



‘Minimum elements’ for community-based land mapping approaches in post disaster contexts

Pilot version

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The International Federation of Red Cross and Red Crescent Societies (IFRC) is the world’s largest volunteer-based humanitarian network. With our 190 member National Red Cross and Red Crescent Societies worldwide, we are in every community reaching 160.7 million people annually through long-term services and development programmes, as well as 110 million people through disaster response and early recovery programmes. We act before, during and after disasters and health emergencies to meet the needs and improve the lives of vulnerable people. We do so with impartiality as to nationality, race, gender, religious beliefs, class and political opinions.

Guided by *Strategy 2020* – our collective plan of action to tackle the major humanitarian and development challenges of this decade – we are committed to saving lives and changing minds.

Our strength lies in our volunteer network, our community-based expertise and our independence and neutrality. We work to improve humanitarian standards, as partners in development, and in response to disasters. We persuade decision-makers to act at all times in the interests of vulnerable people. The result: we enable healthy and safe communities, reduce vulnerabilities, strengthen resilience and foster a culture of peace around the world.

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Glossary of terms applicable to these Guidelines

(adapted from the Food and Agriculture Organization's Multilingual land tenure thesaurus 2003)

Cadastral system. Normally a parcel-based and up-to-date land information system that contains a record of interests in land (including rights, restrictions, and responsibilities). It usually includes a geometric description of land parcels which is linked to other records that describe the nature of the interests, ownership or control of those interests, and often the value of the parcel and its improvements. It may be established for fiscal purposes (to value land and tax it equitably), legal purposes (conveyancing), or planning and other administrative purposes (to assist land management and use).

Community mapping. Often used as part of a participatory enumeration. It is an exercise undertaken by the residents for the residents. It includes a range of activities from sketch map projects (hand drawn maps showing community information on specific issues or themes) to cartographic projects (accurate to scale area, township or village maps).¹

Customary laws. Customs, rules and or practices regulating social behaviour that a social group or geographical area has developed over time and that many members of the group consider mandatory.

¹ Adapted from UN Habitat, *Count Me In: Surveying for Tenure Security and Urban Land Management* (2010).

Parcel plan. Generally a large-scale map of an area showing all property parcels and their use, boundaries and the distances between them, and buildings and improvements. A parcel plan usually includes a register of parcels. In the context of land administration, a cadastral plan is a parcel plan.

Participatory enumeration. A data-gathering process that to a significant extent is jointly designed and conducted by the people who are being surveyed. Participatory approaches can avoid some of the shortcomings of more conventional data gathering methods:

- The data gathered is more reliable and more relevant.
- Disadvantaged groups are included more efficiently. Because resident participation is broad, elites in a settlement do not exercise undue influence.
- Data is legitimate, because communities and official institutions have been involved and have approved the results.
- The impact is sustained. Because residents support the process and feel engaged, the results of participatory enumeration can lay the foundation for subsequent phases of development, and more appropriate, equitable and efficient land administration systems.²

Security of tenure. Can be defined in various ways:

- The degree to which land users can be confident that they will not be arbitrarily deprived of the rights they enjoy over land and the economic benefits that flow from it.
- The certainty that an individual's rights to land will be recognized by others and protected in case of challenge.
- More specifically, the right of all individuals and groups to effective government protection from forced evictions.

² *Ibid.*

Conversely, tenure is insecure when urban or rural users and holders of land consider that their rights to land are threatened by other actors or may not endure.

Tenure. The way that land is held or owned by individuals and groups, or the relationships with respect to land that are legally or customarily defined between people. Tenure reflects relationships between people and land directly, and relationships between individuals and groups of people in their dealings in land.

Tenure systems. Sets of formal or informal rules and institutions that determine access to, and control over, land and natural resources.

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Many different methodologies are used for community land mapping programmes in post-disaster settings. All can produce comparable descriptions of who lives where. However, different approaches can achieve higher or lower levels of precision and visual representation. Higher precision requires more specialized technology and more expertise, and can therefore be more expensive; it is not always appropriate, available or attainable. In all cases, however, it is vital to involve, engage and check back with the people who are being mapped – the communities themselves. These Guidelines consider three different community mapping approaches of varying technical complexity. We identify the minimum elements of each. All three build on a basic model of community land mapping.

The Guidelines have been developed to support disaster managers and shelter practitioners.

1. Introduction

One in three urban residents now lives in a slum in developing countries, while only about one third of land in the developing world is formally registered.³ Disaster-induced displacement is also rising.⁴ Such uncertainty and informality has led the humanitarian community to consider how shelter assistance⁵ can be provided to affected people whose ownership or occupancy rights are unclear. In some cases their ownership or occupancy is unclear because land ownership certificates have been lost or registries destroyed, physical boundary markers have been wiped out, or the land itself has been transformed by landslides or coastal erosion, etc. In other cases, individuals may lack title documents, because their land was never titled or they relied on less formal tenure systems. If they do not know who lives where, humanitarian agencies and local authorities cannot be sure that they are supporting the most vulnerable or monitor the support they provide.

The humanitarian community has shown growing interest in regulatory issues associated with shelter programmes. In November 2011, these issues were addressed by the 31st International Conference of the Red Cross and Red Crescent (which includes all state parties to the Geneva Conventions as well as components of the Red Cross and Red Crescent Movement). A background paper written for the Conference recommended the development of:

³ UN-Habitat, *Designing a Land Records System for the Poor* (2012, Nairobi). At: <http://www.stdm.gln.net/docs/Designing-a-Land-Records-System-for-The-Poor.pdf>

⁴ Since the 1970s, disaster-related displacement has quadrupled: IDMC, *Disaster Related Displacement Risk: Measuring the Risk and Addressing its Drivers* (2015). Approximately 160 million people have been displaced since 2008: IDMC, *Global Estimates 2014: People displaced by disasters* (2014).

⁵ 'Shelter assistance' covers the recovery phase as well; in other words it covers the provision of emergency shelter and more temporary and core structures.

procedures to overcome gaps in official titling systems, such as upholding (at least on a temporary basis) verification of land occupancy rights derived by humanitarian organisations on the basis of community-based participatory land mapping...⁶

This recommendation was well received. Resolution 7 of the International Conference subsequently called on humanitarian organizations to:

make every effort to assure equitable shelter assistance as between all persons in need, including as between those who possess formal legal title to land or real property and those who do not.

It called on States to examine their regulatory frameworks and:

address how to provide shelter assistance to persons who lack documented title to their damaged or destroyed homes.⁷

Although humanitarian agencies are increasingly aware of the different ways in which people occupy their homes (tenure), many still require affected people to produce formal proof of tenure (land title documentation) in order to qualify for shelter assistance. The agencies do so primarily to establish certainty of ownership and avoid later disputes;⁸ but it is an approach that not only

⁶ IFRC in consultation with the ICRC, 'Addressing regulatory barriers to providing emergency and transitional shelter in a rapid and equitable manner after natural disasters' (October 2011, Background Paper). At: http://rcrconference.org/docs_upl/en/IC31_5_5_3_barriers_shelter_2Oct_EN.pdf

⁷ Resolution 31IC/11/R/7, Strengthening normative frameworks and addressing regulatory barriers concerning disaster mitigation, response and recovery. At: http://www.rcrconference.org/docs_upl/en/R7_Disaster_Laws_EN.pdf

⁸ IFRC and the Norwegian Refugee Council, Security of Tenure in Humanitarian Shelter Operations (2014). At: <http://www.ifrc.org/Global/Documents/Sekretariat/201406/NRC%20IFRC%20Security%20of%20Tenure.pdf>

often excludes some of the most vulnerable people but is likely to do so unfairly. If the relevant documents have been destroyed, or land was occupied under less formal systems of tenure, or the legal/cadastral system was incomplete or defective, people may simply be unable to prove their right to the land or homes they occupy, or even prove where their land and home was. Making the situation of such people even more difficult, overburdened local authorities are often unable to prioritize the management, survey or reconstitution of property records (including boundary maps) after a disaster, further delaying the provision of shelter and other humanitarian assistance.

