Mapping Indigenous Lands: Issues & Considerations

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Summary: This paper is a discussion of indigenous mapping, which I define as mapping done by and for indigenous peoples to achieve political objectives. The primary purpose of mapping of this sort has been, and will continue to be, to claim and defend land and natural resources. Secondary goals include strengthening political organization, recording traditional history and culture, developing education programs on a variety of topics (such as the environment), and planning for economic development. I begin with some general comments on indigenous mapping and then look more specifically at the community mapping methodology Native Lands has been developing over the last 14 years. We often note that the methodology is simple in concept yet complex in practice. It is not hard to understand the main outlines of how it works; but when one is on the ground and the wheels of all the component parts are set in motion, with people interacting, logistics to be arranged, deadlines to be met…the complexity of the undertaking becomes apparent.

Indigenous mapping projects should not be seen as technical exercises, but rather as social-organizational events that happen to have a technical component. They can be, if handled correctly, much more than undertakings to produce maps. The process is as important as, if not more important than, the product that rolls off the conveyor belt at the end. In this paper I want to lay out some of the component parts that have made up our work with indigenous peoples in Latin America, Africa, and the Island of New Guinea and show how they interact and move forward. With the details of the process on display, I then go on to discuss a number of issues that I consider central to indigenous mapping as a whole.

Perspective: Human beings have most certainly been making maps since the beginning, whenever that was. Maps serve as a useful tool in finding your way around, and the first maps were probably lines on the ground drawn with sticks. Today most people haven’t really progressed beyond this stage – they use MapQuest to locate vacation spots or consult atlases to find exotic places mentioned in the news.¹ Webster’s New World Dictionary, for example, defines a map as “a drawing or other representation, usually on a flat surface, of all or part of the earth’s surface, ordinarily showing countries, bodies of

¹ Apparently few people in this country even do this. A recent poll found that of Americans age 18 to 24 years of age, 88 percent cannot locate Afghanistan on a map of Asia; 75 percent are unable to find Iran or Israel, and 63 percent can’t correctly identify Iraq. (“Hidden in Plain View: Geography? Not Our Strongest Subject,” The Washington Post, 26 Sept. 2006). Several days later, a reader sent in a letter noting that on the map provided by the Post, Sudan had been labeled as Egypt.
water, cities, mountains, etc;” and traditional cartography textbooks elaborate little on this definition.

This is fine for a start, but maps are a good deal more than this. The above definition tells us something about what maps are, but it doesn’t say anything about how they function. As the geographer Denis Wood reminds us in his book *The Power of Maps*: “they work” (1992:1). Maps are not passive pieces of paper with lines drawn on them. They do things for those who make and control them, and one of the uses of maps has been to stake out and claim land. This function was put on dramatic scale during the European Age of Exploration and Colonization from the 15th through the 19th centuries. As empires expanded, cartographers were enlisted to transform huge areas of the globe into real estate. In 1494, a map accompanied the Treaty of Tordesillas when the Spanish and Portuguese governments carved up the southern portion of the New World; and after several centuries of upheaval, the present configuration of nations emerged through still more cartographic maneuvers. In Berlin in 1884, European nations employed the map of Africa in what was dubbed “the struggle for Africa” – with no Africans present – to create a patchwork of “possessions.” The colonies have since evolved into independent nations, but their present-day configurations were arbitrarily set by European cartographers.

Today this tradition continues in slightly different form. Governments and multinational corporations stake out and take control of vast regions for timber operations, mining, and gas and oil production. They do this by first noting that the maps they possess show large “empty quarters” where nobody lives or uses the resources; and then by drawing maps within these empty spaces to confer use rights to state or private companies. Another use of maps is for the creation of protected areas, which are generally set up to limit human exploitation of natural resources, or in some cases to exclude the native inhabitants altogether through relocation.

