GODAN
Global Open Data
for Agriculture & Nutrition

# CREATING AN OPEN-DATA REVOLUTION TO END HUNGER, IMPROVE NUTRITION & TACKLE GLOBAL FOOD SECURITY

**By making open data on agriculture & nutrition available, accessible & usable for all, GODAN tackles extreme poverty, eradicates hunger, improves nutrition, and achieves food security.**

**We equip stakeholders with the means to live healthy and prosperous lives, empowered by equal opportunity and sustainable agriculture solutions for generations to come.**

# THERE IS ENOUGH FOOD MADE IN THE WORLD FOR EVERYONE BUT...

**300 MILLION**

**Children die as a result of malnutrition each year**

**800 MILLION**

**People go hungry every day – that is one in every nine people, with the majority being women and children.**

The Global Open Data for Agriculture and Nutrition (GODAN) is a rapidly growing collaborative alliance of **1000+ global innovators** across governments, businesses, and NGOs from over **121 countries**.

GODAN is convinced that the solution to ending extreme poverty and hunger, improving nutritional choices, and tackling global food security lies within existing, but often unavailable and inaccessible datasets.

GODAN's mission is to make all agriculture and nutrition data open - available, accessible, and usable for unrestricted use worldwide – to shift the global food and agriculture system profoundly.

In doing this, we can unlock our potential to respond to the needs of millions of food insecure people worldwide for generations to come.

## GODAN does this in two ways:

### ACTION

by developing, implementing, and investing in innovative agriculture methods and processes led by open data practices.

### ADVOCACY

by convening high-level public and private institutional support for effective open data use to ensure better policy and decision making.

**GODAN is supported by the United Nations and the Governments of UK, USA, Netherlands, and Germany.**

**We address the challenge of improving agricultural and farming output for farming communities, with particular consideration for the millions of smallholder farmers who constitute 90% of all agricultural jobs worldwide.**

**We empower them to have a more autonomous say in the sustainability and success of their output by enriching them with informed practices that:**

develop better farming processes to enhance food production

improve nutritional methods as they access better information and advice

encourage better access to markets to expand their businesses and increase their incomes.

**That is why sustainable impact is at the heart of GODAN's mandate, and changing lives is the call to action.**

# OUR IMPACT, OUR PARTNERS

**GODAN's initiatives have successfully led to policy change from major donors such as USAID, DFID, and the Bill and Melinda Gates Foundation, linking research funding to the release of data.**

Due to our efforts, major publishing institutions are moving in this area, insisting on data underlying scientific publications to be released.

GODAN's activities have also encouraged numerous governments to embark on the release of their data, a principle endorsed through international engagements as reflected through the Nairobi Declaration (2016) and the Accra Declaration (2019), initiated.

We were instrumental in pioneering the development and the global endorsement of the FAIR principles to facilitate government action, which have become a global standard for all.

**Feeding the world is a complex issue. Securing real global nutrition security requires the best of humanity's skills, knowledge, and ideas that need to be shared, combined, and built on for one another. This is how the GODAN network - currently present in over 121 countries, assembled over a thousand organisations and with expertise ranging from genomics to satellite observation - united around this common goal of putting data to use for the next significant global progress: the data revolution.**

# OUR MISSION: ENDING HUNGER, MALNUTRITION & FOOD INSECURITY

In September 2015, 193 world leaders committed to achieving the United Nations' Sustainable Development Goals (SDG). This is a set of 17 ambitious Global Goals that, if achieved, will eradicate global poverty, reduce inequalities, and tackle climate change by 2030.


**UN SDG 2 is Zero Hunger, established to end global hunger, achieve food security, and improve nutrition and sustainable agriculture by 2030.**

## GODAN is committed to accelerating progress to achieve SDG 2

The problems of food production, distribution, and access lead to hunger, malnutrition, and food insecure populations.

While hunger has seen a slow and steady decline over the last two decades in some countries, it is still unacceptably high. The coronavirus pandemic also threatens to undo all the progress made to date and drive more people back into poverty with a quarter of a billion people expected to experience acute hunger in 2020.

Related to hunger, malnutrition remains rampant, exacerbated by the lack of knowledge people have about locally available food options and the importance of nutrition choices.

Consequently, food production trends tend to focus on low cost, mass produced food products instead of less known or less popular but more nutritious food options.

With the population expected to reach around 9 billion by 2050, global demand for food, feed, and fibre is expected to nearly double. Also, as a direct consequence of the current Covid-19 pandemic, experts say that the number of people at risk of hunger is likely to increase from 881 million in 2015 to more than 1.2 billion within the next five years.

# ADDRESSING TOMORROW'S CHALLENGES TODAY WITH OPEN DATA

GODAN's solution is founded on a simple principle – 21st century problems need 21st century solutions.

For far too long, we have not modernised the agriculture and food sector beyond the mechanical aspects. GODAN is here to make things smarter and more sustainable, and we believe open data is the key we hold to solving all these problems.

In today's evolving global landscape, we face complex challenges - populations are continuing to grow, climates are rapidly changing, and markets are becoming more volatile. Open data provides a route to sustainable farming, increased yields, and improved nutrition for millions.

A key element in this strategy is to deliver the benefits of open data, such as precision agriculture, into the hands of smallholder farmers.

Open Data is data that anyone can access, use, and share. Once made open, data can help shape solutions for more efficient and effective decision-making at multiple levels across the agriculture and nutritional value chain. It can foster innovation via new services and applications and drive organisational change through transparency, knowledge sharing, and collaboration.

In this era of climate change, exploding demographics and emerging health issues, innovation is needed now more than ever. For this purpose, GODAN stimulates global innovation from three critical angles:

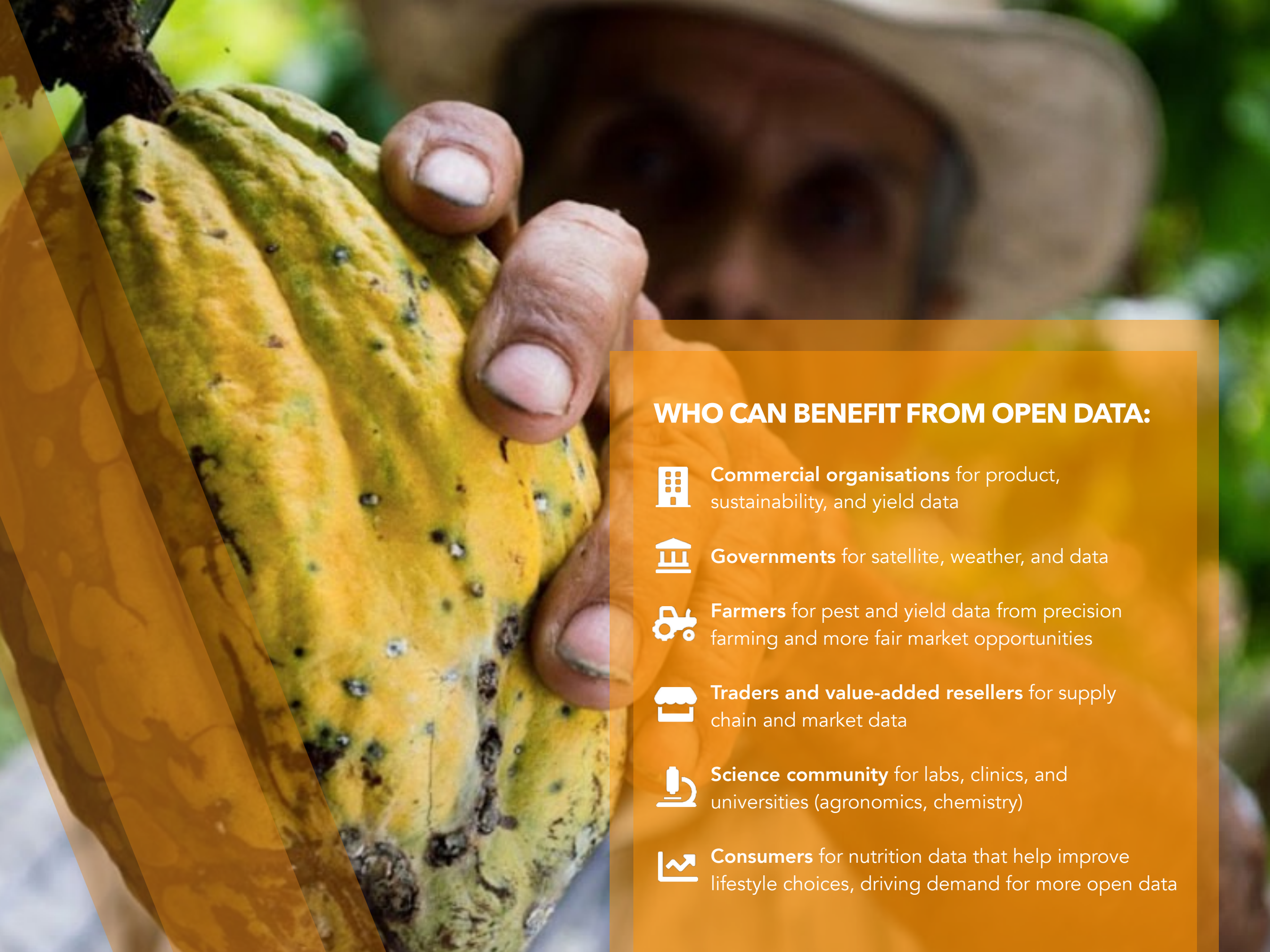
**1.** **By making data available and increasing our capacity to analyse it with new technologies such as Artificial Intelligence, researchers from all horizons can now advance global knowledge at a pace never seen before.**

**2.** **Sharing data and its underlying knowledge allow best practices to be shared across the globe, bringing proven solutions from one region to another.**

**3.** **Combining ideas and data from previously isolated 'knowledge silos', allows producers to develop and implement work methods that combine skills and expertise into a new, higher level of ingenuity, producers, empowerment and efficiency.**

**"Today, data is our greatest instrument, opening doors to endless possibilities and providing tools for better decision making by governments, entrepreneurs and consumers alike."**

André Laperriére, Executive Director, GODAN



## WHO CAN BENEFIT FROM OPEN DATA:

**Commercial organisations** for product, sustainability, and yield data

**Governments** for satellite, weather, and data

**Farmers** for pest and yield data from precision farming and more fair market opportunities

**Traders and value-added resellers** for supply chain and market data

**Science community** for labs, clinics, and universities (agronomics, chemistry)

**Consumers** for nutrition data that help improve lifestyle choices, driving demand for more open data

**BY INTEGRATING OPEN DATA METHODS AND PRACTICES WITH ADVOCACY, TECHNICAL SUPPORT, AND SENIOR POLICY GUIDANCE, GODAN IMPROVES FOOD SECURITY FOR GENERATIONS TO COME. GODAN ACHIEVES THIS BY:**

**improving nutrition**

**helping to ensure zero hunger**

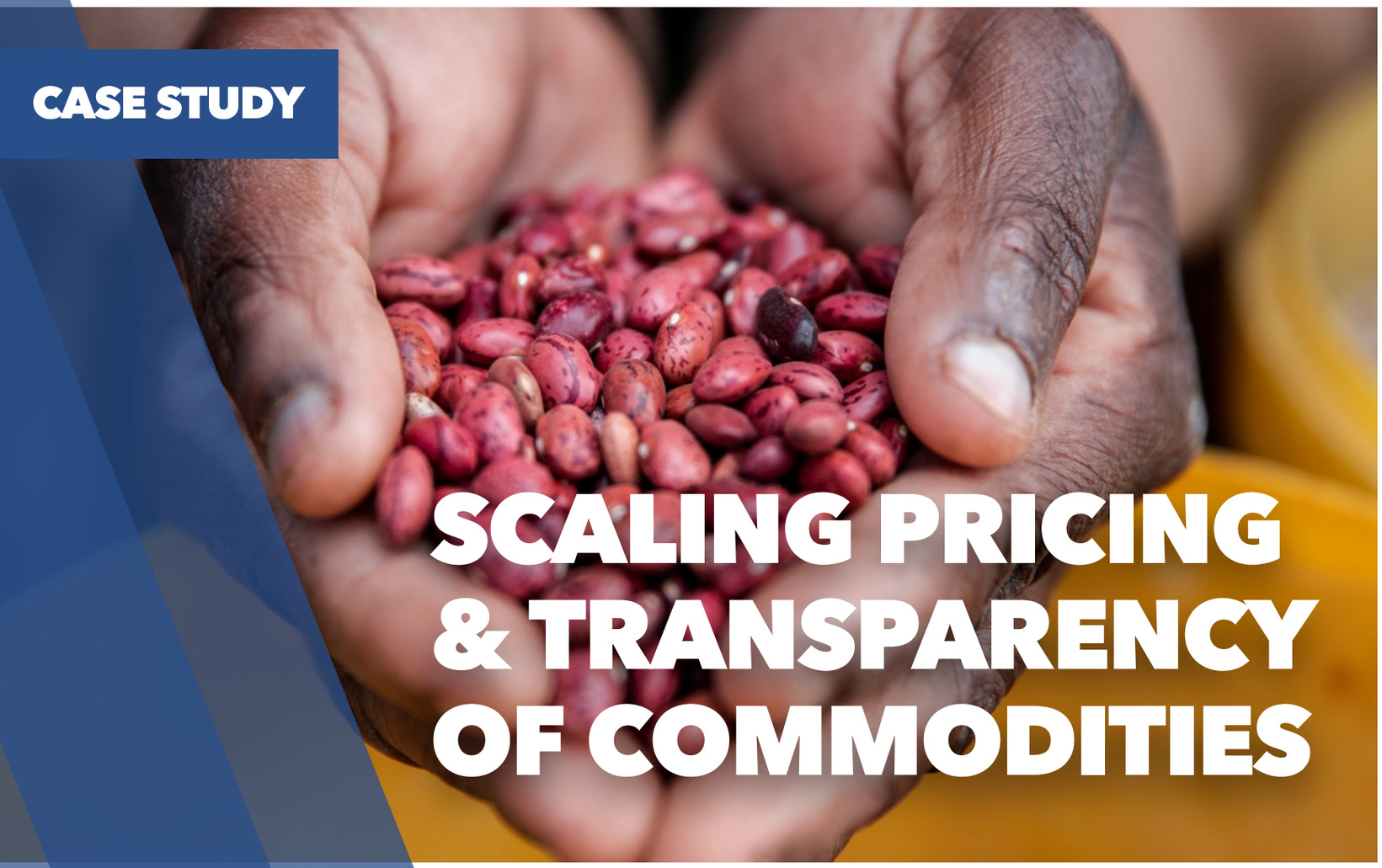
**empowering the lives and livelihoods of people and farming communities across the globe**

