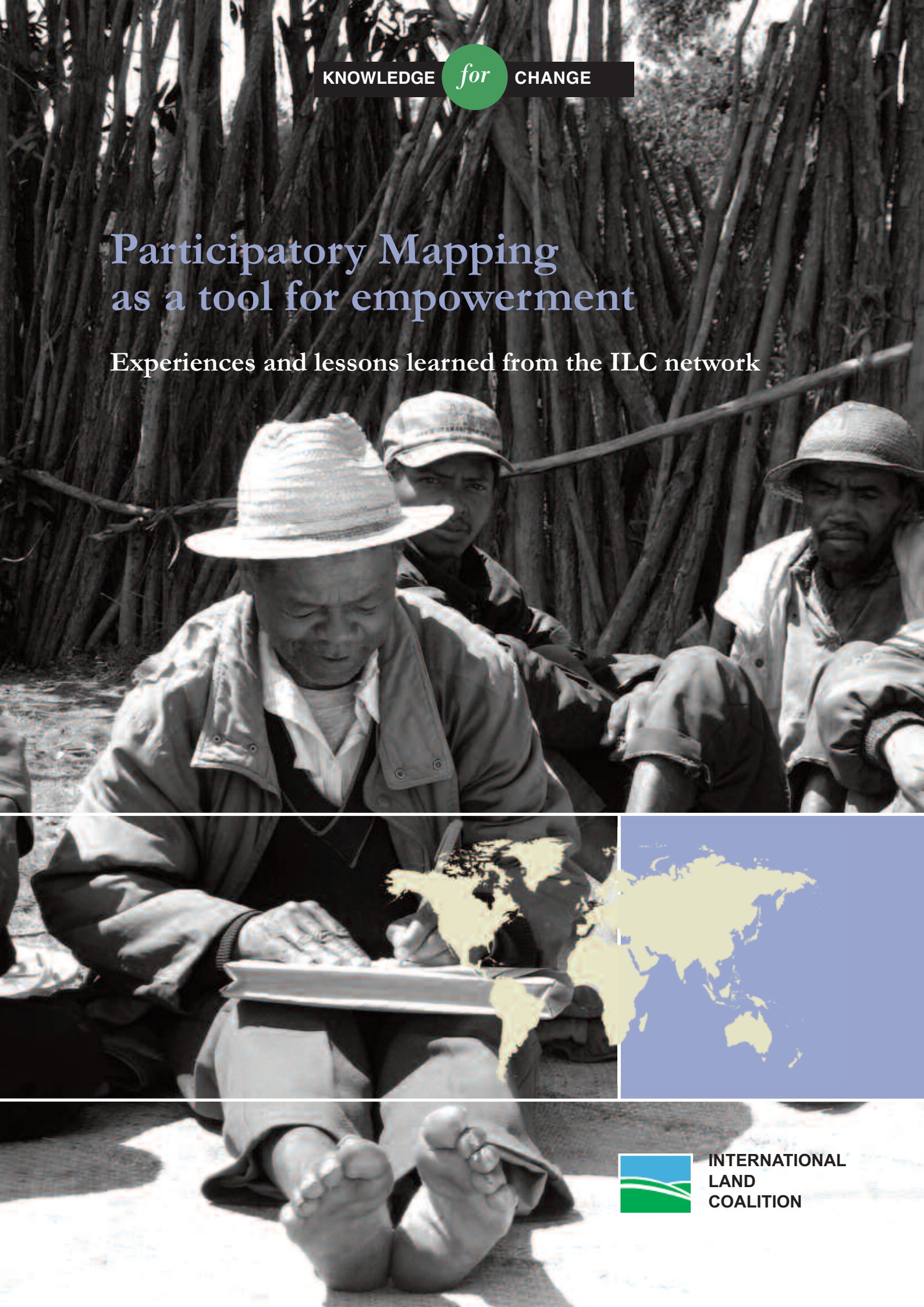


KNOWLEDGE *for* CHANGE

# Participatory Mapping as a tool for empowerment

Experiences and lessons learned from the ILC network



INTERNATIONAL  
LAND  
COALITION

## The ILC 'Knowledge for Change' Series

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1. *Common Ground – The Challenges to Developing Inclusive Land Policies: Experiences of the International Land Coalition in Promoting Land Alliance for National Development*
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4. *Working at the Boundaries: International Land Coalition's Engagement with the Land Rights of Indigenous Peoples and their Neighbours*
5. *Participatory Mapping as a Tool for Empowerment Experiences and Lessons Learned from the ILC Network*

This publication shares the experiences from the International Land Coalition's network on participatory mapping as a tool for empowering communities to gain secure access to land and natural resources. While the publication expresses the lessons learned by the ILC, the views and case studies are those of the authors.

The opinions and assessments made herein do not necessarily reflect the views of the civil society, governmental, bilateral or intergovernmental organizations associated with these activities or with the International Land Coalition.

# Participatory Mapping as a tool for empowerment

**Experiences and lessons learned from the ILC network**

**Stefano Di Gessa**

*with contributions from*

**Peter Poole**

**Timothy Bending**

# Acknowledgements and Contacts



**INTERNATIONAL  
LAND  
COALITION**

*Secretariat at:*

Via del Serafico 107,  
00142, Rome, Italy  
Tel +39 06 5459 2445 Fax  
+39 06 5043 463  
E-mail: [info@landcoalition.org](mailto:info@landcoalition.org)  
[www.landcoalition.org](http://www.landcoalition.org)

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## **Our Mission**

The International Land Coalition is a global alliance of civil society and intergovernmental organizations working together to promote secure and equitable access to and control over land for poor women and men through advocacy, dialogue and capacity building.

## **Our Vision**

Secure and equitable access to and control over land reduces poverty and contributes to identity, dignity and inclusion.



The ILC wishes to thank the European Commission for providing support that helped to make this publication possible.

## Photos

**ILC Secretariat, PAFID, HARDI, Grupo Tierra, J. Corbett**

## Contributors



### **PAFID**

Philippine Association for  
Inter-Cultural Development,  
**The Philippines**



**Grupo Tierra**  
**Nicaragua**



### **HARDI**

Harmonisations des Actions pour la  
Réalisation d'un Développement Intégré,  
**Madagascar**

*Case Studies assembled by* **S. Jonckheere**  
*Inputs* **H. Liversage, B. Codispoti**

*The International Land Coalition would appreciate receiving copies of any publication that uses this publication as a source.*

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# List of Acronyms

<b>ACH</b>	Acción Contra el Hambre, Nicaragua
<b>AFRA</b>	Association for Rural Advancement, South Africa
<b>APA</b>	Amerindian Peoples Association, Guyana
<b>APLR</b>	Association for Protection of Landowners Rights, Georgia
<b>CADT</b>	Certificates of Ancestral Domain Titles
<b>CEDETI</b>	Centro de Tecnología Intermedia, Bolivia
<b>CEPES</b>	Centro Peruano de Estudios Sociales, Peru
<b>CIDOB</b>	Confederación de Pueblos Indígenas de Bolivia, Bolivia
<b>CODER</b>	Comisión para el Desarrollo Rural San Juan de Cinco Pinos, Nicaragua
<b>CPI/AC</b>	Comisao pro Indio do Acre, Brazil
<b>FTierra</b>	Fundación Tierra, Bolivia
<b>GIS</b>	Geographic Information Systems
<b>GPS</b>	Global Positioning System
<b>GTierra</b>	Grupo Tierra, Nicaragua
<b>HARDI</b>	Harmonisation des Actions pour la Réalisation d'un Développement Intègre, Madagascar
<b>ILC</b>	International Land Coalition
<b>IMPECT</b>	Inter-Mountain Peoples Education and Culture, Thailand
<b>INETER</b>	National Cadastre Institution
<b>IPs</b>	Indigenous Peoples
<b>IPRA</b>	Indigenous Peoples Rights Act
<b>JKPP</b>	Jaringan Kerja Pemetaan Partisipatif, Indonesia
<b>LMMA</b>	Locally Managed Marine Areas
<b>NACFP</b>	National Association of Communal Forest and Pasture, Albania
<b>NCIP</b>	National Commission on Indigenous Peoples
<b>NGO</b>	Non-Governmental Organization
<b>NRM</b>	Natural Resource Management
<b>PACOS</b>	Partners of Community Organization, Malaysia
<b>PAFID</b>	The Philippines Association for Intercultural Development, The Philippines
<b>PGIS</b>	Participatory GIS
<b>PhiIDHRRA</b>	Philippine Partnership for the Development of Human Resources in Rural Areas, The Philippines
<b>PLOF</b>	Local Land Use Plan
<b>PPGIS</b>	Public Participation GIS
<b>P3DM</b>	Participatory 3-Dimensional Modelling
<b>UNORCAC</b>	Unión de Organizaciones Campesinas e Indígenas de Cotacachi, Ecuador
<b>YTM</b>	Yayasan Tanah Merdeka, Indonesia

# Foreword

*The members and partners of the International Land Coalition together represent a great diversity and richness of knowledge and experience in land tenure issues. The ILC's Knowledge for Change Series of publications was created to share work within the Coalition that is particularly innovative in supporting the land rights of marginalised people.*

