gODAN

Global Open Data
for Agriculture & Nutrition

Success Stories Issue 1

Foreword

Today's world never faced so many intense challenges as it does now. Soon the Earth's population will have more than tripled in less than a century, requiring us to increase food production by more than 60% in the next few decades. This comes at a time when major obstacles such a climate change, land degradation and loss of agricultural land, due to the expansion of cities, already make it difficult to maintain our current food production.

Yes, we do live in unprecedented times. Unprecedented times require unprecedented measures. Unprecedented times require change.

We need to change the way we do things. We need to increase food production, yes, but we need to increase quality food production, not just volume. We need to make sure the food produced reaches those that need it, and that it does not go to waste. Moreover, and some say more importantly, the world needs not just to be better fed but it also needs to be safer, wealthier, healthier, happier.

The industrial revolution is long gone. Even the Internet revolution and its extraordinary benefits seem to level off. What is the solution then? How are we going to reach our next level of global efficiency? Through **open data**.

In 1986, approximately 1% of the world's data production was in a digital format. Twenty years later, in 2007, it was 94%. Today, almost the totality of data generation is digital.

This means that we are now for the first time in the history of humanity, in a position to instantly share, disseminate, send masses of information anywhere around the globe (and beyond) at any time.

Data is knowledge; or rather, data may become knowledge once the concepts, the processes, the ideas, the decisions that led to its generation, are extracted and reformulated in a manner that can be understood, analysed, and accessed by everyone. Then data truly becomes knowledge. In turn, through wide dissemination, knowledge allows leaders and individuals alike to make better facts-based, enlightened decisions, leading to better societies and better individual well-being.

Open data is the next revolution. Humanity will be able to build on the gains made from the series of industrial and intellectual revolutions that has led the world to progress to where it is today. Open data allows governments, private sector and civil society for the first time to work together in a true participative manner.

Yes, we do live in unprecedented times. We also live with unprecedented tools, made largely and widely available through open data, examples of which are illustrated in the following pages.

It is now for us to make use of it, for the benefit of all.

GODAN Executive Director **André Laperriere**

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LAND RIGHTS IN RWANDA
Transparency, land rights, land tenure regularisation

The commitment of the Government of Rwanda to open data has helped to successfully deliver a nationwide digital based land registry system. It is online and machine readable. The project began in 2008 and offers a valuable service for individual citizens and for national planning.

It has improved income security for many rural citizens, while opening the door to a new wave of rural development, allowing many, often for the first time, to apply for credit against the value of their property and to invest in new business.

Because the national registration system is online, it connects quickly and efficiently to the Mortgage Registry and Rwanda's main banks. The data contained in the registration system speeds up land transactions, avoiding the need to search for physical records which were previously housed in offices around the country and could take days to find and send out.

The new digital system automatically records a mortgage approval and other details linked to land occupation so a decision about ownership, tenure or liabilities can be dealt with quickly. The Rwanda Revenue Authority and the Ministry of Justice also have access to the registration process, helping to streamline the country's tax gathering and justice system.

A transparent method of registering land and encouraging sustainable economic growth in Rwanda.

In its 2013 Annual Report, Rwanda Land Tenure Regularisation Programme, the UK's Department for International Development (DFID) heralded Rwanda's digitization process as the first large-scale land registration programme of its kind in Africa, demonstrating the use of open source software and open

data as the first of its kind based on digital technology.

The Rwanda Natural Resources Authority (RNRA) reports that the immediate result of the process was its ability to record 84% of all land with identifiable owners and establishing approved title.

More than 11M individual parcels of land are now defined and all those records are accessible online

The Rwandan Government's objective was to provide registered titles for every landholder in the country, supported by the international development organisation, DAI in its Land Tenure Regularisation Programme, 2005-2009. DFID has confirmed that because the land registry is publicly available on an open database it ranks the achievement as outstanding in its 2013 Annual Review. The endeavour proved fundamental in unlocking a transparent method of registering land and encouraging sustainable economic growth in Rwanda.

More than eleven million individual parcels of land are now defined and all those records are accessible online by banks, tax offices, courts and at local council offices. The digital process plays an important on-going role in offering better administration for tracking legitimate landholding into the future. Land can now be treated as an asset which can be lent against, enabling ordinary citizens to get involved with new commercial ventures, investing and enhancing their properties or building rural enterprises.

At a more fundamental level the country's digital registration system plays a key role in creating social cohesion and helping to increase agricultural productivity. In publically defining each plot it has reduced the

number of conflicts around tenancies and property boundaries, freeing up officials to concentrate on strategic development rather than spending time adjudicating on disagreements between neighbours. The RNRA estimates that, "...given a population density of 407 inhabitants per kilometre, the highest density in sub-Saharan Africa," land registration was a critical component for successful rural development.

The RNRA states that ninety percent of those now registered represent predominantly low income households occupying only small parcels of farm land. This creates opportunity for a vast majority of families who can successfully apply for small scale loans supporting development.

Looking at the bigger picture, now that property ownership and tenancy is registered digitally, the new data helps secure long-term social stability and harmony – important factors for a country which is only two decades away from the devastating inter-communal violence that resulted in a genocide that killed 800,000 members of the Tutsi community and moderate Hutu. Many argue the conflict was ignited by issues linked to land so the regularisation of land ownership, openly available in a digital registry, is crucial for Rwanda's future peace and development.

But behind the obvious economic benefits and its role in supporting reconciliation within rural communities the registration system offers potential to improve gender equality, allowing women to formally register as landholders, gaining rights to buy and sell land and to assert their entitlement to inheritance after the death of a spouse or father.

"There are a significantly higher number of unique female holders of real rights on land compared to male counterparts."

The RNRA reports, thanks to the open data available in the land registry, that by the end of 2015: "There are a significantly higher number of unique female holders of real rights on land compared to male counterparts."

This is a remarkable transformation from twenty years ago when few women owned land and found it extremely difficult to inherit or purchase land. The digital registration process has helped opened up information about women's increasing involvement in the rural economy and supports gender land rights.

Sources:
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The men working on tea plantations collect tea on their basket.

2 SMART FERTILIZER MIXER, GLOBAL

Agriculture, innovation, commercial

Using an array of information and years of research, crop yields can be increased while reducing fertilizer costs and saving water.

Taking advantage of open data, the SMART! system is designed to offer precise nutrient formulations, regulate fertilizer amounts and offer directions on mixing and applying fertilizers.

At the heart of this new innovative commercial software, aimed at the farming and agribusiness sector, is a set of algorithms that draws salient information from years of agricultural data, extracting answers needed to help farmers anywhere in the world mix the correct amount of fertilizer to achieve optimum crop growth.

Utilizing open data enables the system to tap into historic and up-to-date details on crop types, water conditions and fertilizer characteristics, intelligently directing farmers to mix the exact formula.

Guy Sela, CEO at SMART! says, "at the base of our system is a layer of information that comes from all types of data bases. It's open data, but in its raw form it is not readily available to the average farmer or agronomist. All this raw data, once it's understood and applied, can address crop nutrition anywhere in the world."

The software is designed to improve the exact mix needed to get the best performance from plants and is geared to deal with a wide range of ingredients, soil types and water conditions.

The open data at the heart of the SMART! system is made up of thousands of reports, figures and research results. SMART! processes all of this data, effectively channelling it into solving the fertilizer usage of a multi-

tude of growers, focusing results to account for thousands of variables. It is the company's investment in creating the fact-finding algorithms that make the open data valuable, translating data into practical results.

Sela says his team has been working on the fertilizer mixing software for 10 years. Much of that time has been focused on R & D, only going to market about a year and half ago. "We started as a very small business. We sold fertilizer mixing solutions to a few growers while at the same time developing the technology that makes SMART! such a powerful and versatile service. Now that we've brought an investor on board we are scaling up the business," he says.

SMART! has attracted mainly arable farmers so far and this has brought the company customers from South Africa, South America, the USA and Australia. Sela insists it is helping produce remarkable results, with yields of corn increasing from 20% to 70% when farmers use his company's system.

The software is designed to improve the exact mix needed to get the best performance from plants and is geared to deal with a wide range of ingredients, soil types and water conditions. Sela says the strength of SMART! is its ability to deliver instant fertilizer recipes that can build up maximum yields with zero mistakes and minimizing costs.

The company does not only report success with corn. It has also seen new business come from the soya bean and vegetable sectors. Most recently there has been increased take-up of the system by coffee and sugar cane farmers. All this success is based on effectively directing open data to the needs of individual growers around the world.

The SMART! process is downloadable onto a smartphone or tablet, providing a series of

SMART! worker explaining the software.

menus targeting grower's needs. The ability to extract relevant information from open data sources and apply it to different quantities and mixes of fertilizers suitable for a wide variety of soils and water types means it has potential for environments everywhere.

The vast amount of data lying behind the user-friendly system is not necessarily apparent at first glance. Growers are only required to enter their specific soil and water types against the crop they wish to cultivate. The software processes the information and designs an optimal recipe using the fertilizers and other products already on hand.

Sela says, "This cuts out unnecessary buying or wasting of fertilizer."

SMART! is a young company, but already its application is attracting the attention of agricultural development agencies and Sela is looking at ways to broaden the reach of the SMART! technology.

"We are investigating ways we can offer this solution to small farmers. We need to work out how to make it cost effective for them and are investigating ways to introduce it to rice farmers in Vietnam. There's over one million hectares we could support with precise fertilizer mixing instructions. It'll make a major difference for the farmers and help the environment." he says.