# WE KNOW THAT EVERY BOLD AMBITION REQUIRES A BOLD STRATEGY, AND THIS IS HOW WE DO IT:

1. Identify the areas for improvement across food, nutrition, farming, and agriculture processes
2. Help capture the data and prepare models for improvement
3. Help harmonize data management standards and stimulate interoperability
4. Build open data strategies and projects focusing on finding solutions to these agriculture and nutrition problems, based on actual challenges faced by producers, distributors and consumers alike
5. Develop the infrastructure, assets, and capacities for open data in relevant organisations and networks
6. Use open data and support users of relevant data
7. Engage with local, national, and international communities, including governments and corporates to map a long term self-sustainable solution
8. Develop in person and online materials and training adapted to the various audiences across the food security spectrum
9. Lead policy support discussions with public and private sector(s) leaders worldwide
10. Learn through ongoing evaluation, reflection, and sharing to ensure we can all continue to improve our practice. GODAN provides a forum for shared learning, by creating case studies, mapping partner activity, and bringing partners

# CASE STUDIES

CASE STUDY



# SCALING PRICING & TRANSPARENCY OF COMMODITIES

## THE CHALLENGE

Over 90% of farmers worldwide are defined as smallholder farmers who own 4 acres or less of land. Traditionally, smallholder farmers were confined to subsistence farming, with a considerable part of the proceeds from the sale of their crops taken by intermediaries.

Since GODAN's involvement, a significant change is taking place, thanks to the use of data-driven systems and apps.

For example, in Ethiopia, an innovative system enables smallholders to cut out reliance on wholesale buyers. Using an open data supported system, they can check market conditions and pitch their prices competitively and independently from traders who keep costs low. The system has now provided the opportunity to increase incomes.

## GODAN'S SOLUTION

GODAN's use of open data has increased the value and accuracy of the information provided daily to smallholders, which has allowed farmers to control their expenses better and plan their crops and harvests based on up-to-date market data and prices.

For example, in Ethiopia, an open data supported innovative system enables smallholders to cut out reliance on wholesale buyers. With this, they can check market conditions and pitch their prices competitively and independently from traders who keep costs low. Ethiopian farmers involved in this model now buy inputs at a lower price, sell their products at a better price, reduce the need for costly intermediaries, and increase their margins. This helps increase incomes and improve the longer-term viability of smallholder farming in the country.

To achieve this, GODAN worked with a range of experts to bring a variety of skillsets together. This ensured market information was provided promptly to farmers and in an easy to follow format, taking account of language and style which could be understood, used, and contributed to.

GODAN's approach includes extensive use of computers, phones (smart or older generation), and radio stations directly connected to farmer organisations. These combinations have proved to deliver a very high level of success.

Since the Ethiopian smallholder farmer project, successful platforms have adapted to the specific needs of the target groups of farmers depending on their level of literacy, access to technology, and available information.

This project specifies the individual benefit and value to the nation of GODAN's intervention, with the significant change being to cut out the buyers and wholesalers' complete control on pricing.

Access and use of data gave a lot more power to smallholders.

CASE STUDY

## THE IMPACT

**In Ethiopia, the commodity exchange mechanism has effectively linked 2.4 million smallholder farmers to markets through agricultural cooperatives.**

First tested in the coffee sector, it proved so successful that the government suspended the country's traditional coffee auction floor and made it mandatory for all coffee trading to be conducted through the virtual exchange mechanism.

The commodity exchange mechanism provided vital daily data on yields, farm-gate prices, and wholesale conditions, helping to influence international and domestic coffee prices. This has since expanded to include other farm produce.

**Since using the exchange and the hotline, producers have seen profitability improve by up to 30%**

GODAN's system showed that

**70%**

of **1.2 million**

monthly calls to the data server came from rural areas, confirming the very high level of adoption, satisfaction, and value acknowledged by farmers/users

Improved knowledge about coffee prices reduced trader margins by almost

**1/2**

returning these amounts to the producers

CASE STUDY

# DATA DRIVEN AGRICULTURE TO TACKLE WATER SCARCITY

## THE CHALLENGE

Agriculture in a wide range of countries uses up to 90% of all available freshwater. But with global warming, water scarcity is a growing problem, with severe water shortages becoming more common. This is risking food shortages, social disruption, displacement of populations, and increased morbidity and mortality.

**GODAN's partnership with satellite agencies and European based development organisations is changing this trajectory for the better.**

CASE STUDY

## GODAN'S SOLUTION

The partnership worked with fruit farmers in Cape Town, South Africa when the city came within two days of completely running out of drinking water. Fruit farmers were shown how satellite data vastly improved water use results, increasing efficiency and reducing waste.how satellite data vastly improves water use results, increasing efficiency and reducing waste.

GODAN's satellite-based approach has empowered farmers - big and small - to adapt to their specific situation using decision-making technology. This included precision agriculture and weather data to predict and plan the use of rainwater. By combining geospatial expertise with local ingenuity, the data needed to create precision irrigation has been put into the hands of farmers, leading them to significantly improve their irrigation methods and reducing the level of fertilizers required, while improving yields.

Implemented in collaboration with the Netherlands Government, the Netherlands Space Organisation (NSO), private sector partners/start-ups, and farmer organisations, the project lowered costs and recorded a significant reduction in the amount of water needed to grow produce.

## THE IMPACT

**The outcome of GODAN's satellite-based service, which was reliant on open data to help improve irrigation and water management, showed immediate results:**