*"Participatory Mapping as a tool for empowerment" brings together a number of valuable experiences on community-mapping approaches. These represent a set of tools and methods that are rapidly being taken up, developed, improved and shared by community-based organizations in many parts of the world.*

*Map making at the community level can be a very empowering tool in securing land rights. Locally-produced maps present a collective expression by the community of their entitlements, and have been used successfully in many contexts to persuade decision makers of the legitimacy of local claims to land and natural resources.*

*For populations that have been marginal to national political and economic processes, creating maps of 'their' lands has been a means not only to validate their land claims, but also to becoming more powerful in expressing and defending their rights within national processes. Legal recognition of rights is thus often only one of a series of outcomes of community-based mapping. Increased community pride and cohesion, ability to influence policy, sounder natural resource management, and a greater political voice can be equally important outcomes. These are all important milestones towards enabling people to more actively decide what 'development' should mean in their own communities and territories.*

**Bruce H. Moore**

*Director,*

**ILC Secretariat**

## I. Introduction

Participatory mapping is well established as a tool of development intervention. The mapping elements of Participatory Rural Appraisal, for example, have gained increasing prominence since the late 1980s. They have allowed for improved information exchange between community members and outsiders (e.g. researchers, NGOs, government) in the design and implementation of development projects. Today, however, community-based mapping approaches have also become important tools for many land stakeholders. They are no longer confined to exchanges of information for project design and implementation. Mapping can be a powerful tool for communities and for the civil society groups that collaborate with them. Mapping processes can be used to help secure access to land and natural resources, to facilitate the management of these resources and to support community advocacy on land-related issues. In other words, mapping is increasingly playing a role in the empowerment of people and communities. This paper seeks to give an overview of the different roles participatory and community mapping can play in helping communities improve their control over their land and natural resources. In particular, it reviews the lessons learned by International Land Coalition (ILC) network members and partners in combining participatory mapping and spatial information technologies to improve secure land access and control for

poor men and women. This overview does not seek to cover the full range of the mapping toolbox; rather, it seeks to frame how technology-assisted community mapping is related to the broader goal of empowering rural people, a central objective for many of ILC's partners. This paper seeks to show how mapping can facilitate community empowerment, but also how it must be employed with care, being mindful of the risks for communities that such activities can entail.

As well as giving this overview, this paper will present three case studies, each demonstrating the use of a different community-mapping strategy in a different country and context. Both the overview and case studies are presented with the objective of sharing the innovations, experiences and lessons learned by ILC's partner organizations.

These are experiences arising from the building of alternatives for rural areas through the empowerment of local stakeholders, especially rural communities. Such innovative tools or practices are developed and carried out by ILC members and partners in collaboration with communities facing land-related problems. They are an attempt to offer concrete opportunities to disadvantaged groups to enhance their capacity to advocate for, gain and secure their access to land.



## The International Land Coalition (ILC)

### Our Mission

The International Land Coalition is a global alliance of civil society and intergovernmental organizations working together to promote secure and equitable access to and control over land for poor women and men through advocacy, dialogue and capacity building.

### Our Vision

Secure and equitable access to and control over land reduces poverty and contributes to identity, dignity and inclusion.

## 1.1 Opportunities and Lessons

Mapping tenure relations not only provides spatial information about the landscape of natural resources, their use and ownership; it also maps the socio-political relationships underlying this landscape, in particular the institutional structures that govern natural resource use. Mapping is an exercise through which tacit knowledge, as embedded in people's spatial memory, is converted into explicit and externally-usable knowledge. Herein lies the usefulness of mapping as a tool for empowerment, but also some of the risks that it entails.

Participatory or community mapping can be used:

- As a tool for advocacy and as a way to enhance community cohesion in the face of land-related challenges;
- As a way to identify rights, a way to make customary tenure relations and rights apparent for outsiders and a way to facilitate the official administrative recognition of these rights;
- As a tool for conflict resolution in disputes related to land, natural resources, and/or territory; and
- As a tool for improved collaborative natural resource management and for cross-sectoral territorial planning.

In none of these areas is success automatic or even easy to achieve. There are no blueprint mapping processes that can be applied regardless of context. Instead, it is necessary to keep in mind a number of lessons.

The following lessons have been learned from the experiences of ILC's members and partners:

- An enabling environment matters: mapping to secure rights works best by taking advantage of a political and legal window of opportunity. In this respect, developing a strategic partnership with government can pay off.
- Mapping needs to reflect all types of rights, not just the fixed territorial ownership rights that map making may prioritize.
- The mapping process - building the capacity of the community - may matter more than the final map itself.
- Advanced mapping technology must be inclusive, not exclusive to a few.
- Making the map is not the end of the empowerment process but the beginning – the community's capacity to use the map for its own benefit must be enhanced.
- Mapping can highlight social relations. This can be a basis for improving natural resource management institutions.
- Mapping and defining rights to land can challenge power relations in a society, and thus carries the risk of aggravating social tensions and conflict. Attention must therefore be made to mitigate such risks in particularly polarised or politicised contexts.

Different community mapping approaches also bring with them different prospects for the scaling up of the mapping process. Factors that affect scaling up include the level of community engagement in the process and the mapping capacity that exists within the community, the complexity and expense of the technology used, and the level of involvement of government agencies in the process. But the experiences of ILC members and partners also illustrate that scaling up can refer to different aspects. Scaling up can mean the amplification and diversification of community mapping capabilities, community-to-community dissemination of mapping practices seeking to influence decision making at higher administrative levels, or replicating an approach through expanding the geographical coverage of a programme.

The three case studies illustrate diverse mapping approaches in practice. These case studies cover the work of PAFID in the Philippines, Grupo Tierra in Nicaragua and HARDI in Madagascar. They illustrate practices of participatory 3-D modelling, GPS-supported community mapping, and citizen's cadastre using satellite imagery.



## 2. Overview of Mapping Technologies

Some low-tech community mapping techniques were developed for use by development practitioners as part of Participatory Rural Appraisal (PRA). Other approaches to mapping for communities, by communities, were developed by indigenous peoples' organizations. The former were more focussed on the design and implementation of development projects, the latter on producing high credibility maps for advocacy for securing land rights, therefore, more high-tech. While PRA techniques have become incorporated in community-led approaches and combined with more advanced mapping technology, there has been a trend in more technology-dependent community mapping towards greater affordability and more community self-sufficiency.

This section gives an overview of some of the key mapping technologies and approaches that have been developed and are in use, as well as to providing some background on their development.

### 2.1. Towards Self-Sufficiency in Community Map-Making

In the 1970s, indigenous map-makers had little choice but to rely on outside agencies to take care of the technical aspects of map compilation. But since then, map-making technologies have become progressively more accessible, easier to use and cheaper. It is now possible to set up a complete map-making unit, capable of producing high quality, digital and printed maps, and serving the interests of many communities, for less than US \$10,000.

The increasing affordability of advanced mapping technologies has had an enormous effect on the mapping capacity and self-sufficiency of some rural people's organizations.

An example is the Amerindian Peoples Association (APA) which first managed a mapping project to map out Amerindian ancestral domains in the Upper Mazeruni in Guyana. The mapping unit used for the pilot cost around US \$16,000. Once the pilot was completed, APA was able to employ this mapping unit in mapping the remaining Amerindian territories in Guyana.

In the early 1990s the Forest Peoples' Programme and Local Earth Observation worked on a 'no-name' methodology for making geographically accurate maps designed to maximize local self-sufficiency, for example, by choosing tracing (manual) over scanning (digital) or by using graphics software rather than GIS to make tenure maps. This 'no-name' method is further described below. The mapping process was organized as on-the-project training, designed to produce not only a tenure map but the capacity to make more maps. This methodology has been used, and improved, in the course of ten more community tenure-mapping projects in the Guyana Shield region.

Cartographic self-sufficiency was not a declared goal of these early projects, but rather evolved as an unintended consequence. Once communities and their associations had learned how to make their own geographically accurate maps, based upon an original data base of traditional names and knowledge they had gathered themselves, mapping became an instrument for expressing and advancing their agendas for stewardship, a tool for levelling the playing field when dealing with external groups.

### 2.2. Appropriate Geomatic Technology

Community mapping methods are applications-driven. They are pragmatic and opportunistic combinations of traditional and Western technology and practices, guided by considerations of what works, what is available, and what can be afforded. Executing a mapping project is like cooking with what is fresh that day. And community mapping may perversely entail the deliberate scaling down of mapping technologies, localizing and simplifying them so as to make them accessible to community mapping groups. The geomatic technologies that have been selected or simplified for community mapping make it possible for individuals to progressively scale up their expertise.

Capacity building starts with what remains the most important feature of community mapping, the collection of original and often geo-referenced field data, using interviewing and sketch-mapping, along with Global Positioning System (GPS) units and compass binoculars. Both instruments are durable, cheap and easy to learn. The next level is computer mapping. In this case indigenous associations, other popular organizations or supporting NGOs usually manage the computer mapping facilities needed to provide mapping teams with geo-referenced field maps.

