap from trees, with all the value in the supply chain taken by resin traders. Climate change is limiting alternatives for harvesting communities even more. Combined, these factors trap harvesters in destructive cycles with few incentives to harvest sustainably, instead overharvesting to maximise short-term income.



### Grant summary

The GSMA is supporting Dayaxa to:

- Improve earnings and secure livelihoods for resin farmers in Somaliland through a bespoke mobile blockchain app that traces where resin is sourced from and the price paid to harvesters.
- Use ecological research on frankincense trees to calculate the current fragility of the ecosystem, create estimates on tapping rates and identify critical metrics to track.
- Build a tree health mobile app using mobile technology to enable traceability and ecological monitoring.



*"We are very proud that GSMA has selected Dayaxa as a grant recipient for the GSMA Innovation Fund for Climate Resilience and Adaptation. The funding will enable us to transform traceability and tree health tracking for resin-producing species in the Sanaag region of Somaliland, and in particular for Frankincense Carteri, through developing a bespoke blockchain app that furthers our mission to transform this fragile supply chain and support marginalised resin harvesting communities."*

Abdirizak Salah Mohamed, CEO

## GeoKrishi

Helping smallholder farmers in Nepal adapt to climate stressors and adopt climate-smart agricultural practices through digital learning content and advisory services.

LOCATION:  
Nepal

FIND OUT MORE:  
GeoKrishi website

DIGITAL CHANNELS: Mobile app, digital payments  
BUSINESS MODEL/S: B2B, B2C  
RESILIENCE CAPACITY: Adapting



### Organisation

GeoKrishi (Geo: location, Krishi: agriculture) is Nepal's first fully integrated, data-driven digital agriculture platform designed to help remove the financial, technical and cultural barriers preventing farmers from accessing and using information to improve farm productivity and maximise profitability. GeoKrishi applies a data-driven system approach to translate knowledge into action, offering timely and context-specific advice at all stages of the crop value chain.



### The problem

In recent years, Nepal has faced high risks from changing climatic patterns and climate variability, which have had a significant impact on yields and livelihoods. In the absence of technical know-how, access to advice or the availability of input supplies in the market, smallholder farmers are unable to respond to the immediate and ongoing risks of climate change. In addition, extension services, input supplies of climate-smart tools and technologies are often inefficient and not tailored to changing climate. Nepal currently serves only 18% farmers with extension services - far lower than many countries in South Asia.



### Grant summary

The GSMA is supporting GeoKrishi to:

- Upgrade their existing system to expand their reach of bundled smart agricultural solutions. Each farm registered in the GeoKrishi platform will be geotagged to provide farmers with location-specific and customised recommendations. This will equip farmers with climate-smart tools and technologies, farm management solutions, advisory services and market prices.
- Build a sustainable public-private-community business model by engaging closely with local government, local service providers and farmer cooperatives, building a feedback loop to continuously improve the platform.



*"Agriculture is no longer just farming, it is a business. It is important to attract our youth and farming communities for catalysing agricultural transformation through data, analytics and digital technological innovation that bridges the gap between science and practices."*

Rajan Bajracharya,  
Founder



## Hello Tractor

Improving planning and preparedness for farming communities facing unpredictable rainfall patterns in Nigeria, by using weather and historic tractor service demand data to model and optimise tractor service provision.

LOCATION:  
Nigeria

FIND OUT MORE:  
Hello Tractor website

DIGITAL CHANNELS: Mobile app, IoT, CML  
BUSINESS MODEL/S: B2B, B2C  
RESILIENCE CAPACITY: Adapting, anticipating, natural resource management and environment



### Organisation

Hello Tractor is an agricultural technology company using IoT technology to connect farmers across emerging markets with farm equipment owners. It seeks to use commercial microwave links (CML) and satellite imaging to close the weather data gap and visualise farmer demand for tractor services based on historical associations between rainfall activity and tractor behaviour.



### The problem

Up to 2 million people in Nigeria (including farmers and tractor owners) are estimated to be vulnerable to late planting, loss of income and undercultivation of land due to erratic rainfall patterns.

Vulnerable farming communities are often unable to access intelligence to monitor and predict demand over time. Such data is needed for timely asset deployment to address tractor demand and adequately plan for climate-smart agri-advisory services that help farmers adapt to climate change.



### Grant summary

The GSMA is supporting Hello Tractor to:

- Use CML data and satellite imaging to close weather information gaps and employ predictive models based on historical data for tractor usage service demand. This is designed to help optimise tractor service provision, harvesting and yield, and build a more resilient, adaptive community of farmers and tractor owners.



