

Kizito's Dream – Transforming Agriculture in Africa

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The instruments on Europe's Sentinel satellites are high-precision devices, designed and developed to operate reliably for years in the challenging environment of Space. Based on decades of experience with earth observation satellite programmes, scientists and engineers have created the possibility to observe our planet with ever greater precision and produce an ever-increasing volume of data. But can the data from these instruments help to improve the life of people living in a very different challenging environment, smallholder farmers in rural areas in Africa?

How it all started

In 2009, at the age of 18, Kizito Odhiambo had secured a place at a university in Kenya. But he decided instead to leave his home near Lake Victoria for a voluntary year in Germany, helping disabled children. Studying could wait for a while.

Less than ten years later Kizito had founded his own company in Germany, with the goal of using Space technology to support smallholder farmers in East Africa.

Like many young people in Kenya, Kizito had always dreamed of owning a German car – a Mercedes, a BMW or an Audi. So when, in 2010 at the end of his voluntary year, he was offered the chance to study Electrical Engineering and Information Technology at the Technical University in Darmstadt, he realised that he might even get the opportunity to help design and build these cars.



Many foreign students in Germany send money home to their families and Kizito was no exception. He took student jobs to earn enough money to support himself and have something left over for his mother in Homa Bay in Western Kenya. His mother used the money wisely. Like many of her neighbours, she had a small plot of land and she spent the money on soya bean seeds for herself and her friends. But how do you make money with soya? Kizito and his mother founded Kedo Solutions and suddenly, at the age of 25, Kizito was an entrepreneur.

By 2018, he had received his degree from the Technical University of Darmstadt. In addition, he was CEO of a Kenyan agriculture company. Kedo Solutions now worked with over a thousand women and men growing soya beans in Homa Bay and adding value to them, turning them into flour and soy beverage products for the local market.

But he knew the business was extremely risky. Smallholder farmers were not able to benefit from the advances in technology which were now available to their counterparts in Europe and other parts of the world. His own first-hand experience told him without access to that technology, his mother and

her neighbours would not be successful. During his studies, he had designed and built a low-cost weather station. His ambition was to set up many such off-grid stations across Kenya to help improve the weather forecasting which could ultimately be used to customize agro-weather advisories for small holder farmers struggling to produce rain-fed crops.

That could be a step in the right direction, but he had to find ways of meeting the bigger challenge. The idea of founding another company, an “agri-tech” company for smallholder farmers, started to take shape in his mind.

The agriBORA Platform

In a first step in 2018, Kizito Odhiambo made a proposal to the Business Incubator of the European Space Agency (ESA) in Darmstadt, Germany. His idea was to develop a platform through which a range of services and products could be made available to smallholder farmers and their business partners. The proposal was accepted and the company agriBORA was registered in Darmstadt.