The next step, the use of Geographical Information Systems (GIS), is often triggered by a switch in focus, for example, to more complex natural resource management applications. GIS is also useful where complex, high-quality maps are needed to support negotiations of tenure rights.

Mapping processes are initially often driven by strategies of negotiation over tenure, access and stewardship rights. But the mapping process can also provoke other processes within communities. It can reinforce local awareness of land issues, while drawing in younger people as mappers and elders as sources of knowledge. It can localise cartographic operations previously restricted to distant agencies. Above all, as negotiations proceed, the mapping process can elucidate a local and territorial information base, indicating where people live and have lived, the resources they depend upon, their seasonal movements in gathering and hunting, and so forth.

This traditional knowledge base can be kept current and continues to give distinctive form and purpose to what rural peoples do with their lands - it can be mobilised to provide for the future as well as elucidate the past. Land settlements act as a threshold. Beyond them communities face a fresh array of environmental issues and players such as monitoring, protecting, and restoring their lands while dealing with incursions from corporations and other external agencies.

### 2.3. Methodologies and Technologies Used in Community Mapping

One of the main advantages of community mapping is that the first and most important step - the gathering and mapping of original field data - is also the easiest to teach and the cheapest to support. A range of key methods and technologies is summarized below. Some considerations on the advantages and disadvantages of each are also given.

#### ***The No-Name Method***

This method is designed to maximise control by communities and/or by their associations. Skills are needed in basic computer graphics at this stage, but not in GIS. The cost of the equipment needed to control the entire mapping process has fallen below US \$10,000, even to US \$5-6,000 where there is local access to a wide-bed scanner and a new generation of intermediate printers. In Stage I, rivers, and sometimes contours, are extracted from the best topographic maps available, by digitizing or tracing on mylar and scanning. These features, along with latitude and longitude, become the project base map a 'no-name' map from which all 'political' features have been removed. In Stage II, community teams are trained in interviewing community members and in using GPS units for navigation and field mapping. In Stage III, the field data placed on the 'no-name' field map is transferred to the base map.

### ***Interviewing and Sketch Mapping***

This is the entry phase and the essential core of community mapping. Sketch mapping can work as a complement to conversations with informants. In some cases, all that is needed is a sketch map, as in PRA applications. In others, sketch-mapped data are transferred to topographic maps. Most community mapping continues to use sketch mapping in some way. But while sketch mapping may be enough for transactions between communities, sketch maps are at a disadvantage compared to official scaled maps in external transactions. This disadvantage has been almost entirely overcome with the advent of the GPS.

### ***Asset Allocation Mapping***

This is an interesting variant of sketch mapping, particularly used by indigenous communities with the ultimate aim of enabling them to make informed decisions over the allocation of their territorial assets. To do this, they need not only to arrive at their own evaluations of these assets but also to understand the multiple values assigned to their assets by others; they must be able to map the ways in which assets are imagined, defined and evaluated by an unfamiliar and mutating array of external interests. Just as tenure mapping has evolved as a way of enabling communities to pursue negotiations over tenure, so asset allocation mapping prepares communities to implement the results,

to exercise stewardship of their territories and to deal with rival claimants. Whilst tenure mapping is about making claims rooted in the past, asset allocation mapping is about the future.

### ***GPS-based Field Mapping***

For community-mapping teams to be able to map local knowledge and resources over extensive territories, GPS is increasingly essential, while GIS remains an optional tool for processing the data collected. GPS units are low cost without sacrificing ground accuracy, and reasonably reliable, and their use for navigation and field mapping can be taught in one or two weeks.

### ***Computer-based Map Making: Graphics Software and GIS***

Two methodologies are in play in computer-based map making. One uses graphics software, such as Adobe Illustrator, to make geographically accurate maps. This is one step in the 'no-name' mapping method and the sequence of mapping routines serves as a platform for using GIS to compile maps. GIS becomes more useful when communities decide to move from one-off tenure maps to mapping as an instrument for resource management. The cost and complexity of computer-based mapping no longer presents a serious obstacle to its localising in remote communities.

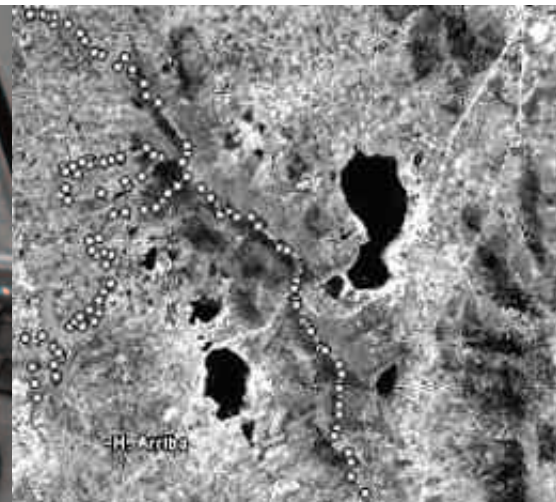
Instead, computer-based mapping technologies, both the mapping hardware and the GIS software, continue to evolve in more user-friendly and financially accessible ways.<sup>1</sup>

### ***Image Maps***

All aerial and space imagery is slightly distorted in its raw form. Once rectified, the geographical accuracy of the image is comparable with that of topographic maps, thus the term 'image maps'. For community mapping, image maps bring significant advantages.

First, landscape images can be more readily accessible and understandable to community members than symbol-based maps, allowing interpretation without prior training. Second, image maps make it possible to apply the no-name method in areas without a

dense river network to serve as a geographic frame of reference: earth images display more varied and finer surface detail than topographic maps. Third, image maps are becoming cheaper and are often free. Fourth, they are becoming accessible via the web to communities where public access to maps is restricted. Five, image maps are, in theory, not loaded with political or neo-colonial content in the form of names and boundaries (other than infrastructure). They are a kind of 'no-name map', only a lot more interesting. Nonetheless, the status of an image map as a kind of photograph may sometimes be problematic. Image maps may be seen as 'fact' by community members who are thus less willing to challenge what they see, compared with non-photo-based maps which may be more readily seen as merely a starting point for discussion.



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<sup>1</sup> For community mapping units in the 1990s, there was a usually unaffordable gap between the costs of wide format (usually 36 inch) printers and scanners and their letter-sized equivalents. However, advances in image maps, and increasing access to digital versions of topographic map layers, are making wide-bed scanners obsolete, replaced by a new generation of intermediate affordable printers, which can produce maps of the same size as conventional topographic maps.



### **3-D Landscape Modelling**

This methodology is an easily learned, and engaging, approach for communities to map their traditional lands.

It provides an accurate and immediately understandable representation of a landscape, comparable on screen to 3-D representations with GIS when viewed with special glasses.

In the Philippines, the Philippine Association for Intercultural Development (PAFID) has successfully used this approach, while in Thailand IMPECT (Inter-Mountain Peoples Education and Culture, Thailand) uses 3-D modelling as part of the induction process for new community members. As a result, there are now more than 250 such models in existence in Thailand. From the experience of IMPECT or PAFID, one of the biggest advantages of relief models is that they are visual and tactile. They ease contribution in legend making as well as

in debates over legend symbols and their placing on the model by many community members at once. This, in turn, allows for wider participation in principle.

The potential for the dissemination of model-making techniques is high, as it is an almost entirely manual process. Relief models can be geo-referenced to comply with standard cartography requirements. However, there are obvious terrain limitations, e.g. modelling does not work well in lowland landscapes with little relief. 3-D modelling has also not been widely taken up in the Americas.

This could be a matter of geographic scale. Tenure mapping in the Americas often covers very large collective territories of several communities, whereas optimum 3-D modelling uses a large scale and is usually limited to a single community, or a few communities in a limited area.



## 3. The Potential of Mapping: the Experience of ILC's Partners

The experiences of ILC's network members suggest that mapping initiatives are undertaken with at least five key purposes in mind: (1) providing community cohesion and leverage for collective action, (2) identifying, adjudicating and registering land rights, (3) improving land-use planning and management, (4) supporting land dispute or conflict resolution, and (5) forming a basis for territorial planning and socioeconomic integration.

### 3.1 Mapping for Community Cohesion and Advocacy

Mapping often contributes to building community cohesion and, especially in the form of 3-D modelling, can be used as a tool to pass historical knowledge down through generations, thus nurturing cultural identity (as has been the experience of, for example, UNORCAC-Ecuador and CPI/AC-Brazil). This may be particularly significant for indigenous communities for whom cultural rights can be closely linked to territorial rights. For them, mapping can be used to buttress their own vision of the many interrelations between people and the surrounding environment, as well as between land and territory.

In cultural mapping, information is not necessarily geo-referenced. Sketch mapping and ethno-mapping can be combined with geographical information systems when the knowledge generated in the mapping process is also aimed at land rights registration (PAFID-The Philippines, JKPP-Indonesia). Community mapping of local and indigenous knowledge, moreover, has the potential to facilitate local governance as a channel through which to defend or advocate for the rights of indigenous peoples to their ancestral lands (CEDETI-Bolivia).

### 3.2 Mapping for Land Rights Identification, Adjudication and Registration

Geo-referenced community mapping can help rural communities have their land claims recognized by state institutions, particularly where the existing legal framework is receptive to such claims. There are examples of this on both the individual and family levels, as well as of land rights claimed and subsequently registered by communities (PAFID-the Philippines, APLR-Georgia).

