Technology to Promote Transparency around Land Acquisitions

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BPN	Badan Pertanahan Nasional (Indonesia's National Mapping Agency)
CDE	Centre for Development and Environment (University of Bern)
CSO	Civil Society Organisation
DFID	Department For International Development
ExCites	Extreme Citizen Science Section
FIG	International Surveyors Organisation
FLOSS	Free/Libre Open Source Software
GIS	Geographic Information System
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeeit
GNSS	Global Navigation Satellite Systems
GPS	Global Positioning System
ICM	Interactive Community Maps
ICT	Information and Communication Technologies
IFPRI	International Food Policy Research Institute
IIED	International Institute for Environment and Development
ILC	International Land Coalition
ISO	Organisation for Standardisation
LSA	Large Scale Land Acquisitions
LNLMA	Lao National Land Management Authority
OSCAR	Open-Source Cadastre and Registration
PC	Personal Computer
SMS	Short Message (or messaging) Service
SOLA	Solutions for Open Land Administration
UL&PE	Urban Land and Property Rights
UN-FAO	United Nations Food and Agriculture Organisation
UN-HABITAT	United Nations Human Settlement Programme

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Report Summary

<u>Objective of Study</u>

The Department for International Development (DFID) is looking to propose that the UK supports a package of measures to strengthen land transparency and ultimately governance. This should include a technology application to crowdsource and quality assure data, to engage local communities, provide them with information and help to strengthen transparency and accountability. This short, desk-top study investigates and reviews how technology is being used in developing countries to promote transparency around land acquisitions. This includes reactive solutions to identify and highlight what land acquisitions have taken place and proactive solutions that promote and protect land rights from future land acquisitions.

<u>Context for Study</u>

The convergence of global crises in food, energy, finance and the environment has driven a dramatic revaluation of land ownership as powerful transnational and national economic actors tap into lands outside and inside their own borders to provide food and energy security at home. The phrase 'global land grab' has become a catch-all phrase to describe and analyse the current explosion of (trans) national commercial land transactions. Around the world, various state, corporate and civil society groups have reacted, albeit in different ways. Some see this as a major threat to the lives and livelihoods of the rural poor worldwide, and so oppose such commercial land deals. Others see economic opportunity for the rural poor, although they are wary of corruption and negative consequences, and so calls for the improving land market governance feature prominently.

<u>Emerging Technology Trends</u>

Crowdsourcing - A dramatic shift in how geospatial data are sourced is unfolding through the direct involvement of citizens in crowdsourcing. Its roots lie in the increasing convergence of three phenomena: the widespread use of Global Navigation Satellite Systems (GNSS) and image-based mapping technologies by professionals and expert amateurs; the emerging role of Web 2.0, which allows more user involvement and interaction; and the growth of social networking tools, practices, and culture. A number of crowdsourcing initiatives are providing free and open source software technology toolkits to support their easy and widespread adoption, including Ushahidi[1], Open Data Kit[2] (University of Washington) and EpiCollect.net[3] (developed by LUTRA Consulting, a spinoff company from Imperial College London).

Free open-source systems - Over the past decade, free open-source systems have come to prominence. These are increasingly being used in developing countries that cannot afford the high costs of licensing commercial solutions. A good example is the UN-FAO's Solutions for Open Land Administration (SOLA)[4] project that is offering open-source solutions for land administration.

Cloud computing - This is a set of services or resources offered by different providers through the Internet and you connect to these services through the Internet. Cloud computing is about putting more of an enterprise's computing systems, data, and services on the cloud and less on PCs or servers that the enterprise runs for itself.

Web- and mobile phone-based information services - Online access to information services are multiplying with the expansion in broadband infrastructure and the use of mobile

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[1] www.ushahidi.com a non-profit software company.
[2] http://opendatakit.org/
[3] http://www.epicollect.net/
[4] See the Solutions for Open Land Administration (http://www.flossola.org)

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phones to deliver Internet and SMS-based services. Now a whole new generation of information services are being provided to users in developing countries through mobile phones: providing agricultural information services for prices, weather and farming tips; gathering health information in the field to help manage drug stocks and verifying the authenticity of drugs.

Support of social and customary tenure - The Social Tenure Domain Model is a specialisation of the Land Administration Domain Model, which has been adopted by the global International Organization for Standardisation (ISO) standard[5].

Open government policies - Improved access to public sector information is being enhanced by the increasing adoption of Open Government policies across the world.

Projects Capturing Data around Land Acquisitions

Two types of projects were identified: reactive solutions that identify and highlight what land acquisitions have taken place; and proactive solutions that promote and protect land rights from future land acquisitions.

Reactive Solutions

- Lao PDR National Database of Concessions - In Lao unregulated access to land is a major cause of poverty. Up until 2009, Lao had let over 2,200 land concessions to foreign as well as local companies. However, due to the fragmented institutional arrangements governing land, the extent of these concessions was unknown. A German funded project[6], through GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeeit) and the Lao National Land Management Authority (NLMA), has created an initial inventory of concessions.
- Land Matrix - The Land Matrix[7] was established as a crowdsourcing system to monitor land acquisitions larger than 200 hectares by foreign investors. It includes land used for agriculture, livestock, forestry for wood or fibre production, mineral extraction, including petroleum – essentially all rural land. The database has registered nearly 1,000 land deals. Unfortunately, the Land Matrix is currently having serious problems with the quality of its data and this has undermined its credibility.
- Observatory on Land Acquisitions Project - The Observatory on Land Acquisitions Project[8] is an innovative project that aims to improve the quality and inclusiveness of policy dialogue and decision-making on land, both globally and in countries around the world, by making spatial data, as well information on actors and their activities, more accessible and engaging. The aim is to create a Land Matrix 2.0. A pilot programme has recently been initiated, focusing on the collection of crowdsourced data for LSA in five counties: Lao, Cambodia, Tanzania, Madagascar and Peru.
- Ushahidi - Although Ushahidi serves as a model for what has been coined as 'activist mapping' and is extensively used to support disaster management and recovery, it is also beginning to be used to crowdsource information about land incidents, including land acquisitions. Good examples are 'Let's Talk Land Tanzania', the gateway to land related Information in Tanzania[9], where citizens can submit reports on land incidents and identify their locations on a map, and Deriban.net[10] that allows civic activists and ordinary citizens to submit reports on land violations in Ukraine.

Proactive Solutions

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[5] http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=51206
[6] http://www.landandpoverty.com/agenda/pdfs/paper/heinimann_paper.pdf
[7] http://landportal.info/landmatrix
[8] http://landportal.info/resource/announcing-observatory-land-acquistions-project
[9] http://letstalklandtanzania.com/u/main
[10] http://innovation.internews.org/blogs/deribannet-land-people

- Forest Communities in the Congo Basin - This Congo project is part of Rainforest Foundation UK's "Mapping for Rights" program[11]. It trains forest people to map their land using GPS devices, marking the areas they use for activities such as hunting and fishing -- as well as their sacred sites -- and the routes they use to access these vital areas. The information captured is used to create a definitive map of the land used by these semi-nomadic communities, which can be used to challenge decisions that see them excluded from areas of forest. Two other organisations are pursuing similar strategies to the Rainforest Foundation UK's: Forests Monitor (http://www.forestsmonitor.org/) and the Forest People Programme (http://www.forestpeoples.org/). In both cases, University College London is developing new versions of their data collection tools for their monitoring activities.
- Surui Tribe of the Brazilian Amazon – The Surui Tribe have embraced Google Earth, the mapping technology[12], as a way of protecting the rainforest and preserving the tribe's way of living in harmony with the rainforest. The Surui people have been taught to use mobile phones to record instances of illegal logging. Tribe members can now capture GPS-located photos and videos for immediate upload to Google's mapping tools, so perpetrators of illegal deforestation literally have nowhere to hide.
- Land administration services in Indonesia - Indonesia's National Land Agency has developed the People's Land Titling Service (LARASITA), a mobile land office that travels to previously disconnected communities gain to provide access to BPN's property services. The mobile office (a modified van) is equipped with laptops connected to the main database in BPN's Karanganyar office through wireless connectivity (WLAN), a 2.4 GHz wireless antennae installed on top of the van and on top of a 60 meter tower behind the BPN office. This infrastructure enables the LARASITA van to operate in real time within a 20-kilometer radius of the tower.
- Inuit Sea Ice Use and Occupancy Project[13], - In Canada, the combination of climate change and federal government policy priorities (i.e., arctic sovereignty, social and economic development, environmental protection and governance devolution) have resulted in increased activity in the north that could potentially jeopardise the way of life and land rights of the Inuit. This crowdsourcing project to document the land rights and use of the land and sea will help to safeguard their rights.
- Pro-Poor Land Rights Recordation Systems - a number of companies active in capturing land records in developing countries are adopting innovative, pro-poor recordation systems. The approaches typically use community / societal evidence, innovative mapping solutions, trusted third parties who can act on behalf of the poor to gather the community information and mapping data in the documentation process and crowdsourced land rights information (See McLaren's paper[14] on 'Crowdsourcing Support of Land Administration' for more details of this proposed approach).