To overcome these challenges and be able to provide assistance swiftly and fairly, shelter assistance programmes have therefore increasingly adopted community mapping approaches. Where documentation does not exist or property demarcations have been lost, neighbour or community verification can provide a method for establishing quickly who occupied what land or property in an area.

2. Background to and use of the Guidelines

A number of humanitarian actors have developed tools for participatory community mapping.⁹ In many cases, however, these are community-minded and focus on disaster risk reduction measures or the community's overall need of services and infrastructure; they do not necessarily produce parcel plans that demonstrate family and individual occupation or ownership of individual plots of land. Especially when local authorities are not able to provide land occupation data in the timeframe required by a humanitarian response, general community mapping can generate parallel systems and information that is short-lived, legally uncertain, and has not received official approval. In some cases, parties sign 'certificates' or tenure agreements that do not conform to existing property law in the hope of achieving some security of tenure.

To avoid these problems and still provide timely shelter assistance, these guidelines have identified 'minimum elements' of community land mapping, based on case studies and consultations with practitioners in the Philippines and Nepal. These 'minimum elements' have been selected because they promote and support the long term recovery and resilience of both affected communities and local authorities. If the process adopted is adequately rigorous, fair, and inclusive, local and national authorities may give the results temporary recognition until more permanent cadastral records are established.

⁹ Many of the techniques used in participatory enumerations have their origins in participatory rural appraisals (PRA). Although originally developed for use in rural areas, similar techniques have been increasingly applied in urban informal settlements as well.

The case studies that were considered include humanitarian projects and development programmes. Many development mapping programmes (for slum upgrading programmes, for example) are carried out at household level, often in conjunction with local and national authorities. By strengthening land governance, they advance economic sustainability, poverty alleviation, and peace and security.¹⁰ (Please refer to the last two sections of this document for more information on why mapping is used in humanitarian responses and why land governance and administration systems need to be considered in post disaster community mapping.)

To prepare these Guidelines, thirty case studies, tools and guidelines produced by humanitarian and development actors were reviewed. In terms of their complexity, the projects reviewed tended to fall into three categories, which were somewhat homogeneous in terms of the level of technology used, the geometric accuracy of the maps generated, and their sophistication.

- Category One** Employs basic technology; maps are primarily sketched.
- Category Two** Employs moderately sophisticated technology; maps are developed using GPS and satellite imagery.
- Category Three** Employs sophisticated technology and requires expertise; maps are developed using unmanned aerial vehicles (UAVs) and geographic information systems (GIS).

The case studies included in these Guidelines have been grouped accordingly. In all cases, community consultation and involvement takes place at various stages.

¹⁰ Sustainable Development Goals – Target 1.4: <https://sustainabledevelopment.un.org/?menu=1300>

Each Category is written on the basis of the example at the end of this section ('Basic stages of a community land mapping programme'). It acts as a skeleton outline which each Category then fleshes out.

The description of each Category includes:

- ↳ An *Overview* that explains the approach.
- ↳ *Minimum elements* for the level of complexity in question.
- ↳ *Specific considerations* that need to be borne in mind.
- ↳ *Case studies*.

Note: the minimum elements of Category One are relevant to both Categories Two and Three.

To ensure the approach is rigorous, as well as participatory, fair, and inclusive, the following IFRC tools should be considered throughout:

- ↳ IFRC's Vulnerability and Capacity Assessment.
<http://www.ifrc.org/Global/Publications/disasters/vca/vca-toolbox-en.pdf>
- ↳ IFRC's Minimum Standard Commitments to Gender and Diversity in Emergency Programming.
<http://www.ifrc.org/Global/Photos/Secretariat/201505/Gender%20Diversity%20MSCs%20Emergency%20Programming%20HR3.pdf>
- ↳ IFRC's Project/Programming Monitoring and Evaluation Guidelines.
<http://www.ifrc.org/Global/Publications/monitoring/IFRC-ME-Guide-8-2011.pdf>

The Guidelines build on the IFRC and NRC report, *Security of Tenure in Humanitarian Shelter Operations* (2013/14).¹¹ An early draft of the

¹¹ IFRC and Norwegian Refugee Council, *Security of Tenure in Humanitarian Shelter Operations* (2014). At: <http://www.ifrc.org/Global/Documents/Secretariat/201406/NRC%20IFRC%20Security%20of%20Tenure.pdf>

Guidelines was reviewed by technical experts and tested during field visits to the Philippines and Nepal. This is nevertheless a 'pilot version' that will be reviewed after a period of use. Feedback is welcome. Please send comments to regulatorybarriers@ifrc.org.

3. Basic stages of a community land mapping programme

1. Community Planning Meeting. A meeting and discussion with the whole community is held, where the purpose and objectives of a land mapping programme are explained and a discussion with all parties is started. This should be a public meeting, welcoming everyone, and should be well advertised in advance.

2. Community Rough Mapping. The team does a rough map. Rough mapping is a process that records a community's geographic, social and economic features. It can also be a useful tool for identifying specific issues that affect a community.

3. Land mapping team selection. Mapping teams are appointed and allocated to each area. Teams should be representative of the community or area that is to be mapped.

4. Planning and training. The teams are trained. They learn what is to be mapped and consider the challenges that data collection will raise.

5. Questionnaire/survey design. After the rough mapping, a working group identifies key areas where quantitative data would be useful.

6. Launch. The programme is launched at a public meeting where the results of the rough mapping are shared and a detailed plan and schedule for household mapping agreed.

7. Survey. The mapping team goes house to house with questionnaires, and measures plots and house sizes. It explains to households what the survey is for.

8. Verification. Once collected, the data is checked for standardization and any errors or omissions. Incomplete or disputed information may need to be recollected.

9. Group discussions. Ideally the information gathered is shared with the whole community at public meetings and smaller group discussions. These should be fully inclusive.

10. Creation of public awareness.

4. Minimum considerations applicable to all Categories

Before decisions are taken, it is vital to understand and analyse the political, social and economic dynamics of land in the area and country in which you are working. Consider the different forms of tenure and how people perceive their security of tenure. A Rapid Tenure Assessment¹² should be carried out before determining what level of mapping complexity is appropriate, and applying the Guidelines.

Consider the context in which you are working. Is it rural or urban? In both cases, the minimum elements remain relevant. However, programmes in urban areas will require more time, staff and resources. Because urban environments are more regulated and have more stakeholders, urban assessments are more complex and can take longer to complete.

It took over a month to map the land rights on a single hill (Morne Lazar) with just 26 landowning families.¹³

Analyse the nature of urban communities. Urban areas are usually defined by their administrative boundaries; within these may be many 'neighbourhoods', which may be fixed or transient, and may be shaped by ethnic or other characteristics. Urban residents also adopt a wider range of living arrangements. In fluid or very individualized neighbourhoods, it may be impossible to verify property occupation because people do not know one another.¹⁴ For all these reasons, mapping variances increase and more time is required to

¹² IFRC, *Rapid Tenure Assessment Guidelines for Post Disaster Response Planning* (2015).

¹³ S. Levine, S. Bailey, B. Boyer, with C. Mehu, *Avoiding Reality: Land, institutions and humanitarian action in post-earthquake Haiti* (2012, HPG Working Paper), p. 25.

¹⁴ ALNAP, *Area-based Programming and Coordination Approaches in Urban Response* (2015). At: <http://www.alnap.org/resource/20728>.

understand the social environment, notably the situation of marginalized and socially isolated people, who are often overlooked.

In Kolkata, *thika* tenants rent plots and then sublet rooms to others who sublet beds on a shift system, with each party entitled to certain rights.¹⁵

It is important to work from the start with local authorities, both to secure their approval and ensure that information obtained is valid. Where appropriate, efforts should be made to assist local authorities to manage and take ownership of the programme.

Community mapping is a process. It should not be led by technology. To reach individual households while achieving geometric precision implies striking a balance between technology and process. Technology should be complementary: communities should lead the process and software developers and users should adapt their approach to ensure that communities are involved and comfortable with the technologies used. As approaches become more sophisticated, information management also becomes more demanding. This too should be considered before starting.

None of the three categories generates a formal adjudication of land rights. This should be clearly understood. It is best to think of the exercise as a land inventory process that identifies properties and their occupants. It generates information that at a later date can inform a systematic titling programme, when land administration systems have been re-established. If validated by local authorities, it can be seen as a form of temporary (rather than legal) titling.