In orchards,

**60%**

of farmers showed

**10%**

more effective water use due to satellite data

**1/5**

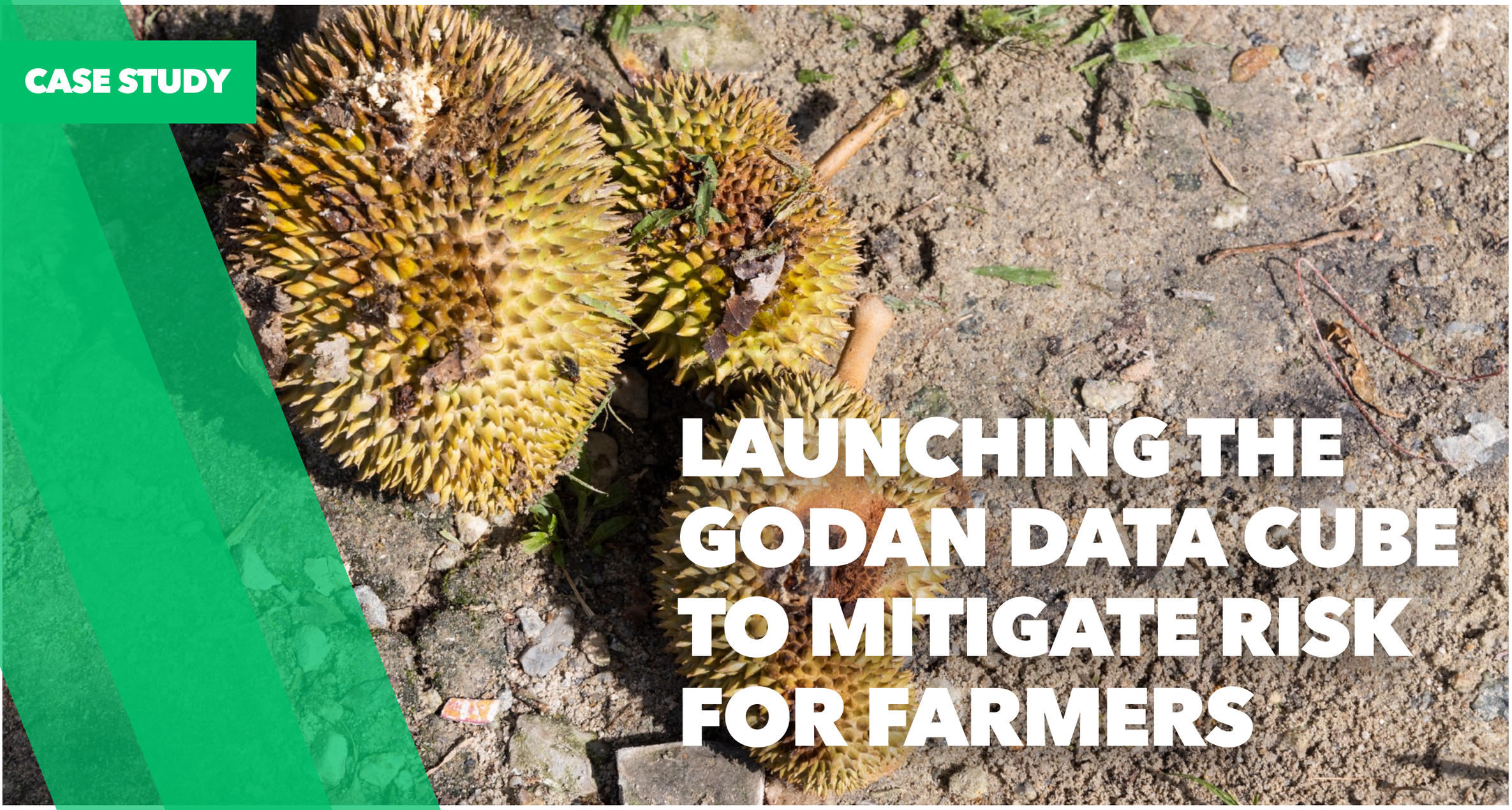
farmers reported that water use efficiency had increased more than

**30%**

in less than a year

**Further to the successful completion of the project, a decision was made to replicate the same approach in Indonesia, targeting 200,000 farmers**

CASE STUDY



# LAUNCHING THE GODAN DATA CUBE TO MITIGATE RISK FOR FARMERS

## THE CHALLENGE

Smallholder farmers' incomes can be tenuous, given the vagaries of weather conditions, pest infestation, and market conditions.

The Horn of Africa faces routine extreme weather events, recently compounded by locus swarm infestations, destroying crops at what appears to be an increasing frequency.

**GODAN has been instrumental in building new farm insurance that is affordable for smallholders and worthwhile for insurance companies with the GODAN Data Cube.**

CASE STUDY

## GODAN'S SOLUTION

Getting the right insurance product into the market requires access and use of open data provided by satellites and weather sensors. GODAN works on building accurate predictive systems for different regions in Africa, helping to turn marginal and threatened livelihoods into sustainable agricultural businesses.

With crop insurances offering protection from the catastrophic loss of income due to weather or pests, smallholders can now secure loans and other banking services that help them build their businesses.

The application of open data has meant the uninsurable can now be insured, and the marginal have become more mainstream, helping many rural communities in Kenya, Ethiopia, and beyond to secure local food supply and to increase resilience.

**In Kenya, GODAN has been making extensive use of geodata (satellite imagery) combined with historical data, increasing the country's capacity to predict where natural disasters are most likely to strike and mitigate the negative impact of these extreme events.**

With this success established, a more advanced predictive system is being developed known as the GODAN Data Cube, a collaboration between the country's space agency, weather department, and data-based satellite institutions. While focused on Kenya, this advancement is ready to roll out to other countries.

The GODAN Data Cube means local authorities can now assist farmer organisations in mobilizing their members and working with crop insurance companies to adjust their premiums to more accurate risk levels. It also helps them partner with banks to increase their willingness to lend to farmers as they are in a better position to assess and manage risk.

CASE STUDY

# THE IMPACT

**Not only have GODAN's projects on open data and crop insurance helped farmers secure more reasonable insurance premiums and access to credit, they are now better protected as threats to their enterprise are identified and addressed before they strike. Kenya has paved the way for these programmes with other countries/ cities following suit.**

**GODAN's open data and crop insurance projects now active in 80+ countries in Africa, Asia, Latin America and the Caribbean.**

- **Insured Farmers**

**Kenya**
**150,000+**

**Rwanda**
**100,000+**

**Ethiopia**
**40,000+**

**India**
**33,000,000+**

- **Insured farmers increased the amount of savings by an average of 123% compared to those who were uninsured**
- **100,000+ pastoralists insured in Kenya and Ethiopia for livestock**

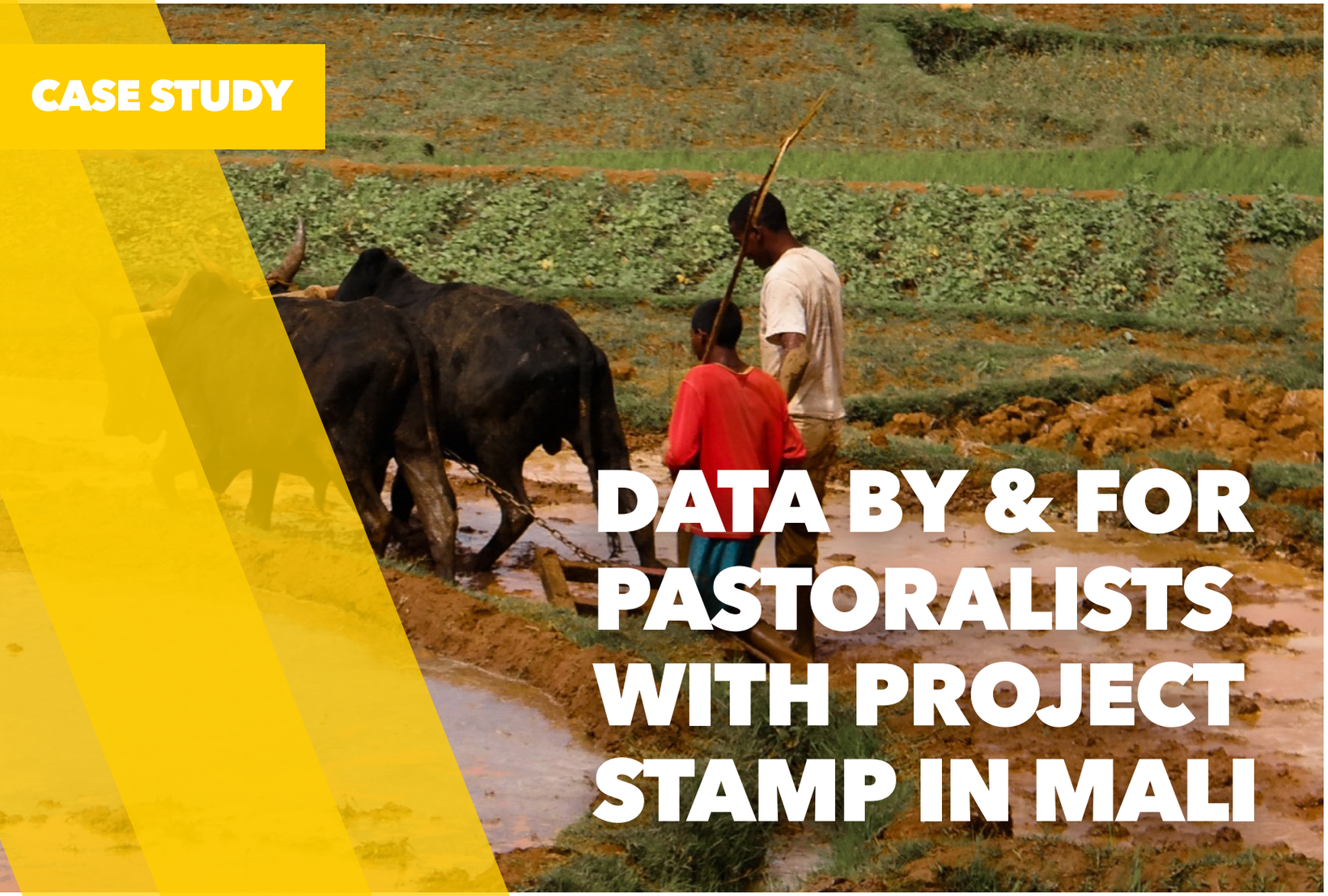
**40%**
of people purchasing insurance were women