Key Success Factors

The majority of these initiatives and projects are relatively new. Initial news on the projects has focused primarily on the technology and its innovation in being applied to remote communities. However, further research is required into the actual impact on the communities, e.g. has security of tenure been achieved, and are the solutions sustainable once the project teams leave. However, some initial lessons learned have been identified:
- All initiatives that have adopted a 'top down' approach to LSA data collection have found it difficult to obtain and maintain the corresponding information from governments and the organisations (local and foreign enterprises and foreign governments) involved in

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[11] http://ictupdate.cta.int/en/Feature-Articles/Crowdsourced-land-rights/%2869%29/1353928539

[12] http://www.google.co.uk/intl/en/earth/outreach/stories/surui.html

[13] http://sikuatlas.ca

[14] http://www.rics.org/cn/knowledge/research/research-reports/crowdsourcing-support-of-land-administration/

land acquisitions. It is now clear that a more successful approach to LSA data collection should also include a 'bottom up' component of crowdsourced data from other stakeholders, including those on the ground.

- Those initiatives that have found global platforms to promote their issues, either loss of land rights or planned LSA, have attracted international support for their predicament.
- Ushahidi, the open source the activist mapping' that is extensively used to support disaster management and recovery, is also being used to record crowdsourced information about land incidents. This solution could provide an excellent early warning system for land issues.
- Those proactive initiatives that are capturing existing land rights to promote and protect the ownership and use of land by communities are being successful by empowering the communities, supported by NGOs, to directly capture the land rights data themselves. The technology toolkits being applied to these applications are being designed to be simple to use and involve innovative solutions to counter the lack of mobile phone coverage in remote areas.
- Increasingly, pro poor approaches to the capture of land rights in developing countries are being adopted. These are participatory, affordable and equitable. These approaches will accelerate the security of tenure for vulnerable communities in developing countries.
- Crowdsourcing in land administration is another technique that could accelerate security of tenure in developing countries and help to safeguard communities' land rights from LSA.

Challenges

The embryonic nature of these initiatives leaves a number of critical challenges to be resolved; especially around authenticity of information and sustainability and scalability of the initiatives. The key challenges identified are:

- Transparency – Governments / Corporations - Many of the stakeholders involved in LSA are not willing to be transparent about their dealings in land; many deals are corrupt and made in secret. This makes it difficult to obtain and authenticate the data about LSA.
- Mobile Phone Coverage and Access to Internet in Remote Areas - Many of the crowdsourcing initiatives depend on input from citizens through their mobile phones. Therefore, a key limitation is mobile phone coverage. Although 2G coverage does impose limitations on functionality and the ability to transmit data efficiently, there are novel solutions being developed to counter these deficiencies.
- Authenticity of Information - One of the most contentious issues surrounding crowdsourced information is the authenticity or validity of the information provided. Without the rigors and safeguards associated with formal professional and legal based processes, crowdsourced information is of variable quality and open to potential abuse. Some alternatives, including lessons learned from leading wikis and e-commerce, are discussed in McLaren's paper[15] on 'Crowdsourcing Support of Land Administration'. However, the most appropriate crowdsourcing approaches to authenticity assessment for LSA and land rights will only be identified through testing in the field.
- The most successful LSA initiatives are those where the associated information has been nationally or globally promoted through exposure on social media or platforms such as Google Earth. The capture of land rights information through crowdsourcing will not provide security of tenure against LSA unless the information can be used to formally register the land rights with a Land Administration agency or can be promoted and accessed through an Internet platform to gain international attention and reaction.

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[15] http://www.rics.org/cn/knowledge/research/research-reports/crowdsourcing-support-of-land-administration/

- A number of separate initiatives are currently capturing information on LSA worldwide. It would be better if there was a central, authoritative repository of LSA, associated metadata and an agreed process for authentication.
- Typically crowdsourcing participants are active for a period of around 18 months then they lose interest, especially when the maintenance phase comes around. Sustainability is a serious challenge for LSA initiatives using crowdsourced information.

Objective of Study

Department For International Development (DFID) is looking to propose that the UK supports a package of measures to strengthen land transparency and ultimately governance. This should include a technology application to crowdsource and quality assure data, to engage local communities, provide them with information and help to strengthen transparency and accountability. DFID have noted a number of small pilot programmes, but do not yet have the full overview. To build an evidence base DFID have raised the following questions that they would like this rapid review to respond to:

- What are the best examples of how technology is being used in developing countries to promote transparency around land acquisitions?
- How has technology improved community engagement in land transparency work? What were the winning characteristics? What are the challenges?

Description of Work

This report has been produced following a desk based rapid review of evidence (peer reviewed and grey literature) in response to the above questions.

Study context

The convergence of global crises in food, energy, finance and the environment has driven a dramatic revaluation of land ownership as powerful transnational and national economic actors tap into lands outside and inside their own borders to provide food and energy security at home. This is occurring globally, but there is a clear North-South dynamic that echoes the historical land grabs that underwrote both colonialism and imperialism. In addition, however, there is an emerging 'North-South-South' dynamic in the recent global land grab, with economically powerful non-Northern countries getting significantly involved. The lands of the Global South are increasingly perceived as sources of alternative energy (primarily biofuels), food crops, mineral deposits (new and old) and reservoirs of environmental services. The pace and extent of these land deals has been rapid and widespread. Research by the International Institute for Environment and Development (IIED), estimated the extent of land deals in Africa at 2.5 million hectares between 2005 and mid-2009. Estimates by the International Food Policy Research Institute (IFPRI) placed the total amount of lands to exchange hands at 20 million hectares globally over the same period. Major areas of rapid expansion in plantation crops include South America and Southeast Asia, while in sub-Saharan Africa major land deals have been negotiated in many countries.[16]

The phrase 'global land grab' has become a catch-all phrase to describe and analyse the current explosion of (trans) national commercial land transactions. Around the world, various state, corporate and civil society groups have reacted, albeit in different ways. Some see this as a major threat to the lives and livelihoods of the rural poor worldwide, and so oppose such commercial land deals. Others see economic opportunity for the rural poor, although they are wary of corruption and negative consequences, and so calls for the improving land market governance feature prominently. And, of course, between these two extremes for and against large scale land purchases/sales are a range of intermediate positions offered by other groups.

This study investigates and reviews how technology is being used in developing countries to promote transparency around land acquisitions. This includes reactive solutions to identify and highlight what land acquisitions have taken place and proactive solutions that promote and protect land rights from future land acquisitions.

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[16] http://www.plaas.org.za/ldpi

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SECTION 3
Technology Briefing

Emerging trends

Some of the trends with the most powerful implications for capturing, managing and accessing Large Scale Land Acquisitions (LSA) information are occurring within ICT itself. They include the rise of free, open-source systems as competitors to proprietary systems, mobile technologies to empower citizens, new land rights information standards, e.g. the new ISO standard on Land Administration Domain Model, and the power of cloud computing to overcome some of the limitations of implementing costly local systems.

Crowdsourced Information

Before science became the preserve of the professional scientist, almost all science was citizen science albeit mostly by affluent members of society. However, even with the rise of the professional scientist, the role of volunteers remains significant, especially in archaeology, astronomy and natural history. People sign up to support archaeological excavations, others collect and send samples and observations to national repositories. For example, the Christmas Bird Watch started around 1900 counted a total of 63 million birds in 2009 using tens of thousands of observers[17]. Tapping into 'crowds' of people using the Internet and on-line tools to get work done, to obtain input and to stimulate action is called 'crowdsourcing' and is part of the wider societal change towards participatory democracy. A good example of citizens influencing government policy is 'FixMyTransport'[18]; a site specially built for public transport users who want to make public transport better for all in the UK.

A dramatic shift in how geospatial data are sourced is unfolding through the direct involvement of citizens in crowdsourcing. Its roots lie in the increasing convergence of three phenomena: the widespread use of Global Navigation Satellite Systems (GNSS) and image-based mapping technologies by professionals and expert amateurs; the emerging role of Web 2.0, which allows more user involvement and interaction; and the growth of social networking tools, practices, and culture. The highest profile mapping based crowdsourcing initiative is OpenStreetMap[19] which has spearheaded the democratisation of mapping. In August 2011 this world-wide initiative involved over 400,000 citizens and 2,480,072,760 Global Positioning System (GPS) points had been uploaded in mapping covering most countries of the world[20].

Technology standards and tools to support crowdsourcing

A number of crowdsourcing initiatives are providing technology toolkits to support their easy and widespread adoption. For example, Ushahidi[21] has helped human rights workers and others from Kenya to Libya to Japan to Philippines to document and make sense of fast-moving crises with a web-reporting platform. The free and open source software platform

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[17] http://www.jonathansilvertown.com/Site/Citizen_Science_files/Silvertown%20TREE%202009%20Citizen%20Science.pdf

[18] www.fixmytransport.com

[19] www.openstreetmap.org

[20] http://www.openstreetmap.org/stats/data_stats.html

[21] www.ushahidi.com a non-profit software company.

allows crowdsourced reports from cell phones and web-connected devices to be collected and simultaneously displayed on Web-based maps – see figure 1. The organisation uses the concept of crowdsourcing for social activism and public accountability, serving as an initial model for what has been coined as 'activist mapping'.

Another crowdsourcing toolkit initiative has been developed at the University of Washington[22] using Android, the open-source mobile operating system championed by Google, to develop an Open Data Kit to turn a mobile phone into a versatile data-collection device. It is being used by organisations around the world that need inexpensive ways to gather information in areas with little infrastructure. For example, children have been mapping their home slum of Rishi Aurobindo Colony in eastern Kolkata, India with the support of UNICEF and will upload much of the information onto Google Earth[23].