**The current state of indigenous mapping:** It is only recently that the indigenous peoples of the world have begun to fight back, and one of their strongest weapons is maps. The use of maps for political purposes was first carried out in Canada and Alaska in the 1960s and 1970s. Headed up by geographers with a few anthropologists in tow, it was an attempt to document the occupancy and use of land by the aboriginal peoples of this region (see Ellanna et al. 1985, Usher et al. 1992, Flavelle 1993, Berkes et al. 1995, Weinstein 1993). The circumstances of this work were atypical, as the people of the north were hunters, gatherers, fishers, and trappers who lived in dispersed settlements and traveled with the seasons. The Whites who had been moving into the region in numbers since the late 19th century were farmers who saw cultivation of the land as the only legitimate land use; for them, semi-nomadic hunters and gatherers had no legitimate claims to ownership. Usher et al. (1992:121) quotes a British Columbian Indian Agent in the 1880s who grounds his views in “agriculture and the Bible:”

> Some of the old Indians still maintain that the lands over which they formerly roamed and hunted are theirs by right. I have to meet this claim by stating that as
they have not fulfilled the divine command, ‘to subdue the earth’, their pretensions to ownership, in this respect, are untenable.

Geographers working with the aboriginal peoples of this region developed what became known as the “map biography” method. It was used to document migration and subsistence routes the people took seasonally and through time to subsist, charting the patterns over the lifetime of elderly informants. The map biography has evolved since its beginnings and “has become virtually the sole method of documentation in the official claims process” (Usher et al. 1992:125).

Mapping done by and for indigenous peoples only began in the rest of the world in the late 1980s and early 1990s. In the Third World, largely in the tropical latitudes, small mapping projects started popping up sporadically through parts of Latin America, Africa, and Asia. This appears to have occurred independently from developments in Canada and Alaska. Perhaps the main reason was that the circumstances were so different. Whereas in the North the people live by hunting, fishing, and gathering, indigenous peoples in the tropical regions were settled agriculturalists (the Baka of the Congo Basin are one notable exception). We find no single thread here. Most of the mapping projects were an improvised combination of the participatory methodologies that had come out of Britain in the 1980s and a grab bag of basic cartographic techniques such as transects, compass reading, contour mapping, and so forth. Electronic technologies such as GIS, GPS, and Remote sensing were making their appearance by the late 1990s and have been replacing the more low-tech techniques with ever increasing speed.

Developments in the lower United States took a very different course. While there was some influence from the north along the Canada-U.S. border, most dealings the Native American peoples had with mapping came already highly technified, thanks to the Bureau of Indian Affairs and the Earth Sciences Research Institute (ESRI). The earlier stages in Canada, Alaska, and the Third World, which were strongly participatory and low tech, were in some ways richer experiences. They took fewer shortcuts and moved at a more leisurely pace. People were more important than technology, to some extent simply because the fancy technologies were not available, and the processes that developed relied more heavily on cultural and political mechanisms than on computer programs. As an example of this, the government mapping agencies we worked with in Suriname and Panama had no GIS capability; maps done by the cartographic unit of the Panamanian Instituto Geográfico Nacional in 2003 were scribed on plastic sheets covered with wax. Limitations of this sort force attention onto the human side of cartography.

If we look at the state of indigenous mapping today, we see a tremendous gulf between the bulk of the Third World and North America (including the U.S. and Canada). This

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2 See Poole 1995 for a partial list of some of the diverse projects that have appeared.
3 A good early example of this is the work of Frank Momberg and colleagues, who produced two guidebooks based on their work in Indonesia (Momberg et al. 1995, 1996). Alix Flavelle’s more recent manual, which is an update of an earlier work, also falls in this tradition (Flavelle 2002).
4 This can be viewed on the web site of the Open Forum on Participatory Geographic Information Systems and Technologies (http://ppgis.iapad.org).
division is caused by money and the things money can buy: the North American indigenous peoples have access to money through the sale of natural resources, the lease of land, and government subsidies. Indigenous peoples in the poorer nations have none of this. The relative wealth in the north has allowed tribal groups to set up a permanent GIS capability, make use of remote sensing and other spatial technologies, and integrate their mapping work into campaigns within legal systems which, if imperfect, at least function. This has given their programs continuity through time and has allowed them to claim and legalize land, plan economic and social development, and negotiate with outside companies over the exploitation of a range of natural resources.