Insured farmers had
**16%**
more earnings and invested
**19%**
more compared to their uninsured neighbours

Insurance helped remove
**25-40%**
of total livestock mortality risk

**38%**
purchasing insurance for livestock were women

CASE STUDY



# DATA BY & FOR PASTORALISTS WITH PROJECT STAMP IN MALI

## THE CHALLENGE

Livestock is an essential source of protein and a vital component of the agri-food systems, especially in regions where the lack of irrigation makes agriculture more difficult. As a result, pastorals whose livelihoods rely on cattle are significant actors in the agricultural sector. Primarily nomadic, the pastoralist populations are always on the move, bringing their cattle from one grazing area to the next, moving from one water point to another.

Due to the harshness of the environment pastoralists live in accelerated by climate change, thousands of communities have suffered from significant losses: the disappearance of grazing land, the drying up of water holes, the increased likelihood of drought and unreliable rainfall, and the lack of access to a veterinarian and related services. It also means a valuable source of food in developing countries could be lost forever.

Pastorals often travel long distances moving from one traditional grazing area to the next, relying on traditional knowledge of the land suitable for their cattle. Because of climate change, appropriate grazing areas are more and more difficult to find.

GODAN stepped in to empower them to correct the problem by providing reliable destination information to plan their journey and routes accordingly.

## GODAN'S SOLUTION

GODAN teamed up with French telecom operator Orange, the Dutch Space Agency (NSO) and local partners, to deliver a system that helps pastoralists secure reliable weather data, and to connect and improve their ability to trade more profitably. Piloted in Mali before expanding to other countries, the system guides herdsmen to the nearest suitable supply of drinking water, alerts them to grazing areas, connects them to markets, and allows them to exchange information that keeps their cattle healthy.

GODAN's system is all about working with local communities and agriculturalists, empowering them with the knowledge that sustains their livelihoods and helps strengthen their communities. It relies on a network of data experts and agri-scientists to assist farmers, even in the world's remotest regions. Essentially, this is a cost-effective and straightforward solution, reliant on pastoralists to feed in relevant data and to keep the system up to date. The service is provided by the mobile phone company, which justifies the small outlay on maintaining the system because of the growing amount of use it is enjoying by the pastoralists.

CASE STUDY

# THE IMPACT

**Initially activated in Mali, the project has reached 55,000+ users and expects to reach 45,000 additional pastoralists by 2021. Discussions are already underway with neighbouring country representatives to expand this to other parts of the Sahel region.**

The project has now scaled up across West and East Africa, with GODAN teaming up with local network operators and veterinarians, helping animal health workers receive diagnostic advice and guidance about the best treatments for their cattle. Bringing the benefits of geodata and market information to pastoralists' hands is the obvious sign of progress in this vital sector. However, for GODAN, its success is based firmly on a self-sustaining system. The process brings change-making decisions, reached between communities, and supported by governments and innovators.

Livestock mortality, productivity reduced by

**10%**

Income from livestock increased by

**10%**

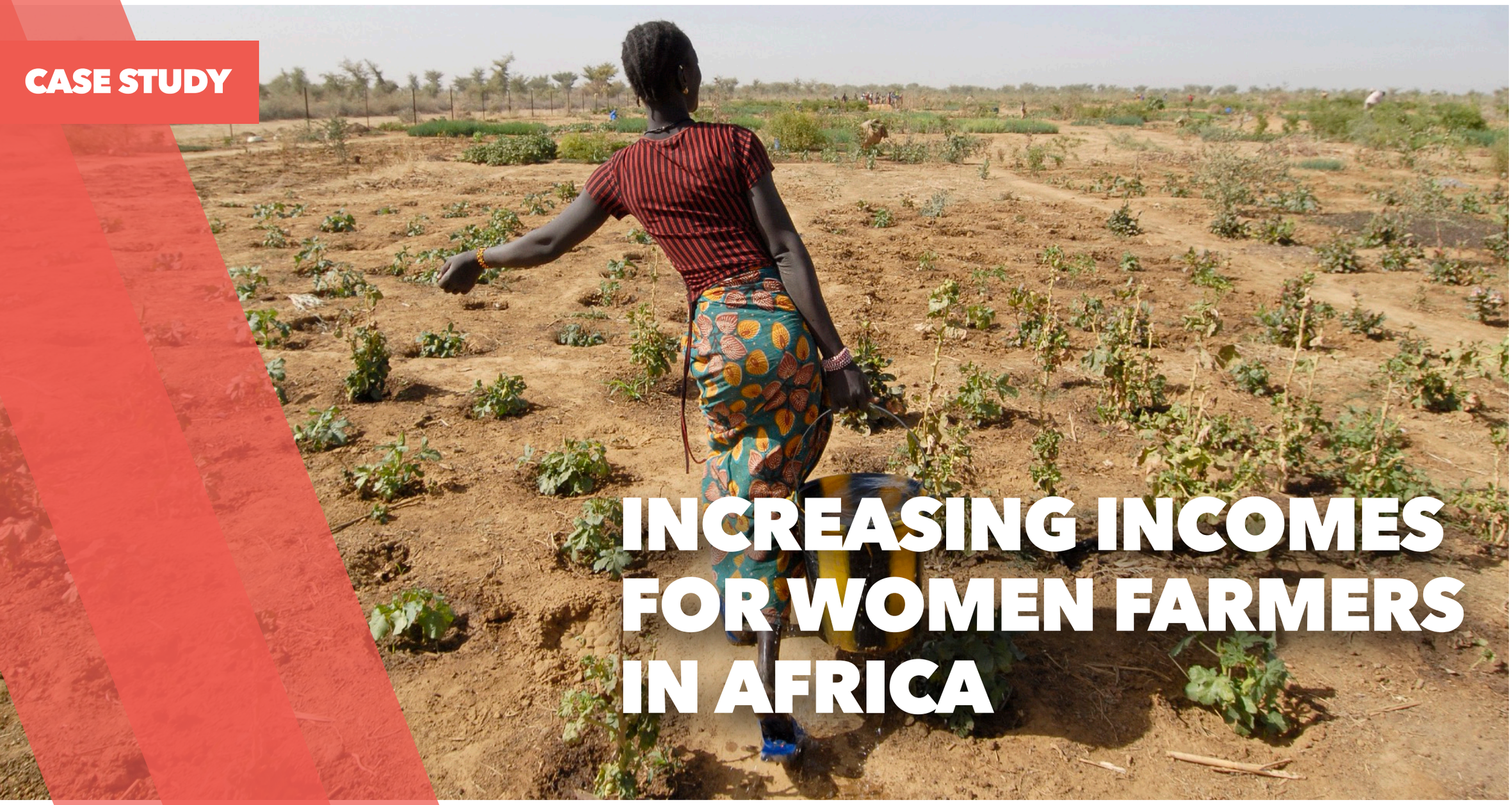
Pastorals reported a satisfaction rate above

**90%**

Adoption rate above

**85%**

CASE STUDY



# INCREASING INCOMES FOR WOMEN FARMERS IN AFRICA

## THE CHALLENGE

Women farmers, especially in developing countries, are the farthest behind in accessing digital tools and technologies. According to the International Telecommunication Union, the gender digital divide in sub-Saharan Africa has skyrocketed in the last decade, now estimated to be over 45%.