Geo-referencing community spatial knowledge (e.g., PGIS, PPGIS, GPS, ortho-photo mapping, participatory 3-D modelling, satellite imaging) provides the accuracy needed in community-led processes for state authorities to recognize the results (FTierra-Bolivia, HARDI-Madagascar). Although the higher level of accuracy required (especially for individual titling of small plots) can make the process time consuming, mapping for land registration enables information to be transferred and digitized into GIS. While land title deeds or certificates of occupation do not capture the overall complexity of land insecurity, a reliable and regularly-updated cadastral system can enhance land security for the rural poor, particularly when maintained at the local level. Community-level organizations advocate for decentralized land administration systems that have been created and monitored in a participatory manner. These are often perceived as more equitable and able to empower community-level land institutions because they make information available where it is generated and better reflect community-level land systems, such as customary use rights (NACFP-Albania, HARDI-Madagascar, FTierra-Bolivia, GTierra-Nicaragua).

However, title deeds or certificates of occupation alone will not secure land rights for poor men and women unless enforcement is guaranteed and the process of identifying and issuing them is unbiased by vested interests. Indeed,

the mapping process may bring out latent conflicts. The process must also be affordable and its methods understandable by communities that use them (AFRA-South Africa).

### 3.3 Mapping for Land Use Planning and Natural Resource Management

Planning and managing land use is intimately linked to tenure security. Moreover, land planning goes beyond the determination of primary rights (ownership rights) to include secondary use rights (access to grazing land, water resources, fruit trees and forest). These are fundamental in defining the livelihood strategies of the communities' poorest members and partially define the comparative advantage of a communal tenure system as an alternative or complementary to an individual ownership/tenure system.

ILC partners' experience in this area is often linked to broader strategies of land demarcation and/or territorial planning, as in shifting cultivation management or pasture management (NACFP-Albania, APLR-Georgia), or land and water use optimization (ACH/Grupo Tierra-Nicaragua, UNORCAC- Ecuador). When past, present and future patterns of natural resource use are taken into account, the mapping process can also help to create a learning environment in which landscape-nested institutions, and their strengths and weaknesses, appear more clearly to community



members (ACH/CODER-Nicaragua). When community institutions or water users' committees are empowered as full partners in action research – rather than treated as mere subjects for data collection – mapping land and water use plans can become instrumental in negotiating better conditions for farmers (CEPES-Peru).

### 3.4 Mapping for Land Dispute or Conflict Resolution

Land conflicts, particularly in rural and remote areas, are multi-dimensional and complex in nature. Often the financial concerns of national and local governments generate policies that attract outside investment to areas in which disputes or conflicts already exist and where laws and policies related to land and territorial rights – particularly those concerning indigenous peoples' rights – are not in place or not enforced. A blend of statutory,

customary and hybrid (formal or informal) institutions and regulations may co-exist in the same territory, all having a *de jure* or *de facto* authority over land rights.

In such contexts, mapping can be a powerful mechanism to transform and possibly resolve disputes or conflicts, if it is accompanied by appropriate institution building and a broader effort to empower people and communities. Community-initiated and collaborative mapping can assist the negotiation process in extractive exploitation (APA-Guyana, YTM-Indonesia). Furthermore, mapping can help manage conflict through the identification and strengthening of conflict management capacity both within the community (ACH/Grupo Tierra-Nicaragua) and among neighbouring communities (PAFID-The Philippines, NACPF-Albania).

#### 3.5 Mapping for Territorial Planning and Spatial Integration

Decentralization processes are underway in many countries. With varying degrees of effectiveness, these are devolving powers to local and regional bodies. Within the newly empowered or established political or administrative units, therefore, new opportunities are emerging for community members to define paths of development. This is particularly important for rural areas, historically neglected in the design of national policies.

For decades, the planning has been urban-biased and done on a sector-by-sector basis. There is now some movement towards inter sectoral and spatially-integrated territorial

planning. In this context, mapping can support the process of identifying territorial units of management, while helping rural communities to include their concerns in an enlarged, integrated vision of local realities. Mapping allows the spatial visualisation and recording of the social, economic and natural dynamics of a given territory. This includes routes of communication and commerce, natural resource management systems, water flows and commercial flows. In other words, by using a common spatial framework, maps can fortify the users' understanding of how physical, social and economic factors interact. Spatial integration thus becomes a step toward socio-economic integration (PhilDHRRA-The Philippines, JKPP-Indonesia).



## 4. Mapping as a Tool for Empowerment: Lessons Learned

Mapping, when combined with geographical information technologies, can be highly supportive in advancing the land rights agenda of rural communities. Maps often represent a step toward grass-roots empowerment for better land access and tenure security. Rural maps, in the experience of ILC's partners, have shown themselves to be useful tools, increasing the users' capacity to advocate, lobby, plan, manage and monitor territorial and land-related issues within the mapped area. It must be said, however, that the promise of community empowerment through mapping may be tempered by concerns that the mapping process – including the control and management of its technology – can reinforce or reconfigure existing forms of power distribution and relations.

Here are several key lessons that arise from ILC's experiences of using mapping as an empowerment tool:

### **1. An Enabling Environment Matters.**

Mapping helps communities take advantage of a political window of opportunity. Mapping is most successful in helping gain security of tenure and use rights when land administration institutions and decision-making

processes are to some extent accessible and accountable to rural people. Many ILC network members develop strategic partnerships between government and civil society in an effort to make mapping outcomes binding. This has proven to be a viable strategy – although one that is difficult, delicate and time consuming. It increases the likelihood that the state will recognize land claims by rural poor and indigenous groups, including those documented through mapping. A key aspect of an enabling environment for community mapping is access to cartographic information. Are base maps available, affordable and up-to-date?

In Indonesia, for example, community members often find it impossible to buy maps. JKPP labelled their approach 'counter-mapping' as a tool to influence government to accept and promote community mapping and its results.

In the Malaysian province of Sarawak, community mapping itself has been criminalised. Such cases of official hostility to community mapping show how access to information and state agencies becomes a key factor in determining the feasibility of different mapping approaches.

### **2. Mapping Needs to Reflect the Full Bundle of Rights.**

Secondary rights – including rights to use, improve, assign, and transfer natural resources – are highly relevant for rural people. Ownership rights may appear more clearly than others, though, and, if registered via a mapping process, can obscure the bundle of secondary rights, thus reducing the livelihood options of those relying on them. There is also a trade-off between map accuracy and respecting the fluidity of some use rights. In many rural areas, land rights are founded on voluntary-based flexibility and mapping carries the risk of freezing the fluidity of those tenure arrangements. Accuracy of boundaries – necessary for dispute and conflict resolution, natural resource management and land demarcation – should aim to reflect the agreement reached by mapping users concerning the trade-off between fluidity of land rights and their relative security.

### **3. The Mapping Process May Matter more than the Results.**

In the experience of ILC's partners, the ultimate aim of mapping land rights may not be the final lines on a map so much as developing the community's ability to resolve conflict, build consensus and take collective action. With this in mind, it is important to establish guidelines to make the whole process as transparent as possible.

### **4. Technology Must Include, not Exclude.**

More advanced technologies, such as those related to GIS, permit a wider use of vast amounts of information but run the risk of increasing the conceptual distance between those making the maps and those providing the local knowledge that nurtures the maps. All too often, it is difficult to make the technology available at the local level because software is either too costly or available only in English (a major constraint in countries where English is not even the second language), or simply because of frequent disruption of the electricity supply.

Capacity building in the use of mapping technologies can represent an empowering experience for some rural people, but this may happen at the expense of other community members (e.g. women, elders, orphans, and returnees). Experience shows how, in some cases, communities strategically choose not to master new mapping technologies unless the mapmakers themselves are accountable to community members. Training – including the production of important reference materials in the local language – is important in improving the capacity of community members to monitor and intervene in the mapping process.



**5. Maps Are the Beginning of the Empowerment Process, not the End.**

Maps are made to be used. The idea that the map can be an empowering tool implies not only that there must be a local demand for mapping, but also that communities should have an improved capacity to develop map-use strategies. Community institutions and their members should be able to update the maps according to their needs. The long-term usefulness of a mapping exercise depends on the initial strategy, that is, whether capacity building for these long-term uses is built in.

**6. Maps Visualise the Social World as well as the Natural.**

Mapping not only helps to identify physical resources; it can also identify

customary institutions that manage these resources and regulate power among different territorial stakeholders. Maps may thus not only reveal rights that community members wish to preserve and secure, but social relations that they may wish to change. This can provide a basis for reviving and strengthening local Natural Resource Management (NRM) institutions that may have grown weak over time. This can contribute to greater environmental sustainability and reduced conflict. This institutional dimension of mapping must be taken into account when setting out the strategy, so that the final map product is not a mere museum item, but a real tool for community empowerment and sustainable development.