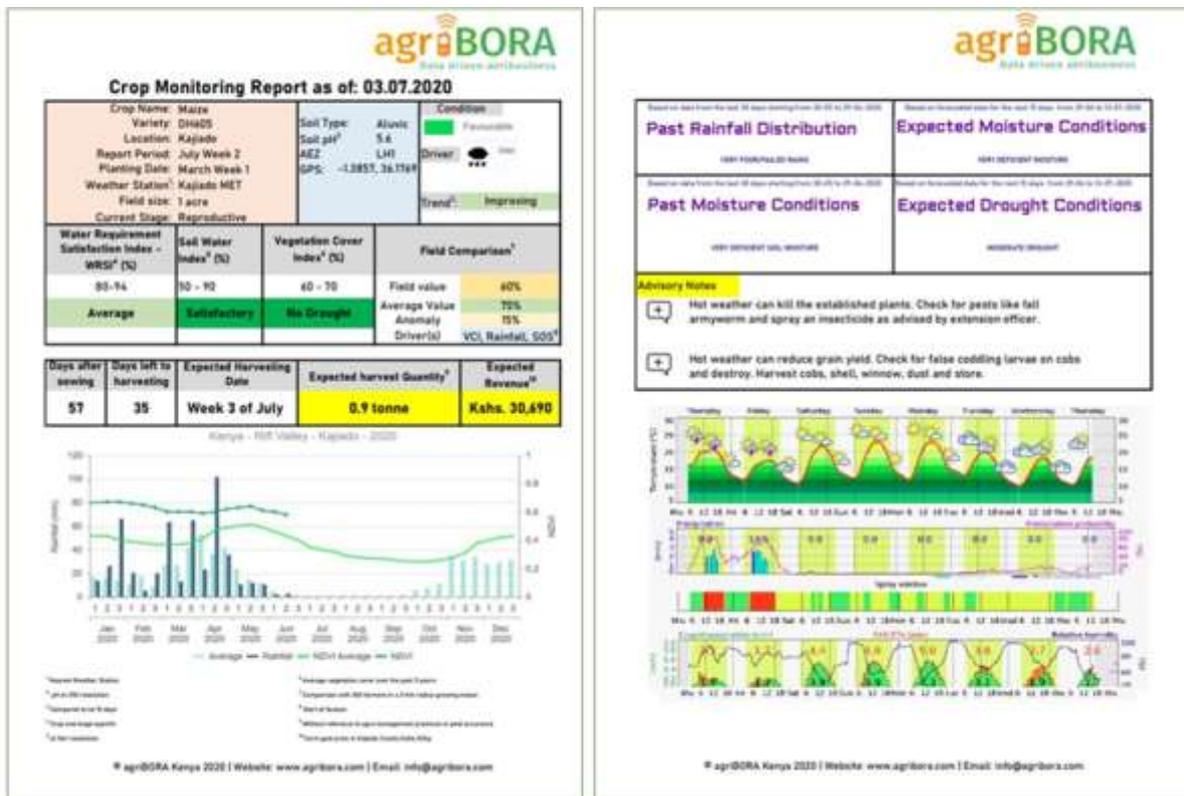


Figure 1: An Early Report Produced by the agriBORA Platform

Over the next eighteen months, a small team led by Nicolas Caspari, a geo-information data analysis expert, developed the agriBORA platform. The team knew of the many problems faced by Kenya’s seven million smallholder farmers. Most of them don’t own smartphones or have unreliable internet access, so the platform had to support communication with so-called feature phones, using SMS and the USSD protocol. For many young engineers, working with this type of technology would have been a step backwards. But Nicolas and Kizito knew that they had to find a way to bring the benefit of satellite technology to the people who needed it.

Most of the farmers don’t have an address – but how do you deliver location-based services when you don’t know the location? AgriBORA configured a GPS device which could be used together with a feature phone to capture a location with one button-push. And they started to think about which

services, derived from satellite data, would be most useful for the farmers. Weather information was clearly top priority, and agriBORA signed a collaboration agreement with Meteoblue, a Swiss company which provides local weather forecasts worldwide.

The Space2Agriculture Network

Kizito and his team knew that Space technology could now form the basis of a range of products and services to help smallholder farmers. But agriBORA did not have either the resources or the expertise to develop these products and services themselves. They needed partners and, through the ESA Business Incubator, they became aware of the DLR INNOspace® network Space2Agriculture, which was created in 2019 as a communication platform between space and agriculture. The objective of the network is to establish cross-sector networking, to initiate and consolidate synergies.

Realising the potential for finding like-minded partners through Space2Agriculture, agriBORA was one of the first organisations to join the network. By the end of 2021, Space2Agriculture had over 200 member organisations, about a third of which are small commercial companies and start-ups with exactly the sort of expertise agriBORA needed.

Many of these organisations use space technology, in particular data from Europe's Copernicus programme, to build agricultural applications for crop recognition, yield forecasts, soil analysis, pest recognition and other purposes. Potential partnerships with such companies are important. They give agriBORA access to products, services and expertise without the risk of having to develop them in-house and give partners access to a market which they are not currently addressing.