This means that women, who occupy more than 70% of all agriculture-related jobs in the region do not benefit from the advantages that precision agriculture and technical knowledge or support could bring. In turn, this leads to excessively demanding agricultural methods, low productivity, and minimal income.

**To address the gender disparity, GODAN stepped in to close this digital divide.**

CASE STUDY

## GODAN'S SOLUTION

GODAN sought to improve access to resources and information to increase independence and incomes of women farmers, adapted to their reality: many or most being illiterate and/or only fluent in their local or native language.

Considering the increasing proliferation of low-cost smartphones, GODAN developed several mobile applications to provide daily farming information, weather data, and other guides for women farmers to relate to, understand, and use.

For instance, pictograms proved to be an efficient way to convey knowledge without a literacy (lack of) barrier and the use of local languages. These applications now provide a step-by-step guide to women farmers on selecting and caring for crops, market prices, and basic budget management. There is no need for complicated instructions or written text – the farming guide presents agriculture tips simply and clearly.

## THE IMPACT

**These applications have so far been downloaded 30,000+ times across 140 countries.**

**In Kenya alone, GODAN impacted the lives of**

**42,000**

**farmers in 40 communities**

**with**

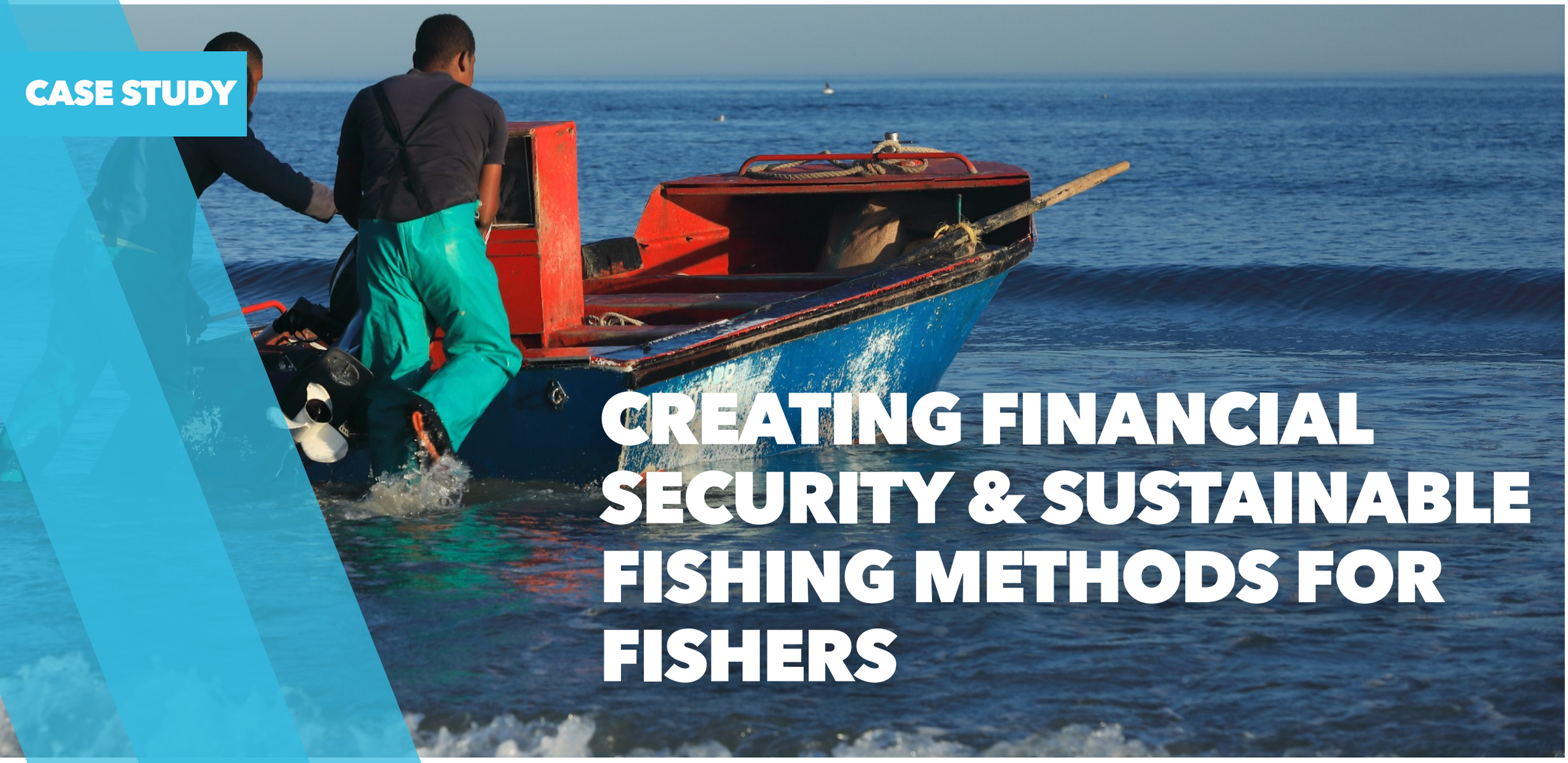
**80%**

**of farmers directly benefitted being women**

GODAN has a network of inventors and entrepreneurs who are putting power back into the hands of women to build a stable and flourishing future.

With this woman-centered approach, GODAN delivers successful and viable systems. This secures a better future for rural communities and puts an end to world hunger.

CASE STUDY



# CREATING FINANCIAL SECURITY & SUSTAINABLE FISHING METHODS FOR FISHERS

## THE CHALLENGE

Subsistence farmers and fishing communities face the same problem: little or no access to credit, condemned to be treated as marginalized and left to survive on low incomes as part of the informal economy.

**In South Africa, GODAN works with fishing cooperatives that support the livelihoods of inshore, small scale fishers.**

They struggled to survive against foreign commercial fishing methods without access to open data, often draining fish stocks far off the African coast and leaving them perilously close to starvation.

No matter how hard they tried, their traditional and sustainable methods left them locked out of the formal food production sector and reduced their opportunity to maintain a supply of a nutritious source of food for South Africa's growing population.