The EpiCollect.net[24] toolkit (developed by LUTRA Consulting, a spinoff company from Imperial College London) provides a web application for the generation of forms and freely hosted project websites for many kinds of mobile data collection projects. Data can be collected using multiple mobile phones and all data can be synchronised from the phones and viewed centrally (using Google Maps) via the project website or directly on the phones. This toolkit has been used in the Congo to support communities protect significant areas from logging (see section 4 of this report).
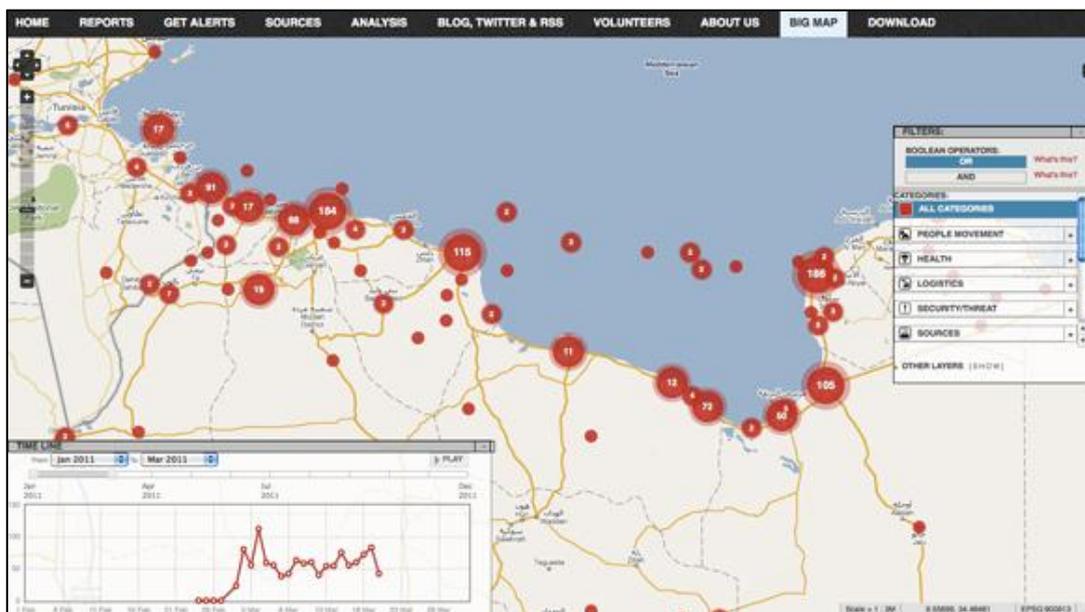
Figure 1: Example of Ushahidi Crisis Mapping of the Libyan Conflict in 2011

Source: http://blog.ushahidi.com/index.php/2011/03/06/using-new-ushahidi-map-libya/

The Extreme Citizen Science section (ExCitesS)[25] of University College London is also developing a number of data collection toolkits to enable any community to start a Citizen Science project that will help them deal with issues that concern them. An example is a set of monitoring tools for Forests Monitor[26].

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[22] http://opendatakit.org/
[23] http://opendatakit.org/about/deployments/
[24] http://www.epicollect.net/
[25] http://www.ucl.ac.uk/excites
[26] http://www.forestsmonitor.org/

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The above toolkits are more suited to the capture of land rights information when compared to tools provided by OpenStreetMap and Google Map Maker, for example, which just focus on volunteered geographic information.

Free, open-source systems

Over the past decade, however, free open-source systems have come to prominence. Licenses for these programs give users the freedom to run the program for any purpose, to modify the program, and to redistribute copies of either the original or modified program without having to pay royalties to previous developers. "Open source" is a software development method that harnesses the power of distributed peer review and a transparent process. The promise of open-source software is better quality, higher reliability, more flexibility, lower cost, and an end to predatory vendor lock-in[27]. The development of systems based on open-source software also encourages local capacity building. The obvious advantages of open-source development can be seen in the emergence and success of major projects like the Apache HTTP server (now running more than half of all websites globally).

Although the total ownership costs, including license, maintenance and support costs, for free, open-source systems will probably be lower than costs for proprietary systems, the costs are not to be underestimated, especially the costs surrounding software integration. Open-source software may make maintenance easier (problems can be solved without external support and with advice from international user and developer communities) and cheaper (the absence of license fees releases funds to maintain and further develop the system).

The use of open-source solutions for land administration will increase in developing countries that cannot afford the high costs of licensing commercial solutions. A cooperative effort among IT experts to foster open-source software development and accessibility is led by UN-FAO with support from the World Bank and New Zealand's University of Otago. The initiative, involving the extension of the Open-Source Cadastre and Registration (OSCAR) software development concept and its continuation project Solutions for Open Land Administration (SOLA)[28], is offering governments a choice between licensing often restrictive and costly proprietary software and promoting the development of free, non-proprietary applications and communication software (more details of the SOLA initiative is contained in section 4 of this report.) Open-source land administration solutions are likely to succeed in countries where the government embraces the idea of using open-source software for its information systems and supports its use in education and research to capacity build. Such a national context makes it easier to find local ICT specialists who are familiar with free, open-source products and form the human resource base to maintain systems.

Cloud computing

Cloud computing is a set of services or resources offered by different providers through the Internet and you connect to these services through Internet. Cloud computing is about putting more of an enterprise's computing systems, data, and services on the cloud and less on PCs or servers that the enterprise runs for itself. Characteristics of the cloud are: (i) the cloud provides storage space for your files; (ii) the cloud provides software to process your files (word processor, photo editing, email, contact management, calendar, etc.); (iii) the cloud automatically backs up your files; copies of your files are stored in different

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[27] See the Open Source Initiative (http://opensource.org/docs/osd) and the Open-Source Geospatial Foundation (http://www.osgeo.org).
[28] See the Solutions for Open Land Administration (http://www.flossola.org)

geographical areas; and (iv) data can be accessed by multiple users at the discretion of the creator of the data.

The main advantages of this approach are that clients can outsource the burden of maintaining servers and applications; scale systems up or down on demand; access their data and services from anywhere with an Internet connection; and substitute regular, predictable operational expenditures for occasional heavy expenditures on ICT (for servers, for example). Cloud computing requires a robust, high-bandwidth broadband connection to the Internet and has real benefits, but there are also reasons for caution. Risks include loss of service and data if the provider has downtime or goes out of business, regulatory problems when personal data are stored internationally, security concerns when users lose control of how their data are protected and used, one-sided service agreements that give users little redress in the event of a calamity, and lock-in dependency on proprietary cloud applications.

Web- and mobile phone-based information services

Mobile phones have made a bigger difference to the lives of more people, more quickly, than any previous communications technology, and their use is growing most significantly in developing countries. Mobile phones are connected to phone networks at ever-higher bandwidths, which have opened real-time access to the Internet and information services. For those living outside of the main cities, mobiles may be their only means of accessing the Internet.

Online access to information services are multiplying with the expansion in broadband infrastructure and the use of mobile phones to deliver Internet and SMS-based services. Now a whole new generation of information services are being provided to users in developing countries through mobile phones: providing agricultural information services for prices, weather and farming tips; gathering health information in the field to help manage drug stocks and verifying the authenticity of drugs (see the World Bank's Sourcebook on ICT in Agriculture[29] for more innovative applications). However, mobile phones are now the primary source of crowdsourced information.

Support of social and customary tenure

Until recently, land information infrastructure only supported the management of formal land rights, but a recent initiative between UN-HABITAT and FIG developed a Social Tenure Domain Model[30], which was trialled in Ethiopia. The Social Tenure Domain Model is a specialisation of the Land Administration Domain Model, which has been adopted by the global International Organization for Standardisation (ISO) standard[31]. The inclusion of social tenure support in land information infrastructures will result in more secure tenure for many, and it directly supports the UN-HABITAT "continuum of land rights" approach, which advocates registering a range of informal rights rather than formal rights alone[32]. The importance of openness and transparency in improving security of tenure should not be underestimated.

Open government policies

Improved access to public sector information is also being enhanced by the increasing adoption of Open Government policies across the world. The USA and the UK were the first

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[29] http://www.ictinagriculture.org/ictinag/content/ict-agriculture-sourcebook
[30] http://www.fig.net/pub/figpub/pub52/figpub52.pdf
[31] http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=51206
[32] "Secure Rights for All," United Nations Settlement Programme (UN-HABITAT), 2008, ISBN: 978-92-1-131961-3

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and launched their open data initiatives in 2009. These Open Government initiatives normally have three main strands:

- **Open Data:** offering government data in a more useful format to enable citizens, the private sector and non-government organisations to leverage it in innovative and value-added ways;
- **Open Information:** proactively releasing information, including information on government activities, e.g. civil servant salaries and budgets, to citizens on an ongoing basis to increase transparency; and
- **Open Dialogue:** giving citizens a stronger say in Government policies and priorities, and expanding engagement through Web 2.0 technologies. For example, "It's Your Parliament" (www.itsyourparliament.eu) gives citizens a unique overview of the votes cast in the European Parliament. You can find and compare voting records of members of the European Parliament (MEPs) and political groups, make your own comments and cast your own "votes".

