GIM INTERNATIONAL INTERVIEWS JIDE KUFONIYI

Nigeria Needs Federal Commitment to its Geodata Policy

Nigeria has all the prerequisites to install an effective national geospatial data infrastructure (NGDI) from which all its 170 million inhabitants would benefit. The country has many educated professionals, a national policy concept, money, lots of projects, more and more data, etc. But what is missing is the will to make a conscious effort to implement an NGDI in order to facilitate coordination of the geospatial resources and provide easy access to data such as Earth observation images. So says Jide Kufoniyi, president of the African Association of Remote Sensing of the Environment and member of Nigeria's National Geospatial Data Infrastructure Committee, in this interview with GIM International.

What are the main characteristics of the Nigerian spatial data infrastructure?

In a nutshell, national geospatial data infrastructure (NGDI) implementation in the country has so far been largely characterised by unfulfilled expectations. We have a national geoinformation policy, adopted by the Minister of Science and Technology. We also have a 27-member NGDI Committee, together with six sub-committees (Geospatial Datasets, Standards, Clearinghouse and Metadata, Capacity Building and Awareness, Legal, Sustainability and Funding). The policy was submitted to the Federal Executive Council for approval in 2004, but it was subsequently returned for review of the membership of the NGDI Committee and the funding mechanism (since the proposed budgetary provision was 2.5% of the federal government's total annual budget). Many years have passed since the draft was reviewed, but the modified version has still not been presented for approval by the federal government, let alone been processed for enactment by the National Assembly. It is obviously not regarded as a priority.

The failure to get the policy approved so far has greatly affected the sustainable implementation of an NGDI because the lead agency – the National Space Research and Development Agency (NASRDA) – could not really support the request for adequate yearly funding. Despite the lack of an enabling law and funding, NASRDA implemented a pilot project in 2009 involving three other NGDI node agencies: the Office of the Surveyor General of the Federation, the National Population Commission, and the Nigerian Geological Survey Agency. That project was successful and showed the country's NGDI readiness. We used international standards to provide low-cost, domestic solutions for SDI development and used indigenous professionals in the complete design and implementation of the SDI pilot. The resulting web portal, based on ISO 19115, has a metadata search page where the (limited) metadata from the four agencies can be found and includes a web map view for visualising framework data. There is also a forum to facilitate communication among the various NGDI groups [www.ngdi.gov.ng].

In 2011, a follow-up activity, titled 'Integration of Web Map Services with the Current Nigeria NGDI Portal', achieved limited success. Unfortunately, there has not been any other activity relating to NGDI implementation since then. Although the geoportal is still up and running, none of the four agencies have captured additional metadata records since early 2010. This clearly highlights the challenge of the initiative's sustainability. Nigeria is a federal country with 36 states, yet only one of them, Lagos State, has so far developed its own draft GI policy – a kind of domestication of the national policy – and two other states are planning to do so.

So the 'NGDI fire' is still burning, albeit slowly ?

What is encouraging is that there are currently many geospatial programmes and mapping projects in many government and private-sector organisations. The awareness of the need for a coordinated SDI at various levels has increased tremendously. In addition to the usual need for adequate funding, we could benefit from some SDI 'champions' in strategic positions.

Encouraging is also the ongoing land reform programme, which is aimed at achieving nationwide, systematic land titling and registration. It requires the use of faster and relatively low-cost data acquisition methods. Also many surveying and mapping organisations, at both federal and state levels, are transforming their production methods and services into fully digital, thereby necessitating relevant education.

18 universities are offering degree programmes in Surveying and Geoinformatics, while 29 polytechnics and four specialised institutions

are offering ordinary and higher national diplomas and postgraduate courses. The surveying and mapping community in Nigeria feels the need to review the curricula once again to fully reflect the today's geospatial technology, and the two national agencies in charge of quality assurance within university and technical education have this recommendation on their agenda.

Nigeria is Africa's biggest oil producer. Should there be less financial constraints there than in other African countries to support SDI projects?

Indeed, the oil wealth has contributed both positively and negatively to socio-economic development in the country, including in the area of SDI-related projects. To cite some examples, all of which are being executed without external funding or loans: Nigeria has launched three Earth observation (EO) satellites – NigeriaSat-1 (32m spatial resolution) in 2003, and NigeriaSat-X (22m resolution) and NigeriaSat-2 (2.5m PAN and 5m MX) in 2011 – as well as a communication satellite (NigComSat-1R). Moreover, many of the federation's states have implemented mapping and GIS programmes. Cross River State carried out digital aerial mapping at 20cm ground sampling distance (GSD), resulting in the production of orthophotos of the entire state at 1:10,000 and five major towns at 1:2,000. Lagos State acquired digital aerial photography of the entire state at 10cm GSD and Lidar data to generate large-scale orthophotos/photomaps, a DTM and various layers of digital line maps as well as a web-based enterprise GIS. Osun State acquired aerial photography of the state at 25cm GSD for the production of a DTM, orthophotos/photomaps, various layers of line maps and a land information system. The Federal Capital Territory provided one-stop land information and geospatial services for government and citizens in the Abuja region. Many other states are planning or already executing similar projects. Furthermore, at the moment, there are about 21 continuously operating reference stations in various parts of the country.

Do the benefits outweigh the costs of the three Nigerian Earth observation satellites?