CASE STUDY

**Thanks to GODAN's initiative, connected to open data, life has changed significantly for thousands of fishers in Southern Africa.**

## GODAN'S SOLUTION

Fishers can now record their catches, market their fish, and build business accounts trusted by banks and financial institutions in Africa. With the help of an app, this delivers two significant benefits in one action:

1. fishers can enter the formal business sector by providing accepted accounts of their income, which opens up access to credit to allow them to invest in their businesses and build a sustainable future

2. data-driven processes preserve an ecological and environmentally sustainable fishing method that protects fish stocks

**GODAN's solution is adaptable - what works for fishers on the coast of South Africa can also work for smallholder farmers. At the high end of the market, the benefits of the solution include:**

- Helping customers and restaurants check the provenance of the fish they buy, so they know how the fish was caught and where.
- Because the system builds fishers' business profiles, they are now secure to continue supplying to local fish markets with an essential and affordable nutritious food source for many living in coastal regions.
- Fishers can manage their businesses more effectively with open data-driven devices and systems
- Individuals can pool resources and expertise to receive essential guidance in growing crops and improving land use
- They can compile costs and revenue accounts enabling them to generate a monthly P&L statement endorsed by their cooperatives.

Like the fishermen, smallholders can also market ecologically and environmentally friendly produce, which brings added value and improved income for once marginal farms.

CASE STUDY

# THE IMPACT

**GODAN's work in South Africa, Angola, and Namibia has impacted the livelihoods of fishing families along the southern African coastline.**

**New markets and income streams have been created as fish farmers become drawn into the mainstream, selling to restaurants and consumers interested in sustainably caught fish.**

**Locally sourced nutrition has been saved and sustainable businesses that support the food supply chain established.**

**By strengthening the effectiveness of cooperatives means many informal sector workers can shake off their marginalised status, allowing them to build their businesses and reduce the need for imported fish products out of the reach of millions of Africans.**

CASE STUDY

# PUTTING DIGITAL DATA TO USE IN LOW TECH ENVIRONMENTS

## THE CHALLENGE

For the millions of small farmers that constitute more than 80% of the agricultural sector's jobs worldwide, access to market, weather, and agricultural data is still a goal that until now appeared unreachable.

This condemned smallholders to the mercy of intermediaries who imposed unsustainable prices for their produce and held a stranglehold on the cost of essential farm supplies. Without access and use of data, smallholders were destined to be victims of circumstances and locked in a spiral of debt.

In most cases, the ability to provide valuable mass information to smallholders has not been possible as smartphone proliferation was low, and internet access intermittent or absent for more than 70% of the African population (ITU 2019).

**To overcome this problem, GODAN has supported innovations that ensure data is delivered 'the last mile' to farm gates everywhere.**

Ingenuity was directed to connecting a suitable analogue system to relevant data that could help farmers prosper. It meant that game-changing information was delivered, and yields improved.

## GODAN'S SOLUTION

Building on an idea originating in Uganda, GODAN's partners linked valuable farm data to basic SMS technology. This effectively conveys daily information to farmers via a technology that works for them. Using simple SMS services, GODAN could deliver daily up-dates on local market prices, weather conditions, crop advice, including planting times and information on tackling infestations and plant diseases. In turn, this allows populations with basic analogue mobile phones to benefit from the support so far exclusively granted to the holders of more advanced technology.

While it might seem that everyone has a mobile phone these days, millions of people cannot afford a smartphone, excluding them from apps. But this hurdle is being crossed by using alternative means of delivering critical weather, crop, and market data.

**CASE STUDY**

# THE IMPACT

**For the first time, traditional farmers, mostly women, receive farming tips that help them improve the productivity of their farms and with locally-focused services.**

They are now empowered to produce more, better, at lower costs and selling at the best price available. They are at last, no more at the mercy of intermediaries as now they can compare prices to buy and trade under the most advantageous conditions.

As a direct consequence of this approach:

- **Producers have seen an increase in their net income from 15% to 30%.**
- **One million mobile phone profiles created in Ghana alone, ensuring delivery of relevant agriculture data to smallholders, focused on sending information relevant to each farm type**
- **ESOKO, the Ghana-based model, provides SMS information from weather and market data, improving decision making for smallholders which led to increased incomes**

**Replicated in 16 countries across Africa, reaching 350,000+ farmers in West Africa**

CASE STUDY

# EARTH OBSERVATION TO HELP KENYA'S SMALLHOLDERS

## THE CHALLENGE

The world is increasingly acknowledging how data can help leaders, managers, business owners, and farmers with their decision-making.

This has resulted in an increasing number of data-driven initiatives, which has grown the volume of data available in each sector and the number of sources. However, the data produced is highly compartmentalized, limited to one area, one sector, or one specific issue.

With the emergence of Artificial Intelligence, there is the capacity to rapidly correlate different data sources, significantly increasing the ability to use these correlations to improve predictive modelling and manage behaviours.

With the increased effects of climate change, this capacity has become fundamental to the agriculture industry's future, the sector most severely hit by global warming. However, the problem is that until recently, there was no specific mechanism to integrate data as wide-ranging as satellite data and genomics into one process which can process, interconnect, correlate, geographically tag, and holistically analyse data. This wide variety of separate but interconnecting datasets need to work together and be delivered to farmers to be beneficial.

**GODAN's solution to addressing this issue was the development of the GODAN Data Cube.**

## GODAN'S SOLUTION

The GODAN Data Cube concept originally came from satellite imagery data analysis: as satellites scan the earth, it divides its data into 'stripes' representing each satellite scan.

As it moves around the planet, these are cut horizontally, offering a range of 'squares' which can target one or another area of interest. As this data is cumulated over time, new 'layers' of data are added, representing the situation over different periods. This is how the 'stripes' became 'squares,' which themselves became cubes.

Acknowledging the benefits of the combination of surface and historical data makes it much easier to draw trends, identify events likely to occur in the future, and be better prepared to address them before they arrive.

CASE STUDY

Thanks to advances in technology, data cubes today go much beyond satellite imagery; multiple new types of sensors have been developed, allowing additional 'layers' of data looking back at the earth. More significantly, data from traditional repositories can now be incorporated in the model, allowing for a genuinely multidimensional 'cube,' which is extremely useful in various sectors and agriculture.

GODAN, through its Programme for Capacity Development in Africa (P4CDA), established a geospatial infrastructure to provide ground-truthing data for the development of a generic National Earth Observation data cube adopted by the 55 sovereign states of the Africa Union (AU).

GODAN recognizes the pressure on natural resources that continue to increase with climate change. Alongside that concern, there are several challenges to be overcome to meet the needs of Africa's youthful demography within a period of food and nutrition uncertainty and environmental variability. The environmental issues will be monitored using remote sensed Earth Observations (EO) data that shall be generated from increasingly available Satellite data. This is verified using the ground truthing that the capacity building programme GODAN has established with local partner organizations, including universities.