The opening up of governmental data, free for re-use, has been justified on economic grounds since access to this data will have major benefits for citizens, businesses, and society and for the governments themselves. This public sector sourced data can include geospatial data, statistics, meteorological data, data from publicly funded research projects, and digitised books from libraries.

Lao PDR National Database of Concessions

In Lao unregulated access to land is a major cause of poverty. Up until 2009, Lao had let over 2,200 land concessions to foreign as well as local companies. However, due to the fragmented institutional arrangements governing land, the extent of these concessions was unknown. A German funded project[33], through GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeeit) and the Lao National Land Management Authority (NLMA), has created an initial inventory of concessions and was surprised that over 5M hectares of land were involved in concessions corresponding to 21% of the territory. 85% of all concession areas are foreign, with Chinese investors accounting for around 50%, with the other four main investors being Thailand, Vietnam, South Korea and India. A large share of the concessions, 85%, relates to mining exploration areas.

Interestingly, the Lao government[34] announced that they won't consider any new investments in mining, rubber and eucalyptus until the 31th of December 2015. The government admits that they have approved large investment projects in these sectors in the past, without looking at the ownership details of the land. Right now, the existing investment projects in these sectors are being investigated on their negative side-effects before approving any new projects. The initial project obtained the information on concessions from official channels. However, the current phase of the project has decided that these inventories should be maintained using crowdsourced information.

Land Matrix

The Land Matrix[35] was established as a crowdsourcing system to monitor land acquisitions larger than 200 hectares by foreign investors. It includes land used for agriculture, livestock, forestry for wood or fibre production, mineral extraction, including petroleum – essentially all rural land. The database has registered nearly 1,000 land deals. There are approximately 1,300 additional land deals that are in the process of being verified so they can become part of the database. Since the launch of the Land Matrix at the end of April 2012, users of the platform can report a deal by sending an email, but the International Land Coalition is now in the process of allowing users to submit all of the relevant details in the database. This Land Matrix Editor tool will facilitate the collection of crowdsourced data and empower researchers in partner organisations around the world to help them manage, verify and organise the crowdsourced information. The bigger the data set becomes, the more powerful the Land Matrix will be in monitoring land acquisition trends. Once it becomes a truly crowdsourcing initiative, it may well have a serious impact on certain deals and may encourage companies to be more responsible and allow more open investment. It will serve as a tool for advocating better land governance by countries, especially in the context of the UN-FAO's Voluntary Guidelines on the tenure of land, forests and fisheries. Unfortunately, the Land Matrix is

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[33] http://www.landandpoverty.com/agenda/pdfs/paper/heinimann_paper.pdf
[34] http://www.laolandissues.org/2012/11/30/pm-order-13-titled-halting-of-all-investment-projects-related-to-mining-rubber-and-eucalyptus/
[35] http://landportal.info/landmatrix

currently having serious problems with the quality of its data and this has undermined its credibility.

The Land Matrix platform is built using standard, open source technology. The platform leverages the LAMP stack (Linux, Apache, MySQL and PHP) for the back-end server and database management. All the visualisations, maps and infographics are created dynamically, based on the most recent data; it uses JavaScript libraries such as jQuery and Raphaël for vector-based real-time drawing of graphs and charts[36].

The Matrix project has recently been reformed under the Land Observatory, which is essentially creating the Land Matrix 2.0. See the details below.

Observatory on Land Acquisitions Project

The Observatory on Land Acquisitions Project[37] is an innovative project that aims to improve the quality and inclusiveness of policy dialogue and decision-making on land, both globally and in countries around the world, by making spatial data, as well information on actors and their activities, more accessible and engaging. As an interactive platform where individuals and organizations can both participate in providing information, but also explore commercial pressures on land by activity, by region, and by investors, the platform will ultimately provide both a global and regional 'bird's eye' view and a ground-view of the issue of land-based investments. The ground-view will come from reports by partners and in the future by the general public and engaged citizens in participating countries. It will provide international and national policy dialogues with greater insight into the real conditions faced by people, as well as give affected people a more direct voice in these processes. The project is coordinated globally by the International Land Coalition (ILC) with its strong experience in monitoring, policy dialogue and advocacy, and by the Centre for Development and the Environment (CDE) at the University of Bern, Switzerland, with its technical and conceptual know-how. But it will be co-created together with partners in pilot countries, which may have custom national-level versions. The aim is to create a Land Matrix 2.0.

A pilot programme has recently been initiated, focusing on the collection of crowdsourced data for LSA in five counties: Lao, Cambodia, Tanzania, Madagascar and Peru. The project is still in the early development phase and a round of co-development workshops with the respective partners in the countries has recently been held. A beta version of the online, crowdsourcing tool will soon be available for a first round of comments outside of the partners in the 5 counties. The interest and response from the participating countries has been varied; while in Madagascar and Lao the agencies (mainly CSOs, but partly government) are very eager to use this approach and contribute their knowledge about LSA, it is much more difficult in Cambodia.

The pilot programme uses various open source packages for this observatory of land acquisitions, for example[38]:

- Client User Interface: ExtJS, GeoExt and OpenLayers
- Server: Pyramid (Python Framework) similar to MapFish
- Database: PostGIS

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[36] http://ictupdate.cta.int/en/Feature-Articles/Crowdsourced-land-rights/%2869%29/1353928539
[37] http://landportal.info/resource/announcing-observatory-land-acquistions-project
[38] Personal correspondence with Dr. Andreas Heinimann, Swiss National Centre for Competence of Research.

An objective of the pilot programme aims to help make the Land Matrix a site where companies willingly provide information on their investments. The Observatory is currently exploring the feasibility of the Land Matrix playing this role, and are encouraging companies listed in the Land Matrix to write comments or provide information.

Forest Communities in the Congo Basin

Half a million people in Africa's Congo Basin are hunter–gatherers, whose lives depend on the biodiversity of the rainforest. These indigenous communities in the rainforest have no legal rights to the land that they and their ancestors have been using for centuries. And with logging, mining, industrial plantation and conservation activities spreading fast in the area, there is a growing urgency to map their hunting and gathering areas and preserve their livelihoods.

This Congo project is part of Rainforest Foundation UK's "Mapping for Rights" program[39]. It trains forest people to map their land using GPS devices, marking the areas they use for activities such as hunting and fishing -- as well as their sacred sites -- and the routes they use to access these vital areas. The information captured is used to create a definitive map of the land used by these semi-nomadic communities, which can be used to challenge decisions that see them excluded from areas of forest. University College London currently has significant research effort focused on securing land and carbon rights for these forest communities and is developing mobile phone based technology to record the land use and rights information.

Over the last 10 years, the foundation's participatory mapping programme has demonstrated that forest communities in Cameroon, the Central African Republic, the Democratic Republic of Congo and Gabon are capable of accurately defining the lands they occupy and use with the help of geo-technologies. It has so far trained over 200 mapping facilitators and 40 Geographic Information System (GIS) technicians from civil society and government in participatory approaches, not to mention over 1,000 local community mappers. To date these have supported over 300 forest communities to produce fully geo-referenced maps of their lands and resources, covering over two million hectares of forest. The Rainforest Foundation UK has recently launched a new website (www.mappingforrights.org), which aims to provide easy access to accurate geographic information about the presence, land use and rights of indigenous peoples and other forest-dependent communities in the Congo Basin. The 'Mapping for Rights' initiative plans to significantly scale up the foundation's mapping work in the coming years and will provide a basis for real-time monitoring of lands under the ownership or control of forest communities.

Lessons learned from this project are detailed in Appendix A.

Other Forest Community Initiatives

Two other organisations are pursuing similar strategies to the Rainforest Foundation UK's: Forests Monitor (http://www.forestsmonitor.org/) and the Forest People Programme (http://www.forestpeoples.org/). In both cases, University College London is developing new versions of their data collection tools for their monitoring activities.

Let's Talk Land Tanzania

Although Ushahidi serves as a model for what has been coined as 'activist mapping' and is extensively used to support disaster management and recovery, it is also beginning to be used to crowdsource information about land incidents, including land acquisitions. A good

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[39] http://ictupdate.cta.int/en/Feature-Articles/Crowdsourced-land-rights/%2869%29/1353928539

