Can you describe some of the potential long-term impacts of insufficient global monitoring of agriculture?

JL&OL: Food is a basic human need and low agricultural yields may lead to shortages. Obtaining information on agricultural production in order to plan and regulate food supply and demand is essential. In past decades, these data have become increasingly critical in light of the growing global population; competition between food, feed and energy; as well as rising levels of global food trade. What we find in our shops is grown in many different parts of the world. As such, failures in national supply chains may have a global effect, possibly with severe consequences. For this reason, accurate, transparent and timely information is required to enable countries to take appropriate mitigating actions – both in the short- and long-term – that can lessen the impact on a country’s food security status.

What measures have been taken to address the situation, and how can these be improved upon?

JL&OL: In 2008, food prices spiked, pushing millions of people into extreme poverty and hunger. This was caused by uncertainty in food supply, with market speculation and export bans aggravating the situation. As a result, in 2011 the G20 agreed to increase transparency on agricultural commodities on a global scale. The resulting Agricultural Market Information System (AMIS), managed by the Food and Agricultural Organization of the UN (FAO), collects and provides information on agricultural markets worldwide. The Group on Earth Observations’ Global Agricultural Monitoring (GEOGLAM) initiative, managed by the Agriculture Community of Practice of the GEO, uses remote sensing-based technologies to increase accuracy, transparency and timeliness on agricultural production as an input to AMIS. The FAO and EC Joint Research Centre has such systems operational, but needs to intensify international cooperation and harmonise with other systems in the world.

The need for global monitoring of agriculture is critical to ensure that stakeholders have accurate, transparent and timely information which both improves their capacities to stabilise and improve food security at the national level, while helping to inform governments of the appropriate policies that they can implement in response to the potential regional and global implications.

Information on agricultural dynamics is vital in the long term. Many studies indicate that, with current practices, crop yields may be flattening or even declining over longer timescales, providing an additional challenge to meet the dietary needs of the global population. Frequent scientific data that shed light on this area are needed to ensure sustainable food production and effective management.

Lieven, you have spent a lot of time working for environmental organisations in Africa. How did this experience develop your interest in agricultural monitoring?

LB: My work at the UN Environment Programme in Africa focused on the effects of human activities on ecosystem health through a multidisciplinary approach that addressed both the environment and agriculture. Remote sensing was one of the key technologies that we used to map and monitor changes, so this was how I came into contact with the monitoring and early warning communities, and learned about the benefits and operational usage of remote sensing.
FOR MANY PEOPLE, food is a source of great pleasure as well as a necessary means of nourishment. Yet the UN’s World Food Programme estimates that around one in eight people worldwide are currently malnourished, and thus suffer from a gamut of related social issues including ill health, poor economic performance and political volatility.

On top of the staggering number of people already hungry, it is widely held that the world’s food supply will continue to be challenged in decades to come. According to a Food and Agriculture Organization of the UN (FAO) report, our planet’s population is set to swell to over 9.7 billion by 2050. Not only will this growth mean more mouths to feed, it will put further pressure on natural resources, with food, feed and energy all vying for agricultural land.

THE NEED FOR ACCURATE PREDICTIONS

The FAO report forecasts that, in order to feed this exponentially growing population, global food production will need to increase by between 70 and 100 per cent – a major task that will depend upon the intensification of current agricultural practices, as well as the expansion of existing farming sites. To achieve this production target sustainably, a deeper understanding of the environmental impacts caused by changes to farming is required. Earth observation-based information systems – widely used to produce short-term forecasts – will need to be adapted in order to provide value in the longer-term, to pinpoint the dynamics of different practices, and their impacts on productivity and the environment.

The international scientific and agricultural communities have responded to this issue by establishing a number of working groups and programmes including: the Group on Earth Observations (GEO), that aims to build a system of systems that will bring together and harmonise global monitoring efforts; the Agricultural Market Information System (AMIS), an aggregator of information on agricultural markets around the world; and the Global Agricultural Geo-Monitoring (GEOGLAM) initiative, set up to boost AMIS by improving crop yield forecasts.

