Parallel session 7

Agricultural information and crop insurance

By Maria Victoria Sáenz

This session covered information requirements for crop insurance, how best to collect agricultural statistics, key technologies used for agricultural information systems, and how such a system is to further develop crop insurance in Peru.

Essentially, a sustainable crop insurance plan requires good-quality data to determine pricing that is actuarially correct for various covers; assessing risk exposure over the policy term; correlating deductibles and rates; and detecting fraud (see Table 2).

Data availability, quality and analysis capabilities are not uniform or consistent across the board; there are gaps between a good and poor record that are widening, among countries and among insurance companies. Investment is needed in both public and private sectors to improve data collection, storage, analytics and sharing.

Most crop insurance schemes involve public money (e.g. premium subsidies), so insurance data should be transparent.

Artificial intelligence and machine learning may help better manage and process data in the future. Meanwhile, other new technologies, such as yield-recording, can help fill the gaps – though they cannot substitute the "ground" work required.

Available, reliable and integrated to meet users' needs

Like agriculture, having dependable information about it is vital. The global value of agricultural products exceeds US$ 2.4 trillion, farming produces jobs for 1.3 billion persons, and it is crucial for developing countries, with women making up 43 % of the agricultural labour force there.

Statistics like these are used to produce data for a myriad of purposes, including agricultural insurance. The data must be available, reliable and meet the specific needs of users. Without it, governments can make inaccurate decisions, producers can suffer because of wrong public agricultural policies, which may even pose a threat to food security.

The reliability of the data is rooted in the selection of the method for agricultural statistics. It must be accurate, cost-efficient (fairly priced, good quality), sustainable and integrated (put together from various sources, such as the cadastral database and weather stations).

Table 2
Data requirements and sources

Why needed	What kind	Who collects	Quality/availablity	New technologies
1 Pricing (crop varieties, agricultural practices, risk prevention strategies) 2 Risk assessment (exposure) 3 Underwriting questions (Deductible? Self retaining?) 4 Fraud detection	1 Depends on the crop and type of insurance (damage loss, yield based or meteorological trigger) 2 Location (geographical, general statistics, administrative units) 3 Size of plot 4 Plot types 5 Liability and deductible	1 Insurance companies 2 Centralised organisations of the industry 3 Government organisations Questions: Who does the acturial rating? Take in consideration potential differences between company and industry standards	Varies among countries and regions. For example, hail information is good in developed countries, in developing not so much. Yield information is average.	1 Automatic yield recording technologies 2 Remote sensor – plot and crop identification monitoring, yield estimates 3 Data analytics 4 Artificial intelligence

Source: Herbold, Joachim. Presentation "Information requirements for crop insurance." 13th International Microinsurance Conference 2017.

Giving risk a price tag

Nowadays, big data resounds throughout the land. The insurance and reinsurance industry focused on data long before the hype about big data started. The reason for that is simple: our business model is based on data. But data alone is not sufficient: we need reliable, high-quality data. Bear in mind that one of the major tasks of risk takers is to give risks a price tag. And if we fail to do that appropriately, our business won't be sustainable.

Joachim Herbold

A periodic census, sample surveys and the official registration systems are among prevalent methods for statistics. The type of integration shown in Figure 23 is what allows long-term planning, monitoring, quality-control systems and sustainable human resources, among other purposes.

Remote sensing and GIS

Two key technologies in agricultural information systems are remote sensing and GIS (geographic information system). The potential of remote sensing is obvious, as it provides independent data from space, covers huge areas every day, and is partly free of charge. Some satellites like Sentinel capture the whole earth every 5 days at a level of 10 m^2.

A consortium led by GAF AG[11] covers 39 countries from Europe and provides high-resolution layers of forest, grassland, water and wetlands, among others. The system in 3D pictures can monitor floods (water spread, depth, and velocity), and it has helped the EC emergency management service since 2012. It is also used to control farmers' subsidies – an important task as 40% of the EU budget goes to agriculture – and to help with land registration, risk assessments, loss adjustments, and automated crop monitoring. The results are obvious for public policy and for the insurance industry.