Consider how the 'minimum elements' can be incorporated into a broader assessment or mapping process in a manner that avoids creating neighbourhood or official or beneficiary fatigue.

¹⁵ G. Payne, *Urban Land Tenure Policy Options: Titles or rights?* (2000, Paper presented at the World Bank Urban Forum).

As with all programmes consider the impact that a land mapping project may have on areas that border your programme area. How will you determine the boundaries of your project and how will you communicate these decisions to those who fall outside them?

Regardless of the complexity of the methods you adopt, four overriding aspects should be considered before starting:

1. How will you store, maintain and update the data?
2. How will you resolve disputes?
3. What level of ownership will local authorities have over the information?
4. How will you manage expectations? None of the three categories create land ownership; they merely indicate who occupies land and properties. That information may increase security of tenure but will not bestow formal ownership.

5. Category One: Basic technology

Overview

Basic community mapping is a data-gathering process that directly involves the people who are being surveyed. In terms of land mapping, the exercise records, based on individual declarations, how people own or occupy their properties and where those properties are. Neighbours confirm the information. The individual surveys are then compiled and represented visually in a map of the neighbourhood/community, which is finally verified by the community and local authorities. All plots should be referenced and plotted. Once the map has been verified, it can be used as a temporary record of individual and community occupation.

Minimum Elements

1. **Understand the land and housing context** in which you work. For this purpose, consider using IFRC's *Rapid Tenure Assessment Guidelines for Post Disaster Response Planning*.
2. **When assessing needs, include specific questions on land and housing** to crosscheck answers obtained by the Rapid Tenure Assessment. Questions must be context specific.

Examples of assessment questions on tenure used by the Nepal Shelter Cluster after the 2015 Earthquake.

<p>What was your household's status of land and house occupation before the earthquake?</p> <p>Own house and plot Own house but rent plot Own house, rent free plot with consent of owner Own house, rent free plot without consent of owner Rent house and plot with consent of owner Rent free house and plot with consent of owner Rent free house and plot without consent of owner Don't know</p>	<p>What kind of proof have you ever had of this occupation status?</p> <p>Land Title/Ownership Certificate Tenancy Certificate Rental Agreement Proof of address; for example tax or utility bill Verbal confirmation from owner, neighbour or local authority representative None Don't know</p>
<p>Do you still have this documentation?</p> <p>Yes No - it was lost due to earthquake No - we do not have it for other reason</p>	

3. **Consult and co-operate with local authorities and community leaders.** After the assessments described above, discuss the results with local or municipal authorities. Consider with them the viability of neighbour verification of occupation, and the possibility of temporary recognition of occupancy rights. Consider whether a slum or informal settlement upgrading programme has been carried out in the area before the disaster, and what methodologies were used to identify different forms of tenure. If the programme was successful, consider using the methodology and work with officials to modify the

community land mapping programme so that it can build on an already proven concept.

4. **Mobilize the community and build trust.** Meet with the community to agree what forms of formal and informal tenure exist, for both occupancy and ownership. Explain the land mapping process, take account of community feedback, and seek approval for the approach you adopt. You may find it helpful to convene a representative group from the community to gather and discuss feedback.

It will take time to agree the approach. You may need to discuss issues case by case. For example, landlords are likely to perceive that land mapping will formalize the status of their tenants, weakening their hold on the properties they rent out, while tenants are likely to fear that land mapping may cause landlords to raise the rent or evict them.

5. **Communicate the plan and develop a communication strategy.** Make sure that everyone, including landowners and local authority officials, understand what information the land mapping exercise will collect, what results it will produce, and that it will not formalize ownership. Good communication can prevent stakeholders from renegeing later on agreements. To ensure you have done everything possible to manage expectations, prepare a map of the project area; set out the proposed timeframe for each step of the exercise; state clearly what the outcome will address; and indicate what documentation may be received by the individual households at the end of the process.
6. **Share your approach with shelter partners.** Where possible, share findings and solutions with other agencies. It is important to establish a common methodology with other shelter partners.

7. As the process evolves, **create a community map to provide a point of reference.** Display the map in a public space, so that the community understands what is happening and what phase of the programme has been reached. The different levels of complexity in Categories Two and Three can be introduced and implemented at this stage.
8. **Verify the results.** Irrespective of the approach you take, and its complexity, this is vital. Neighbours and members of the community must verify individual claims to property and land. Verification can also take place in community meetings. It is important to ensure that information is understood to be publicly available ('open source'). Display the map and relevant contact details in a public place, so that issues or queries can be addressed straight away.
9. **Obtain signatures.** At the very minimum, ask members of the community to sign the map when they have verified it, to indicate that they are aware of, accept and approve the information it contains.
10. **Assess alternative evidence of ownership or tenure.** In the absence of formal land titles, you will need to decide, with the local authorities, what evidence of tenure or ownership should be provided to households, that will be considered socially legitimate. To determine this, use the questions in Section 4 (Evidence of Security of Tenure – how do people prove they live somewhere) of the **Rapid Tenure Assessment Guidelines**. The following documents may be relevant:
 - Proof of address (utility bills, rental receipts, identification cards).
 - Signed statements of occupation/ownership verified by neighbours or community leaders.
 - Maps of properties or boundary markers, drawn up in consultation with neighbours.

- ↳ Informal maps of land plots, showing trees, burial locations, ritual locations and public areas, agreed in consultation with the community.

Specific considerations

Recognize that land mapping exercises are time consuming and intensive. Think of them as contributions to a long term strategy to increase resilience.

The approach should cover the entire project area. However, you may also need to work case by case, for example if landowners or beneficiaries are not willing to sign off on the whole proposal at once.

Consider the administrative impact on the local authority and how this might be eased. For instance, how can local authorities most easily verify occupation and provide required documentary evidence?

Consider how records might be digitalized. Make clear who owns and who has access to data.

Put in place arrangements for data collection, data storage (after scanning or photography), and data privacy. How is data processed? Where is it stored? Who 'owns' it?

Make sure that vulnerable groups (including marginalized and socially isolated people) are included in the exercise and that power imbalances in the community are managed adequately.

Case Studies

IFRC PASSA (Participatory Approach for Safe Shelter Awareness)

At: <http://www.ifrc.org/PageFiles/95526/publications/305400-PASSA%20manual-EN-LR.pdf>

PASSA is a participatory method that addresses shelter safety by reducing disaster risks. Volunteers guide community groups through eight participatory activities that enable them to: develop awareness; identify, recognize and analyse causes of hazards and vulnerability; and plan shelter safety strategies.

Beforehand, a specific assessment should take place (which usually serves as the foundation for shelter programmes). It maps significant hazards, capacities, vulnerabilities, shelter typologies, settlement features, and construction processes. Its results help managers to select geographical areas for interventions and identify relevant social, economic, cultural and institutional features of the communities in those areas.

Having identified an area for intervention, the programme should inform and consult local authorities and relevant government ministries at district level, as well as potentially suitable communities. They should introduce and explain the PASSA approach to those who show a strong interest. Willing volunteers from the community then form a 'PASSA' group and are briefed on the process and their roles. It normally takes one to two months to complete the first seven PASSA activities, and a further two months for implementation and monitoring. The PASSA group attends eight meetings, facilitated by Red Cross Red Crescent volunteers, during which they work through the PASSA activities. Meetings are held once or twice a week, depending on availability. Between meetings, the PASSA group interacts with the community to ensure that everyone is aware of the process and understands its purpose, and to gather opinions. By the end of the training phase, the PASSA group should have created a plan of action and

a monitoring plan that reflects its own thinking and the concerns of the wider community.

During community mapping (PASSA Activity 2), the PASSA group splits into three sub-groups, each of which makes a map of the community (using paper or local materials). Groups are encouraged to include:

- Important physical features and boundaries.
- Roads, paths and areas of housing.
- Schools, places of worship, health facilities, businesses, etc.
- Farms, fields, forests and other open spaces.
- Streams, ponds and other places where there is water.
- The direction of flow of streams and rivers.
- High and low areas.
- Sites with the most vulnerable shelter.
- Evacuation routes.