## 5. Prospects for Scaling Up

**O**n the global scale, a great variety of community mapping methodologies is in use. The potential for the scaling up and replication of these approaches varies greatly. One of the lessons of the work of ILC's network members and partners is that different approaches bring with them different prospects for scaling up. It has also been learned that scaling up means more than one thing. Scaling up can mean increasing the geographical coverage of a programme, replicating a

process and disseminating techniques from one community to another, seeking to influence higher levels of decision-making, or diversifying and extending the applications of mapping where it is already used. Different scaling-up objectives may require the adoption of different community-mapping approaches. This section looks at some of the basic characteristics of mapping approaches and suggests how these characteristics affect prospects for different types of scaling up.

### ***Is there Life after Tenure Mapping?***

Tenure maps are made with the intent of producing legally-acceptable evidence of prior land use and occupancy to be used in national or global negotiations. Two strategies for organizing tenure mapping projects are in play. One builds local capacities in gathering traditional knowledge via interviews and sketch maps but out-sources the computerised aspects of map-making to official cartographic agencies. The other uses the same community requirement for a tenure map as a context to initiate a graduated training process aimed at competence in and control of the entire mapping process. Community-based teams learn to use GPS to produce geographically-accurate field maps. A simple computer plus printer set-up has enabled some indigenous associations to set up their own mapping units. Official reaction may include denial or criminalization, but the most serious problem is sustainability: tenure maps are one-shot affairs; they get things going but cannot keep them going. What can community mapping teams do next and who will support them?

*Peter Poole (IIED 2006)*

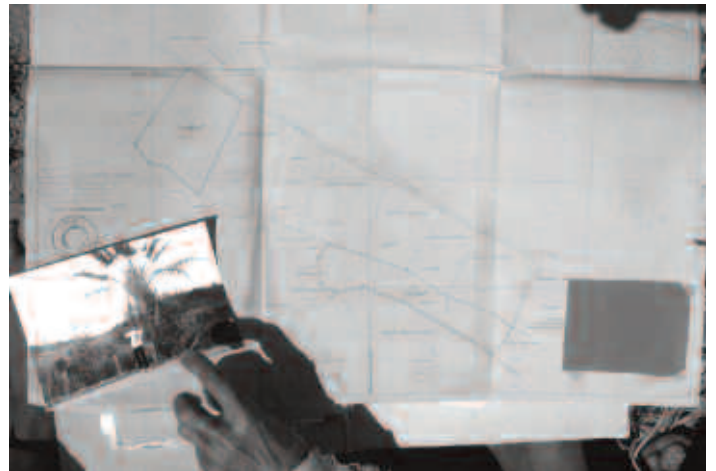


## 5.1. Different Ways to Scale Up

### ***Amplification and Diversification of Mapping Expertise***

This implies scaling up the utility of mapping for communities that already employ mapping as a tool. Amplification refers to advancing geomatic expertise in the manipulation of geographic information. Diversification refers to the application of data gathering, manipulation and analysis skills to new purposes, such as, tenure mapping, asset allocation mapping, natural resource management (forestry, fisheries, wildlife census, impact assessment), and cultural mapping.

A key factor in the diversification and amplification of community mapping capacity is the extent to which initial mapping projects are centred on developing capacity within the community. However, even cooperative mapping approaches, where government agencies provide technical support and the



community role is focussed on gathering basic data through sketch mapping and conversations, develop core skills for community mapping. Experience has shown that many communities which started as cooperative projects have since graduated to capacities in GIS-based resource management.

The success of community-based resource management where tenure is secure is an indication of what is possible where conflicts over tenure or resource access can be resolved. In this process, mapping units housed in either indigenous associations or support NGOs, have played a pivotal role in capacity building, through training individual mappers and assisting with technology transfer. These experienced mapping and capacity-building groups could play a similar role in enabling those community-based groups that have acquired basic mapping capacities to diversify into new applications, such as biodiversity monitoring, conservation area management and delivery of environmental services.



### ***Dissemination of Expertise to Other Communities***

The geographical scaling up of mapping approaches to cover more communities can occur through horizontal dissemination from community to community.

Prospects for disseminating expertise to other communities are obviously higher for communities that have acquired their own mapping capacities.

Community control and engagement is an asset, as is interest in networking with other community-based mapping groups and NGOs. A good example comes from British Columbia where the Aboriginal Mapping Network has been instrumental in sharing knowledge and raising standards. Expectations about rapid dissemination can be over-optimistic, however.

Long distance dissemination over the internet has been less rapid than many expected, and more successful examples of dissemination seem to come from exchange visits and learning-by-doing, even if these have cost implications. The potential for scaling up through dissemination approaches based on cooperation with government agencies is limited by government readiness to participate in such a community-led process.

### ***Scaling Up Influence on Decision Making***

Community mapping often aims at influencing decision making at some level, whether within the community, by local resource management associations, by government departments at the local district and national level, or even by national legislative bodies.

This decision making may concern official recognition of land tenure and rights, in which case influencing government is often a very ambitious goal. Influencing local dispute resolution processes, planning or natural resource management decisions may often be more achievable. In some cases, for example, this potential is codified in joint agreements on hunting and fishing or co-management agreements for protected areas.

In cooperative mapping approaches, the initial interviewing and sketch-mapping stage occurs in the community, but the transfer of the sketch-mapped raw data to topographic maps is done in cooperation with government cartographic agencies.

Advocates of this approach argue that this predisposes governments towards claims that may emerge from the joint mapping exercise. It also assumes that more accurate and professional maps, produced by higher-technology mapping processes, are more likely to be seen as credible by government agencies.

This is no guarantee of influence, however. In the Philippines, the regulations for acquiring Certificates of Ancestral Domain Title (CADT) required maps of community lands accurate to one metre. This prompted the growth of a number of support NGOs, with the necessary mapping capacity, such as Anthro-Watch and PAFID.

The government's response was to raise the requirement, to a 'surveyor' accuracy of five centimetres. Technical accuracy or the prior involvement of government agencies are key factors, but sometimes influence in an adversarial environment simply depends on political pressure. In the case of JKPP in Indonesia, the replicating and scaling up of a mapping programme to cover more than two million hectares has been an important source of influence.

### ***Scaling Up Programme Coverage***

Whereas dissemination implies a bottom-up process of expanding geographical coverage, some government and donor-funded programmes can be said to adopt a top-down approach to scaling up community mapping. In Madagascar, for example, the government is seeking, with donor support, to foster community mapping as a tool to build local land cadastres. In theory, prospects for geographical replication should be good in government-promoted interventions. Nevertheless, the investment needed for staff training at various government levels often becomes an issue as funds tend to

privilege the mapping technology rather than training and participation. A risk inherent in this form of scaling up is lower and lower participation by communities because the target measured is land mapped, rather than the quality of the process and the accuracy of the maps. This problem can be worst in the lowest levels of administration and for the most remote areas and where, paradoxically, tenure-related conflicts are concentrated and mapping can be most beneficial. Civil society networks and support NGOs can play an important role in ensuring effective participation and a proper delivery of training.



# I. PAFID: Participatory 3-D Modelling in Mindanao - The Philippines

## 1.1 Context

As the second largest island in the Philippine archipelago, Mindanao has a third of the country's land resources and nearly half of its fishery yield. It is home to a melting pot of cultures dominated by Christian settlers totaling 11 million followed by Muslim groups comprising 22 per cent or 4 million. The lumad peoples, the original inhabitants of the island, make up the remaining 16 per cent with 3 million people. It is estimated that at least half of the gold deposits of the country are found in Mindanao. Most of the last remaining old-growth forests in the Philippines are also located on the island.

Poverty and landlessness (14 of the 20 poorest provinces in the Philippines are in Mindanao), in the midst of vast natural resources, together with the highest military expenditure in the country, mark Mindanao's landscape. The control of land and other natural resources is largely limited to warlords and armed groups, and to the economic and political elite. Achieving land tenure security through recognition of ancestral domains is the main priority of all indigenous peoples/communities in the Philippines. In the past this has often led to (violent) conflicts with neighbouring



communities, migrants and big project developers (e.g. after the discovery of mineral deposits).

The Indigenous Peoples Rights Act IPRA was passed in 1997. The law recognizes the rights of indigenous peoples over their ancestral domains and provides for a process of titling

## Philippine Association for Inter-Cultural Development - PAFID

**PAFID** was founded in 1967. PAFID is a social development organization which assists indigenous communities regain and secure their ancestral domains.

PAFID was formed following a series of regional conferences organized by the National Council of Churches in the Philippines in the mid-1960s.