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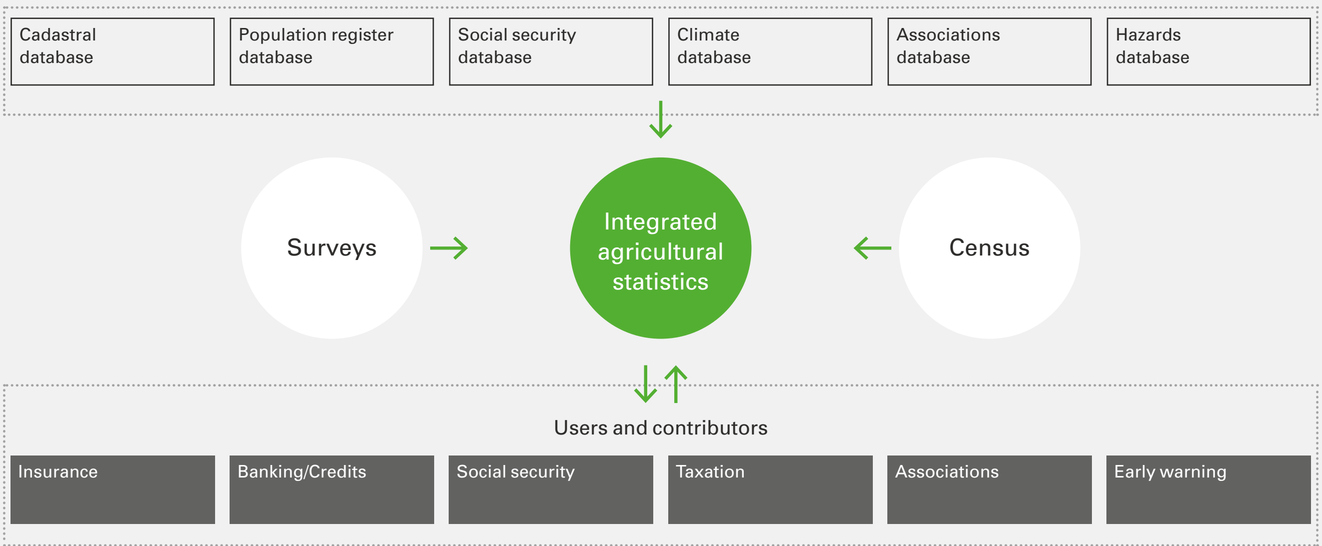
GAF AG is a German company that has grown from a small satellite remote sensing start-up into a well-respected geo-information service provider.

Figure 23
Integrated registration and data collection system



Source: Demirbüken, Hakan. Presentation "Agricultural statistics. Why and how? Summary of best practices." 13th International Microinsurance Conference 2017.

Mapping of agricultural areas

GAF AG is being contracted by German International Cooperation (GIZ) in the Climate, Agriculture and Risk Transfer Project that is being implemented jointly with the Ministry of Agriculture in Peru and financed by BMUB(13). The objective of this project is to create a risk transfer system to foster the resilience of agricultural producers to climate change; its information component has the following goals:

1. Improve the agricultural statistics system.
2. Implement a collaborative information platform.
3. Provide training in the use of modern technology.

The priority so far is the first, for which the project has developed a tool called Mapping of Agricultural Areas (MAA), researching what the government has, what needs to be improved, and what must be added. The interrelated dimensions of the MAA are the agricultural area (space), parcels (cadaster), farms (registration) and the agricultural households. The dimensions, captured through satellite images, create the geographical information (see Figure 24).

The decision-making information for the government and other stakeholders is derived from three sources. One is the qualified informant, currently used for official agricultural statistics. It is not reliable because it has no frame, no way of measuring potential error and is non-probabilistic. The second is a probabilistic method used by the National Agriculture Survey – better but needing improvement. The third is the administrative record of different stakeholders, such as a "declaration of intention" for the next planting season. The pilot phase reported a more accurate estimation of the agricultural area, confirming that the MAA is a useful tool that improves the administrative, qualified-informant and probabilistic information by using technology and producing reliable and cost-efficient information.

Lessons learnt

- Investment is needed to fill the gaps in data availability, quality and analysis capability across countries and insurance companies.
- The potential of new technologies such as remote sensing and GIS is immense. However, there must be a human interface to analyse all the data and produce accurate and sustainable information.
- Satellite imaging is producing high-resolution layers of forest, grassland, water and wetlands, as well as agricultural areas that can help monitor floods, record land registration, and assist with risk assessments, loss adjustments, and automated crop monitoring.

Figure 24
Statistical sectors – Cadastre – MAA of the pilot area Chongoyape / Lambayeque (Peru)

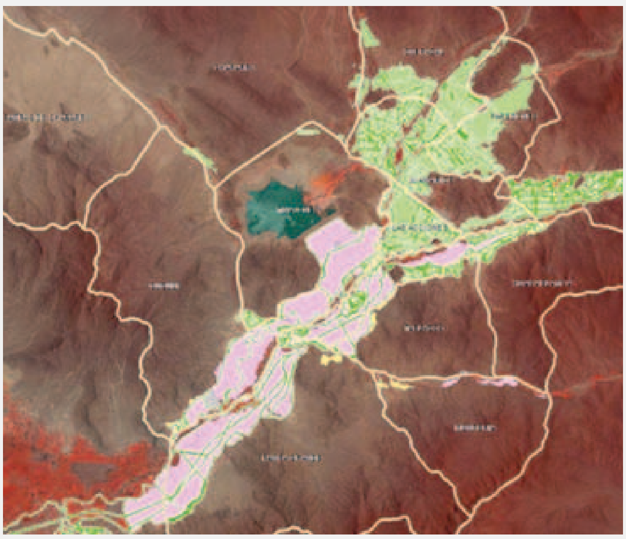
Statistical sector

Cadastre

MAA

- Arable crop
- Permanent crop
- Heterogeneous agricultural areas
- Non-agricultural land

Sentinel image (09-10-2016)



Source: Salcedo, Rodrigo et al. Presentation "Improving the Peruvian agricultural information system: the bases for further developments in crop insurance." 13th International Microinsurance Conference 2017. © GIZ / GAF AG

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