The three maps are compared and the clearest one is chosen, borrowing elements from the other two. The map is then photographed, and a volunteer also copies it on to a white cloth, plastic sheet, or paper. The copied map is displayed publicly, where it can be seen by the entire community.

Baan Mankong National Collective Housing Programme

<http://www.codi.or.th/housing/frontpage.html>

The Thai Government launched this programme in 2003, to address the housing problems of the country's poorest urban citizens. It channels government funds (infrastructure subsidies, soft housing and land loans) directly to poor communities. Communities carry out improvements to their housing, environment, basic services and tenure security. They plan their activities and manage the budget themselves.

Each city starts by conducting a city-wide survey of poor communities. Relevant stakeholders are identified who can eventually take ownership of the programme. In community meetings, the programme is explained to ensure that residents understand the financial support measures on offer. A joint committee is then formed to oversee implementation. It includes leaders of poor communities and networks, municipal officials, local academics, and NGOs.

The committee runs a people-led survey to collect information on households, housing security, land ownership, infrastructure problems, community organisations, savings activities, and development initiatives. Using the information gathered, an improvement plan is drafted covering all the city's informal settlements. Pilot projects are then selected and planned, and implementation begins.

The programme enables slum dwellers to survey, identify, and negotiate to acquire public or private land through direct purchase or leasehold arrangements. It allocates land tenure collectively. People can acquire land by purchasing land they already occupy, buying other land nearby, buying or leasing part of the land they already occupy through a land sharing agreement, or obtaining a long-term lease on land from a public agency. Various tenure arrangements can also be negotiated: joint land ownership through community cooperatives, for example, or cooperative lease contracts that may be long (30 years), medium (10-15 years) or short (3-5 years).

The communities decide how to develop the land they have secured. Upgrading is decentralized. Each project is planned and implemented by the community in collaboration with local authorities, with support from other city development partners. The programme grants an infrastructure subsidy of up to THB 25,000 (USD 625) per family for *in situ* upgrading or reconstruction, and up to THB 65,000 (USD 1,625) per family if communities relocate to new land.

One challenge for the project is that the information collected can be of variable quality, because of different levels of participation. Communities that do not face eviction or other serious problems may be slow to join in. At the same time, observers consider the process has strengthened and empowered poor communities by giving them information they can put to use to solve their problems. Community members also learn to plan and work together, and work with local authorities, to improve their housing and security of tenure.

Habitat for Humanity – Community enumeration and mapping (Haiti)

A community enumeration and mapping approach can be particularly useful in informal and densely populated urban areas where land tenure and ownership issues are unclear, where no accurate maps exist, and where official institutions lack the capacity to plan urban settlements and deliver infrastructure adequately. The local community governance structures it establishes can partly compensate for the absence of municipal planning, and encourage municipal authorities to engage as plans are taken forward.

The community enumeration project in Simon Pelé started after the 2010 earthquake in Haiti. It confirms that this approach can be very effective in densely populated informal settlements after a disaster.¹⁶ Simon Pelé had a population of approximately 30,000 people. The project facilitated the training of 30 engineers to carry out 625 detailed damage assessments and hired 4 community enumerators who completed more than 6,500 household surveys. 2,700 houses and land boundaries were mapped, and a complete community database with linked maps was created.

¹⁶ Habitat for Humanity, *Urban Neighbourhood Approach: Community-based Enumeration and Community Contracting* (2012, Port au Prince case study). At: http://www.habitat.org/lc/TheForum/english/pdf/Forum_Vol19_1.pdf.

The process was as follows:

- ↳ In consultation with community representatives, community-based organizations, and camp committees, the project selected a local enumeration team. It included members of the target community, local authorities and academics.
- ↳ The enumeration team met community leaders and city officials to 'rough map' the settlement.
- ↳ Community members carried out a trial run to test the survey.
- ↳ The enumeration exercise was launched at a public ceremony. Ministers, mayors and local leaders attended to add political credibility.
- ↳ Each household was surveyed, a verification process identified points of disagreement, and these were settled by members of the community. Habitat for Humanity staff compiled the data and presented it in graphs, charts and narratives. These were shared with the community and city officials.
- ↳ With clipboards, pencils, tape measures and GPS units, enumerators then created qualitative and quantitative maps of their settlements. They surveyed each household, and numbered and measured each structure.
- ↳ Community mapping sessions put detail on the initial rough mappings (step 2 above). Elements of the household and cadastral survey were then combined with the community maps to provide a more in-depth and comprehensive view of the neighbourhood. In further community workshops, the community developed a physical and spatial master plan.
- ↳ The results of the enumeration were tabulated and presented to the community at a 'validation' event.

The project was time-intensive. A number of the community representatives also had personal agendas. It became important to establish who owned and had access to the data both during the project and afterwards.

6. Category Two: Moderately sophisticated technology

Overview

After disasters, many properties may be left partly standing. After an earthquake, even if a house has collapsed, its rubble is evidence of a property or boundary demarcations. By contrast, floods and tsunamis often wash away evidence completely. In Aceh, up to 80 per cent of land demarcations were obliterated after the Tsunami in 2004. In such cases, land mapping requires more than a community consultation to verify who lives where. Far more comprehensive mapping is needed to determine how much space individual households formerly occupied or owned. It requires more time, and more stakeholder engagement and community buy in.

In emergency responses, it is essential to strike the right balance between speed and deliberation; a perfect damage assessment is not always appropriate. In the case of mapping, official and community-based approaches should ultimately complement one another, but community mapping can fill an immediate need while government frameworks are set up or restored.

Where entire communities have been destroyed by a disaster, governments are likely to undertake a systematic adjudication: they will seek to identify, collect and record all land tenure relations in an area at the same time. This is where participatory enumeration can sometimes help, by completing part of the work of a systematic adjudication process. In order to safeguard compatibility, participatory enumerations should mirror the formal statutory steps of systematic adjudication in such cases. They can gather essential information and enter data in a documentation system; adjudication decisions can then be made on who holds rights to occupy or own land or properties.

Minimum Elements

1. Overall, community adjudication follows the steps identified in Category One (see above). However, there are some considerations in addition.
2. Consider requesting geo-spatial data (satellite images) from UNOSAT. Satellite images can provide impressionistic information dating from before the disaster. Pre-disaster and post-disaster images can also be compared, and the results validated by ground observation and surveys. This provides a foundation for community mapping. For community members, it is easier to draw land parcels precisely on a satellite map that shows topographic data, housing units, and natural features than on the out-dated maps that municipalities and land management offices often use.
3. Consider creating a matrix to identify the different characteristics of land parcels. (See the Case Study on Aceh, below.)
4. Discuss with local authorities how landowners can temporarily identify their boundaries. For instance, they might put boundary stakes around their land parcel, and complete a statement identifying its location and ownership. Statements may be endorsed by the owners of neighbouring plots and the village head or local government official.
5. Once boundary markers have been agreed, boundaries will need to be recorded and transferred to a map. For this, community members will need to receive GPS training. To avoid discrepancies in measurement, the same GPS platform or technology should be used throughout the affected area.
6. Work with the government or local authority to establish land registration committees. These can verify the approach taken and the results, in advance of community verification.
7. Ensure that local courts can adjudicate claims and inheritance issues; and that they are accessible.
8. Work with the authorities to mobilize accredited surveyors to oversee the surveying of boundaries and land parcels.

9. After a complete map has been compiled and verified by the land registration committee, it should be publicly displayed for at least 30 days, allowing time for objections to be lodged before the land registration committee or local authority.

Specific considerations

In order to be considered compatible with the official procedure, community adjudication exercises must collect information using prescribed methods. Because enumerators must be trained to use these, recruiting them from within the community can sometimes become difficult – which in turn threatens the participatory nature of the process.

A participatory enumeration is most straightforward when it is the only basis for adjudication. Complications arise if other evidence becomes available (such as recovered official records), because there will inevitably be some divergence. If participatory enumerations are to be accepted by official adjudication systems, they must guarantee that data is reasonably accurate and that prescribed procedures have been followed.