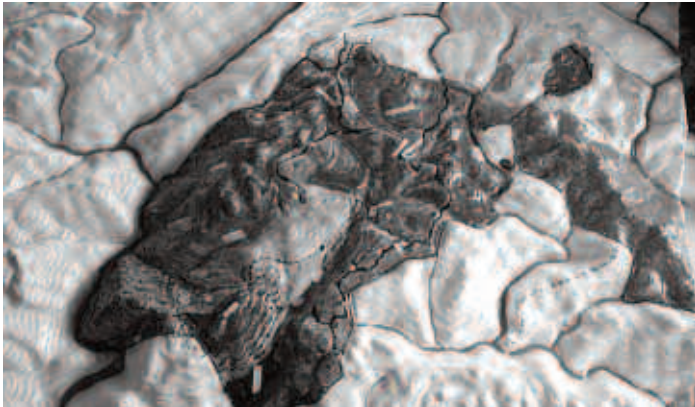
The conferences gathered anthropologists, lawyers, academics, missionaries, members of different indigenous peoples' groups and other advocates to report and assess the problems faced by indigenous communities. Landmark events in the defence of ancestral domains in the Philippines, such as the Kalinga peoples' resistance against the Chico River Hydro-electric Dam and the

Cellophil Resources Paper Mill in the late 1970s, have shaped PAFID from its inception as a resource centre for indigenous peoples' issues to its transformation into a non-governmental organization committed to supporting community-based initiatives. PAFID today is an institution with over 140 members and a staff of 32 engaged in the development of indigenous social organizations, ancestral domain management, community-based natural resource management planning, community mapping, agro-forestry, technical services, policy advocacy and others. Forty per cent of PAFID staff are themselves members of indigenous communities and 38 per cent are women.

lands through the issuance of Certificates of Ancestral Domain Titles (CADT). IPRA law includes 'Self Delineation' as one of the guiding principles in the identification of ancestral domain claims. Due to a lack of capacity and resources, however, the National Commission on Indigenous People (NCIP) - a specialized agency that is expected to support the titling process through validation - is seldom able to support the implementation of the law. This has been largely left to the communities and their support groups, who often themselves lack the capacity to file legal claims over their ancestral domains.

### 1.2 Participatory 3-D Modelling

Participatory 3-D modelling integrates people's knowledge and spatial information (i.e. contour lines) to produce stand-alone scale-relief models (Figure 1). These have proven to be user-friendly and relatively accurate data storage and analysis devices, and, at the same time, excellent communication media. Relief models may also contain additional geo-referenced information obtained from field surveys, GPS readings and secondary sources.



**Figure 1.** A 3-D relief model in the Philippines

The making of a 3-D model leads participants through a collective learning process to the visualisation of their economic and cultural domains in the form of a scaled and geo-referenced relief model.

### 1.3 Steps

Participatory 3-D modelling is a process that can be used to generate a series of physical outputs, from which the information may be stored in a database for use in GIS. After PAFID receives a request from a community, the following basic steps are undertaken in the production of a 3-D relief model:

1. Community meetings
2. Assembling the blank model
3. Coding sessions
4. Validating results
5. Digitizing the information
6. Community validation
7. Handing over the model

Rituals accompany the various phases of the process.

### Community Meetings

Consultation meetings with the community are held, first, to introduce the concept of participatory 3-D modelling as a method that could help them in implementing actions to address selected problems and aspirations. Usually PAFID is invited by communities as a technical support body to help them meet the challenges they first express even before explaining what mapping can offer them.

Next, the community must reach a consensus on some important questions:

- Why do we want to make a map?
- What do we want to map?
- Where do we want to map?
- Who will plan the map?
- Who will gather the data for the map?
- Who will make the map?
- Who will see the map when it is finished?
- What do we want to do with the map/data?



**Figure 2.** Planning the process

Then, the community, with the support of PAFID, must make logistical arrangements. This includes finding a venue sufficiently large to allow the manufacturing of the model.

The materials needed for the model must be procured. It may also be necessary to organize transport, accommodations and catering.

### ***Assembling the Blank Model***

A relief model, to be most useful, must accurately show locations, distances and elevations on a given base of a convenient size. This means that everything featured on the model must be shown in proportion to its actual size. Based on these considerations, the corresponding base map must be chosen as the source map of the process. Pieces of carbon paper are assembled at the back of this map. In preparing it for tracing, the base map is laminated with plastic tape.



**Figure 3.** *Numbering and tracing of contour lines*

All contour lines are numbered for guidance and consistency. Next, the contour lines are traced at 20 m intervals. The selected material is then cut per contour line.



**Figure 4.** *Cutting the contour lines*

Meanwhile, the wooden base of the 3-D model is prepared. The initial layer (contour) is laid down on the base. This is continued for each cut contour using glue and small nails. The terracing of the contour slopes is then smoothed.



**Figure 5.** *Laying down different contour layers*

The model is allowed to dry and is painted with white enamel.



**Figure 6.** *Painting the model with enamel*

Strings and yarns are used to depict information and to define boundaries.



**Figure 7.** *The colour coding of the model*

The participants are given the opportunity to study the blank model and orient themselves to local directions and features.

Facilitators may need to help resolve conflicts and initiate agreements.

### ***Coding Sessions***

An agreement is sought on the terms, symbols and colours that will be used in the model. Key informants are then invited to delineate vegetation types, land use, and other aspects that they consider relevant to their environment.



**Figure 8.** *Discussions on land boundaries*



### ***Validating Results***

In the course of the mapping process, and often again before digitizing the information, transect walks for delineating boundaries are organized with appointed community members where GPS positions can be taken. If a boundary between neighbouring communities is to be marked on the GPS, neighbours are also invited to take part in the delineation process. Community members are therefore made familiar with GPS and its use as a tool, as well as minimal accuracy requirements required by law to have a land title issued.

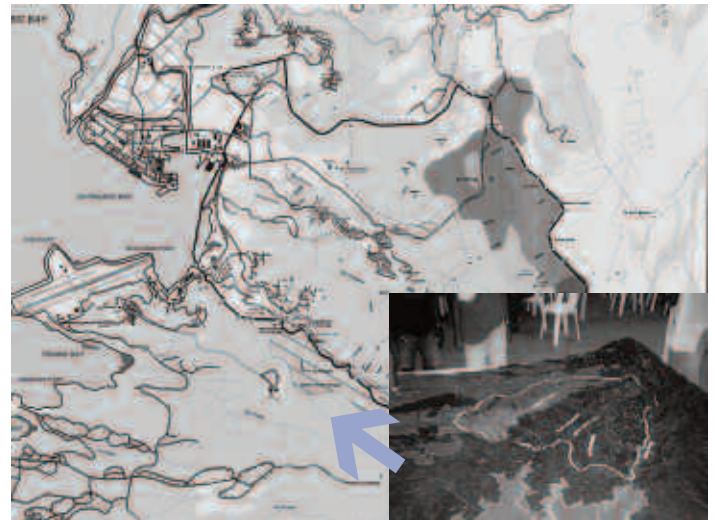


**Figure 9.** *Taking GPS positions*

### ***Digitizing the Information***

A plastic sheet is placed on top of the model and the data are copied and documented. Accurate documentation is essential. The initial results are discussed with the community.

The transparent plastic sheet, accompanying legend and colour prints are then handed over to the GIS team for digitization, editing and data storage.



**Figure 10.** *Data input into GIS*

### ***Community Validation***

Map validation activities are undertaken to enable the community to examine and evaluate the accuracy of the information that has been provided during the 3-D mapping and coding sessions. Sometimes there are requests for recoding of some important landmarks and features which were not previously identified for fear that others might use and abuse confidential information on the location of sacred sites or mineral deposits.



**Figure 11.** *Community validation*

### ***Handing Over of the Model***

A handing-over ceremony follows which formally transfers ownership of this asset to the community that can use it for the purpose set forth at the beginning of the process. The model has to be entrusted to an entity with the means and the commitment to safeguard and maintain it, and to make it accessible to those who would like to use, update, integrate or correct data input previously.

Participatory 3-D models assure that accurate, meaningful-to-all information is kept among the people who generated it.



**Figure 12.** *Hand-over of the model*

### **1.4. Results**

The main aims of these projects are the full recognition of the rights of indigenous communities over their ancestral domains and long-term sustainable forest management based on secure community-based tenure.

Indeed, participatory 3-D modelling has helped to improve the capacity of the communities to interact with national and international institutions and to induce substantial change in terms of resource allocation and management.

Furthermore, modelling processes have been instrumental in facilitating conflict resolution. Many have led to potentially stable solutions, anchored in objectively-verifiable, geo-referenced sources. In light of growing development pressures, agreements making use of sketch maps and non-technical descriptions tend to be short-lived, being prone to subjective interpretations. In addition, modelling has contributed to improving communication by creating a shared vocabulary, thus bridging communication barriers due to different perspectives and spoken languages.

Nevertheless, mapping remains a sensitive issue. Especially in Mindanao, it has led to violent confrontations with logging companies that have impeded the delineation activities. In some cases, the Philippine army was called upon to ensure the safety of the participants. In others, PAFID suffered human losses.

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## Contacts

**Contact Person: Dave De Vera**

71 Malakas Street, Diliman,  
Quezon City, 1100 Metro Manila  
Tel: 63 2 9274580

[www.iapad.org/pafid/index.htm](http://www.iapad.org/pafid/index.htm)

## 2. Grupo Tierra: GPS supported community mapping in Nicaragua

### 2.1 Context

Unequal land distribution and its inappropriate use, leading to land and natural resource degradation, are two of the main problems in Central America. In Nicaragua, 56 per cent of the arable land is in the hands of 9 per cent of the producers, while 61 per cent of the farmers have access to only 9 per cent of useful agricultural land. Nicaraguan producers face market liberalization and unequal competition. Furthermore, legal recognition of land is very difficult to achieve for the most vulnerable agricultural producers due to their limited economic resources, remoteness and bureaucratic hurdles. There is a lack of articulation between the systems that recognize rights at the local level and the legal system. This intensifies and prolongs conflicts over land and natural resources, with high social and economic costs. This is one of the main contributing factors to the extreme poverty (less than two dollars a day) and chronic malnutrition of a large part of the population in Nicaragua.