*"The need for strengthening climate resilience in potential markets in Africa has only become more acute with the geo-political turmoil in the Ukraine and Russia - one of the 5 bread baskets in the world."*

Jehiel Oliver,  
Founder



**LOCATION:**  
Liberia

**FIND OUT MORE:**  
J-Palm website

## J-Palm

Transforming the sustainability of wild palm oil through access to ecological information for local harvesters, as well as mobile blockchain technology for improved traceability.

**DIGITAL CHANNELS:** Blockchain, digital payments  
**BUSINESS MODEL/S:** B2C  
**RESILIENCE CAPACITY:** Adapting, natural resource management and environment



### Organisation

J-Palm works to empower smallholder oil palm processors in rural communities by providing access to modern, efficient processing technologies. Their mini mills reduce processing time by 75% and improve extraction rates by 53% for smallholders. J-Palm Liberia also purchases palm kernels, which were previously viewed as a waste product, to process into palm kernel oil (PKO). This is used in J-Palm's brand of health and beauty products or sold to other businesses.



### The problem

Rural communities in Liberia are already impacted by climate change due to their reliance on agroforestry. An estimated 250,000 individuals are dependent on harvesting palm oil for income, with Liberia accounting for 43% of the remaining Upper Guinea forests of West Africa. Less reliable rainfall, coupled with a lack of infrastructure for fruit processing, communities are forced to turn to alternative means of income, such as felling trees for charcoal or logging. Climate change is increasing these pressures and accelerating forest clearance as smallholders lack alternative sources of income.



### Grant summary

The GSMA is supporting J-Palm to:

- Develop two mobile blockchain apps to deliver transparency and traceability to Liberian wild-harvest palm oil supply chains. It aims to demonstrate that forests where palm trees grow wild are being protected while improving incomes and livelihoods for 7,500 palm harvesters, delivering a sustainable, no-deforestation palm product that helps make communities more resilient to climate change.



*"Our goal at J-Palm has always been to build a business that helps local communities thrive economically, while preserving and enhancing the natural environment. The partnership with GSMA enables us to scale our work in important ways that build climate resilience and economic stability in rural communities in Liberia."*

Mahmud Johnson,  
Founder



**komunidad**

## Komunidad

Upgrading communities' capacity to respond to disasters in the Philippines with a typhoon early warning system and weather analytics platform designed to help the local government plan and prepare for hazards more efficiently and accurately.

**LOCATION:**  
Philippines

**FIND OUT MORE:**  
Komunidad website

**DIGITAL CHANNELS:** Web app  
**BUSINESS MODEL/S:** B2B, B2G  
**RESILIENCE CAPACITY:** Anticipating



### Organisation

Komunidad is a Singapore- and Philippines-based company that focuses on data and analytics to improve climate resilience and sustainability. Komunidad's products and solutions are designed to enable businesses and communities in Asia to build and deploy their own decision-support tools more effectively and sustainably to strengthen climate resilience and build up data to support climate action.



### The problem

The Philippines ranks fourth in the world as the most-affected country by extreme weather events. With an average of 20 tropical cyclones affecting the country each year - at least five of which can be destructive - Filipinos are always finding ways to protect themselves and their property from disasters. In December 2021, nearly 8 million people were affected by Tropical Cyclone Rai, the impacts of which were compounded by COVID-19. The typhoon first made landfall over Siargao Island, Surigao Del Norte, leaving the popular surfing and tourist destination totally devastated. A total of 173,664 people were affected with an estimated damage of 20 billion pesos.



### Grant summary

The GSMA is supporting Komunidad to:

- Leverage a data-driven approach to integrate environmental intelligence, early warning systems, and mobile dissemination. The desired impact is to strengthen climate resilience and empower communities with preparedness information that is tailored to the local culture and technology usage.
- Empower the local government and vulnerable communities in Siargao Island that were devastated by Typhoon Rai, rapidly scaling the solution from municipalities to provinces.
- Focus on in-person activities such as capacity building and training, and onboarding using onsite and online approaches to guide user adoption.



*"Using the latest technologies in telecommunications, information technology, meteorology and data science, it's now possible for vulnerable communities anywhere in the Philippines to have their own comprehensive climate resilience centre that can be set up in just a few minutes without buying multiple systems and expensive monitoring equipment."*

Felix Ayque,  
CEO and founder



**LOCATION:**  
Ethiopia

**FIND OUT MORE:**  
Lersha website

## Lersha

A one-stop digital service for smallholder farmers that provides advisory content on climate-smart agriculture solutions, weather information and facilitates access to agri-credit and agri-insurance.