But for now, the company's main customers are large commercial farms. Corn is where it made early inroads but the concept is moving into the vegetable and tobacco sectors as word spreads. Over the next few months SMART! is launching a marketing campaign so this quiet revolution in the world of fertilizer mixing may soon become a way of life for many more farmers.

Source: http:// www.smart-fertilizer.com

3

COPERNICUS SENTINEL
Satellite, environmental

In 2016 the third European Sentinel satellite added to the growing array of earth-observing instruments offering greater open data based information, aimed at helping to counter environmental damage and mitigate against climate change. The new satellite will provide useful data focused on transport, agriculture and renewable energy sources.

The data generated by the family of Sentinel satellites, making up Europe's Copernicus environmental monitoring network, are used worldwide and are free of charge for all users.

The satellites provide data for monitoring the environment and supporting civil security activities.

According to a report on the Italian Space Agency website the benefits of the satellites will also produce other kinds of tangible results, "some studies showed that Copernicus may create around 50,000 new jobs in Europe by 2030, as well as boost economic benefits by €30 million."

The new Sentinel 3A is now the third satellite in a planned family of six, which will eventually make up the European Space Agency's Copernicus network. The ESA relies on the Sentinels, and contributing missions from other satellites, to provide data for monitoring the environment and supporting civil security activities. Sentinel 3A carries a series of cutting-edge sensors to do just that.

"This is the third of the Sentinel satellites launched in less than two years and it is certainly a special moment. It also marks a new era for the Copernicus services, with Sentinel 3A providing a whole range of new data with unprecedented coverage of the oceans," says the Director of ESA's Earth Observation Programmes, Volker Liebig.

Over oceans, it measures the temperature,

Space satellite orbiting the earth.

colour and height of the sea surface as well as the thickness of sea ice. The information can be accessed by a wide range of research institutions, universities and environment agencies. For example, the openly available data can help monitor changes in earth's climate and supports more hands-on applications which report marine pollution and measure biological productivity. It will support ocean forecasting services.

Over land, this innovative satellite yields further open data, monitoring wildfires, mapping the way land is used, checking vegetation health and measuring the height of rivers and lakes.

In a new agreement with the ESA, US agencies can access Sentinel data. This enables data to be accessed by NASA, the National Oceanic and Atmospheric Administration (NOAA) and the US Geological Survey (USGS). All sides are committed to the principle of full, free and open access to the European Sentinel services along with the data provided by the American owned earth observation satellites supported by NASA, NOAA and USGS.

One example of this open access is the service provided by EarthExplorer, a service of the USGS. It provides online search, browse display, metadata export, and data download for earth science data from the archives of the USGS and now access to the latest data provided by the Copernicus programme. Amongst all it can do, it helps emergency planning after earthquakes.

Sentinel 3A was commissioned and launched by the ESA on 16th February 2016 and will provide a 'bigger picture' for the Copernicus environment programme. The 1150 kg payload was carried into orbit aboard the Rockot launcher from Plesetsk, Russia.

The new satellite's duties are expected to begin three months after launch. Controllers spend the initial period in orbit checking all the satellite's equipment, making sure they are calibrated correctly before officially commissioning it for work. Like the two other Sentinels it is designed to transmit open data that provides scientists, agricultural experts and environmentalists more details on conditions here on earth.

The ESA describes Copernicus as the most ambitious earth observation programme to date.

"With the successful launch of Sentinel-3A we are now looking forward to how our teams of experts will steer this mission into its operational life – like they have done with the first two satellites of the series," says ESA Director General Jan Woerner.

The first signal from Sentinel-3A was received just 92 minutes after launch by the Kiruna station in Sweden. Telemetry links and attitude control were then established by controllers at ESA's ESOC operations centre in Darmstadt, Germany, allowing them to monitor the health of the satellite.

"This is another demonstration of the broad range of competence we have at ESA from the early design phase until the operational mission in orbit," says Woerner.

The ESA is an intergovernmental organisation, created in 1975, with the mission to shape the development of Europe's space capability and ensure that investment in space delivers benefits to the citizens of Europe and the world.

The ESA describes Copernicus as the most ambitious earth observation programme to date. Its aim is to provide accurate, timely and easily accessible information to improve the management of the environment, understand and mitigate the effects of climate change and ensure civil security.

Copernicus is the new name for the Global Monitoring for Environment and Security programme, previously known as GMES. The European Commission partners with the ESA to deliver this initiative and the ESA manages the delivery of open data from upwards of 30 satellites.

Sentinel-3B, the new satellite's twin, is scheduled for launch in 2017.
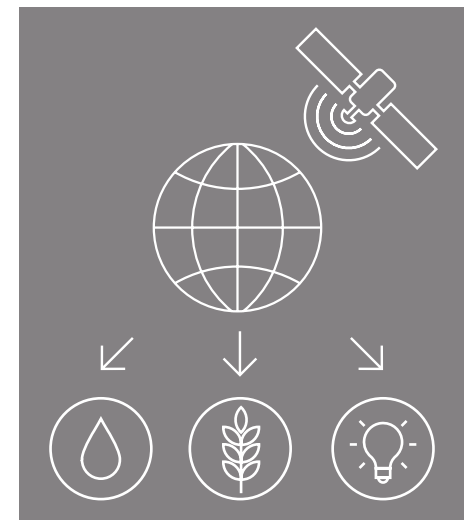
4

COMMODITY EXCHANGE, ETHIOPIA

Pricing and transparency of commodities

Ethiopia has been leading the world in creating and developing an electronic commodity exchange for small farmers. Getting access to the price of crops and making sure you get the right price on the day is the concern of most farmers around the world. But if you lack resources it is all too easy to lose out on the best prices or even be duped.

But open data has played an important role in making the Ethiopian Commodity Exchange (ECX) work for smallholders and the result has seen increased income for thousands of growers while reducing the commission charges to dealers and middlemen.

Along with providing a physical and electronic trading platform, complete with a market information system, the exchange offers warehouse management and quality certification. Importantly, it also guarantees payment against delivery and where necessary it can help resolve any commercial disputes through a professional arbitration system.

"It's basically a way to coordinate all the buyers and all the sellers with the most efficient way of trading."

Since the exchange began in 2008, it has proved a major breakthrough for Ethiopian smallholders. According to Hana Behaila, writing on behalf of the Ethiopian Commodity Exchange, small-scale farmers produce 95 percent of Ethiopia's agricultural output and they have been hungry for information linked to price and quality. They have wanted a fair mechanism to sell their crops and stay informed about the fluctuations in the market.

Over the subsequent years most smallholders have turned to the ECX to reverse what was once a dismal record of underachievement and poor returns. It was estimated that before the ECX, most farmers often received
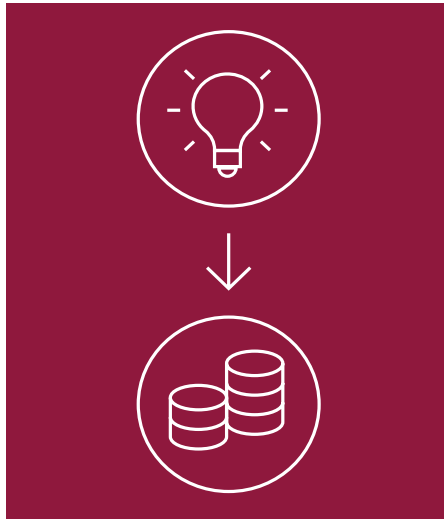
prices, on average, of only 35-38 percent of the full export price.

By 2012, Lauren Everitt writing in The Guardian Newspaper reported, "the Ethiopian Commodity Exchange reported that 70 percent of the 1.2 million monthly calls to the ECX data server came from rural areas. Improved knowledge about coffee prices reduced trader margins fell by almost half, with increased revenue going to farmers."

"It's basically a way to coordinate all the buyers and all the sellers in a sort of most efficient way of trading," says Eleni Gabre-Madhin, ECX's former CEO and former World Bank senior economist who championed the establishment of the exchange.

The United Nations Development Programme's report on 'Promoting African Commodity Exchanges' stated that the "ECX now provides a secure, low-cost platform for farmers to trade agricultural goods, such as coffee, sesame, haricot beans, maize, and in an otherwise tradition-bound system

suffering from unusually high transaction risks and costs."

The UNDP also recognised that the ECX could guarantee the integrity of the products traded, quickly and reliably circulating market price movements to all traders.

Previously, the farmers' were selling their produce at low price to individual traders. Now our union is buying their products with better offers.

The ECX has come a long way from its formative stage in 2008, but at its core remains the use of open data, ensuring critical agricultural and trading information is available to all. On its website, the ECX describes its present array of communication channels: "The ECX allows market actors, including small scale farmers, to access real time pricing for commodities. Information is accessible via SMS text messages, an interactive telephone hotline, tickers using electronic displays at specific regional sites, the EXC.com website, and TV, radio, and newspaper dissemination in four languages."

On the ECX website, Ato Yirdaw Alemu tells of the advantage of the exchange for his organisation. Ato is the general manager at the Wodera Farmers' Cooperative Union and as a member of the exchange he says his cooperative buys crops from smallholders and trades in beans and coffee.

ECX has transformed the Ethiopian traditional trading system into a modern marketing system with technological advancement and transparency.

"Our participation in ECX is benefiting not only the members of the union but all the small holder farmers as well. Previously, the farmers' were selling their produce at low price to individual traders. Now our union is buying their products with better offers," he says.