For a participatory adjudication process to be accepted by all stakeholders, especially government, it may be necessary for the government to grant a clear legal mandate to a dedicated taskforce. The process required to operationalize such a taskforce with requisite 'buy in' from all stakeholders could lead to delays and cause frustrations.

After a mega-disaster (such as a large tsunami), many different organisations will be present, with different focuses and priorities. Organisations that help local people re-establish themselves and find adequate shelter may have little interest in longer term initiatives such as land adjudication. Coordinate with other shelter actors as much as possible, in forums such as the Shelter Cluster. Since land adjudication can be expensive, discuss with

other agencies the technologies they plan to use. See whether it would be possible to collaborate and share costs.

Interpret satellite images with care. Appearances of precision can be misleading. Persistent cloud coverage can also obstruct and interfere with the quality of images. Even the best should ideally be interpreted by trained and experienced staff.

Case Studies

2004 Indian Ocean Tsunami, Aceh, Indonesia – Community-driven adjudication

<http://www.worldbank.org/projects/P095883/reconstruction-aceh-land-administration-system-project?lang=en>

The tsunami affected more than 500 miles of coastline, and an estimated 53,795 parcels of land were permanently destroyed by erosion or submersion. Most documentation of land ownership was also destroyed along with much of the physical evidence of possession (walls, fences, boundary markers).

The Reconstruction of Aceh Land Administration System (RALAS) project was designed by the World Bank and the Multi-Donor Trust Fund (MDF) for Aceh and North Sumatra to support reconstruction of housing and communities in post-tsunami Aceh. The project design included an official community land mapping process to title land, and within it a community land mapping exercise facilitated by civil society. The MDF provided USD 28.5 million of World Bank funds to restore land and property rights, develop a computerized land records management system, and strengthen the land administration system in Aceh province.

The initial phase of activity, funded by USAID, took place in three sub-districts of the city of Banda Aceh. The programme was eventually extended to more than 400 villages across Aceh province. Community members conducted a land inventory

using guidelines developed by the national Land Administration Agency (LAA). Volunteers were trained to identify landmarks and produce drawings. When a parcel boundary was mapped, it was signed by a family member and owners of neighbouring parcels (left, right, front and back). The LAA then validated the community's declaration of ownership and boundaries (using land records from before the tsunami and parcel measurements), and secured community agreement.

16 different characteristics of land parcels were identified in Aceh.

N°	Land parcel	Owner	Land certificate	Official document
1	Exist	Exist	Exist	Exist
2	Exist	Exist	Exist	Exist
3	Exist	Exist	No	Exist
4	Exist	Exist	No	No
5	Exist	No	Exist	Exist
6	Exist	No	Exist	No
7	Exist	No	No	Exist
8	Exist	No	No	No
9	No	Exist	Exist	Exist
10	No	Exist	Exist	No
11	No	Exist	No	Exist
12	No	Exist	No	No
13	No	No	Exist	Exist
14	No	No	Exist	No
15	No	No	No	Exist
16	No	No	No	No

Land-Owner-Document Condition. From T. S. Haroen, E. S. Herryani, A. N. Hidayat, *Cadastral Reconstruction in Aceh* (2005, paper presented at the MAP ASIA 2005 Conference, Hotel Mulia Senayan, Jakarta, 22-25 August 2005).

Over four years, the project completed community land maps for 317,170 land parcels. 275,945 land parcels were officially surveyed and adjudicated, and 238,758 registered in the Buku Tanah (official Land Book or Register). At the end of 2006, the National Land Agency (Badan Pertanahan Nasional, BPN), the Bureau of Reconstruction and Rehabilitation for Aceh (Badan Rehabilitasi dan Rekonstruksi), and Aceh's provincial government formulated a Joint Land Titling Policy that was adopted for implementation under RALAS. Under the policy, 63,181 titles were distributed to women owners (individually or jointly with their spouses), about 28 per cent of all titles distributed.

UN-Habitat/GLTN - Social Tenure Domain Model

<http://www.stdm.gltm.net>

The Social Tenure Domain Model (STDM) is a multi-partner initiative of UN-Habitat, the Global Land Tool Network (GLTN), the World Bank, the International Federation of Surveyors, and the University of Twente, Faculty of International Institute for Geo-Information Science and Earth Observation (ITC). Initiated in 2005, a prototype was presented in 2010. The STDM is a development tool that provides an overview of who lives where, under what tenure conditions. To do this, it creates a complete map of 'people to land relationships' that recognizes all forms of social tenure (personal, customary, informal, and indigenous land use and property rights). Bringing professional surveyors and communities together to create multiple tenure data produces a more sophisticated map: it can also establish the basis for a Land Administration System (LAS) that is able to record multiple forms of tenure, address the specific needs and vulnerabilities of displaced and non-displaced persons, and support durable solutions in cases of return, resettlement or local integration.

The STDM integrates social elements in land administration by:

- ↳ Acknowledging non-formal tenure arrangements.

- Creating options for innovative and incremental approaches to improving security of tenure.
- Bridging the gap between formal tenure systems that emphasize title and informal ones that do not.
- Unpacking existing social tenure arrangements.
- Providing a snapshot of people-land relationships at any given time.
- Informing land administration structures about the situation on the ground.

The STDM collects the following initial data (types):

- Spatial Unit Inventory. What medium is used for physical evidence (image, photograph, sketch, map).
- Social Tenure Inventory. What evidence is used to show occupation (paper, digital, verbal, historical).
- Spatial Unit. What evidence is used to outline buildings (topological drawing, point, sketch, drawings).
- Social Tenure Relation: ownership, informal tenure, customary tenure, cooperation, tenancy, possession, occupation, common land, religious.
- Group: farmers, indigenous, association, informal.
- Gender: male, female.
- Quality: terrestrial, satellite image, digitized, GPS.
- Use: agricultural, residential.
- Point: concrete post, bottle, metal pipe, nail, monument, wooden pile, etc.

The STDM approach pioneers a new way of thinking about land records, using free open source software that allows individuals with little training to collect, record, analyse and disseminate land administration data. Its software can link individuals or 'land users' to specific parcels of land or 'spatial units' using different social tenure options. Individuals are also identified by photographs, fingerprints and signatures to ensure that records

are valid. Before inputting data, however, the land must be surveyed using the following means:

1. Communities (villages, co-operations, slum dwellers organizations, or NGOs) can organize data collection, but must use appropriate tools.
2. If on-site tests demonstrate their quality, high-resolution satellite images can be used to establish parcel index maps in selected cities or villages. After printing the images on paper (at a scale of 1:2000), the boundaries of spatial units are determined on the ground using a pencil.
3. Data on boundaries as well as administrative information (such as village names) are collected on the ground in the presence of local officials and those who own or occupy the land. The software can also upload supporting documents (photographs, maps, images).
4. The field data map is scanned and placed over the original image drawing. This can also be done with digital pens, which computers can read and geo-reference at once without scanning.
5. The drawn boundaries are vectorised and given identifiers. (Preliminary identifiers may be used during field data collection.)
6. The vectorised spatial data can be linked to personal data using a spatial tenure relationship.
7. The data is then presented publicly to local communities. (Images and boundaries may be projected on a screen, for example, if electricity is available.) Local people and community leaders and neighbourhood councils are invited to check the data.

8. Certification of occupancy can then be agreed with the national and local government, so that individual evidence of occupation is provided to each household.

The analysis generated by this process not only feeds into community-driven advocacy for tenure and housing rights, including access to basic services, but can assist municipalities and urban governance institutions to plan for movement of people from rural areas.

CARE – Kabul Shelter and Settlement's Programme (KASS) 2007

<http://pqdl.care.org/CuttingEdge/Delivery%20of%20Humanitarian%20Shelter%20in%20Urban%20Areas%20-%20Afghanistan.pdf>

KASS was implemented by CARE and funded by USAID and the Office of US Foreign Disaster Assistance (OFDA). It provided 3,774 households with safe, adequate and habitable shelters, and delivered integrated shelter activities (such as safe water supplies and sanitation, health education and ditch drainage) to 6,625 households in seven districts of Kabul. The project succeeded because it involved key stakeholders, including the Kabul Municipality and community members, in everything from beneficiary selection to choice of project sites. A Memorandum of Understanding (MoU) with the Kabul Municipality ensured that all shelters were recognized and permitted to remain for five years. This was a first step towards recognizing land tenure and gave the residents some security of tenure. Significantly, in the MoU the Government of Afghanistan explicitly authorized people living in unplanned areas to build and occupy structures on land they owned. Previously, the Municipality had been unwilling to grant such a concession to residents of unplanned areas.