**DIGITAL CHANNELS:** Mobile app, call centre  
**BUSINESS MODEL/S:** Peer-to-peer  
**RESILIENCE CAPACITY:** Absorbing



### Organisation

The organisation Green Agro Solutions created the Lersha platform to provide a one-stop digital service for smallholder farmers to access farm inputs, hire mechanisation services and request dynamic agro-climate advisory using technology. Lersha is the Amharic equivalent of the phrase “for agriculture”. It represents the desire to fulfil the agricultural needs of smallholder farmers through innovation.



### The problem

Smallholder farmers in Ethiopia are vital members of agri-businesses, accounting for 95% of production. They often manage multiple farm enterprises simultaneously under highly variable climatic and uncertain socio-economic conditions. They confront several risks in a given season that require integrated information and advisory services to manage risk effectively and maximise farm income. Farmers need additional information on the availability and price of recommended farm inputs, as well as a mechanisation service to catch the short planting window, expected market price for their produce and access to credit services.



### Grant summary

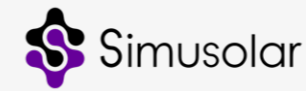
The GSMA is supporting Lersha to:

- Scale up use of the Lersha platform among smallholder farmers by promoting agricultural finance and climate-risk insurance.
- Improve the existing Lersha platform by providing more customised extension through greater participation of service providers and frequent agro-climate advisory.



*“We seek to make agriculture easy for everyone.”*

Abrhame Endrias,  
Founder and Managing Director



**LOCATION:**  
Tanzania

**FIND OUT MORE:**  
Simusolar website

## Simusolar

Supporting fishers in securing livelihoods, adapting to weather changes and sustaining fisheries management in Lake Victoria, Tanzania, through IoT-enabled productivity and activity tracking equipment.

**DIGITAL CHANNELS:** Mobile app, IoT  
**BUSINESS MODEL/S:** B2C  
**RESILIENCE CAPACITY:** Anticipating



### Organisation

Operating in Tanzania and Uganda, Simusolar seeks to increase rural incomes through productive use solutions like fishing lights, water pumps and freezers. Simusolar offers a complete solution, including design, last-mile distribution, financing and after-sales service.



### The problem

For artisanal fishers, a rise in water temperature in Lake Victoria is leading to a lower catch of a small fish critical to the local economy. Volatile weather and a lack of real-time information also make it difficult for local fishers to plan their fishing and dry the fish for transport, which leads to wastage. Technology could help, but fishers are often hesitant to adopt anything that is not secure from theft. At the same time, overfishing is difficult to regulate due to the resources required to cover the large territory.



### Grant summary

The GSMA is supporting Simusolar to:

- Introduce the first-ever smart IoT fishing light that is locatable, trackable, energy efficient with dimming capability and remote controlled via smartphone. This light will be combined with a mobile app to track usage, monitor weather and manage fishing operations.
- The tracking feature will allow Simusolar to provide the Ministry of Fisheries with anonymised data, supporting their goal of digitising the fishery.



*“With GSMA’s support, we will serve a key role in sustaining the fishery of Lake Victoria while also helping fishers to adapt to climate change, reduce carbon emissions, and sustain their livelihoods.”*

Marianne Walpert and Michael Kuntz,  
Founders



# Looking ahead

## The Innovation Fund for Climate Resilience and Adaptation

The trends in Innovation Fund applications provide valuable insights into the current and potential use of mobile and digital technology to build climate resilience and adaptation in LMICs, and highlight areas where further testing and funding is needed. We have identified key knowledge gaps among innovators and areas where technical assistance could benefit the current cohort in their journeys to scale.

This fund offers a unique opportunity to work with start-ups to generate and test insights and create a body of evidence on how to improve the uptake and impact of digital climate solutions. Over the course of the grant, the GSMA ClimateTech programme will be conducting monitoring, evaluation and learning activities to shed light on key questions. This will include environmental impact assessments to evaluate the effects of selected start-ups' projects to further inform sustainable solutions.

Through the grant, the GSMA will explore the following questions:

- How can innovative digital technology increase the capacity of low-income and vulnerable communities to adapt to, anticipate and/or absorb climate-related shocks or stresses?
- What business models and partnerships are required for innovative digital solutions to be adopted sustainably and at scale?
- What other socio-economic, commercial and environmental/climate impacts will using digital solutions have on climate resilience and adaptation solutions?
- What role can MNOs and other technology companies play in these business models and how can their role be commercially sustainable?

Through the insights gathered in this funding round, the GSMA seeks to support the 12 start-ups to realise their full potential, providing technical assistance and dedicated support to facilitate partnerships with MNOs and public sector organisations. In sharing the lessons learned, we hope to inform and inspire more actors – including donors, the private sector and technology providers – to join their efforts.