Ato adds that because of help from the exchange the cooperative is expanding its business, "we have exported limited amount of chickpeas to Pakistan, India, Russia and UEA. We should be thankful about ECX. It has transformed the Ethiopian traditional trading system into modern marketing system with technological advancement and transparency. It has also created reliability among business community members who engaged in the agricultural commodity trade."

Open data has played a pivotal role in bringing market intelligence to smallholders and cooperatives in Ethiopia, pointing the way for other countries to make farming pay and increasing the income of rural communities.

Farmer with fresh nutmeg.

5 ORCHARD WATER MANAGEMENT, SOUTH AFRICA
Agriculture, innovation, commercial

Vineyard in province West Cape, South Africa.

Eyes in the sky are helping improve fruit production in South Africa. By using the latest technology, farmers are increasing yields while reducing water consumption. eLEAF is a Dutch based company pioneering a satellite based service that extracts open data to help improve irrigation and water management.

Half of the 270 active participants have been able to reduce water consumption by ten percent as they place greater reliance on eLEAF's digital service.

The company's expertise supports an ambitious plan by the Department of Agriculture in the Western Cape to refine irrigation usage in orchards and vineyards. With support from Hortgro Science and the European Space Agency high-tech facilities are directed to growers through the FruitLook programme.

Ruben Goudriaan, Project Manager at eLEAF for South Africa is proud of FruitLook's latest results, now in its fifth season. He reports that sixty percent of those participating show ten percent more effective water use

due to the company's use of satellite information. One out of five even indicates their efficiency in water use has increased by more than 30%.

This means growers are using less water to produce more fruit. According to Goudriaan, a recent query indicates half of the 270 active participants have been able to reduce water consumption by ten percent as they place greater reliance on eLEAF's digital service.

Andre Roux, Director of Sustainable Resource Management at the Department of Agriculture in the Western Cape Government oversees the programme and says, "Currently we have more than 1,075 users registered on the web portal and the number is increasing every week."

The secret to eLEAF's success is its ability to apply complex algorithms on raw data gleaned from the satellites, turning this information into easy to understand and visually effective imagery. This unique facility is called Pixel Intelligent Mapping which is all about creating the 'clever pixel'. Simply put, it creates images of vineyards and orchards

that show how plants are coping and where water should be deployed.

In providing quantitative information it improves water usage and reveals the biomass growth of target crops. The Pixel Intelligence Mapping developed by eLEAF form the foundation for the applications and management systems that present farmers with increased practical and usable data on weather, water and the state of their crops.

With the clever pixel based information available on their mobile devices or office computers fruit growers and their irrigation experts can fine tune their husbandry skills, gaining the highest yield for the least water possible. "It's making more for less." explains Goudriaan.

The international partnership behind Fruit-Look brings together a government department, a space agency, private business and growers generating valuable results for South Africa's growers along with equally impressive statistics. FruitLook delivers data on more than 170,000 hectares of fruit crop with users calling up 22,500 hectares of satellite based information on a field by field basis.

Meanwhile, arable farmers have not been left behind in the use of open data. Cropscan 250m is a facility developed by South African based firm enterpriseEvolution and it extracts

data provided by eLEAF but for a wider geographic area than provided by FruitLook.

It offers arable farmers information on crop conditions throughout the country during the summer growing season. It presents detailed information on water use and provides information on the state of grain crops.

While Fruitlook focuses on field by field data for fruit growers, Cropscan 250m looks at a much wider area, aimed at supporting precision arable farming.

As awareness grows about the value of Cropscan 250m Piers Kenyon of enterprisEvolution Technology Holdings reports, "We have recently been approached by the Department of Agriculture's Crop Estimate Committee to look at feeding our data into their system to improve accuracy through weekly reporting and analysis." Meanwhile Kenyon hopes to develop similar services for sugar cane producers, rolling out the intelligent technology, made possible by access to open data.

FruitLook and Cropscan 250m both combine satellite imagery and weather information. The services provide a dataset made up of information on crop growth, crop water use and leaf nitrogen content. Hugh Campbell, General Manager of Hortgro Science assesses the value of the programme for fruit growers and says, "It has the opportunity to

Open data   Bings knowledge   Saving water   Saving money

save water but more importantly to ensure that an orchard stays within the required norms to optimise production."

His ambition for the new technology is to ultimately maximise productivity of every single drop of water.

eLEAF aims to become the data provider of choice for agricultural businesses and armers worldwide. "We plan to set-up our data processing and sales portals in such a way that we can sell our data worldwide at an affordable price." says Mechteld Andriessen, Projects Account Manager at eLEAF. Open data and the company's close collaboration with service providers ensures it can efficiently deliver relevant information to the end users. Without doubt open data is enabling eLEAF to roll out services to a growing number of farmers.

With a changing climate, rising costs and increased competition for water, the technologies designed to help farmers in the Western Cape are transferable to other environments and can assist in achieving higher yields with less water.

Andre Roux believes FruitLook is offering farmers and the greater community a win-win solution. "Increased water use efficiency is one of the best ways of dealing with the impacts of climate change and saving water also results in saving electricity used to pump the irrigation water and reduces deep infiltration of fertiliser, which leads to input cost savings."

The open data based operation at the heart of the FruitLook project will surely become a valuable, if not required, tool for farmers across the globe.

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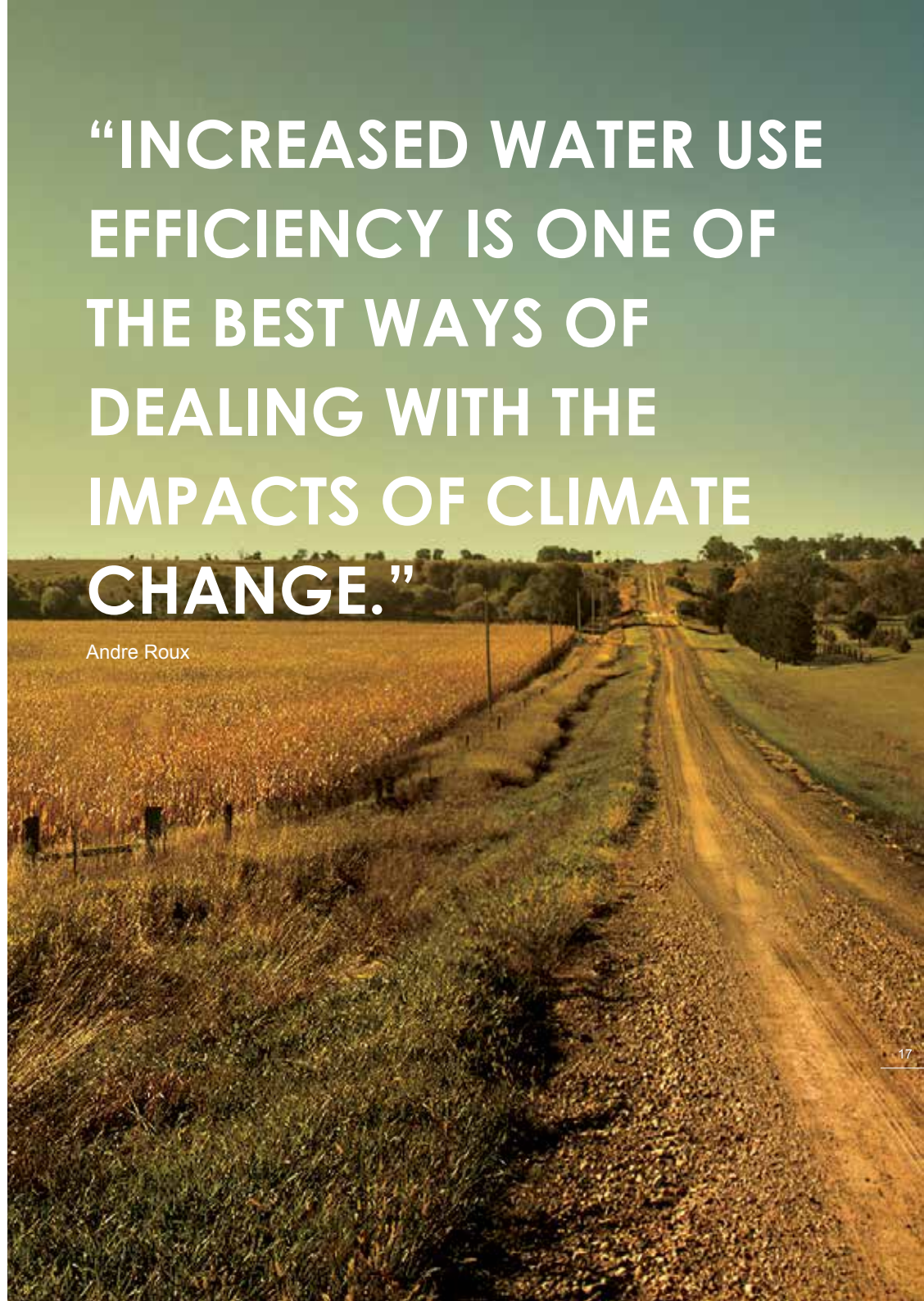http://www.eleaf.com/file:///C:/Users/User/Downloads/eleaf_brochure_compact%20(1).pdf
http://www.fruitlook.co.za

Picking grapes in Stellenbosch, South Africa.

"INCREASED WATER USE EFFICIENCY IS ONE OF THE BEST WAYS OF DEALING WITH THE IMPACTS OF CLIMATE CHANGE."

Andre Roux

6 SHARING CROP INSURANCE METHODS, AFRICA
Agriculture, insurance

When it comes to launching an affordable crop insurance in Africa aimed at smallholders, traditional options have proved too expensive. This obstacle has been overcome thanks, in part, to the use of open data, allowing development experts to access a combination of archive and up-to-date climatic information collected by satellites.