The project began by identifying the availability of vacant or underutilized land. A group of trained surveyors documented the

different types of structures in the city, including repairs required, and unoccupied and underutilised land. They also gathered information on issues of land ownership, including the status of land. As its base reference, the survey used official maps produced by AMIS (Afghanistan Information Management Service, a UN body) alongside official maps available at the district offices of the municipality. The area was mapped by physical observation without the use of GPS or other technology. Information was recorded on hand-drawn maps. These were subsequently used to advocate for land ownership, since Kabul Municipality would not guarantee the issuance of land certificates but agreed to provide letters approving occupancy.

Once the shelter programme started, GPS devices were used to plot the different types of shelter assistance provided, the location of latrines, family water points and community wells, and drainage ditches and gravelled roads. The project gathered exact information on the land parcels where KASS shelters were constructed in order to strengthen residents' claims to tenure. KASS maps later served as a planning, management and advocacy tool and reinforced legal claims to land ownership because the land occupied, and the shelters that KASS had constructed, were clearly identified on a map.

In parallel, KASS established elected Community Councils that monitored project implementation, settled conflicts, and brought residents' needs to the attention of higher authorities. The project's MoU with the Kabul Municipality, and its recognition of the right to own structures and occupy them, encouraged residents to contribute to shelter construction. When households were awarded KASS housing assistance, the beneficiaries signed an agreement with CARE that was countersigned by representatives of the Community Council and the Municipality.

One challenge was to reconcile the official maps, the hand drawn maps, and changing district division maps. Official maps were outdated and inaccurate, while hand drawn maps were accurate but incomplete and not to scale. In the absence of supporting documents, landowners, residents and the authorities could not always be sure where land boundaries lay.

UNOSAT

<http://www.unitar.org/unosat>

UNOSAT provides geo-spatial data, such as GIS data and satellite images to UN agencies. At their request, it can produce maps for a given context. In general, satellite images provide impressionistic information that should be validated by ground observation and surveys. However, because they have become increasingly accessible to International NGOs, civil society groups and individuals concerned with human rights abuses, they are often now used to plot changes on the ground in areas where ground observation is not possible, because of disasters, conflict or political volatility.

In disaster assessment and risk management, satellite imagery has been used for rapid assessment of the damage caused by a disaster, especially at the start when access may be limited. For example, UNOSAT provided satellite images of the destruction in Mindanao after Tropical Storm Washi or Sendong in 2011/2012, assisting humanitarian organizations to develop strategies for response and recovery. Satellite images are also used to generate geo-referenced hazard maps that highlight areas vulnerable to future disasters, helping agencies to ensure that people who are displaced do not return or resettle in high-risk areas. Both uses of satellite imagery can be used for urban areas.

Satellite images can prevent or limit new displacement and promote durable solutions for IDPs by:

- ↳ Informing urban land planning, limiting construction in areas prone to hazard, and improving resilience by strengthening building standards.
- ↳ Providing evidence for advocacy to prevent or sanction forced evictions.
- ↳ Analysing land use and land vacancy.
- ↳ Monitoring the situation in camps (growth, weather damage, changes that affect protection and camp management, coordination, and service provision).
- ↳ Identifying reconstruction needs.
- ↳ Supporting community mapping by providing pre- and post-destruction satellite images.

7. Category Three: Sophisticated technology and expertise

Overview

Agencies are increasingly adopting a settlements approach (also called a neighbourhood approach or an integrated programme approach): they take responsibility for the holistic recovery of a community or neighbourhood, not just by providing shelters, health units or education facilities, but by taking steps to rehabilitate the community as a whole, which implies developing all the services a community requires to be resilient and sustain its future. To achieve this goal, agencies are looking for technologies that give them an overview of the project area from the outset and identify each household they assist.

Unmanned Aerial Vehicles (UAVs) and satellite imagery can support a mapping programme; together with hand-held GPS and ODKs (used to gather household information), they can support community verification. When all the information is represented on a GIS system, it is possible to produce a map to household level, which in addition can be a tool for decision-making and for monitoring and evaluation. Since a snapshot can be taken in under an hour, aerial photography can significantly reduce the time required to complete the community mapping programmes outlined in Categories One and Two.

Minimum elements

1. All the minimum elements of Category One are relevant. More attention must be given to engagement with stakeholders and the community.

2. Although UAVs can quickly produce maps that are more detailed than pre-disaster satellite images, this type of mapping requires specialized equipment, software and training.
3. In many countries, laws governing the use of UAVs are not in place, and their use must be cleared with national and local authorities. Where laws are in place, regulations must be followed: this may require you to inform regulators, obtain clearance documents, and respect no-fly zones (in the vicinity of airports, logistics hubs, etc.).
4. Ethical concerns and the privacy of project participants must be considered, because UAVs may capture sensitive personal information when they observe private property. People may be uncomfortable about being filmed; they may be shown going to places or doing things they want to keep private; illegal businesses or structures may become visible. Few countries have comprehensive domestic legislation on privacy, data protection and information storage. Seek advice on what community members who are observed should be asked to approve, and on what constitutes informed consent (both formal and informal).
5. Community engagement is critical. In addition to official consent, the community must decide whether the use of UAVs is acceptable. In addition to explaining land mapping to the community, you will need to explain UAVs and how the information they obtain will be used.
6. Whether or not UAVs are employed, a comprehensive baseline map and Geographic Information System (GIS) can incorporate numerous features using data obtained from household surveys, GPS, fieldwork, statistical descriptions, and spatial analysis. Ensure that a GIS technician is involved from the beginning of the project.

7. Use open source maps such as those provided by OpenStreet Maps or the Missing Maps project (see case studies). These outline roads and street names, footpaths, and waterways (rivers, drainage). In urban areas, include administrative boundaries; the local authority's planning department can often provide these.
8. During household surveys, GPS handheld devices can provide dot locations of surveyed households. Train community enumerators in their use to ensure that locations are accurate. If boundary demarcations are visible, generate GPS dot points at each significant point of the boundary marker. Take particular note of unused spaces that might be used for temporary shelters.
9. Work with local authorities throughout to ensure they are equipped to manage and run the database when the project ends.

Specific considerations

Using UAV and GIS may be less expensive in the long run than manual land surveys. However, these technologies need to be carefully managed and communicated to ensure the community fully accepts them and remains involved.

Regardless of safety records, liability insurance for UAVs should be seriously considered. Evaluate the cost implications, especially of mechanical failure.

The military remain the largest users of UAVs and many manufacturers are military contractors. The agency responsible for the project should therefore consider ethical issues, including concerns about neutrality, before approving their use. Seek its approval before opening discussions with the government or communities.

Identify UAV best practices, for achieving transparency, engaging with communities, programme design, codes of conduct, and data security. A useful contact is the Humanitarian UAV Network (<http://uaviators.org/>).

Decide at the start whether to buy or hire the UAVs you employ. Consider who will operate, maintain and repair them, and what rules and regulations will govern their operation.

Aerial photographs, GPS printouts, urban planning blueprints and district maps can be printed out for annotation by enumerators and members of the community. However, such documents can often be difficult to obtain or expensive to buy. They may also be too detailed, or difficult to read and interpret. District maps and urban blueprints may reflect administrative boundaries and may not accurately represent the community.

Though GPS and the development of digital maps and GIS have proved valuable, they do not *replace* detailed work on the ground or interaction with residents. Mapping based on aerial or satellite images without ground verification cannot determine populations or the boundaries between houses or settlements; these technologies provide little information on house structures. Professional surveyors working in consultation with residents produce more sophisticated maps that can support a better Land Administration System.

Case Studies

Missing Maps project

www.missingmaps.org

Founded by American Red Cross, British Red Cross, Humanitarian Open Street Map and Médecins sans Frontières, this project maps the most vulnerable locations in the developing world.