BUILDING BETTER SYSTEMS TOGETHER

Funded by the EU’s 7th Framework Programme (FP7), the Stimulating Innovation for Global Monitoring of Agriculture (SIGMA) project is a collaborative venture between a consortium of 22 partners from 17 countries that aims to add to this work by supporting the R&D component of GEOGLAM through a mix of local, regional and national activities. The project will feed into GEOGLAM by developing the methods and tools necessary to generate information on how changes to cropland distribution and agricultural practices impact upon the environment and ecosystems, as well as boosting efforts to integrate effective new methods into existing global monitoring infrastructure. SIGMA is coordinated by Lieven Bydekerke at the Flemish Institute for Technological Research (VITO); an organisation with considerable experience of building and fine-tuning innovative agricultural monitoring solutions. Bydekerke himself has a background in geographic
INTELLIGENCE

SIGMA

STIMULATING INNOVATION FOR GLOBAL MONITORING OF AGRICULTURE

OBJECTIVES

To actively develop methods and products that will allow policy makers and decision makers to know how ecosystems and agricultural sustainability is affected by changes in cropland distribution and cultivation practices. This will help ensure integration of developed methods for global monitoring systems.

PROJECT PARTNERS

Instituto Nacional de Tecnología Agropecuaria, Argentina • International Institute for Applied Systems Analysis, Austria • Université Catholique de Louvain, Joint Research Centre – EC, Belgium • National Meteorological Centre, Institute of Remote Sensing and Digital Earth, Chinese Academy of Science, China • GISAT S R O, Czech Republic • GeoSAS Consulting Service PLC, Ethiopia • Agricultural Research Institute for Development, France • EFTAS Fernerkundung Technologietransfer GmbH, Germany • Food and Agricultural Organization of the UN, Italy • Regional Centre for Mapping Resources for Development, Kenya • Stichting Dienst Landbouwkundig Onderzoek – Alterra, University of Twente; SarVision BV, The Netherlands • Centre Regional AGRHYMET, Niger • Space Research Institute of Russian Academy of Sciences, Russia • DEIMOS Imaging SLU, Spain • Sarmap SA, Switzerland • Space Research Institute of the National Academy of Sciences of Ukraine, Ukraine

FUNDING

EU Seventh Framework Project (FP7)

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LEVEN BYDEKERKE has a Master’s degree in Bio-Engineering from the University of Ghent, Belgium; following which he worked as a Junior Professional Officer for the UN Environment Programme (UNEP) in Nairobi, Kenya. He has since worked in other areas of the UNEP including the Division of Early Warning and Assessment, the Net initiative and the World Conservation Monitoring Centre. Bydekerke has been employed at VITO since July 2003, where he is currently responsible for the Remote Sensing Applications group.

PROGRESS TO DATE

Since SIGMA’s official launch at VITO in November 2013, the team has set about gathering remote sensing and field datasets for analysis. The project will start with the GEOGLAM Joint Experiment for Crop Assessment and Monitoring sites, which are located in China, France, Belgium, Africa, Argentina, Ukraine and Russia, and several other countries are being considered for inclusion.

Specific outcomes of the project will include enhancing understanding of global agricultural practice on cropland expansion and intensification; as well as determining their impact on the environment using maps and statistics. Educational materials on remote sensing-based agricultural monitoring will also be developed.

By the end of the project’s 42-month term, it is hoped that its network of research and monitoring bodies will be fully operational and harmonised, and will have collaboratively generated information and methods that can be used and shared by the GEOGLAM community to underpin a robust international agricultural prediction strategy.

SIGMA AT A GLANCE

TITLE: Stimulating Innovation for Global Monitoring of Agriculture and its Impact on the Environment

DURATION: 42 months

START DATE: November 2013

CONSORTIUM: 22 partners from 17 countries

PROJECT COORDINATOR: Flemish Institute for Technological Research (VITO)

PROJECT WEBSITE: www.geoglam-sigma.info

SIGMA

Stimulating Innovation for Global Monitoring of Agriculture

PROBA-V image of the mouth of Ganges, 333m resolution.

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