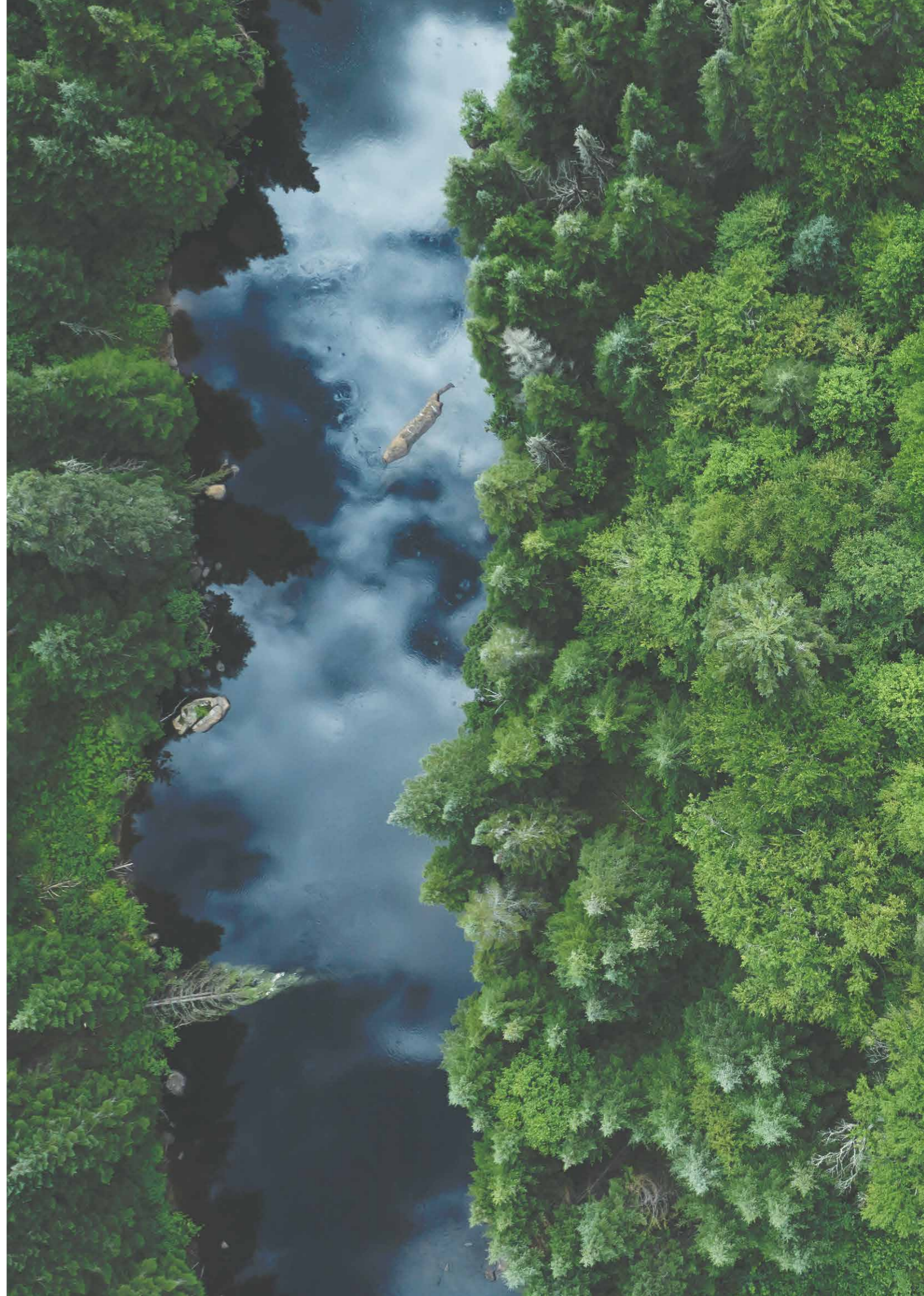
## The Innovation Fund for Climate Resilience and Adaptation 2.0

Given the GSMA's continued commitment to investing in climate solutions, in March 2023 we launched a second round: [The Innovation Fund for Climate Resilience and Adaptation 2.0](#).

Informed by the applicant trends outlined in this report, this funding round will focus on supporting innovation in underrepresented sectors to build the evidence base for effective promotion of climate resilience and adaptation.

Through this ongoing initiative, the GSMA seeks to foster a global ecosystem of digital innovators, working collaboratively to tackle the urgent challenge of climate change and build a more sustainable future.

**Since 2012, the GSMA Innovation Fund has supported more than 130 organisations to develop, launch and scale innovative businesses and services. Collectively, these organisations went on to raise more than £560 million in follow-on funding within two years of the end of the grant and impacted the lives of more than 36 million people.**



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