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example is 'Let's Talk Land Tanzania', the gateway to land related Information in Tanzania[40]. Citizens can submit reports on land incidents and identify their locations on a map. The reports are classified as Trusted Reports, Verified, Under Reconnaissance and First Sighting, depending on the corresponding level of authentication (see figure 2).
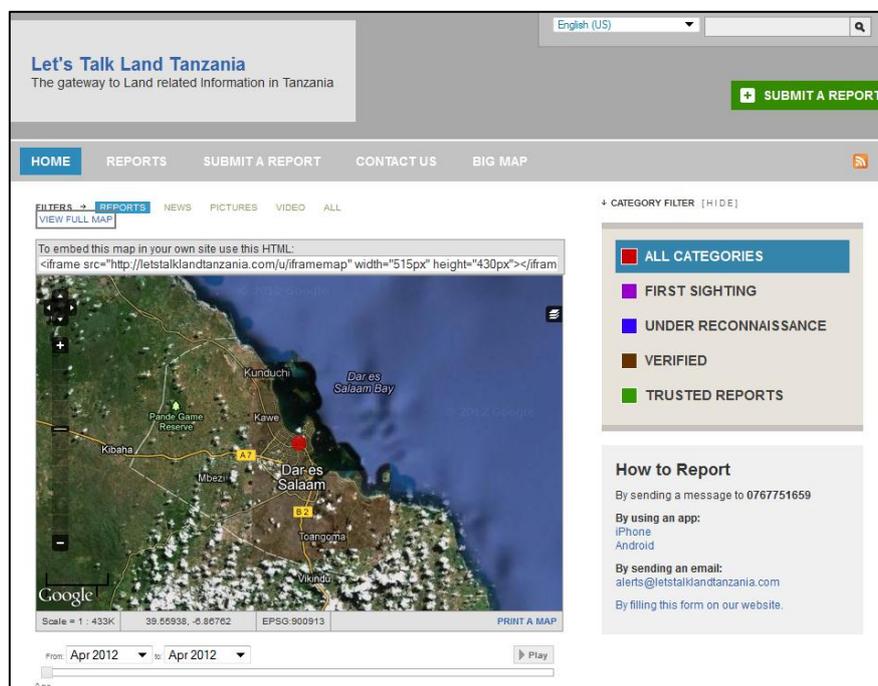

Figure 2: Let's Talk Land Tanzania (source: http://letstalklandtanzania.com)

Ukrainian Land Violations

The Deriban.net project[41] utilises Ushahidi, an open source crowdsourcing platform that provides geolocation options, to display reported land violations. Deriban allows civic activists and ordinary citizens to submit reports on violations, select a category (for example corruption or improper use of land), locate them on the map, upload photos, add the links to video (Ushahidi does not have the capacity to upload video so the reporter must upload to YouTube or Vimeo and share the link to the video) and write comments. The Ushahidi platform accepts reports not only via the website but also from iOS and Android applications, which makes it very useful for crowdsourcing.

Surui Tribe of the Brazilian Amazon

The Surui people of the Brazilian Amazon had their first contact with outsiders in 1969. While the first encounter brought disease and deforestation, later contact helped bring about cultural preservation and environmental protection. Their tribal leader, Chief Almir, came across Google Earth in 2007 and has since embraced the mapping technology[42] as a way of protecting the rainforest and preserving his people's way of living in harmony with the rainforest.

When Chief Almir first glimpsed Google Earth on a visit to an Internet café, the indigenous chief immediately grasped its potential for conserving the heritage and traditions of his

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[40] http://letstalklandtanzania.com/u/main
[41] http://innovation.internews.org/blogs/deribannet-land-people
[42] http://www.google.co.uk/intl/en/earth/outreach/stories/surui.html

people. Google were invited to train his community in recording the stories of tribal elders. Surui tribe members learned to create YouTube videos, geo-tag content and upload it to a "cultural map" on Google Earth in order to share their unique history and way of life with people all around the globe.

In 2009, Google visited the Surui people again and taught them to use mobile phones to record instances of illegal logging. Tribe members can now capture GPS-located photos and videos for immediate upload to Google's mapping tools, so today's perpetrators of illegal deforestation literally have nowhere to hide; anyone anywhere can see the effects of their work with their own eyes. The Surui are currently using the Open Data Kit[43] to monitor their forest's carbon stock to trade on the carbon credit marketplace, which will allow them to build a sustainable future for their territory.

Solutions for Open Land Administration (SOLA)

Introduction of IT systems to land registration is one of the key ways to reduce corrupt and non-transparent land management practices. In fact, IT improves the structure and accessibility of records, facilitating knowledge based decision-making and wider data dissemination. The SOLA[44] project promotes affordable IT-systems that enable improvements in transparency and equity of governance.

Started in June 2010, SOLA is a 3 year trust fund project funded by the Government of Finland. The NRC Land Tenure team of the UN-FAO initiated and now manages SOLA as a measure that will benefit security of tenure for the poor. Through the development and re-use of Free/Libre Open Source Software (FLOSS), it aims to make computerised cadastre and registration systems more affordable and more sustainable in developing countries. Three countries (Samoa, Nepal and Ghana) were identified for pilot implementation of the software.

Open-source means that, unlike proprietary software, developers have access to software's "engine", which can be freely modified and adjusted. Open-source solutions are typically more flexible and adaptable to local cadastre and registration practices and languages than proprietary software. Over time it is expected that the community of land administration agencies using SOLA will increase. As land administration agencies complete further software development to customize, extend and enhance SOLA, it will be seen not only as a low cost software solution, but also a way of adopting international best practice in the fields of cadastre and registration.

Although the SOLA project funding finished at the end of 2012, SOLA lives on both through the pilot implementations (Ghana, Nepal and Samoa) and as one of the technologies that could be included in the support UN-FAO can provide to countries wanting to implement the Voluntary Guidelines. In Africa, UN-FAO have completed SOLA software developer training in Kano State and Ondo State, Nigeria and it seems likely that the Nigeria Presidential Technical Committee on Land Reform will use customised SOLA in their planned pilots covering systematic registration and improvements to (subsequent) registration processes. A feasibility study has also been completed with the Lesotho Land Administration Authority and that seems highly likely to result in another SOLA implementation. In the Pacific, the UN-FAO sub-regional office is funding a SOLA implementation in Tonga with work due to begin in February/March 2013. Other countries which are showing a lot of interest that will probably result in implementations in 2013 are Palestine/West Bank and Fiji. An end of

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[43] http://opendatakit.org/
[44] http://www.flossola.org/home

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project, independent review of the SOLA pilots is being initiated and will be completed by March 2013.

The SOLA project's experience of using open source solutions for land administration is very positive, especially in building open source communities and building capacity. Therefore, these SOLA open source communities are ideally placed to start the development of open source crowdsourced solutions on mobile phone platforms. This would provide a potential link between the crowdsourced verified form of recording to the formal registration of rights.

Since there are very few examples of technology that deal specifically with land acquisitions, UN-FAO have identified this application as a possible extension to the SOLA software[45].

Improving public access to land administration services in Indonesia

With World Bank support[46], Indonesia's National Land Agency (Badan Pertanahan Nasional, BPN) has set out an exciting and ambitious plan for land reform, with ICT at the centre. Improving public access to land services is a priority of the BPN Karanganyar office in Central Java, where involvement in the land office computerization project triggered innovative uses of ICT to build public trust in land administration. The office has expanded its services to include an SMS-based property enquiry service, known as Interactive Land Information (INTAN). INTAN removes the need for intermediaries to access BPN's services. It's simple, transparent, and accessible services rapidly build public trust.

The BPN Karanganyar office has also developed the People's Land Titling Service (LARASITA), a mobile land office (see photos[47]) that travels to previously disconnected communities to provide access to BPN's property services. The mobile office (a modified van) is equipped with laptops connected to the main database in BPN's Karanganyar office through wireless connectivity (WLAN), a 2.4 GHz wireless antennae installed on top of the van and on top of a 60 meter tower behind the BPN office. This infrastructure enables the LARASITA van to operate in real time within a 20-kilometer radius of the tower. The head of the BPN Karanganyar office observed that "as long as we can bring BPN presence and services closer to the people, and provide the right information, then LARASITA has achieved its mission." BPN rolled out LARASITA to an additional five provinces in 2009, increasing its outreach significantly.

Photo 1. LARASITA: A Mobile Land Office in Indonesia (Warnest and Bell 2009)

[45] Personal correspondence with Neil Pullar, SOLA Programme Manager, UN-FAO
[46] http://www.ictinagriculture.org/ictinag/
[47] Warnest and Bell, *Country Focus Indonesia*. In Information and Communications Technology (ICT) Utilization in Land Administration in the East Asia Region, World Bank, 2009.

Inuit provide evidence on impact of climate change

Sea ice is a fundamental feature of the polar environment; it is also one of the most tangible indicators of change in the Arctic. During the last two decades, and in the past several years in particular, both polar scientists and local Inuit residents have detected important shifts in the extent, timing, dynamics and other key parameters of arctic sea ice. Conventional maps show terrestrial variations and features in great detail, while water bodies are outlined and left "blank." Therefore, the Inuit Sea Ice Use and Occupancy Project[48], carried out by the Geomatics and Cartographic Research Centre at Carleton University, has undertaken collaborative investigations to document and map sea ice knowledge and use around several Inuit communities, including: characterisation of seasonal sea ice conditions; extent and areas of sea ice use; nature and location of notable sea ice hazards; key harvesting areas; traditional and current ice routes; and shifts in patterns of sea ice use due to social and/or climatic change.

Inuit elders and hunters are the local experts on sea ice. Through long term observation and experience with the sea ice, they have developed deep and rich understandings of the marine environment. They had to learn about the relationships between winds, weather, tides, currents, and sea ice in order to travel safely on the sea ice, understand animal habitat and behaviour, hunt successfully and survive.

Much of this detailed Inuit knowledge is not written down. It has been passed on orally over generations, and through long term use and experience in this environment. However, today, elders and experienced hunters recognise that youth are not travelling on the ice as much. Young Inuit have less experience on the ice as they travel faster with snowmobiles, and they rely more on technology for navigation. Elders want to make sure that youth have the survival and navigational skills needed if their snowmobiles break down, or their GPS runs out of batteries. They are also concerned about changes being observed in seasonal sea ice conditions, and want to be sure that youth are aware of these changes, and know how to identify signs of danger as they travel in more unpredictable times.