In the rest of the world, we have another reality altogether. Indigenous people there do not have a steady income of any kind. In contrast to the North American groups, indigenous peoples in other regions do not have a steady income of any kind. They lack rights to the subsurface resources, and in many cases they are not even seen as the owners of the resources on the surface side, such as trees. A common practice is for governments to simply plop timber concessions down on the lands traditionally used by indigenous peoples with the argument that these are “national” lands, not indigenous territories – and in a strictly “legal” sense, this is true.

How Native Lands got into the mapping business: In the late 1980s, Native Lands started working with indigenous peoples in Central America to assist them to protect their lands, their natural resources, and their cultures. At this time, the indigenous movement in the region was just starting to coalesce and gain direction. Few groups had organizations to represent them in capital cities, and those that did exist were weak. There were increasing pressures on the traditional homelands of Central America’s indigenous peoples, especially along the Caribbean coastal strip; but there were no coherent strategies to confront the threats. The Indians of Panama had a legal structure that provided for indigenous reserves, called comarcas; and both Belize and Costa Rica had out-dated and largely ineffective reserve systems. Yet the issue of land was not being addressed by the indigenous peoples in any systematic manner.

In 1992, we became involved in a mapping project with the people of the Mosquitia, a roughly 20,000 km$^2$ tract of land in the northeast corner of Honduras. The region is isolated – no roads connect it to the rest of the country and travel there is difficult. The coastal zone is characterized by mangrove-fringed estuaries and the inland area is covered with lush tropical broadleaf forest interspersed with pine savannah. Approximately 50,000 people live in over 170 communities spread across the Mosquitia, and it is the most sparsely settled part of Honduras with 20 percent of the land and less than 1 percent of the population. The local inhabitants are divided up into five distinct

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5 Comarcas are legally designated indigenous territories with semi-autonomous governments. The Kuna of Kuna Yala received their comarca in the region of San Blas in 1938 and the Emberá and Wounaan were granted their comarca, Emberá Drua, in 1983. In recent years, the Kuna of Madungandi and Wargandi and the Ngöbe in western Panama have been granted their comarcas.

6 A fuller account of this project and the following one in Panama can be found in Indigenous Landscapes: A Study in Ethnocartography by Mac Chapin and Bill Threlkeld, 2001.
ethnic groups: the Miskito, Garifuna, Tawahka, and Pech peoples, together with pockets of Ladinos who have filtered into the region over the years.

At the time we became involved, the Mosquitia’s isolation was being breached by peasant farmers from the south and southwest moving over the mountains and down the river valleys to the north in search of land. While this threat was growing, a much more immediate danger had just appeared in the shape of the Stone Container Corporation, a Chicago-based manufacturer of paper bags and cardboard boxes. In a deal that was most certainly shady and most likely illegal, it had gained concessionary rights to clear-cut a large extension of forest running from the Mocorón and Rus Rus Rivers to the Patuca River, an area covering roughly the central third of the Mosquitia. Over 1 million hectares were included in the agreement, which would have surrendered approximately one-quarter of the country’s remaining forests to the people from Chicago.

While opposition to this development surfaced among environmental groups around the country, the reaction in the Mosquitia was diffuse and weak. Communication there was weak and few people had a clear idea of what was afoot; and no one had any idea what might be done to block threats that were ill defined and only vaguely understood. The people of the region knew the particulars of events in and around their communities – a cattle rancher clearing forest here, a small-scale timber operation there – but they had no grasp of the wider picture, and there was no region-wide consciousness of the generalized threats to the Mosquitia.