G4AW, launched the Scaling Up Mirco-Insurance (SUM) Africa programme, drawing together a specialist team to help farmers in Mali and Uganda solve their insurance problems.

Spotting the problem for poorer farmers, the Dutch based Geodata for Agriculture and Water organisation, better known as G4AW, launched the Scaling Up Mirco-Insurance (SUM) Africa programme, drawing together a specialist team to help farmers in Mali and Uganda solve their insurance problems. The Netherlands Space Office is executing this programme, commissioned by the Dutch Ministry of Foreign Affairs. With the new service tested in East and West Africa, it is anticipated a low cost insurance model can be offered to other parts of the continent.

Open data is seen as one of the best ways to create new insurance products.

For G4AW it is clear smallholders have been held to ransom by the fluctuations in climatic conditions; either facing too much rainfall or suffering drought. These factors lock farmers in Mali and Uganda into the poverty trap, taking years to recover from a bad harvest. While effective insurance is seen as one of the key factors needed to escape this cycle of uncertainty and loss, existing methods are just too expensive for low income smallholders so open data is seen as one of the best ways to create new insurance products. And with

the ability to afford cheaper crop insurance, low income farmers can unlock credit, enabling investment that helps sustain higher levels of production and better incomes.

"The SUM-Africa project has just wrapped up its first year in Uganda and Mali. Drought insurance products have been developed and sold in Mali for maize and sesame, and in Uganda for maize, beans, and livestock fodder." explains Koko Alberti from EARS Earth Environment Monitoring, part of the G4AW's implementing consortium.

The breakthrough is delivered through a creative combination of insurers, brokers, index providers and aggregators. Together they have based their policies on the development of a system called index insurance. The whole endeavour is reliant on open data, derived from output provided by Europe's meteorological satellites, Meteosat.

The service is central to the new farming index insurance, enabling the team to derive relative evapotranspiration (RE) data which is proportional to crop growth and can be linked to rainfall figures known as Cold Cloud Duration (CCD). Accurate weather cycle predictions are possible by using relevant data collected by the satellites stretching

back to 1982. The Meteosat based data helps the experts create the index insurance calculations combining growing season monitoring and loss assessments.

Alberti is sure that with some fine tuning the new affordable service can expand, "We are now in the process of reviewing the performance of our satellite indices and further improving our product assortment. In the coming year we will develop products for additional crops and for different distribution channels, for example via mobile phone operators."

The ultimate goal for the SUM Africa project is to scale up the technology and turn it into a viable business case. Certainly, over the last year the index insurance system pioneered by the SUM Africa programme proves it is possible to insure against unfavourable weather conditions rather than relying on assessing actual losses.

Climatic conditions across Africa can be verified and monitored using historic satellite imagery through the newly designed monitoring system. Because the process is founded on access to open data it avoids the need for costly assessment teams examining conditions after crop failures and the sharing of open data translates into affordable insurance costs for low income farmers. It opens up a brighter future for smallholders in Mali and Uganda protecting them from the cruel vagaries of the weather and helping them to build sustainable farming businesses. Together with local partners Alberti is optimistic, "...we hope that these developments will further scale up our activities and protect more smallholder farmers against drought related crop losses."

The SUM Africa programme is focusing on nine million smallholders in Mali and Uganda. The objective is to serve 430,000 farmers in three years and one million up to six years after the start of operations.

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A woman stands in front of her roadside stall where she sells grains in Monrovia, Liberia.

7

COMMONSENSE, ETHIOPIA
Food security, smallholder's livelihoods

How does one support smallholder communities by providing agricultural information based on open source satellite data? That is a question being answered by a group of Ethiopian and Dutch development organisations and businesses. With the initial assessment phase completed, the CommonSense programme is now moving to full implementation and the opportunity to improve the lot of thousands of families in Ethiopia.

The ambition is to improve the livelihood of more than 200,000 smallholders.

Andre Jellema, programme coordinator says, "We're moving into the pilot stage and at the brink of using systems in real life, to the benefit of farmer communities and others involved in the agricultural value chain."

The ambition is to improve the livelihood of more than 200,000 smallholders. The focus of the work is to develop information services that extract data from satellites. This can be added to other geo-data sources so that eventually the whole agro-business value chain needed to deliver crops to market benefits. In doing so it is expected to improve food security and increase income in the agricultural sector in the Tigray, Amhara and Oromia regions of Ethiopia.

The premise for the project, funded by the Dutch Ministry of Foreign Affairs and supported by the Ethiopian Ministry of Agriculture and Natural Resource Management, is to introduce different value chain players to the data, in a timely and accurate manner. This can help it function more effectively, allowing smallholder farmers increase their production and secure their income.

Traditional Ethiopian village Karat near Konso, Ethiopia.

"What we encountered already is that the Ethiopian Government is very interested in what has been started. But it should not be taken for granted that the use of open data can be successfully used in all aspects of agricultural development. The process is inclusive and consultation with all stakeholders is important to make sure it is sustainable," says Andre Jellema.

The logic behind the programme is to optimise the quality and accessibility of information services reporting on agro-ecological conditions, agricultural production and production risks.

CommonSense takes a user centred design approach, putting individual needs central to the design process. Key is the organisation of stakeholder meetings contributing to the understanding of the needs and requirements of smallholders and the kind of services they require.

The logic behind the programme is to optimise the quality and accessibility of information services reporting on agro-ecological conditions, agricultural production and production risks. Much of that information is derived from open source data. If these matters can be presented clearly and relevantly then everyone involved in food production can reap the benefit by doing things more efficiently and with greater coordination.

Andre Jellema states, "This is an important moment. Farmer organisations have raised their appetite for using open data which can help build a good business model. But we need to see if these organisations can embrace the need for this technology."

"This is an important moment... we need to see if these organisations can embrace the need for this technology."

Some of the key technical areas in which open data can benefit Ethiopia's agricultural sector includes access to localized weather data, be it archived, current, or based on predictions. Growing season monitoring data can help determine dates for planting, planning on improving yields and preparing optimum harvest dates.

In managing the growing cycles, CommonSense will introduce analytical tools to assess the probability about when a certain event occurs in a predefined time window, based on historical archives on weather, vegetation indices and other indicators related to specific problems inherent to each targeted crop.

Based on these type of details two communication systems will be built, both benefiting from open data.

For agricultural unions, they will be supported by a member management system that collects farmers' data and assesses their performance, based on data from the field and yield forecasting made possible by open satellite data. The system can also help the unions plan activities, such as, helping them to sell produce for the best price, while managing their finances, logistics, storage and trade efficiently.

In relation to microfinance the communication system will help make loan assessments, important for those wanting to invest in their farms. The system can collect information on individual smallholders, assessing the profitability of their activities and evaluating the risk of crop failure, based on the agro ecological conditions in the area.

The programme consortium is led by Alterra WUR. The expert partners from the Netherlands include Airbus DS Netherlands BV, Weather Impact BV, ICCO Terrafina. The Ethiopian partners are Apposit LLC, Exo-Talent, Bussaa Gonofaa. SFPI and Harbu.

OPEN DATA FOR INSURANCE, ASTI, GLOBAL
Agricultural research investment

A world free of hunger and malnutrition is an ambition we all share, but the International Food Policy Research Institute (IFRPI) has a plan; in arming researchers, governments and activists with the accumulated wisdom already gathered in datasets around the world it can help bring sense to the assembled range of facts and deliver relevant data to those who are waging war against hunger and malnutrition.

This is not only a worthy pursuit but vital in an age when 20,000 people die daily from starvation, as reported by Dr Shenggen Fan, Director General of the IFRPI. Given the urgency of the problem open-access data and analysis of agricultural research can help create new waves of investment and aid growth for low and middle income countries.

The need to break the vicious cycle of underdevelopment, climate change and crisis involving refugees requires access to useable data. Writing in his blog at the beginning of 2016 Dr Shenggen Fan explains how open data can play a foundational role in delivering solutions.

"To help reduce the impact of natural disasters on rural people's incomes, governments can also strengthen crop insurance programmes through yield or weather indices."

It is access to open data that helps create affordable crop insurance and Dr Shenggen Fan draws on a growing range of data saying, "there is also evidence linking hotter and wetter conditions to a rise in violence. Specifically, climate-related natural disasters can aggravate existing socioeconomic grievances and tension. This is especially the case when a government's disaster-related actions are weak or unevenly distributed."

To help address these concerns the Agri-cultural Science and Technology Indicators (ASTI) provide a trusted open-source data pool on agricultural research systems across the developing world.

The initiative, led by the IFPRI, working with a large network of partners collects, compiles, and disseminates information on financial, human, and institutional resources of value to those working to improve agriculture around the world. The open data based resources are shared both at country and regional levels.

The ASTI helps in the development of strategic plans by governments, assists research work at higher educational institutions and with projects implemented by non-profit organisations.

According to the IFPRI's workplan for 2015-2018, "ASTI is currently active in over 80 countries in Africa, Asia, and Latin America and the Caribbean. Sustained funding has enabled formerly ad hoc activities in South Asia and Africa south of the Sahara to be consolidated into an institutionalized system of data compilation, synthesis, and analysis at regular intervals."

As a result of the IFPRI's work it helps enhance local ownership of data and stimulates national-level advocacy and data analysis. All this is made possible because of open data. One of the IFPRI's partners, the Global Forum on Agricultural Research reports, "The ASTI provides trusted open-source data on agricultural research systems across the developing world. The ASTI country benchmarking tool enables cross-country comparisons and rankings of key ASTI indicators."