In 2002, the Nicaraguan Government, with the financial support of the World Bank, launched an ambitious project to update the cadastre. Various policies,



programmes and laws related to rural development have been created and modified. Nonetheless, the number of landless and land-poor families in Nicaragua has not decreased.

## Grupo Tierra

**Grupo Tierra** was created as an outcome of the International Meeting of Farmers' Organisations and Civil Society on 'Land Use and Economic Development' in November 2003 in Nicaragua.

The participating organizations subscribed to the main findings of the meeting, namely that (1) the heavy concentration of land ownership reveals the great social injustice and inequity that agricultural producers face, (2) it is a fact that small- and medium-scaled agriculture is economically more efficient than large farms, and (3) a poverty-free Central America can be

reached through increasing access to land and services for agricultural producers.

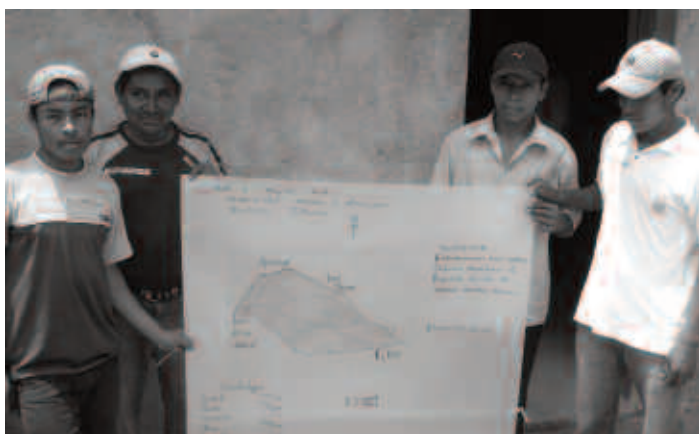
After this international meeting, participating organizations decided to set up a working group in order to give continuity to those efforts in Nicaragua. As such, Grupo Tierra was established. It consists of seven local organizations and four cooperating agencies. A common agenda drives their collective actions aimed at increasing land tenure security, with an emphasis on land reform and the viability of family farming. Afterwards, other groups joined Grupo Tierra. Action Against Hunger acts as its host organization.

Small-scale family agriculture does not seem to be a priority on the policy agenda, even though 40 per cent of the population lives in rural areas and cultivates the major part of the national food staple. Nonetheless, it is predominately these small-scale producers who face poverty. The capacity of local people to participate in land administration, meanwhile, continues to be insufficient.

Grupo Tierra has used community mapping precisely because it is oriented towards empowering local communities. By helping local communities to visualise their territory, using geo-referencing techniques, Grupo Tierra contributes to their participation in a horizontal dialogue with governments and economic powers, where they can put forward their concerns and demands.

### 2.2 Community Mapping

A community map is the representation a community has of its territory. Community members decide what they want to represent on the map, in most cases, community boundaries, land use, infrastructure and water supplies. In fewer cases, individual ownership, which is more difficult to represent due to the scale of the map, is also included. Maps are always drawn by representatives of the community with as many members of the community as possible attending and participating.



**Figure 13.** People with their community map in Nicaragua

### 2.3 Steps

The map is, above all, an instrument to let people talk and to clarify situations. It contributes to the diagnosis of a situation using the words of the actors themselves. Moreover, it is an instrument to facilitate the negotiation and the monitoring of the agreements made among local actors and between local and external actors such as project managers or the mayor's office.

In response to a community's request, Grupo Tierra undertakes the following steps in order to construct a community map:

1. Meeting with the community
2. Locating the community on the map
3. Enlarging the map
4. Putting information on the map
5. Presenting and validating the results
6. Digitizing the data
7. Measuring the parcels
8. Handing over the map

#### **Community Meeting**

The community map is made by the community members because they have the best knowledge of the territory and its resources, as well as of the local opportunities and limitations. It is important that groups from the different sectors of the community (men and women, youngsters and elders) participate in order to have a diversity of viewpoints.

A consultation meeting must also be held with key representatives to introduce the methodology and to reach a consensus on the scope of the process and the logistical arrangements.



**Figure 14.** People with their community map in Nicaragua

### Locating the Community on the Map

The community is located on a topographic map provided by the National Cadastre Institution (INETER) by looking at clearly identified reference points, such as rivers, hills, trails and dwellings.



**Figure 15.** Example of community localised on topographic map

### Enlarging the Map

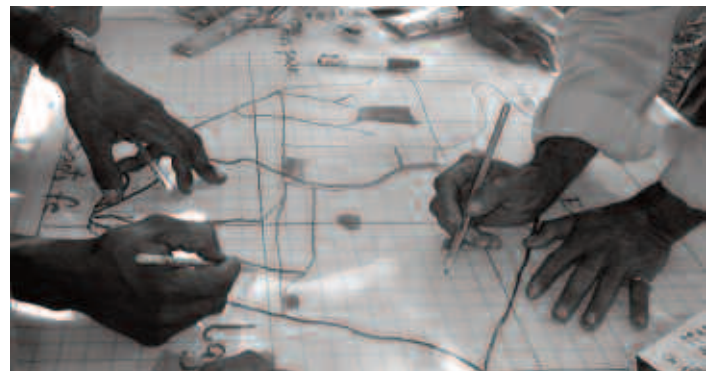
It is important to enlarge the map in order to add information to it. This is done by using a reference grid or by photocopying and enlarging the official topographic map (if possible).



**Figure 16.** Sketch of the community boundaries with a reference grid

### Putting Information on the Map

First of all, the community members discuss and choose what they want to represent on the map and how it will be represented. During this phase, the community draws its territory, marking the location of borders, rivers and trails on the sketch. Before further information is added, a reference grid, with squares that each represent one hectare, is drawn on the sketch.



**Figure 17.** A community map depicting the land use of Honda

The desired information about the community can now be placed on the map, for example, dwellings, wells, actual land use (e.g. cultivations, living zones, forests), community members' parcels and/or the location of conflict areas.

Seven essential elements must be indicated: the map title, north, the legend, symbols and codes, the scale, the date and the authors.

### ***Digitizing the Data***

The data must be processed into a computer, as hand-drawn maps are easily destroyed or can be damaged over time. Elaborating a digital version of the map also offers more flexibility and transparency to the process. In addition, an updated document can be printed whenever one is needed. For the digitalization, Grupo Tierra uses a software called 'Mapmaker Popular', a programme that can be downloaded free from the internet.



**Figure 18.** *Digitising the data*

### ***Measuring the Parcels***

Agricultural producers are trained in the use of GPS. They then use this spatial technology for measuring their parcels.



**Figure 19.** *Measuring the plots with a GPS*

It is always easier to start with a topographic map and to make a sketch of the parcel. This gives the opportunity to plan where to initiate the measurement and, moreover, to estimate the approximate time that will be spent.

The next step is to form a measurement group made up of men and women who have a good knowledge of the area. Owners of neighbouring and adjacent plots must also be involved, as everybody must agree on the results.

After gathering the data, the information is processed by making use of the 'Mapmaker Popular' or 'Fugawi' computer program<sup>2</sup>. The results are then printed on a sheet.

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<sup>2</sup> Fugawi is usually used to download points from GPS while 'Mapmaker Popular' is used to work on them in the computer.



### ***Handing Over the Map***

The community map, and the measurement of the plots, are means, not ends. They are tools to achieve a better dialogue between different actors on natural resources. Therefore, the information obtained in the process must be handed over to the community in an adequate manner.

Concerning the community map, it is important that the whole community has access to the map. During a consultation session with the community, one person can be elected to act as the curator of the map, with the obligation of granting access to the information every time it is needed. The map may be kept in a public space, like a school or a community house. To avoid any damage, the map can be plasticized or kept in a plastic tube (which is cheaper and safer). In the same manner, the measurement data of the plots must be handed over to the community.

Each owner who worked on the GPS survey receives a boundary certificate, reflecting the features of his or her parcel. It is just a certificate, as the demarcation limits have not been validated by INETER, although INETER has shown interest in community cartography. Hopefully this will lead to some official recognition and will help to validate the approach.

The objectively-gathered information can now be used to resolve conflicts

and reach agreements in a transparent way. A facilitator should guide the process and the participants should be given training in conflict resolution.



**Figure 20.** Map for handing over

## **2.4 Results**

The main objective of the tool is to have a better knowledge of the community's territorial assets. This helps the community interact with better leverage with external actors. It also can contribute to the identification, resolution and prevention of conflicts over land as well as access to and use of natural resources, conflicts which are very common in Nicaragua. In those cases where individual boundaries inside the community have been defined and are now known to all the members, there is more transparency which increases the security of tenure.

The concept of social participation is an important mechanism to finding lasting and sustainable solutions.