Kenya's Smallholder Farmers and their Value Chains

By the end of the incubation with ESA the agriBORA platform was ready for pre-operations. Kizito Odhiambo and his team had already analysed their target market in detail. Kenya's seven million smallholder farmers produce about 70% of the country's food. Many of them grow high-value crops such as maize, soya beans, sunflowers, Irish potatoes and rice. The value chains are highly fragmented. Individual farmers have problems accessing credit to purchase seeds and fertiliser or obtaining insurance. They get very little advice during the growing season (one of the problems Kizito had identified with Kedo Solutions) and they have difficulty getting fair prices for their harvests, often being forced to sell through middlemen.



Figure 2: The agriBORA team talking to farmers in Siaya county

The agriBORA team spent a lot of time visiting farmers and cooperatives, gaining an understanding first-hand of the problems they face.

But the farmers weren't the only part of the value chain with problems. The agri-processors, those organisations which buy and process the crops before selling to the consumer market, found it difficult to plan their supply logistics since they had no good overview of the quantity and quality of the crops they were expecting. Traceability was also a big issue for the agri-processors. The Kenyan government had instigated a scheme to give tax relief on crops bought in Kenya, but the agri-processors had no way of being able to prove the origins of the harvest they bought.

The Alizeti Project

AgriBORA needed a way to demonstrate the benefits of their platform and the approach they were taking to both agri-processors and farmers. The team approached the ESA Business Applications Programme and, strongly supported by the German Space Agency (DLR), succeeded in creating the "Alizeti project", which started in May 2021.

Alizeti is Swahili for "sunflower", one of the crops of interest to agriBORA. Five agri-processor organisations agreed to act as pilot users during the project and they spent a lot of time discussing their requirements with the project team.



Figure 3: Kizito Odhiambo talking to Agri-Processors

The Factory Acceptance Test for the system was passed in February and the pilot operations are running during the Long Rain season in Kenya, from the beginning of March until the end of June 2022. The feedback from farmers and agri-processors will guide the further development of the agriBORA platform and the services it provides. More information on the Alizeti project can be found under: [Alizeti | ESA Business Applications](#)

Satellite Technology Gains Traction

Almost all national and international organisations which support the development of agriculture in Africa have discovered the power of satellite-based Earth Observation. In 2021, in addition to Alizeti, AgriBORA signed contracts with the Joint Research Centre (JRC) of the European Commission, the World Bank, Digital Earth Africa, the German GIZ and Heifer International, all of which involved the use of EO data.



Figure 4: An agriBORA expert training KALRO data analysts in Nairobi

The company installed an Earth Observation Data Cubes for the Kenya Agriculture and Livestock Research Organisation (KALRO) and Digital Africa, providing these organisations with access to Analysis Ready Data, in particular from Europe's Copernicus programme. Recently, agriBORA has

run training courses for KALRO, in conjunction with the University of Nairobi, training management and data analysts in the benefits and use of satellite data.

The Future – Will Kizito’s Dream Come True?

Kizito Odhiambo is cautiously optimistic. “When I look at the products and services being developed using Copernicus and Galileo data in Europe, agriculture is one of the main target markets. Smallholder farmers throughout Africa have the same set of basic decisions to make throughout the entire crop cycle as their counterparts in other parts of the world, but without the support technology can give. However, you can’t just create a set of apps and think that their problems will be solved. You have to make sure that the products and services really address their needs, that they have reliable access to them and that they know how to use them.”

This is why the company is setting up agriBORA Hubs, centres which provide lines of communication to the individual farmers. It is also why the agriBORA operations team in Kenya spends a lot of time out in the field, talking to farmers, cooperatives and the organisations they work with.

As Kizito says, “For many smallholder farmers in East Africa, agriculture is a fight for survival. Through our Hubs and our platform, and through the use of satellite data and other digital technologies, we are giving them the means to think about farming as a business. For young people, this combination of technology and business is important in helping them to consider a career in agriculture. This mindset change may be the key to helping Africa become self-sufficient.”