Speaking at a meeting in Davos this year Dr. Shenggen Fan referred to an issue of growing importance linked to research made possible by open data. "IFPRI is committed to identifying the origins and costs of food loss and waste across the value chain to promote effective interventions and set priorities for actions – this is directly aligned with IFRPI's strategic research areas of ensuring sustainable production and improving markets and trade. We are dedicated to collaborating with our partners to ensure the success of this initiative."

Scaling-up investments in science and technology and support for improved country capacities are fundamental to accelerating progress and achieving development objectives.

While policymakers realize that higher levels of investment in agricultural research are key to increasing yields the IFPRI believes many low and middle income countries continue to struggle with capacity and funding constraints in their agricultural research and higher education systems.

Given this on-going problem, the IFRPI's investment in providing information and supporting data dissemination is no surprise. Dr Shenggen Fan champions new ways to modernise agriculture and reducing the causes of malnutrition.

He says, "Scaling-up investments in science and technology and support for improved country capacities are fundamental to accelerating progress and achieving development objectives.

Technological innovations such as biotechnology, nanotechnology and biofortification, are crucial to increasing agricultural productivity, building resilience to weather-related shocks, enhancing the nutritional value of food crops, and ensuring food safety.

Similarly significant efforts should be made to improve the access to inputs such as improved seeds and fertilizer." Open data makes these developments achievable and affordable.

Source: http://www.ifpri.org

Kid hand with sheaf of paddy on Asia rice field.

9

Mobile app, animal care, rural development

Market to buy and sell cattle in Babile, Ethiopia.

A mobile app is being developed that helps African farmers and vets quickly and accurately diagnose problems in cattle. If the livestock are ill then it will efficiently direct the user to find the appropriate remedy or help alert qualified support.

Statistics and knowledge will improve herd management.

The mobile solution has been developed by a Scottish based company, Cojengo Ltd. As it works and helps diagnosis conditions in the farms of East Africa so it also accumulates data, growing in value, with an ability to store and share the data gathered on disease surveillance and monitoring. Over time the build-up of statistics and knowledge will improve herd management.

VetAfrica app which not only diagnoses disease but provides advice on the right drugs to treat ailing livestock.

Cojengo has established links to veterinary colleges and research centres focused on improving animal husbandry in Africa. Dr Dinka Ayana, Dean of College of Veterinary Medicine and Agriculture at the University of Addis Abbas says, "We are excited to utilise this technology to improve veterinary healthcare in our country and the lives of those who rely on it."

Speaking during the trials of the VetAfrica app Dr Ayana hoped the evidence would result in the service being introduced across Ethiopia, Kenya and Uganda, enabling the new technology to reach the tens of millions of farmers and vets across the region.

Cojengo created a partnership with Microsoft Africa and from its beginnings in Glasgow during 2008 it has gone on to develop diagnostic tools and disease surveillance data for farmers in East Africa. The first fruits of this work has been the VetAfrica app which not only diagnoses disease but provides advice on the right drugs to treat ailing livestock.

Last year the founder and former CEO of Cojengo, Craig Taylor stated, "This is a huge milestone for us, we've been working on ground breaking new methods of performing diagnosis on a smartphone since the inception of Cojengo. To finally have statistically credible results from the field will give us the blueprint and model to scale a proven design and product."

Since then Cojengo has been developing further services for vets and farmers. It has extended the product range to include an online data analysis tool to help adapt the diagnostic engine for new markets. The company has announced a new VetAfrica Suite, which it claims is the continent's first integrated product range to aid diagnosis, collect data from the field faster, make sense of it and target resources more effectively.

The independent field trials of the VetAfrica app and its development were conducted during 2015 in Ethiopia. It set out to evaluate the effectiveness of the app, demonstrating its reliability and effectiveness as a mobile health tool designed to work in Africa.

The trial was overseen by a team from the Atlantic Veterinary College from the University of Prince Edward Island, including researchers and academics from other universities. According to Dr Crawford Revie, from the Canadian institution, it produced impressive results with around 70% of the suggested diagnosis offered by VetAfrica matching confirmed diagnosis.

Dr Revie says the finding, "…was impressive considering that this is the first time the app had been used in Ethiopia."

These statistics underline the potential of VetAfrica as a field based tool and opens up the possibility for farmers and less experienced veterinary professionals to make good decisions based on information received from the phone.

The app also acts as a passive surveillance device, as all of the data collected is uploaded to the Cloud and can then be used in a number of ways; for example, as part of a syndromic surveillance exercise – a good use of open data for farmers and rural vets.

Dr Revie explains the value of open data in this process, "The diagnostic inference engine uses a data-driven machine learning approach and as such will only improve in terms of accuracy as more cases are recorded by local users of the system."

Cojengo's literature points to the ethos of the company which is driven by creating solutions genuinely aimed at improving people's lives, save money and make people more productive. Focusing on the emerging African market, the company sees a real opportunity to help drive the adoption of mobile and cloud computing to address real issues in animal and human health.
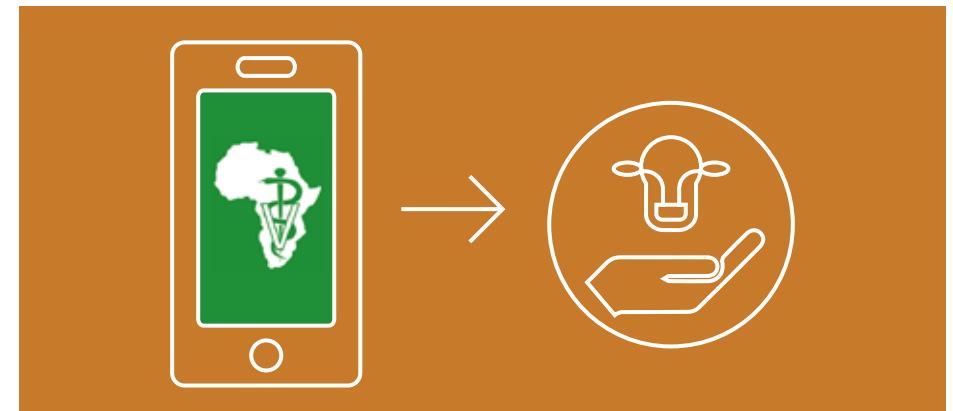
FOOD AND WATER BORNE DISEASES, GLOBAL
Sharing food and water safety data

According to the World Health Organisation (WHO), food and water borne diseases kill an estimated 2.2 million people annually, most of the victims are children. This death toll wreaks an unimaginable level of suffering and grief.

It also has serious economic implications. In Europe, for example, the WHO estimates there are 1.2 million cases of foodborne diseases reported annually, leading to 350,000 hospitalisations and 5,000 deaths. The estimated economic cost to Europe is €117 billion annually.

The WHO estimates there are 1.2 million cases of foodborne diseases reported annually, leading to 350,000 hospitalisations and 5,000 deaths.

To help alleviate the problem, the Global Food Safety Partnership is a unique public-private initiative dedicated to improving the safety of food in middle-income and developing countries. It combines food safety training and technical support to help member countries improve their food safety systems and benefit from better compliance with food safety standards.

However, the organisation sees that open data needs to be better used in the battle against food and water poisoning. While improving skills, knowledge, and resources does help in food safety, digital records are needed to trace food and ensure compliance standards are met throughout the food chain.

Yet the data question has not yet been fully addressed and there remain holes in the information available. This is a problem hampering scientists and public health specialists who aim to curb risks and confidently deliver food and drinking water safety.

A specialist team at AgroKnow, a GODAN partner focusing on capturing, organising and adding value to information available in agricultural and food sciences, is attempting to quantify the problem surrounding open data. Their aim is to make relevant datasets universally accessible, useful and meaningful in the fight against food and water borne disease.

They address the problem recognised by the WHO in a report entitled, 'The efficient sharing and discovery of foodborne diseases information', in which they first identify the problem, "We cannot take full advantage of all the existing data on foodborne diseases. This is mainly because data tends to be unstructured, is kept in internal databases or is stored in customised formats which cannot be easily shared in an interoperable way."

The report, authored by Giannis Stoitsis, Nikos Marianos and Nikos Manouselis, senior staffers at AgroKnow, point to the solution. They see the need to discover an efficient data recovery system that creates shareable information about foodborne diseases that generates food alerts and can recall outbreaks from a diverse range of sources.

But they explain this is only possible if all the relevant authorities agree to combine common semantic vocabulary and permit the use of text mining tools geared to extract structured data from trusted web sources containing information about foodborne diseases and previous outbreaks.

The team who set up Agroknow in 2008 have since grown their expertise over the years to include agronomists, web designers, information scientists, software engineers and web developers capable of providing integrated solutions. Today, Agroknow is an active contributor in European and international standardisation initiatives linked to agricultural data representation and storage.

Stoitsis, Marianos and Manouselis in their report explain why we are facing an increasing tide of food borne diseases, "Cultural and demographic factors, as well as increased mobility have resulted in major epidemiologic shifts in foodborne disease during recent decades."

They continue, "Previous outbreaks of foodborne disease were smaller and limited in scope and more often originated in the home. Nowadays, many more people dine outside the home and travel more extensively. As a result, more than 80% of foodborne disease cases occur from exposures outside the home."

It means more companies and farmers can participate in the global food value chain, confident that their food is safe to eat.