As the participants are trained in making the community map themselves, in using GPS to measure their plots, in systematizing the information, and in conflict resolution, the methodology fosters the further development of their capacity to participate in a horizontal dialogue with local and national government and economic actors. In the best case, it will also lead to legal recognition.

The overall result is better management of land and natural resources and more sustainable territorial planning, if the process is done in a democratic, transparent and participatory way, to sustain the empowerment of local communities.

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### Contacts

**Contact Person: Piere Merlet, Edoardo Celorio**

Del semáforo de LOZELSA, 1 Cuadra al Lago, 1

Cuadra Abajo. Rotonda, Casa # 773.

Altamira D'Este. Managua. Nicaragua.

Teléfono: (505) 277 2892.

**e\_celorio@yahoo.es**

# 3. HARDI: Citizen's Cadastre in Madagascar using Satellite Imagery

## 3.1. Context

According to Article 11 of the Malagasy Law n° 60-004 (1960), the State is the owner of all the land that has not been publicly registered or assigned to an individual by virtue of a legal land title. At this moment, it is estimated that only 10 per cent of agricultural land has been registered.

Customary law, giving the land to the person that cultivates it, prevails in most of the Malagasy land tenure arrangements. Under customary law, continuity in cultivating land legitimizes its appropriation. Plots are inherited by the descendants of the first owners with a strong emphasis on ancestral domains. There are no legal documents that support these claims and transfers; instead, they are primarily based on oral tradition or 'petits papers', which only have a symbolic and practical value. These customary principles are being threatened by modern law.

As customary rights are weakening, the farmer faces a paradoxical situation where neither the formal administration nor traditional rights can secure his or her access to land. In the past, the absence of clearly identified land titles



has often led to (violent) conflicts between farmers who claim the same land. Insecure tenureship also reduces incentives for farmers to make investments in their land.

Land tenure insecurity in Madagascar can mainly be attributed to the incapacity of the central government to respond to the demand for the recognition of land rights and the issuing of land titles.

The two main causes are the lack of financial and human resources within the offices dealing with land administration and the complexity of the procedures for individual registration (24 steps have to be taken with an average waiting time of 20 years between request and issuance).

The situation is made worse by the skepticism with which farmers have come to view administrative institutions. HARDI is using the methodology of citizen's cadastre in an effort to tackle land tenure insecurity. It is primarily aimed at helping farmers to organize themselves to manage their relations with land administrators in a more efficient way and to obtain their land titles with the shortest delays possible.

#### **Citizen's Cadastre**

Citizen's cadastre is a methodology where the population of the concerned area as well as the land title holders and their neighbours together delineate the plots and record their use in a public and democratic way. It is a mechanism for enhancing land tenure security that, on the one hand, is flexible enough to take the material interests of the farmers into consideration, and, on the other hand, respects the juridical framework.

HARDI used two main tools in constructing their methodology. Through PRAs, the community analysed existing ownership and land use. In addition, maps derived from satellite



**Figure 21.** *Agricultural producers trace their plots on satellite images*

imaging were produced and used to determine ownership and to identify land disputes.

#### **3.2 Steps**

After receiving a community request for assistance, HARDI undertakes the following basic steps in constructing its citizen's cadastre:

- 1. Programming**
- 2. Informing the community**
- 3. Holding a ceremony**
- 4. Gathering the community**
- 5. Demarcating the physical plot**
- 6. Identifying and recognizing rights**
- 7. Using satellite images**

## Harmonisations des Actions pour la Réalisation d'un Développement Intégré - HARDI

**HARDI** is a non-governmental, non-profit organization that was created in Antananarivo. In Malagasy, HARDI is called 'Fivoy ho amin'ny Fampandrosoana'.

The organization aims at:

- Understanding the rural and urban world;
- Supporting local initiatives to empower people who face difficult situations; and
- Giving special support to embedded actions that result in sustainable solutions in Madagascar.

HARDI has been concentrating its activities on rural and urban issues with alternative educational projects for children since 1994, micro-credit programmes in favour of small enterprises since 1999, and support to beekeepers as well as enhancing land tenure security since 2002. HARDI collaborates with a technical partner, INTERREG SFAT, that is trying to help the Malagasy Government in its agrarian reform process.

### ***Programming***

The members of the land committee, the president of the Fokontany (local community), representatives of the community, and HARDI representatives get together to discuss the schedule of the construction of the citizen's cadastre. They also decide the frequency of the radio announcements, choose the radio station and settle financial issues.

### ***Informing the Community***

Radio announcements are made and the Fokontany is informed through pamphlets to invite the land owners and inhabitants of the focus area to participate in the process.



**Figure 22.** Meeting of land committee and president of Fokontany

The radio announcements are intended to reach people who do not live within the community. Participants are asked to bring with them all documents that could prove the legitimacy of their land occupancy or that could help in establishing a claim to land.

#### ***Holding a Ceremony***

Before the actual activities start, a small initiation ceremony is held. A flag is raised, a prayer is said and a 'kabary' speech is held in which the objectives and the next steps of the process are explained.

#### ***Gathering the Community***

The inhabitants of the village are gathered, together with other people who may not live in the community, yet claim to hold rights to land in the focus area. An agent of the land office and a representative of HARDI facilitate the discussions.



**Figure 23.** *Gathering of the community*

An agent of the land office and a representative of HARDI will facilitate the discussions.

#### ***Demarcating the Physical Plot***

To start with, one plot is chosen with the others dealt with in succession. The owner is asked to come forward. If nobody claims the land, the next plot

is dealt with. If different people claim the land, a conflict resolution process is initiated. Stakes are then placed in each corner of the plot by the owner. Neighbouring rights holders validate the position of the markers. If no agreement can be found, further conflict resolution is undertaken.

#### ***Identifying and Recognizing Rights***

The documents that are brought by the person who claims his or her rights on the plot are examined by the land committee and by the officials of the land office. If no documents can be presented, family and neighbours are consulted.



**Figure 24.** *Filling in a questionnaire on the plot*

Meanwhile, a questionnaire is completed in order to inventory the diversity of land situations and to compare administrative law with customary rights. A certificate of recognition then is signed under the auspices of the gathered community.



**Figure 25.** *Rights recognition by the community*

**Using Satellite Images**

A satellite picture is printed and tracing paper is stuck to its back. An agent of the land office and the person who holds the rights to the land demark the plot with a crayon on the tracing paper under close attention of the neighbours who will validate the result.

This information can then be integrated into a GIS for systematization and used to create a local land use plan (PLOF).



**Figure 26.** *Delimitation of plots on satellite images*



**Figure 27.** *Integration of the info into a GIS for map-making*

### 3.3 Results

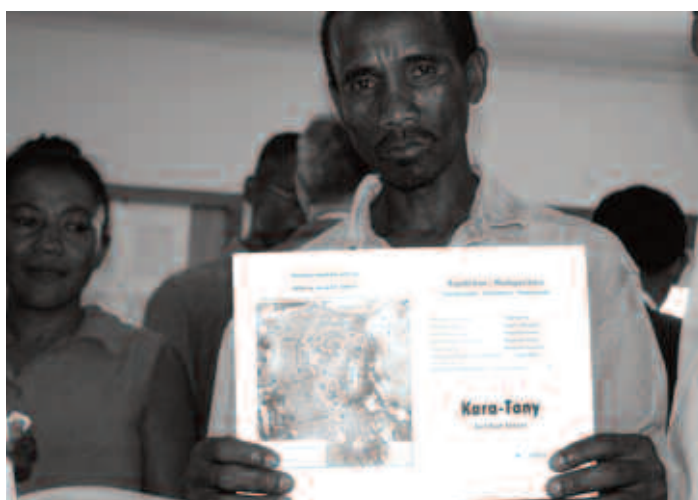
The programme has helped in decentralizing titling procedures to the local level, as the land administration is incapable of responding to the demand for land registration. It makes use of Malagasy Law n° 2003-029 that allows the community the right to issue individual land titles.

People are convinced that this process will accelerate significantly the regularization of their land situation. By identifying and recognizing the land rights of the local farmers, the process has a great impact on their land tenure security.

The citizen's cadastre process helps, in addition, to prevent conflicts over land ownership. The participants are trained in conflict resolution, helping to diminish the economic and social costs of these disputes.

HARDI has noted a very strong level of community mobilization, shown by the fact that people have been ready to leave their homes and fields to participate in the demarcation. By working intensively together and resolving conflicts, community cohesion has been strengthened.

As the information is synthesized in a GIS and used to construct a PLOF, it is expected that this will lead to a better use of natural resources.



**Figure 28.** A Malagasy citizen with his land title certificate



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### Contacts

**Contact Persons: Rasolfo Patrick**

Haja Andrianaivalona Lot 111 bis,  
Cité des 67 Ha Sud, Antananarivo 101, Madagascar  
Tel. 020 22 292 96  
[www.hardi-madagascar.org](http://www.hardi-madagascar.org)

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**INTERNATIONAL  
LAND  
COALITION**

*Secretariat at:*

Via del Serafico 107, 00142, Rome, Italy

Tel +39 06 5459 2445 Fax +39 06 5043 463

E-mail: [info@landcoalition.org](mailto:info@landcoalition.org) [www.landcoalition.org](http://www.landcoalition.org)