- Satellite images are plugged into OpenStreetMap, a free mapping software.
- Volunteers log in remotely, from anywhere in the world, and use an easy point and click tool to trace the outlines of buildings, roads, parks and rivers over the satellite image, producing a basic digital city map after the satellite image is removed.
- The map still lacks street or landmark names. It is therefore physically printed and posted to volunteers in the city concerned, each of whom takes a small section and inserts the names of streets, buildings, neighbourhoods etc.
- The completed maps are posted back to Missing Maps HQ in London, where volunteers insert the names on OpenStreetMap, producing a city map that is open source and free to use.
- Humanitarian organizations use the mapped information to plan risk reduction and disaster response activities.

Catholic Relief Services (CRS) – Tacloban, Philippines

<http://www.crs.org/media-center/typhoon-haiyan-crs-helps-families-build-safe-permanent-homes>

Funded by CRS and USAID, this programme delivered shelter, WASH, protection, and disaster risk reduction (DRR) services to 3,000 households affected by Typhoon Haiyan. The households, who included some private owners, were located in dense, informal urban settlements which, as a result of the typhoon, has been declared a no-build zone.

At household level, the programme provided shelter, a toilet, a water connection and grey water drainage assistance, paralegals to help with civil document recovery, and trainings - on 'build back safer' construction, hygiene promotion, housing, land and property rights, protection issues, and family preparedness. Additionally, at barangay level, the programme provided trainings in DRR and evacuation planning, and support for drainage, solid waste management, and barangay infrastructure. Projects were identified via a participatory community planning process.

CRS used a UAV and GIS to map the communities they assisted, for the following purposes:

- ↳ Land Tenure Mapping proved title or occupation.
- ↳ The participatory development and application of maps increased residents' engagement.
- ↳ Improvements to settlement design created healthier, safer communities.
- ↳ A contour map improved the design of infrastructure projects.
- ↳ Mapping made it possible to plan and display neighbourhood evacuation routes.
- ↳ Data-linked images improved communication with donors and internal decision-making and monitoring.

Process

Baseline maps were developed with GIS specialists, drawing on a range of sources:

- ↳ Data from Open Street Map (for roads/footpaths and rivers/drainage); from the City Planning and Development Office (for administrative boundaries); from NASA (for elevation and contour mapping); and from MapAction (for assessing post disaster damage).
- ↳ High resolution UAV images of the project area (for detecting land cover change and to verify CRS' household registration data).

- ODKs and GPS (for household surveys, to establish a 'spot point' on each site).
- Community workshops (added information to baseline maps). Acetate overlays enabled the project to digitalize community-generated maps and add their information to baseline maps.

By combining GPS data and UAV images, each structure was uniquely identified with a particular household; data on housing damage from the household survey was then inputted and visually represented, providing a complete map of the project area.

IOM – Overcoming land tenure barriers to return and reconstruction, Haiti (2011 onwards)

<http://www.brookings.edu/~media/research/files/reports/2014/02/07%20haiti%20displacement/supporting%20durable%20solutions%20to%20displacementhaiti%20feb%202014.pdf>

IOM Haiti established a legal team to deal with land issues associated with IOM's post-earthquake return and reconstruction programmes in three key neighbourhoods. It had three objectives:

- To gather comprehensive information on land tenure and house occupancy status and organise and store the data accessibly.
- To make the data available to the Government of Haiti and to humanitarian partners working on return and reconstruction programmes.
- To promote a single approach to land enumeration and assist other actors doing similar work.

Step by step process

Component 1 – Data gathering and validation

The project undertook GIS/mapping (household registration, legal research, and community validation). It gathered information on building status (damage and use), household demographics (size, single and couple headed households, age), and land tenure (land owner, building owner, acquisition). It also reviewed the tenure history of neighbourhoods.

Component 2 – Establishment of a land tenure database and data sharing mechanisms

The project developed a land tenure database, which was copied to the government and other reconstruction actors. A user-friendly sharing arrangement was agreed.

Component 3 – Land dispute mediation

The project developed a dispute mediation strategy, including a mechanism for referring land dispute cases to the government.

Component 4 – Harmonising methodologies

The project created a systematic enumeration methodology that was used by other organizations involved in reconstruction.

Between 2011 and June 2013, the project collected data, validated by the community, on 10,695 plots and buildings in two neighbourhoods. It found that the vast majority of residents had lived in Delmas 32 since 1986 uninterruptedly and without challenge, which implied a high degree of *de facto* tenure security and that land and property transactions occurred without great difficulty.

The shelter legal team in Haiti played an important anticipatory role by taking steps before shelter construction started to reduce the risk of land conflict. In essence, its investigation of land tenure on pieces of land scheduled for shelter construction showed that

a high proportion of those who declared that they owned the land they occupied had no formal evidence of ownership. (Receipts of private sale, proof of property tax payments, private lease agreements were used instead.) To stabilize this situation, the team established whether properties had more than one claimant, verified claims with state authorities and the public, checked that the land in question was not state property, and identified any objections. In this exercise, community meetings and dialogue with owners and shelter beneficiaries played a crucial role.

The legal team also designed forms relevant to the shelter construction process (request for shelter construction, authority to begin construction, agreement letter, etc.). These were completed and signed whenever land tenure situations were unclear or disputes could be anticipated.

Informal land tenure security in certain neighbourhoods is high, and care needs to be taken that formalisation attempts do not weaken this security.

USAID Mobile Application for Secure Tenure (MAST)

<http://www.usaidlandtenure.net/project/mobile-application-secure-tenure-tanzania>

USAID has developed 'an easy-to-use, open source smartphone application that can capture information required to issue formal documentation of land rights. Coupled with a cloud-based data management system to store geospatial and demographic information, the project is designed to lower costs and time involved in registering land rights.' The project is currently being piloted in rural Tanzania where USAID is working directly with villagers to map and record individual land rights. The project has trained local people to collect and verify data and the mapping results will be presented to community-wide gatherings for validation.

The data capture application is an android-based mobile application which:

- ↘ Captures spatial, alphanumeric and multimedia information on land rights.
- ↘ Holds data in offline mode for transfer to a cloud-based data management server when a connection is available.

The source code for the MAST android application is available at: <https://github.com/MASTUSAID>

8. Why use community mapping in a humanitarian response?

Maps help to visualize a space and portray how that space is occupied. In humanitarian work, they play an important role in post disaster assessments, disaster risk reduction, and the creation of safer communities. They display in understandable terms the resources, services, vulnerabilities and risks of a community. They can indicate the location of health clinics, schools, water sources and homes, or identify locations at particular risk (such as areas prone to floods or health hazards), and indicate which residents are vulnerable. Humanitarian agencies have always considered that mapping for these purposes needs to be simple, because they are made for and by the community, and a broad variety of residents must therefore be able to use and understand them.

There are three main kinds of community maps: hazard/risk maps, spatial maps, and capacity resource maps. For tenure and land occupation mapping, spatial maps tend to be the most relevant. They map land use and show the main features of an area in relation to their surroundings. Map features may include the arrangement of houses, fields, roads, rivers, and other land uses. Maps can also indicate which services or natural resources (such as water sources) are accessible and owned by individuals or the community.

Community maps are often used to plan activities, or to monitor and evaluate changes (by comparison with earlier maps). For the identification of tenure types, however, maps primarily show evidence of ownership or occupation. Of course, they can serve other purposes too: for example, they can identify land that is available for temporary shelter or relocation.

When maps provide evidence of occupation or ownership, however, it is important to choose the most appropriate way to display the results. The purpose of these Guidelines is to establish how people occupy their homes and property: maps therefore need be detailed enough to show individual households. In consequence, it is vital to make sure that everyone in the community or neighbourhood has access to the map that is being created, to input their data, to share the information with neighbours and the community as a whole, and to verify the final result, ensuring that all marginalised groups are included.