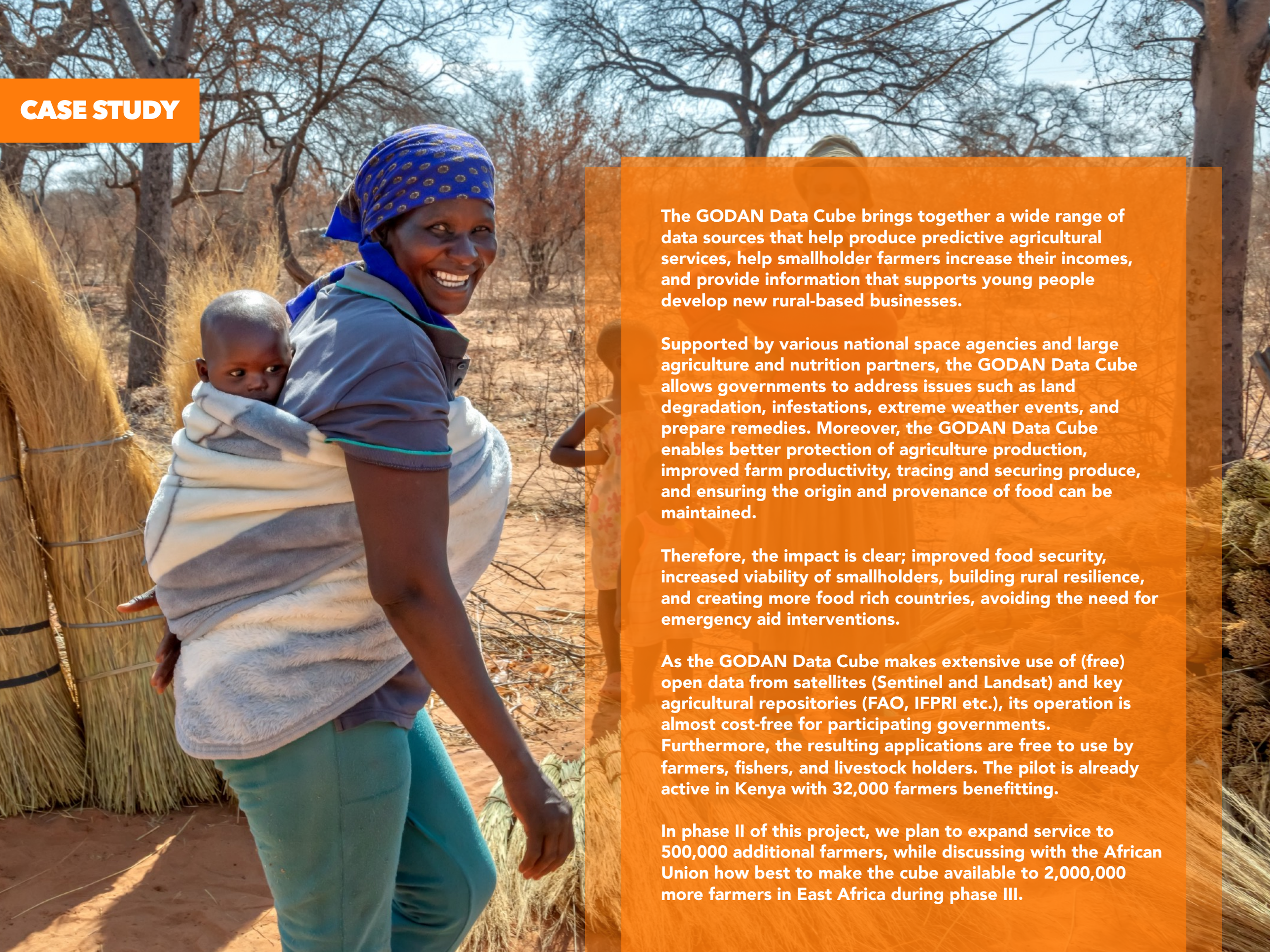
## THE IMPACT

**The GODAN Data Cube brings together a wide range of data sources that help produce predictive agricultural services, assisting smallholder farmers in increasing their incomes and providing information that helps young people develop new rural-based businesses.**

Supported by various national space agencies and large agriculture and nutrition partners, the GODAN Data Cube allows governments to see and address issues such as land degradation, infestations, extreme weather events, and prepare remedies. Moreover, the GODAN Data Cube enables better protection of agriculture production, improved farm productivity, tracing and securing produce and ensuring the origin and provenance of food can be maintained.

Therefore, the impact is clear; improved food security, increased viability of smallholders, building rural resilience, and creating more food rich countries, avoiding the need for emergency aid interventions. As the GODAN Data Cube makes extensive use of (free) open data from satellites (Sentinel and Landsat) and key agricultural repositories (FAO, IFPRI etc.), its operation is almost cost-free for participating governments. Furthermore, the resulting applications are free to use by farmers, fishers, and livestock holders.

# CASE STUDY



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In phase II of this project, we plan to expand service to 500,000 additional farmers, while discussing with the African Union how best to make the cube available to 2,000,000 more farmers in East Africa during phase III.

CASE STUDY

# BRINGING TECHNOLOGY TO THE TRADITIONAL AGRI-FOOD SECTOR

## THE CHALLENGE

Agriculture is the oldest industry in humanity. While it has existed for thousands of years, most of today's farmers (90% worldwide being smallholders) continue to operate as their ancestors did, unaware of the benefits made available today through various technologies.

A significant reason for this is the lack of access to technology, sometimes as simple as smartphones. This technology gap is especially vital for women, who constitute more than 70% of all agriculture jobs worldwide. The lack of data and the subsequent knowledge denied to millions of farmers, perpetuate low efficiency and difficult working conditions, keep small farmers at the mercy of intermediaries.

As a result, young people flee from rural areas, having lost interest in agriculture, moving to more environmentally damaged and unhealthy urban centres. The world is now experiencing accelerating aging of the world's farming population, which will prove disastrous if not halted.

## GODAN'S SOLUTION

GODAN has adopted a hands-on approach that encourages practical experiments, an excellent way to transform new ideas into new farming methods, and create a new level of efficiency.

GODAN has already carried out numerous online training sessions (MOOCs), webinars, and other forms of capacity-building activities. GODAN has been training thousands across the globe to develop data-driven systems and apps for smallholder farmers in Africa and Asia.

Hackathons are a popular and effective way of working with a new generation of actors who have been trained in and have a passion for technology. We have identified and work with those with a desire to find ways to turn ideas into solutions to service their farming communities.

Hackathons bring new engineering and computing talent to support innovations for agriculture.

GODAN has brought together people from different disciplinary backgrounds to form teams around a problem or idea, and collaboratively co-create a unique solution to the problem from scratch.

CASE STUDY

# THE IMPACT

The impact is evident at various levels:

1. The development of actual tools (apps or platforms) - these help to increase yields, protect the environment, or provide innovative tools that help farmers deal with issues related to cost and efficiency.

2. Establishment of start-ups - many, if not most of the GODAN Hackathon winners, have subsequently improved their products resulting in several start-ups. Many of these start-ups have grown to become significant players in their sector or region.

3. A focus on Africa and Asia - so far, dozens of GODAN Hackathons have been carried out in over 40 countries, with participants representing 20 African countries. The result is hundreds of individual leaders, technicians, advocates, and actors contributing to the improvement of agriculture in their own countries.

**Applications so far downloaded 30,000+ times across 140 countries**

## Here are some examples of GODAN's virtual and onsite hackathons:

**1.** The New York Hackathon 2016 had 72 individual specialists grouped into 12 teams. The winning teams developed a range of tools, from search engines enabling the easy use and finding of open databased climate change mitigation solutions to the introduction of new water management services. Several start-ups were created as a result of participation in the Hackathon.

**2.** In 2017, a GODAN international farm challenge was organised as part of the NASA World Wind Europa Challenge. A wealth of new ideas and concepts were developed in this high energy event. It resulted in multiple tools both for farmers and agricultural students. The winning team in this challenge developed an application called Agrisphere, which uses satellite data to demonstrate the impact of climate change on agriculture visually.

**3.** In 2019, a series of virtual Hackathons were held to build and strengthen relationships between several European donors and the African communities they supported. This Hackathon gathered more than 200 registered participants from 42 countries and created three winning concepts that have gone on to become successful start-ups.

# GODAN

**Global Open Data**
for Agriculture & Nutrition

To partner or for further information

**Email: enquiries@godan.info**