As a result, the authors call for greater international collaboration, increased use of information technologies and data sharing to meet the challenge.
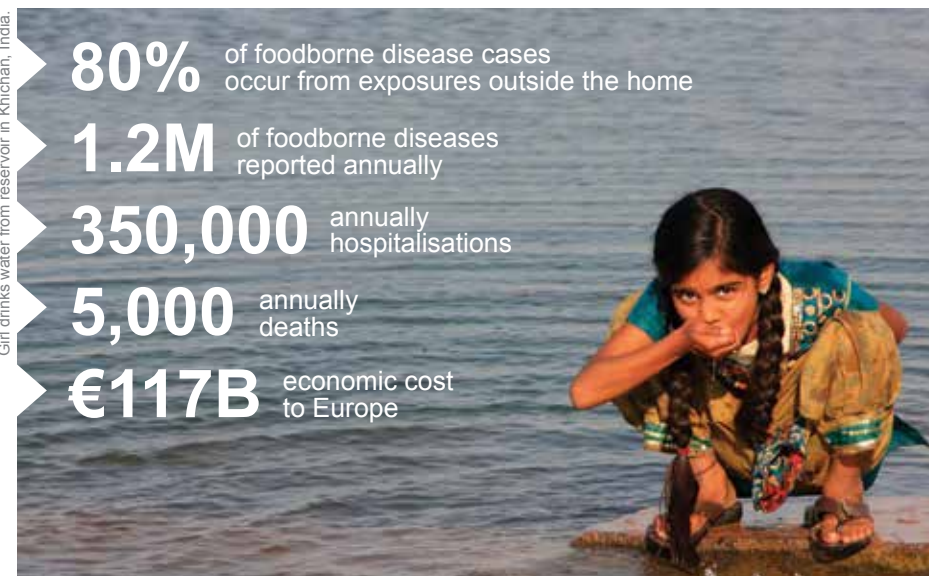
Meanwhile, the Global Food Safety Partnership is addressing the issues raised in the AgroKnow report. It has established a Knowledge and Learning Systems Working Group.

Members of the group represent countries from across the globe and develop recommendations for design and implementation of open solutions. This includes collecting research to understand the factors required to adopt up-to-date food safety standards and behaviours. Its members have also set about analysing potential business models for open source and open content support for food safety.

In turn, this new focus by the Global Food Safety Partnership and others, opens up a world of new economic opportunities for food producers, food processors, and other agrifood businesses in developing countries. It means more companies and farmers can participate in the global food value chain, confident that their food is safe to eat.

Sources:
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Girl drinks water from reservoir in Khichan, India.

80% of foodborne disease cases occur from exposures outside the home

1.2M of foodborne diseases reported annually

350,000 annually hospitalisations

5,000 annually deaths

€117B economic cost to Europe

MOISTURE READING SENSORS, GLOBAL

Agriculture, innovation, commercial

Connecting soil sensor technology to the knowledge of experienced growers is a combination that offers better control of water and improved irrigation. Supported by open data, this allows for continuous monitoring and fine-tuning of growing environments for all participating farms.

"Open data is of great importance in the development of sustainable water projects," says Annemarie Klaasse of eLEAF, one of the leading specialists in agricultural water management.

Even more important than farm-by-farm achievements is the pooling of individual experiences, building knowledge and adding to the ever more valuable series of datasets that are shareable with surrounding farmers.

Looking to the future, the exponential growth in water resource data means speedier refinement in water management techniques as new data is opened up to agricultural researchers who can find even better ways to reduce water usage.

Open data is of great importance in the development of sustainable water projects.

A good example of this process can be seen in pioneering work conducted in Egypt during 2008. It helped farmers there and in similar climatic regions connect the use of soil moisture systems to climate data and improve the efficiency of their irrigation systems. Cooperation between the Egyptian Ministry of Agriculture and the Agency for International Business and Cooperation (EVD), part of the Dutch Ministry of Economic Affairs, introduced a new style of irrigation system, funded by the 'Partners for Water' programme.

Soil moisture sensor specialist, DACOM reported that with 86% of the total annual water usage in Egypt consumed by the agricultural sector, a more refined irrigation and water management system helps Egypt conserve this precious resource.

Much of this important information was retrieved from open data provided by European based satellite images and data.

DACOM and eLEAF (under its old name, WaterWatch), with local partners, combined their individual high-tech specialisms to deliver one integrated system, reliant on satellite and weather based open data sources. They drew on this information to help improve the efficiency of water used to grow strawberries, grapes and potatoes in the Western Nile delta.

Set up as a research project, the partners could compare the rate of water consumption used by traditional irrigation methods against the new, improved techniques. Much of this important information was retrieved from open data provided by European based satellite images and data. Over the life of the programme, farms were monitored during three growing seasons using in-situ measurements of soil moisture, detailed soil mappings and satellite observations.

Farm engineers were trained to use the DACOM software linked to the soil moisture sensors and digital irrigation management systems. Information on the soil and remote sensing were integrated using Google Maps. Klaasse explains the team were responsible for the monitoring of the farms using satellite observations. It became clear from this example that the more farmers and irrigation specialists became involved in the process, the greater the results.

In combination with the weather forecast in your area, the time and amount of irrigation can be determined.

"Making good data available to everyone will definitely improve decision making. And satellite derived data provides stakeholders with a reliable, consistent and objective source of information," says Klaasse.

Since the Egyptian project ended DACOM has continued to develop and supply specialized hardware, software and online advisory services to farmers and the agribusiness worldwide. As a leading exponent of soil moisture sensor systems it contributes to scientific conferences and academic forums.

It is committed to irrigation advice that can report on how much water is absorbed by crops on a daily basis, backed up by DACOM findings which state, "In this way, in combination with the weather forecast in your area, the time and amount of irrigation can be determined. You will never use too much or too little water which contributes to optimal yielding."

As for eLEAF, since 2008, it has conducted several further projects in Egypt, mainly on evaluation of irrigation systems and helping farmers improve water conservation.

"We have also done similar projects in other countries, for example in Sudan where we offered a SMS service to farmers to help irrigation scheduling," adds Klaasse. eLEAF is a GODAN partner.

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Irrigation of vegetables into the sunset.

12 SCALING UP NUTRITION ORGANISATION, GLOBAL
Nutrition improvements, national plan

Scaling Up Nutrition (SUN) is a global movement founded on the principle that everyone has the right to food and good nutrition. It has plenty to say about accessing open data and using it effectively to improve the lives of millions of children and adults around the world.

SUN has a network of 56 national governments who have all pledged to improve their nutrition information systems. It helps governments, researchers and non-government organisations participate in providing routine data as well as contributing to stakeholder mapping on the state of nutrition.

From available data, SUN members are developing a simple to follow dashboard, capturing key information that can be used for decision making at national or regional level. It all helps countries scale-up their strategic plans that improve nutrition levels.

Despite these developments SUN is candidly honest about the ability and willingness of some countries to manage and share good quality data. "It is important to be realistic, and to ensure that expectations are in tune with capacity," the Summary Report warns, from SUN's Network Facilitators' Meeting in 2014. The report also points out that civil society organisations are ahead of many government in their ambitions to highlight the importance of open data.

But against these concerns linked to accessibility and delivering high quality data on nutrition, SUN can boast that many member countries have a forward thinking approach to data capture and distribution.

Insights from the work conducted in Madagascar illustrates the ambitious approach to using open data. The team representing Madagascar, Jean Francois, National Coordinator, National Nutrition Office and

SUN Government Focal Point member and Ralambomahay Lova, Head of Development Partnership and Nutrition Watch, National Nutrition Office, jointly describe their country's progress with data collection systems and sharing sources of information.

It is important to be realistic, and to ensure that expectations are in tune with capacity.

"There are several information systems that collect nutrition related data in Madagascar. Sectoral ministries, civil society organisations, the private sector, United Nations system and donor agencies each have their own information systems. Sometimes, these systems create duplication when they collect data from the same sources, which is wasteful of resources. At the same time, there are still omissions in information."

But despite the Madagascar team's concern about gaps in the country's nutrition data, it is resolutely creating a multi-sector and multi-stakeholder nutrition information system owned by all stakeholders.

The representative of the Rwandan Government, takes up this theme in his report to SUN, emphasising the need for cross sector data collection in the fight

against malnutrition. Getting to grips with the reasons for poor nutrition is a complex matter and fixing the problem requires attention to detail and a determination to get different ministries, experts and regional authorities to collect exchangeable data. Fidele Ngabo, Director of Maternal and Child Health for the Government of Rwanda says,

"Food security and vulnerability are monitored through the food security and nutrition monitoring system conducted every six months and the comprehensive food security and vulnerability assessment and nutrition survey conducted every three years. These surveys are conducted by the Ministry of Agriculture in collaboration with the National Institute of Statistics in Rwanda and the World Food Programme and are complemented by the agriculture management information system which collects routine data. These data are disseminated through bulletins and reports provided to all stakeholders for use in decision making, strategy development and programming."

Dr. Ibrahim Assane Mayaki, Chief Executive Officer of the Secretariat of the New Partnership for Africa's Development encapsulates SUN members' fundamental commitment in the fight against malnutrition, "It is my singular belief that every sector must be held accountable for their performance and delivery of food and nutrition with very clear indicators monitored and evaluated annually."

Even so, some SUN members remain cautious about being overly ambitious. The meeting of the SUN Donor Partner Network, held at The World Bank offices in Washington, D.C, in 2014, reflected upon the quality of present data bases. For data to be of value, it was argued, the inputs need to be trusted and for this to reach an acceptable quality threshold requires collaboration with research partners with applicable experience. Members also considered the trade-offs between an open data approach versus greater control of the data, and the decision of whether or not to share data between countries in order to increase country buy-in.