Methods used to facilitate the capture of this information from the Inuit have ranged from traditional interviews and focus groups, through participatory mapping, community-based monitoring and multi-media recording of ice trips, to cutting edge technology. New technology was designed that combined a hand-held computer with a GPS receiver and mobile weather station that could be mounted on a snow machine or dog sled. Hunters tested the new technology and documented their observations as part of their regular activities. The information and maps created have allowed individuals to: record their travels and harvests; collectively evaluate patterns in hunting success, animal populations, and links to weather or hazardous conditions; municipal land use planning or land use negotiations; school materials to study hunting, local geography, and weather; and real-time tracking of snow machines for search and rescue activities.

The rich local knowledge base and oral history has been collated into an online interactive sea ice atlas as a means of sharing stories in the form of maps, audio, video, pictures and text, in a way that encourages different types of interactive learning. Making this material available online, also means it can be shared across Nunavut (and even Canada) and it can be updated more easily. Eventually, the goal is that it can be directly modified and updated by Nunavut community members and Inuit experts themselves. With the development of a user-friendly interface, contributors will not require advanced technical skills, so communities will be able to input information in their own language and in a variety of forms, e.g. voice

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[48] http://sikuatlas.ca

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input, storytelling, video, photographs, documents, GPS data, and text. This represents an important advance in open source geospatial software as well as in community mapping.

In Canada, the combination of climate change and federal government policy priorities (i.e., arctic sovereignty, social and economic development, environmental protection and governance devolution) have resulted in increased activity in the north that could potentially jeopardise the way of life and land rights of the Inuit. This crowdsourcing project to document the land rights and use of the land and sea will help to safeguard their rights.

Landsafe Community Trust

Zambia is either customary land (94%) under some measure of control by chiefs and headmen, or state land (6%), comprising protected areas and land held under 99-year leasehold. Protected areas and their resources are prone to alienation by the state for mining, forestry, fisheries and wildlife exploitation. Customary land comprises villages and their surrounding agricultural land, the remainder being the customary commons that is harvested and plundered for its natural resources by residents, non-residents and criminals. It is also subject to alienation to leasehold by chiefs and government officials, and appropriated by the state for agriculture and agribusiness, forestry, fisheries, mining, tourism, wildlife conservation and game harvesting. Customary area residents with significant wildlife populations are 30% poorer than those living elsewhere. Customary residents have no ownership or harvesting rights to game animals. To counteract the open-access harvesting and plunder of customary land and the protected land associated with it, an initiative for customary communities to establish statutory trusts, that customary land be vested in them, and that they enter into co-management custodial and harvesting agreements with the state in respect to fisheries, forestry, water and wildlife. Between 2003 and 2011, the Landsafe[49] model was implemented in two adjoining chiefdoms in the Luangwa Valley to assure customary residents secure access to land and lasting benefits from renewable natural resources, essential to biodiversity conservation and to the socioecological and cultural integrity of Zambia.

Pro-Poor Recordation Systems

Increasingly, the approach to capturing land rights information is changing to be more compatible with the needs of the poor. UN-HABITAT has recently released a 'Land Records for the Poor[50]' initiative and a number of companies active in capturing land records in developing countries are adopting innovative pro-poor recordation systems. The pro-poor approaches to land rights recording have the following characteristics:

Community / Societal Evidence - documentation is taking new forms and must be able to accept recorded oral testimony, pictures, sketches, point locations for properties, copies of any bills or agreement etc. In many cases, it is the community leaders – which can include tribal leaders – that can help to secure that documentation. Sharing the recorded land rights information with the community can provide the necessary societal evidence.

Mapping - In most parts of the world, legal titling requires an official survey meeting certain accuracy specifications. Whenever a survey crew gets involved, the cost quickly exceeds the reach of most poor, e.g. in Ghana a professional survey can cost $1,200 or more. Regulations therefore need to be relaxed and innovative mapping alternatives

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[49] http://lawlibrary.unm.edu/nrj/52/1/manning.pdf
[50] http://www.unhabitat.org/pmss/listItemDetails.aspx?publicationID=3321

adopted. For example, Thompson Reuters in Ghana's capital city of Accra [51] have mapped the locations of properties using a compass and measurement wheel to make a hand-drawn map of the neighbourhood. Once the map is done, it is reviewed by the neighbours, who sign it to signify their agreement. In other more densely packed areas where one shanty abuts another with no land in between, a $100 GPS unit is used to pinpoint the location of each front door with an accuracy of less than a metre. This is another form of documenting people and their relationship to a point on the Earth. Although aerial photographs have been used in recording boundaries since the 1950s (in Kenya, for example), digital cameras, high-resolution (less than 1 metre) satellite imagery, digital terrain models, and new software techniques are increasing the availability of reasonably priced orthophotos, presenting opportunities for more cost-effective, efficient, and participatory ways of registering the boundaries of land rights. These approaches have been used successfully in Ethiopia[52], Rwanda, Thailand, and Namibia. In Namibia, however, the systematic registration of communal land rights was 32 percent cheaper than surveying with hand-held GPS.

Third Party Evidence - the use of trusted third parties who can act on behalf of the poor to gather the community information and mapping data in the documentation process is a key element of pro-poor recordation systems. These third parties are often NGOs, such as Habitat for Humanity and Slum Dwellers International, which already have a relationship with the poor in a given area. Or they may be private sector firms such as microfinance organisations. These third parties are more likely to gain the trust of the poor than government personnel would in the process of recording rights.

Crowdsourcing - Mobile phones are progressively integrating satellite positioning, digital cameras and video capabilities. They provide citizens with the opportunity to directly participate in the full range of land administration processes from videoing property boundaries to secure payment of land administration fees using 'mobile' banking. But even today's simpler phones offer opportunities to participate in crowdsourcing. This crowdsourcing approach would allow a partnership to be established between land professionals and citizens and would encourage and support citizens to involve themselves in directly capturing and maintaining information about their land rights (See McLaren's paper[53] on 'Crowdsourcing Support of Land Administration' for more details of this proposed approach). Crowdsourcing initiatives in land administration may coalesce into a much wider open data phenomenon similar to the global OpenStreetMap initiative. If this happened then a free and open source software solution to store and manage the crowdsourced land administration information would be created and populated by volunteers. This could provide a global platform for land rights and help to publicise the impact of existing or planned large scale land acquisitions.

Improving Access to Land and Property Rights for Women in Bolivia

A coalition of partners led by Habitat for Humanity International has implemented a project[54] in Bolivia to support the Bolivian Government in implementing its new Constitution and

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[51] http://geospatialtoday.com/gst/index.php?option=com_content&view=article&id=2640

[52] Lemmen, C., and J. Zevenbergen. 2010. "First Experiences with High-Resolution Imagery-Based Adjudication Approach in Ethiopia." In "Innovations in Land Rights Recognition, Administration, and Governance," edited by K. Deininger et al. Washington, DC: World Bank.

[53] http://www.rics.org/cn/knowledge/research/research-reports/crowdsourcing-support-of-land-administration/

[54] http://www.landandpoverty.com/agenda/pdfs/ppt/alvarado-zanelli_powerpoint.pdf

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National Development Plan for regulatory and governance reform of urban land and property laws and policies. Bolivia is a country with a population of around 10 million with 60% living in inadequate housing conditions without secure tenure of land, 63% under the poverty line and with 31% of Bolivian households headed by women.

The project focused on the district around Cochabamba City with the objective of increasing access to urban land and property rights (UL&PE) for women and excluded families through more transparent and accountable national and municipal governance. A key output from the project was to reduce the UL&PE barriers faced by women and a School of Women Leaders on Secure Tenure was established to educate and train women on land issues, including:

- Educating women on the technical and legal aspects of secure tenure and land rights, including advocacy;
- Providing training for local women to use GPS for land surveying and mapping; and
- Supporting conflict resolution and improvement of land use standards.

Over 130 women and 25 men have completed the programs.

Women played a key role for 18 community-based organizations and grassroots territorial organizations and organised participatory mapping, collected plot plans, land-tenure documentation, etc. Information from Municipal Cadastre & Land Rights Registry Office & Municipal Tax Administration Registry was also integrated and better informed families on the physical, legal, and value aspects of their land.

The project has been successful in increasing the number of gender-responsive laws, policies and regulations at national and municipal levels, reducing the UL&PE barriers faced by women, increasing awareness and support of gender equality in UL&PE rights in Bolivia and increasing participation of women in institutional and non-institutional dialogue with government entities.

SECTION 5
Key Success Factors and Challenges

Key Success Factors

Although the technology solutions for capturing, managing and disseminating information about LSAs are embryonic, there are some lessons learned and key success factors emerging:

1. All initiatives that have adopted a 'top down' approach to LSA data collection have found it difficult to obtain and maintain the corresponding information from governments and the organisations (local and foreign enterprises and foreign governments) involved in land acquisitions. It is now clear that a more successful approach to LSA data collection should also include a 'bottom up' component of crowdsourced data from other stakeholders, including those on the ground. The Observatory on Land Acquisitions Project is a good example of this hybrid approach that has just initiated five pilot projects that all involve crowdsourcing to capture and maintain the LSA data. However, the quality and authentication of this crowdsourced data is still a major issue to be resolved.