In terms of costs, many Nigerians believe that it is money well-spent. Meanwhile, the utilisation of the products of these satellites can only bring benefits to Nigeria. The 2.5m PAN and 5m MX images of NigeriaSat-2 are appropriate for implementation within many applications and infrastructure development projects, including agricultural production, urban renewal, water resource management, mitigation of various hazards such as desert encroachment and erosion, oil spills, etc. In particular, with only 200,000km of various categories of roads within the country's 923,768km^2 of territory, the images would be very useful in the design and construction of new roads and maintenance of the existing ones.

Although Nigeria is the 26th-biggest economy in the world, the country performs less favourably on the poverty scale: 61% of Nigerians live in absolute poverty, of whom 90% survive on less than a dollar a day. It is the most populous nation on the African continent: 188 million inhabitants by 2015. Half of the population live in urban areas, and in view of the rate of urbanisation of 3.75%, increase pressure is expected on urban land with its attendant impact on risk. This is another area where the country's EO images can play pivotal roles. My concern is the difficulty of gaining access to the images; they are not readily available.

There is tremendous growth in mobile communication, but the density of ICT facilities is still low. In 2012, 95% of Nigerians lacked access to computers and the internet, and the bandwidth is often still too low to support geographical information transfer. The launch of our telecom satellite came with the hope that its services would improve this situation but it has made no evident contribution so far.

Hundreds of highly educated surveyors pass their exams each year. Is that too many or too few?

It is true that the universities, polytechnics and specialised institutions produce about 500 new highly educated surveying professionals of different cadres every year. The Surveyors Council of Nigeria has 2,344 people on its register, either in private practice or paid employment, although that number includes deceased surveyors. However, there are many more surveying and geoinformatics graduates from universities and polytechnics who are not registered but are nonetheless working in appropriate jobs. In addition many other departments, such as geography, are producing postgraduate-level application-oriented GIS professionals. Taking these different categories together, it could be tempting to say that there is little cause for concern in terms of manpower. However, when we consider the need to produce, manage and disseminate adequate, fit-for-purpose and easily accessible geospatial data for various national development programmes, it is evident that the number is grossly inadequate for such a large country as Nigeria.

The country has about 4,000km of international land boundaries and about 22,000km of interstate boundaries, not to mention its maritime boundaries. Most of these boundaries are yet to be fully demarcated and surveyed. Furthermore, according to the Presidential Technical Committee on Land Reform, most of the country's states have issued fewer than 10,000 Certificates of Occupancy, and the process (including the cadastral survey) often takes a minimum of six months from the date of application. It is not unusual for an entire state to have fewer than five qualified surveyors in its employment, many of whom require retraining to cope with modern technology.

You are also president of the African Association of Remote Sensing of the Environment (AARSE). What difference is AARSE making for the continent?

Since 1992, the association has been playing a modest yet important role in capacity building and in the overall development and uptake of Earth observation and geospatial technology in Africa. We participate in many programmes and partnerships. AARSE has been very active in the development of a framework for the implementation of the AfriGEOSS initiative, which is the African realisation of the Global Earth Observation System of Systems (GEOSS) programme. As a member of the UN-Executive Working Group on Geoinformation [see p.14 of the September 2014 issue of *GIM International*, Ed.], AARSE contributes to various pan-African initiatives including the 'Mapping Africa for Africa', the 'African Reference Frame' and the 'Global Geospatial Information Management' programmes.

To further contribute to knowledge in our field of operations, we publish books, monographs and special editions of journals plus the edited proceedings of the large international conference we organise every two years on Earth observation and geospatial information sciences. The declarations from these conferences have certainly contributed to change, such as to the development of the African Resource Management Satellite (ARMS) constellation programme.

What do you expect from that satellite constellation programme?

Both the awareness and uptake of geospatial information have increased on the continent since Algeria, Nigeria and South Africa have launched EO satellites. The recognition of the immense opportunities for regional cooperation (despite different national policies and priorities) through the implementation of joint programmes was instrumental in the development of the ARMS constellation programme. That has been supported by Nigeria, South Africa, Kenya and Algeria and will soon welcome other African countries to join. Our

expectation is that the programme will help satellite technology to be developed and transferred. African human resources will grow by means of joint participation and knowledge sharing. The region will gain rapid, unrestricted and affordable access to satellite data, thereby ensuring effective indigenous resource management: in Africa, by Africa.

The stakeholders have strongly advocated that the programme should be the primary focus of the African Space Policy and Programmes which are being finalised by the African Union Commission. However, the regional space programme would be better realised if a coordinating agency in the form of an African space agency could be established. Then we would have an effective platform for the implementation of ARMS and other future regional African satellites.

Biography

Prof **Jide Kufoniyi** is Professor of Geoinformatics (Remote Sensing and GIS Programme, Department of Geography) at Obafemi Awolowo University, Nigeria. Among other functions, he is a member of Nigeria's National Geospatial Data Infrastructure Committee, current president of the African Association of Remote Sensing of the Environment, and Fellow of the Nigerian Institution of Surveyors. He gained a BSc in Geography and Postgraduate Diploma (PGD) in Surveying in Nigeria, and obtained a PGD and MSc in Photogrammetry and a PhD in Geoinformatics in The Netherlands.

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