Andris Piebalgs, former European Commissioner for Development attended SUN Movement Lead Group meetings and says, "Countries must be sure that the information is of sufficient quality to serve as a basis for decision-making and for indicating progress. Taken together, it's proof that officials in SUN countries are organising their national information systems for nutrition in ways that engage all relevant sectors and makes the best possible use of data that are already available. Such multi-sectoral analyses require access to data from all relevant sectors, addressing all levels of the causal pathways that can lead to malnutrition. This data can usefully be organised into a common data base that will be designed and managed by national governments."

It is clear from SUN activities that good nutrition outcomes are achievable but actions cannot be limited to public health interventions. Preparing high quality data is important, while improving access to open data is fundamental - critical to eliminating malnutrition.

Source: http://scalingupnutrition.org

Selection of food that is good for the health.

13
RICE WHEEL, THAILAND
Converting open data to printed information

How does reinventing the wheel help smallholder farmers gain access to years of valuable open source data that helps improve to crop yields? An ingenious cardboard wheel has been invented that transfers digitally relevant data into a simple but effective format. It cost effectively puts critical agricultural information into the hands of Thailand's rice farmers to increase their incomes.

While there is a wealth of data available for Thai agricultural researchers or large scale farmers who have access to computers, until recently it has not been presented in a readily accessible format that could help smallholders improve their farming techniques.

Step forward the designers of the cardboard rice wheel. They are based at the Hia Chai Rice Seed Centre and have designed the wheel specifically for farmers or cooperative members, the main producers of rice in Thailand. It gives them the chance to quickly and easily plan how they grow rice as many cannot afford the cost of a smartphone or computer.

The objective of the rice wheel, according to the design team is to effectively harness open data in a usable way and present it in a format that suits small scale growers.

The yield of rice can increase by at least 10%.

Getting the rice harvest right is so important in a country where the crop is one of the main foods and source of nutrition. Rice is also an important export earner for Thailand, a staple diet for a large proportion of the world's population, especially in Asia.

With farmers using the rice wheel, the team estimate that with precision and care, the yield of rice can increase by at least 10%,

optimizing costs by supporting better crop management.

The rice wheel is a practical way to transfer knowledge contained in open data on a range of subjects, including weather, cultivation and harvesting.

The rice wheel is a practical way to transfer knowledge contained in open data on a range of subjects, including weather, cultivation and harvesting. The wheel is made-up of a circular base and three colourful moving parts, each providing a section that runs concentric to the base. It presents easy to understand instructions, gleaned from years of detailed data.

Each of the three moving parts corresponds to a growing method for the main rice varieties and contains instructions linked to important horticultural data essential for the grower to understand. For example, the wheel's colour coding lets farmers know the best time of year to harvest.

In Thailand, there are more than 200 varieties of rice and so optimizing harvests can be a complex matter.

As the academic behind the planning and testing of the wheel, Professor Asanee Kawtrakul explains, "each variety has different properties in adapting to the environment."

And these differences needs to be understood and planned for by each smallholder.

The rice wheel has been in use since early 2013 with remarkable results contributing to improved rice farming in the central region of Thailand. However Professor Kawtrakul admits the cardboard wheel has drawbacks.

"First, it is difficult, if not impossible, to incor-

porate changes in its structure. For example, if a rice variety is abandoned or a new variety appears in the world of rice farming, the only way to include the change in the query process is to reconstruct the physical wheel. Similarly, if the wheel is to be used in a different region of Thailand, or another part of the world, where weather conditions and water supplies are of a different nature, then again, the only way to include the change in the query process is to reconstruct the wheel," she says.

Professor Kawtrakul also explains that the kind of queries the physical wheel can handle are simple and limited to planting or harvesting dates. This means questions about planning rice farming cannot be answered using the cardboard wheel alone.

However, the team from the Hia-Chai Rice Seed Centre are finding ways to get over the limitations of the card and are working on an app that can be accessed by mobile phone. This is important as mobile phone subscription has reached 144 for every 100 citizens (a) and in a country of more than 67 million people, so a good way to present even more open data sourced crop information. But it will need to be presented in an easy to follow format, gaining inspiration from the effective graphic style of the rice wheel.

So, the design of a digital version that brings added advantages is on-going. With this,

The colourful rice wheel translates open data into an easy to use graphic card.

farmers will have greater levels of crop advice as the online wheel can present greater detail as it trawls through the open data on rice growing in the central region of Thailand, compiled over the last two decades.

With much of Thailand's rural population employed in rice farming the Thai government has also launched a large scale programme aimed at helping low income farmers and supporting the use of the rice wheel and digital wheel. The objective is to encourage farmers to think collectively, for example, to agree similar growing periods in order to reduce costs, and hire harvesting machines together. The goal is to help small scale rice growers gain strength in numbers and build their profit margins.

The goal is to help small scale rice growers gain strength in numbers and build their profit margins.

However, Professor Kawtrakul sees a major issue with the roll out of the soft wheel to rice growers across Thailand. "This will require a transition from traditional farming to IT supported farming. Indeed, the deployment of the soft wheel in rice farming cooperatives over the whole country will require the training of cooperative members to the use of soft wheel on software devices such as PCs, tablets or mobile phones," she says.

To prepare for this modernisation, training is being prepared by the Hia-Chai Rice Seed Centre at its Smart Practice Learning Centre for Farmers. It will introduce rice growers to the soft wheel app. "We plan to extend rice variety knowledge and the ecosystem of each region. With more data, the soft wheel can be utilized effectively", says Professor Kawtrakul.

Over a short period of time Thailand's rice growers will graduate from the reliable but limited printed wheel to the digital wheel, where they will gain greater access to extensive levels of rice growing advice.

14 LAND PORTAL FOUNDATION
Open Data, common land vocabulary

Diplomats play a traditional role in helping cultures and nations talk to each other. But the Land Portal Foundation believes that when it comes to strengthening land rights, local communities should take charge and engage directly with each other. With the help of the Land Portal's website and associated services this is made possible because interested groups can access open data documents which help build alliances and exchange ideas supporting principles governing land rights.

At the root of much of Land Portal's work is the challenge to reduce duplication and redundancy within open data. If this can be achieved then open data can help produce practical results and offers a valuable service to donors planning ways to reduce rural poverty and increase food security.

Land Portal's mission is to help assert strong legal rights to land.

The Land Portal website seeks to help organisations that represent those with the most insecure land rights. In improving their entitlement to live and farm without fear of forcible or unlawful evictions, lifestyles can be made better and with security of tenure, food security can also improve for some of the world's most vulnerable communities. The portal collects and publishes relevant data, making sure it is presented in machine readable, standardised formats under open licenses. This service allows anyone to re-use critical data supporting the right of tenured landholders or small landowners.

Land Portal's mission is to help assert strong legal rights to land. This is crucial for indigenous peoples and local communities, explains Nicholas Tagliarino, a Land Portal contributor, representing the work of the American-based World Resource Institute.

"When communities have weak or insecure land rights, such areas are particularly vulnerable to expropriation, land grabbing and infringements by outsiders," says Tagliarino.

And this impacts livelihoods and security. Threats to land end up being threats to life but open data can help cut those risks.

With its base at the University of Groningen in The Netherlands, staff, experts and partners work from hubs across the globe.

Case study: the Mekong region

One Land Portal project, announced in 2016, supports a partnership in the Mekong region and aims to give local communities a voice in the strategic development of the region. The portal collects and shares content on land governance and use in Myanmar, Vietnam, Cambodia, Laos and Thailand.

One pressing task, given the region's size, its disparate languages and range of national priorities, is the need to communicate effectively about complex land issues across borders and between individuals with different skill sets. This requires establishing better ways to record and share information across the network. Land Portal's access and compilation of open source data puts it in an ideal situation to assist with land rights for local communities.

The Mekong project is complex, not only because of the breadth of countries involved and range of languages catered for, but it brings together a wide range of interests. Land Portal is assisting a growing network wanting access to open data, including governments, civil society organisations, the private sector, development partners and the media.

In offering open source, open data and open content, the Portal promotes greater sharing, collaboration and innovation with all those interested in land governance.

Land Portal is focused on an innovation that expands the value of open data. Laura Meggiolaro, heads up Land Portal's operations and says, "We are working towards establishing an information ecosystem based on linked open data."

While open data provides a world of valuable information, it is only useful when there is a shared vocabulary enabling both people and their computers to understand content from a wide variety of sources. Linked open data helps provide that global and interoperable vocabulary. In the case of land rights, vocabulary must be understood by those from technical organisations, campaigning groups and research institutions. Specialists may find sharing information easy due to common standards and similar training, but land issues are spread across a whole range of sectors and across regions of the world that have little commonalities.

It is a subject debated in many languages, by rural activists and between specialists covering very different disciplines. Land Portal's linked open data approach helps bridge this diversity.

The portal has funding from the UK's Department for International Development for one of its services, the Land Book Project. This involves collaboration with regional hubs that help share the benefits of open data and support knowledge on accessing land rights data.

Meggiolaro says, "The Team has been working on this and is finalizing a land governance vocabulary inside Agrovoc (a system) that enables the Land Portal to autonomously manage all concepts related to land governance."

Land Portal is entering into agreements with local partners in West Africa and South America to complement the existing work in Asia.

Although Land Portal addresses a wide range of issues linked to land rights Meggiolaro says some issues, such as gender land rights, are pressing and she is concerned

The landscape with the mekong river at the Pha Taem Nationalpark, Thailand.

that across the world women make up the majority of agricultural workers, yet they are inadequately represented as tenured land-holders or land owners.

