

Africa Rising - Geospatial Must Underpin Economic Development



In November last year, Andrew Coote of ConsultingWhere visited Addis Ababa for the joint Global Spatial Data Infrastructure (GSDI) and AfricaGIS conferences. GiSPro originally commissioned him to write a GSDI-focused report. But with colleague Phil Knight they realised that a wider focus on the rising use and importance of geospatial technology on the world's most misunderstood continent would perhaps be a more valuable contribution.

The quality and diversity of the projects described by African geospatial scientists in Addis Ababa was humbling. For too long, western eyes have often viewed Africa with a mixture of pity and despair, perhaps conditioned by our developed world-centric media coverage. In this context, the phrase, Africa Rising, made famous by a recent Economist front cover# seems particularly apt.

Africa Really is Huge

To start with, let's talk geography – just in case we forget, Africa is the world's second largest continent covering just over 20% of the world's land mass; but it suffers from the classic misrepresentation in most maps of the world (1).

Mining, oil and gas exploration, agriculture, land management, environment, water supply and management, electricity generation and supply, food security, poverty, transportation and financial services are amongst the most important sectors to improvements in social and economic development. Geospatial information is emerging as a key asset in each. The Addis conference presented not only evidence of significant success in the deployment of geospatial technology in the continent's larger economies such as South Africa, Nigeria, and Kenya but also in other less obvious countries such as Rwanda, Malawi and Ethiopia.

Lack of Data

Several of the keynotes emphasised that the long-held belief that the heart of Africa's problem in respect to geospatial lay in a lack of data should be laid to rest. The burgeoning number of earth observation satellites launched primarily to provide coverage for Europe, North America and China that also collect imagery for large parts of Africa is significant. The agreement by the European Commission to allow cheap or free access to Copernicus (formerly GMES) Sentinel satellite data services# is an example. Equally important is the spread of smartphone technology, enabling crowd-sourced location information for the gamut of applications to be captured cheaply. Even the more pessimistic predictions suggest 40% of Africans will own a Smartphone within five years. Furthermore, the remotest parts of the continent have the promise of GNSS coverage through the advent of networks developed by China, India and the European Union supplementing renewed investment by Russia and the United States.

Lack of Trained People

Although there is no doubt that more geospatial professionals are still needed, the accessibility of geospatial tools through cloud-based services, and the reducing need for deep programming skills to drive them, has in many cases allowed African GIS and remote sensing practitioners to leapfrog their colleagues in more developed countries.

Significant Applications

Many of the applications now being implemented are stunningly innovative and are making truly significant contributions to solving some of the continent's most pressing problems. There is only room in this article to highlight a few.

Famine Early Warning: The United States Agency for International Development (USAID) Famine Early Warning System (FEWS NET) is an important resource in the fight against poverty in Africa. Using GIS to integrate remotely sensed and on the ground survey data on climate, agriculture production, food prices and livelihoods it forecasts changes in food security status six to twelve months in advance. The information FEWS NET produces is used by decision-makers and relief agencies to plan for food emergencies. FEWS NET was created in response to the 1984 - 1985 famines in Sudan and Ethiopia. Although it is a global system, it focuses primarily on Africa; 30 of the 38 countries that the system routinely reports on are in Africa (2).

Natural Resources: Africa has enormous deposits of natural resources. The continent has a majority of the world's known resources of platinum, chromium, and diamonds, as well as a large share of the world's bauxite, cobalt, gold, phosphate, and uranium deposits (3). In addition, oil and gas exploration and exploitation are important to the economies of Algeria, Nigeria and Angola, with both Sudan and Ghana set to rise in the next few years (4). The growth in commercial interest in a sector can often be gauged by the advent of conferences focusing on the subject. So, the inaugural African GIS in Mining Summit (5) held in Johannesburg in October 2013 is significant.

Energy: The future direction in which cloud GIS is the prevalent model is illustrated by work undertaken by the Kenya Electricity Generating Company on geospatial data management as part of their geothermal resource development (6). A prototype system hosted on Amazon cloud servers was created using GeoServer. The results in terms of performance and cost-effectiveness are encouraging.

Land Tenure: lack of land rights is still one of the biggest underlying problems in Africa. More secure property rights and removal of restrictions on land markets promise significant potential benefits. Rwanda has made huge progress through an impressive land tenure regularisation programme. The dual tenure system with both written/statutory and unwritten/customary tenure systems operating simultaneously, was replaced in far-reaching legal and institutional changes. The regularisation occurred through a nine step participatory process carried out by specially formed committees including processes of sensitization, demarcation, adjudication, mediation, and finally registration. The project relied heavily on GI technologies for the demarcation of parcels. The technique used was a participatory process of marking boundaries on remote sensed imagery and subsequent digitisation. As at 2011 more than 3.3 million parcels were digitized. A 2013 study into the impacts of the project found that 84% of households had a land title and that titles had facilitated access to credit and reduced land related disputes (7).

Planning: The Map Kibera# project used community volunteers and the Open Street Map platform to map Kibera, Nairobi's largest slum, which occupies an area of 550 acres and is home to anywhere between 200,000 and 1,000,000 people. The project mapped all water points, toilets, clinics, pharmacies, schools, churches, mosques, and NGO offices. The end goal here is community information development — gathering, reporting, and analysing local information using digital tools, and using that information for advocacy on topics such as health, security, education and water, as well as more mundane uses for just getting about in an area shown on official maps as an undeveloped forest!

Agriculture: The livestock sector is a large contributor to the Ethiopian economy and a mainstay in the livelihoods of many Ethiopians. A spatial analysis of livestock production patterns in Ethiopia#, linked smallholder livestock population from agricultural census exercises with GIS data to assess livestock population, market access, and grazing land. This was combined with travel time data to calculate shares of livestock (cattle, sheep and goat) populations within defined travel time thresholds of major markets.

Health: An interesting global initiative that is making significant inroads in Africa is the Health Management Information System (HMIS) DHIS2. This is a project that originated in South Africa and is now the preferred health management information system in 30 countries and even more organisations across four continents. DHIS2 has an integrated web mapping option that allows users with minimal training to view health indicators on maps to inform decision making. The project currently does not incorporate a feature for detailed GIS analysis, but the project is open source and is therefore constantly evolving. With so many of the instances currently deployed in Africa and a core developer team in Tanzania it seems probable that the system will develop solutions to African problems (8).

Financial Services: Availability of finance will ultimately determine many aspects of development in Africa, as it does in all parts of the world. A fascinating bit of storytelling using GIS was also presented at the conference by Ronald Wall (9). Foreign Direct Investment (FDI) is thought to be overtaking trade as the biggest driver for world development, the diagram above right very clearly shows the flows over the last ten years. Africa is there but not yet part of the main axis.

Tailpiece

A slide at the conference sums up an aspirational way forward for Africa more succinctly than anything we could write – unfortunately my notes weren't good enough to attribute it, so as with many of the best quotes it is anonymous. Nothing aspirational happens by itself so the Champions need to step forward.

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