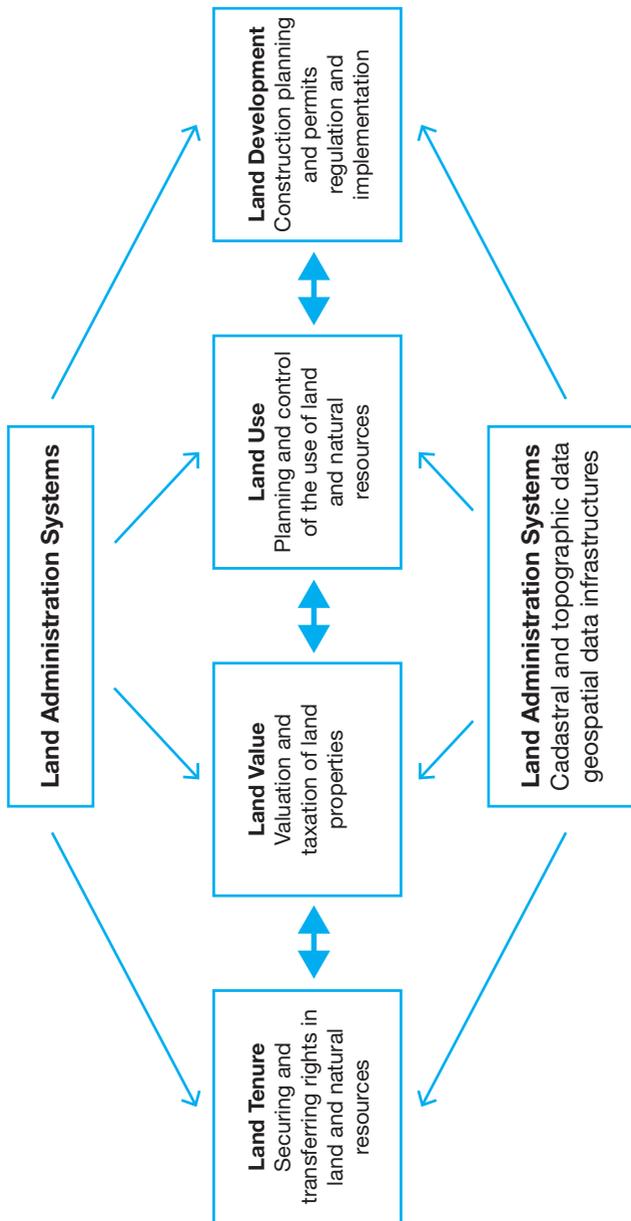
9. Why land governance and administration systems should be considered in post disaster community land mapping programmes?

As the demands for and on land increase, states need land policies to govern its use and development as well as access and tenure. Many developed states have established specialist bodies for land administration in addition to land laws, rules and procedures. These bodies are responsible for land information systems that link land plots with their occupants or users. Area mapping and plot titling typically result in a cadastre, which ties land information to a parcel map or spatial database. However, this process is resource heavy. UN-Habitat has stated that, at the present rate of registration, it will take centuries to achieve complete title coverage in a large number of countries.¹⁷ Humanitarian shelter agencies can therefore meet an important need by delivering programmes that enhance people's occupancy rights and improve security of tenure. To have value and avoid harm, however, such programmes must take full account of the local context.

National, district or city councils and other local authorities are primarily responsible for managing and administering land. As well as underpinning security of tenure, the information held by land administration systems enables land to be managed at scale. Many problems emerge in urban and rural land management when key information is not available. For example, there can be effects on access to safe water, sanitation, and community facilities – and, as elsewhere, poorer members of society are likely to

¹⁷ UN-Habitat, *Designing a Land Records System for the Poor* (2012, Nairobi). At: <http://www.stdm.gltn.net/docs/Designing-a-Land-Records-System-for-The-Poor.pdf>.

'Minimum elements' for community-based land mapping approaches in post disaster contexts



Adapted from International Federation of Surveyors, Policy Statement No. 45 on Land Governance in support of the Millennium Development Goals (2010).

suffer disproportionately. In addition, if claims to ownership have not been established, competition for land is more likely to lead to conflicts and land grabbing.

In general, land administration systems are parcel based and only consider conventional legal evidence for ownership or occupation. This means that they do not register many forms of land tenure. Globally, the land use rights of informal settlement residents, slum dwellers, families and groups living under customary tenure, indigenous people, pastoralists, and refugees are frequently invisible to, and ignored by, conventional land systems. Given that over 70 per cent of land in many countries falls outside the land administration system, new and innovative approaches are needed to collect data with geometrical accuracy on more forms of tenure. The scale of this task can seem intimidating. In order to convert its deeds-based land registration system in rural areas into a title-based system, India is currently in the process of transcribing 430 million records of 140 million owners in nine scripts and 18 languages.¹⁸

Many innovative 'intermediate' tenure options have been developed, such as temporary occupation licences, declarations of possession, and certificates of comfort. They have involved numerous stakeholders - from landowners to private developers and national governments. In some circumstances, such documents can be used in post-disaster settings. Many development agencies are also working with governments to incrementally improve informal settlements and rural areas, many of which have not been subject to area mapping or plot-titling. Examples include slum upgrading with land regularization, and pro-poor land recording systems. (See the case studies of the Baan Mankong Housing Programme and UN-Habitat's Social Tenure Domain Model.)

¹⁸ International Federation of Surveyors, *Policy Statement No. 45 on Land Governance in support of the Millenium Development Goals* (2010). At: <https://www.fig.net/resources/publications/figpub/pub45/figpub45.pdf>.

EXAMPLES OF AFRICAN TENURE INNOVATION

Tanzania. Residential licences in urban areas can be converted later into full title deeds.

Rwanda. The law specifies that formal registration at national level is necessary only for plots larger than five hectares. For smaller plots, local registration methods are to be used.

Ethiopia. The state is considering certification in two phases (less and more comprehensive).

Lesotho. Three forms of lease are under consideration: 'primary', 'demarkated' and 'registrable'. The creation of land records prior to land registration is also under consideration; however the Land Act of 2010 stopped short of legalizing these innovations.

Mozambique. Mozambique has introduced several innovations in tenure and land administration. The 1997 Land Law accepts occupancy rights as equivalent to registered land rights. Oral evidence is equated with title evidence. An investor can obtain a land title only after thorough adjudication to check that the rights of occupants are taken into account and that they and the investor have reached agreement. This pro-poor approach has not yet been applied to urban areas because the necessary regulations have not yet been passed.

From UN-Habitat, *Handling Land* (2012).

Much work is already being done in both the humanitarian and the development sectors to raise awareness of land issues. Initiatives include disaster risk reduction measures such as IFRC's PASSA (Participatory Approach for Safe Shelter Awareness), integrated approaches to post-disaster programmes, and the development of pro-poor tools to record land occupation. To establish 'minimum elements' of community land mapping, both humanitarian and development approaches need to be considered. The ambition should be to combine rigour and speed to ensure that shelter assistance is equitable and sustainable and reaches more affected vulnerable people requiring support than at present.

The Fundamental Principles of the International Red Cross and Red Crescent Movement

Humanity The International Red Cross and Red Crescent Movement, born of a desire to bring assistance without discrimination to the wounded on the battlefield, endeavours, in its international and national capacity, to prevent and alleviate human suffering wherever it may be found. Its purpose is to protect life and health and to ensure respect for the human being. It promotes mutual understanding, friendship, cooperation and lasting peace amongst all peoples.

Impartiality It makes no discrimination as to nationality, race, religious beliefs, class or political opinions. It endeavours to relieve the suffering of individuals, being guided solely by their needs, and to give priority to the most urgent cases of distress.

Neutrality In order to enjoy the confidence of all, the Movement may not take sides in hostilities or engage at any time in controversies of a political, racial, religious or ideological nature.

Independence The Movement is independent. The National Societies, while auxiliaries in the humanitarian services of their governments and subject to the laws of their respective countries, must always maintain their autonomy so that they may be able at all times to act in accordance with the principles of the Movement.

Voluntary service It is a voluntary relief movement not prompted in any manner by desire for gain.

Unity There can be only one Red Cross or Red Crescent Society in any one country. It must be open to all. It must carry on its humanitarian work throughout its territory.

Universality The International Red Cross and Red Crescent Movement, in which all societies have equal status and share equal responsibilities and duties in helping each other, is worldwide.

**For more information on this IFRC publication,
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