Issues associated with land-based inequality are often inaccessible due to language differences or because information is restricted to an incompatible data base. Yet given the importance of understanding the influence customary practices may play in hindering women's land rights, more needs to be done to share these experiences across open data sources.

Lack of machine readable land based data is a fundamental difficulty in opening up greater debate on gender rights.

Meggiolaro explains, there might be need to increase the level of data that records cultural practices. It is easy to share individual country's land legislation, but without sharing knowledge about cultural practices linked to gender land rights, the real issues affecting women are fundamentally incomplete.

So, in many cases the lack of machine readable land based data is a fundamental difficulty in opening up greater debate on gender rights. To address this problem, and other crucial land right subjects, the Land Portal is working out how to present data sets covering, historic records, legal documents, reports, academic articles, and small or dated surveys.

For the future, Land Portal is establishing a cooperation with GODAN on shared open data initiatives and responding to the needs of the land governance community.

"We will do everything we can to make the Land Portal become an effective system that benefits everyone," says Laura Meggiolaro.

Sources:
http://landportal.info/blog-post/2016/04/3-reasons-why-community-land-rights-are-not-legally-secure-many-countries
http://landportal.info/

Woman pulling up water from river, Vietnam.

"WE WILL DO EVERYTHING WE CAN TO MAKE THE LAND PORTAL BECOME AN EFFECTIVE SYSTEM THAT BENEFITS EVERYONE"

Laura Meggiolaro

SATELLITE DATA HELPING INDONESIAN FARMERS

Agricultural insurance, satellite data
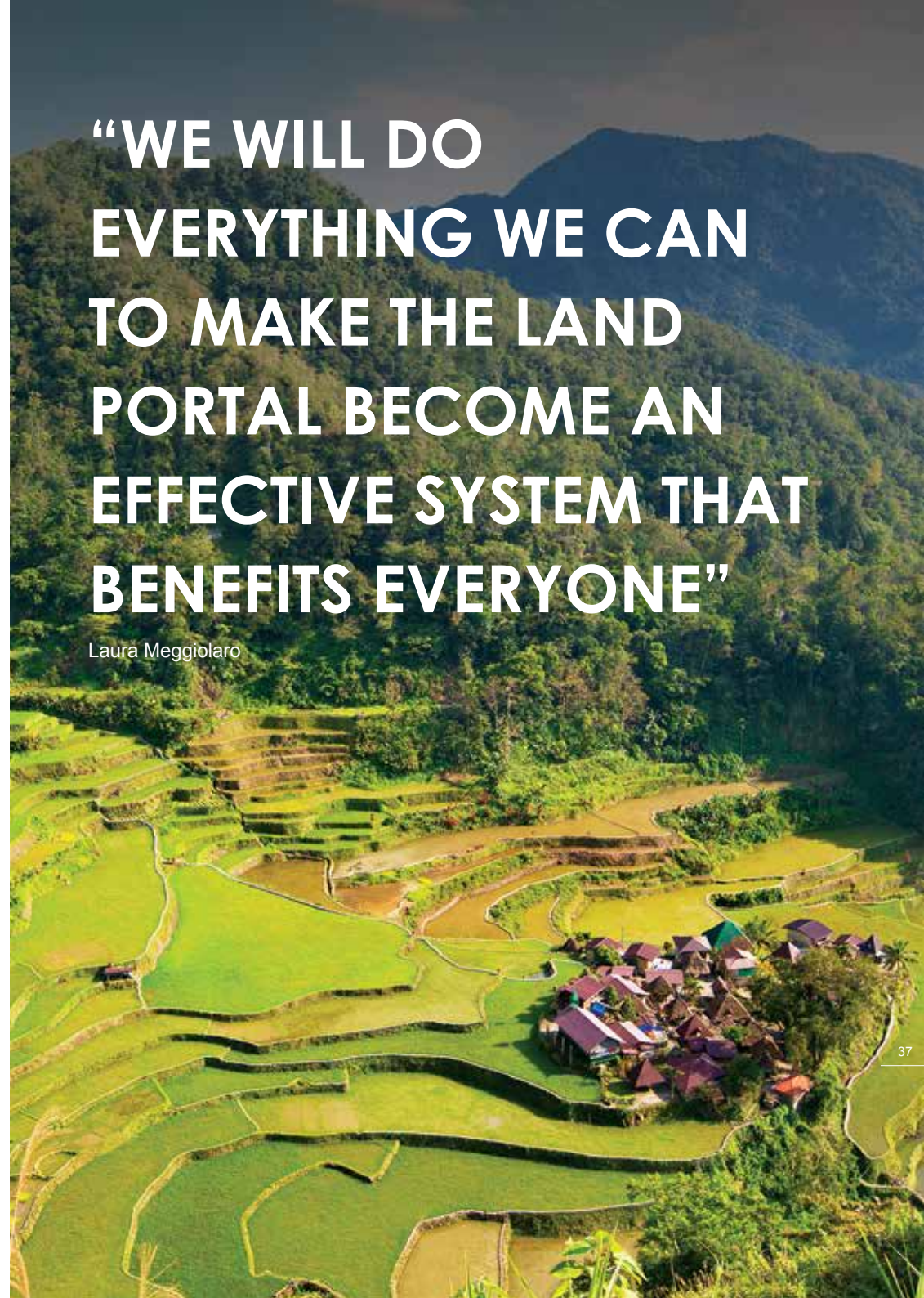
Satellite data is being used to improve food security in Indonesia. The G4IN-DO IT Platform programme, which started in 2014, supports the Indonesian government's plan to help farmers improve rice crop harvests.

Specifically, the government has decided on a crop insurance policy to assist farmers, protecting them from losses caused by bad weather and disease. The programme aims to provide a service to 200,000 smallholders.

The insurance companies show great interest in the IT platform. They expect it to be an instrument that can help keep costs low.

Aart Schrevel, Project Leader of the G4INDO programme, has the answer. "Technically it is possible to provide a crop insurance service if you can afford to pay for all the satellite images you'd need. But Indonesia is a huge country; the harvested area is twelve million hectares, often with double cropping. In order to cover the whole season, crops would have to be monitored from planting until harvesting. That's a long time and would mean acquiring a series of images from a satellite service and all year round - that's potentially very expensive. Even if it was costs were subsided it could easily become excessive. The cost would be much too high to offer an insurance product to small farmers. It's not a viable business case for our crop insurance programme."

But thanks to open data, the programme offers technical assistance in assessing crop yield anomalies, right down to the size of individual plots. The experts working on the programme can gain access to relevant open data which is processed from satellites, including radar and optical earth observations. This is combined with information from weather monitoring, analyses and forecast-ing, crop models, and hydrological models.

Once the G4INDO team have compiled all the relevant data it is made accessible to the Ministry of Agriculture and participating insurers. This process has proved much cheaper and therefore more sustainable than relying on existing assessment methods used by insurers. The new process allows participating insurance companies to cost effectively assess claims from insured policyholders on small farms who might be facing harvest losses. This affordable process helps reduce risk against bad weather or harvest failures, giving smallholders the chance to recover from poor growing seasons.

The three year programme is overseen by Alterra, Wageningen University, a Netherlands based organisation that provides independent expertise on sustainable green living. The overall programme, of which G4INDO is a part, is the Geodata for Agriculture and Water (G4AW) and was conceived by the Netherlands Space Office and funded by the Dutch Ministry of Foreign Affairs.

The platform is useful to assess claims from farmers from behind the computer.

SarVision and Terrasphere provide expertise in radar and optical remote sensing technology, Deltares provides hydrological information and built the IT platform. Syngenta Foundation for Sustainable Agriculture and NDI provide advice on smallholder insurance systems. Alterra coordinates activities and provides expertise on rural conditions in Java, on hydrology and crop growth modelling, and the Royal Netherlands Meteorological Institute (KNMI) advises on climate change and weather forecasting. Indonesian partners are LAPAN, providing remote sensing technology and BMKG (meteorological data), along with the Ministry of Agriculture and the insurance company PT Jasindo.

With implementation mid-way, Schrevel already sees the programme's full potential. "The insurance companies show great interest in the IT platform. They expect it to be an instrument that can help keep costs low. The platform is useful to assess claims from farmers from behind the computer. It will be less necessary to send loss adjusters to the field to check claims," he says.

This open data-based approach is therefore saving money and makes the insurance model affordable for the insurance company. The present plan targets smallholders on the island of Java, where rice farmers typically have land holdings of around two hectares or less.

Small scale farming brings its own problems when attempting to define potential policyholders' property. G4AW's programme literature observes, "landownership is highly fragmented and part of the fields are cultivated on a sharecropping basis."

This complicates matters for normal crop insurance schemes, but this is the nature of small scale farming and the programme is aimed at helping those who cannot afford existing insurance products.

With the help of open data, the development aid phase will end by 2017 allowing the concept to become a fully self-financing model. The objective is to ensure fees collected from individual policyholders will be sufficient to provide enough revenue to cover the cost of running the service.

The initial three-year period provides initial investment in technology and knowledge transfer. The donor funding is needed, "…to bridge the 3-year gap between the start of the project and the moment that the service will become self-financing. And the service will become self-financing in year 4 after the start of the project," is the assessment of the G4AW's programme briefing notes.

Importantly, the programme is designed so that the same style of insurance scheme, built on open data collected from satellites, can be expanded to other regions of Indonesia and will flourish after the termination of support.

Sources: http://www.g4indo.org

Rice tarrace in mountains, Indonesia.