2. Those initiatives that have found global platforms to promote their issues, either loss of land rights or planned LSA, have attracted international support for their predicament. The use of Google Earth by the Surui people of the Brazilian Amazon and Rainforest Foundation UK's recently established online database called 'MappingForRights.org' are good examples of the publicity that can be generated from global information service platforms.

3. Ushahidi, the open source the activist mapping' that is extensively used to support disaster management and recovery, is also being used to record crowdsourced information about land incidents. This solution could provide an excellent early warning system for land issues.

4. Those proactive initiatives that are capturing existing land rights to promote and protect the ownership and use of land by communities are being successful by empowering the communities, supported by NGOs, to directly capture the land rights data themselves. The technology toolkits being applied to these applications are being designed to be simple to use and involve innovative solutions to counter the lack of mobile phone coverage in remote areas. However, there are still issues about the sustainability of the solutions.

5. Increasingly, pro poor approaches to the capture of land rights in developing countries are being adopted. These are participatory, affordable and equitable. These approaches will accelerate the security of tenure for vulnerable communities in developing countries. However, the formalisation and acceptance of these land rights is still an issue in countries with strict regulations and restrictive legal frameworks for land administration.

6. With open-source solutions, developers have access to software's "engine", which can be freely modified and adjusted. Open-source solutions are typically more flexible and adaptable to local needs, practices and languages than proprietary software. The majority of the technology supporting these LSA data collection initiatives highlighted in this report are open source.

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7. Crowdsourcing in land administration is another technique that could accelerate security of tenure in developing countries and help to safeguard communities' land rights from LSA. Although this application of crowdsourcing is in its infancy, it is worthwhile reviewing some of the key lessons learned from wider crowdsourcing / participatory mapping initiatives[55] that should be adopted to help shape future initiatives:

Demand driven
The technological aspects of crowdsourcing are usually the easiest ones. The more difficult and challenging factors are community engagement, governmental cooperation, sustainability, and impact. In order to maximise the chances that the outcome of crowdsourcing will satisfy community needs and that the information will be used by relevant stakeholders, the design of the projects should be as demand-driven as possible. The project needs to identify the target audience and have specific aims that are clearly understood by all stakeholders.

The participants need to understand that they are obtaining something that they value at the end of the process. Therefore, it is very important that formal recognition of land rights by the neighbours and authorities is clear and also that the participants understand what they will get and how they will benefit. It is only worth giving someone tenure security if (a) they feel that their tenure is in some way tenuous and that someone might kick them off their land if they do not get formal recognition; or (b) they want to do something with the land, such as develop it, sell or lease it, get a license to grow a cash crop, mortgage it, etc.

Establish Partnerships on the ground
The effectiveness of crowdsourcing depends to a large extent on the cooperation of local communities. To ensure that the outputs from crowdsourcing will be used, sustained, and further developed upon completion, local Civil Society Organisations (CSOs), groups, and community members should be the entry point to the creation of the crowdsourced information and sense that they "own" it from its inception.

The crowdsourcing process should therefore rely on robust partnerships with groups and organisations that are permanently active in the community. Such partnerships are important at all stages of the crowdsourcing process:

- In the beginning, local CSOs, public officials, or civil society activists may help identify the information needs and demands of the community, and offer guidance with regard to the implementation of crowdsourcing of land rights within the particular local context.
- Then, local partners can help engage and mobilise the community to take part in the crowdsourcing process, organising community forums, igniting public interest in the platform, helping recruit community members to collect land rights information, and supporting them throughout the crowdsourcing process.
- After the completion of the land rights capture, local partners can serve as its "hosts," ensuring the utilisation and further development of the information.

Outreach and mobilisation
The core of crowdsourcing land rights is community engagement and empowerment, and thus local communities should be as aware of the crowdsourcing process as soon

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[55] Source: http://www.opendta.org/Pages/Call-for-Feedback---How-To-Notes--Open-Development-Technology-Alliance.aspx

as possible. An early, major public awareness activity is crucial for success of the projects. Several aspects should be noted in this respect:

- **Infomediaries**: Initial outreach efforts should focus on potential "*infomediaries*"—local community leaders, social activists, and citizen journalists who could spread the word about crowdsourcing land rights, mobilise local residents to participate in the project process, and sustain community interest in the process. It is important to identify early on potentially committed *infomediaires* and keep them as informed and engaged as possible throughout the process.
- **High profile endorsements:** Public endorsements by high profile community leaders or politicians can be valuable to ignite initial public interest and draw attention to the project process.
- **Outreach to marginalized groups:** A special effort should be made to reach out to under-represented and marginalised groups in the community, who can be considerably empowered by participation in the project process. It may be particularly valuable to engage young women in the project activities, thus offering them skills that can be valuable for their future employment pursuits.
- **Communication of benefits**: Communicating the benefits of crowdsourced land rights in communities with low technological capabilities can be challenging. It is therefore important to convey to community members the benefits of crowdsourcing land rights information, highlighting the importance of acquiring technological skills, securing tenure for the community and thus helping improve the provision of public services, and amplifying the digital presence and voice of the community.
- **Persistence:** A persistent outreach approach is important for two reasons. First, it can help better understand the needs and concerns of the community, and adjust the crowdsourcing process accordingly. Further, it can increase the chance that the resulting land rights information will be widely used by the community and other stakeholders.

Capturing land rights information

The example of Interactive Community Maps (ICM) process (similar to crowdsourcing land rights) largely targets marginalised and poor communities, and thus it cannot rely on sophisticated and expensive technological tools. The tool kit for ICM is therefore basic: GPS units; laptops; photo cameras; video cameras; printer/scanner; batteries and chargers; pelican case. The overall costs of such equipment should not exceed $4,000-$5,000. Additionally, it is necessary to find space where community mappers would undergo training (2 - 3 weeks to ensure that public engagement skills are developed) and work with the mapping software. Be prepared to use a variety of data capture techniques, including ground surveying using GNSS and tracing from satellite imagery. Capturing story telling is a useful technique for empowering residents by amplifying their voice and helping the sustainability of projects.

Effectively using the crowdsourced information

The information can be used in a variety of ways to improve service provision in the community and provide community members a platform where they can articulate their issues and needs. However, the working assumption of the crowdsourcing process should be that the information will be used by its stakeholders if it complements their existing strategies and can be seamlessly integrated into their on-going activities. Therefore, the current practices and information of the requirements of the stakeholders should be recorded at the beginning of the project prior to the intervention.

The project should also take measures to protect the information and ensure its appropriate use, to make sure that it is not used against the stakeholders, or in a way that doesn't match their interests and wishes.

Sustaining the land rights information
Sustainability is one of the most challenging aspects of crowdsourcing. While detailed land rights information can be created within several weeks, updating and sustaining the information requires long-term strategic planning and commitment. While initial crowdsourcing efforts are usually supported by development partners and ignite public interest, it may be difficult to sustain this enthusiasm once the land rights information is completed and the external partners leave the community.

Challenges

The embryonic nature of these initiatives leaves a number of critical challenges to be resolved; especially around authenticity of information and sustainability and scalability of the initiatives. The key challenges identified are:

Transparency – Governments / Corporations

Many of the stakeholders involved in LSA are not willing to be transparent about their dealings in land; many deals are corrupt and made in secret. This makes it difficult to obtain and authenticate the data about LSA. This is the serious challenge facing the Observatory on Land Acquisitions initiative that is receiving a varied response from participating countries; in Madagascar and Lao the agencies (mainly CSOs, but partly government) are very eager to cooperate and contribute their knowledge about LSA; it is much more difficult in Cambodia.

Mobile Phone Coverage and Access to Internet in Remote Areas

Many of the crowdsourcing initiatives depend on input from citizens through their mobile phones. Therefore, a key limitation is mobile phone coverage. As far as mobile phone infrastructure is concerned, it looks as if 2G will be the default service in rural areas in the developing world, limiting data transmission and access to Internet. However, it is worth reviewing the coverage maps provided by Mobile and Development Intelligence[56]. The coverage of 3G services is expanding in Africa and is significant in South Africa, for example.

Although 2G coverage does impose limitations on functionality and the ability to transmit data efficiently, there are novel solutions being developed to counter these deficiencies. For example, University College London is developing a solution for forest communities that uses a smart phone that can collect data with no mobile phone coverage. Once the phone comes into 2G coverage then bursts of SMS are used to transmit low volume data. When the phone then comes into Wi-Fi or 3G coverage then the high volume data is transmitted.

Authenticity of Information

One of the most contentious issues surrounding crowdsourced information is the authenticity or validity of the information provided. Without the rigors and safeguards associated with formal professional and legal based processes, crowdsourced information is of variable quality and open to potential abuse. Crowdsourced information has provided input to wikis, obtained feedback of quality of services and counting birds, for example, but is not normally used to capture information on LSA or as data critical and legally binding as property rights. So what techniques could be used to quality assure the authenticity of the information to a

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[56] http://www.mobiledevelopmentintelligence.com/network_coverage

level that would be acceptable? Some alternatives[57], including lessons learned from leading wikis and e-commerce, are discussed below. However, the most appropriate crowdsourcing approaches to authenticity assessment for LSA and land rights will only be identified through testing in the field.

'Grameen Community Knowledge Workers[58]' as Intermediaries

This approach would avoid open, direct crowdsourcing at the outset and only allow information to be provided by trusted intermediaries within communities who have been trained and have worked with local land professionals. Initially, there would be comprehensive quality assurance of the crowdsourced information, but over time as trust is established with the intermediaries the level of quality assurance sampling could significantly decrease. These initial intermediaries could then train further experts to build a significant network of 'experts' across communities. Each expert would be continually checked and appraised to determine the level of expertise and trust in the associated crowdsourced information. To optimise the scarce resources, the intermediaries could be shared with a range of information services, such as health and agriculture.

Community based Quality Assurance

Quality assurance could be directly provided by members of the local communities who take direct responsibility for authenticity. The crowdsourced land right information could be posted for communities to review and comment on. Some form of local or regional land tribunal could be established to arbitrate on conflicting claims. Once a critical mass of land rights information is obtained it is then easier to identify anomalies and conflicting claims. Levels of trust and accuracy of the land rights would be upgraded over time as more evidence and cross checking validates the claims. The local public display of the results combined with the witness function of the local land committee and the citizens will provide societal evidence of land rights.

Wiki and e-Commerce Solutions

Beyond local involvement in quality assurance, a centralised user reputation system based on feedback from crowdsourced registrations, similar to the buyers' ratings of the sellers used in eBay, could be used to assess the credibility of contributors and the reliability of their contributions. Leading wikis, such as Wikipedia.org, originally relied solely upon the "wisdom of the crowds" to evaluate, assess and, if necessary, improve upon entries from individual contributors, usually with great success. However, recent contributions of deliberate misinformation to specific entries have caused Wikipedia to re-assess its approach. Beginning in December 2009, it has relied on teams of editors to adjudicate certain "flagged entries" before deciding whether or not to incorporate a volunteered revision.

Crowdsourcing Quality Assurance

Some elements of the quality assurance process do not require local knowledge of the land rights claim and could be crowdsourced to a network of informed consumers and world-wide professionals or could even be automated. For example, if satellite imagery were made publically available for areas of LSA interest then the identification of plantations could be internationally crowdsourced.

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[57] http://www.rics.org/cn/knowledge/research/research-reports/crowdsourcing-support-of-land-administration/

[58] http://www.ictinagriculture.org/ictinag/sourcebook/module-3-mobile-devices-and-their-impact

EVIDENCE ON DEMAND
CLIMATE & ENVIRONMENT
INFRASTRUCTURE | LIVELIHOODS

Passive Crowdsourcing Quality Assurance

Mobile phones can also be used passively to collect evidence that supports validation of user entered information. For example, the use of a mobile phone is continually logged and this log can be analysed to show where the phone is frequently used, inferring the location of the owner. The network timestamp is another robust piece of evidence that could be associated with collected land rights data, such as images or videos. This is not something that most (99.999%) of users can tamper with.

Promotion and access to LSA Information

The most successful LSA initiatives are those where the associated information has been nationally or globally promoted through exposure on social media or platforms such as Google Earth. The capture of land rights information through crowdsourcing will not provide security of tenure against LSA unless the information can be used to formally register the land rights with a Land Administration agency or can be promoted and accessed through an Internet platform to gain international attention and reaction. Worldwide open access to a register of crowdsourced land rights (a shadow property register similar to OpenStreetMap) would provide some level of security of tenure to communities that have been ignored by their (corrupt) governments in securing their land rights. The shadow property register would be a consequence of non-cooperation by the Land Administration agencies.

It would also be interesting to re-construct and publicise the land rights existing prior to the land grab rather than just recording the areas where land grabs have taken place. These examples would then let the international community understand the extent of the loss to the local communities.

Fragmentation of LSA initiatives

A number of separate initiatives are currently capturing information on LSA worldwide. It would be better if there was a central, authoritative repository of LSA, associated metadata and an agreed process for authentication.

Sustainability of Projects

In terms of sustainability, a key factor is to make sure the project partners, e.g. NGOs, can keep on supporting more communities when the projects come to an end.

The mapping process importantly provides a platform for dialogue between government officials, private sector and communities members, which is often totally absent. This has allowed many communities to stop their displacement and removal from the land. In some cases, this dialogue has led to communities being accepted as a stakeholder in the management of resources in their territories that otherwise would have been excluded to them.

Typically crowdsourcing participants are active for a period of around 18 months then they lose interest, especially when the maintenance phase comes around. Sustainability is a serious challenge for LSA initiatives using crowdsourced information.

Lessons Learned from Congo Basin Projects

This appendix describes the lessons learned from Rainforest Foundation UK's Projects in the Congo Basin.

What are the main challenges in involving communities in these initiatives?

The main challenge here is to have sufficient time with communities to provide them with all the information they need, at the right time and in the right form, for community members to express their consent or not to be part of the mapping process. The community's unrestricted, prior and informed consent is fundamental in supporting communities in producing their maps and using them for the promotion of their rights.

This consent is not generally a problem in areas where communities are facing lot of challenges in accessing, using and controlling the resources in their land. In these cases, the project staff are welcomed as "saviours", as people see the project as a mean to help them overcome these challenges. However, it is essential that communities are provided with all the background information available for understanding and decision making in terms of existing laws, project objectives and previous project experiences with other communities. This information is not always readily grasped by the community. Therefore, it is beneficial to allow communities time to discuss this information amongst themselves. However, this is more expensive as it may involve repeat visits to remote communities before a mapping exercise can even begin and staff are in the field for longer periods of time.

The mapping process has to involve the entire community and therefore requires community wide consent. On the occasions where there have been divisions across the community, this has usually been caused by the project methodology not being implemented effectively. Therefore, it is essential that significant time is spent in training the mapping facilitators and monitoring their performance.

The use of technology directly by communities is also a challenge. The choice of technology is crucial and must be appropriate and easily understood by communities; just like using appliances they use in their day to day life like radios, TV or mobile phones. Communities are generally supported by local NGO's who have the responsibility to sustain the technology.

Rainforest Foundation UK are using open source mapping software and have stopped using proprietary software as it could not be sustained. When licenses needed to be renewed after two or three years, the partner organisations usually did not have the funds and mapping with communities stopped.

Have communities been hesitant in agreeing to participate in these projects?

This is a very rare occurrence and there is usually an underlying reason. There has been one project in the Republic of Congo where project mapping facilitators had been unable to work with a community. When investigated, it was found that the problem was because a Baka community was facing exclusion from their Bantu neighbouring community, and the chief of the Bantu village had refused to allow mapping facilitators to support the Baka community and not that of the Bantu. There had been a deviation from the agreed project

approach, which is to ensure that there are always initial meetings with local Bantu chiefs neighbouring Baka communities.

In circumstances where communities are split in their decisions to proceed, the community is given more time to discuss the proposed work and to take the decision. During this extended decision process, the community is provided with more information to facilitate their decision. In most cases the mapping eventually proceeds.

What are the indicative costs for introducing these projects?

The costs of introducing these projects vary from country to country and experience in trialling participatory mapping in three African countries has resulted in the following range of costs:

- In countries where intermediaries (mostly, national NGOs) have no knowledge or skills in participatory approaches and methodologies or in participatory Geographic Information Systems, the costs tend to be quite high - between US$5 and US$7.5 per hectare of land mapped. This is caused by the need to invest in intensive training of project mapping facilitators.
- In other countries where people already have these skills, or where large contiguous areas are to be mapped, the cost can be considerably reduced and the Congo experience indicates that costs of US$1.5 per hectare mapped are achievable.

Rainforest Foundation UK are developing a survey system that will allow community representatives, government officials, and Civil Society Organisations to independently produce community maps using the tools that are already available to them, e.g. smartphones, databases, etc. This has the potential to reduce the cost of the mapping work considerably and make it more 'autonomous' than it currently is.

How are these projects made sustainable once the project team leaves?

In terms of sustainability, a key factor is to make sure the project partners, e.g. NGOs, can keep on supporting more communities when the projects come to an end. For some communities, the maps are the means to short term objectives, which has a specific end date, e.g. influencing the design of a strictly protected area management plan. In these cases, sustainability is not really an issue.

However, in the majority of cases there are on-going issues and sustainability is much more critical. There is therefore a need to establish a large body of information to press the case for land tenure reforms or changes in forestry or protected areas' laws, for example. This sustainability of projects is normally achieved through the way training is organised and skills levels are maintained. The physical resources needed for the mapping work are such that they can be used for many years after the project.

Rainforest Foundation UK have recently established an online database called 'MappingForRights.org', that provides community representatives, government officials, and civil society organisations a platform where the maps produced by communities can be permanently and securely stored and displayed, and used after many years.

What is the legacy left behind by these projects?

The mapping process is primarily a process of empowering local communities, by providing them with relevant information that allows them to advocate for their rights. A consequence of this is a much better understanding amongst the community about its use of land and how the various elements of this fit together geo-spatially and change over time.

The mapping process importantly provides a platform for dialogue between government officials, private sector and communities members, which is often totally absent. This has allowed many communities to stop their displacement and removal from the land.

Under existing laws and using geo-spatial information in the form of participatory maps, communities have been able to be a stakeholder in the management of resources in their territories that otherwise would have been excluded to them. Examples of this participation in resource management are in the Campo ma'an National Park in Cameroon and Mbaéré Bodingue National park in Central African Republic.