At that point, a Honduran NGO named MOPAWI joined with the Miskito organization MASTA, and the two began discussing what to do. MOPAWI had been in the region since 1985 and part of its program dealt with land legalization; MASTA was in the early stages of its growth and had not yet decided on a clear focus for its program. Native Lands had been supporting MOPAWI since 1987 and we all began talking about various possible strategies for highlighting the land issue and awakening the people of the region to the looming threat.

Initially, we had the idea of holding some sort of workshop to discuss the matter, bring it to people’s attention, and chart a course of action. But we soon discarded this plan, for it was a bit vague, and we felt we would most likely produce nothing more than talk that would disperse into the air as soon as everyone returned home – the fate of virtually all meetings of this sort. Then we hit on the notion of doing a map that would show the native population’s extensive use of the region. The map would cover the entire Mosquitia – roughly 20,000 km² – and include more than 170 communities. Government maps at that time, with their dearth of information, gave the impression that the region was a vast empty quarter, sparsely populated and unused. We proposed to draft maps that showed extensive human occupation and use of resources, as a counterweight to the claim that the resources of the Mosquitia were underutilized and ripe for exploitation.

7 MOPAWI: Moskitia Pawisa, Miskito for “Development of the Mosquitia.” MASTA: Moskitia Asla Takanka, Miskito for “Unity of the Mosquitia.”
We set to work using a combination of a generalized model of the participatory approach and cartography. A geographer from Southern Louisiana State University, Peter Herlihy, had been doing some detailed mapping of several Tawahka Indians villages along the Patauca River, and he offered his services. He collaborated with MOPAWI to develop a strategy for covering the entire Mosquitia, and together they worked out a scheme that involved three workshops and two field periods stretched out over a period of roughly three months. In this process, villagers would gather information on significant physical features and land use patterns and place it on sketch maps. They would return from the field and pour their information into newly constructed base maps informed by government maps and aerial photographs. The process was intensive, consisting of considerable back and forth between the community team and the technical unit.

MOPAWI and MASTA worked with the Honduran government mapping agency, the Instituto Geográfico Nacional, to produce a detailed map of the Mosquitia by the end of 1992.

It served its purpose. It became the basis for a widespread campaign, led by MOPAWI and MASTA, that involved assorted indigenous groups and communities, and it brought the land issue into sharp focus. The Stone Container Corporation was chased out of Honduras. With the map as a point of reference, proposals to the Honduran government were drafted; meetings were held among indigenous organizations, environmentalists, cattle ranchers, associations of farmers, the military, and government; and concerns over indigenous lands spread to other parts of the country. The next few years saw the formation of regional federations and committees, and the fight over lands was the center of attention. None of us had foreseen these developments, which were far beyond anything we had hoped for.

The following year we tried another, similar mapping project in the Darién region of Panama, using the same methodology with the three workshops and two field periods. This time around, however, the process was flawed in a number of ways and nearly exploded in our faces. The maps were finally produced and they were of relatively good quality, but they came at considerable psychic cost to all involved. As we struggled to our feet and the dust began to clear, we set about analyzing what had happened and finally emerged with a new, retooled plan that we figured would avoid the pits we had fallen into and give us a formula that was smoother and more effective. In 1995-6 we tried out our refurbished methodology with Guaraní people in the Chaco region of southeast Bolivia, and it worked. It wasn’t yet perfect, but it stayed on the road and proved to be a far more satisfying and serviceable than its predecessors.

Since then, Native Lands has undertaken mapping projects with the same basic methodology in a wide variety of cultural, political, economic, and ecological settings: southern Suriname, the Xingu of Brazil, the Rama region of Nicaragua, Livingston in Guatemala, the Boa Plains of Cameroon, the Kuna Yala Comarca of Panama, the Nambloung region of West Papua (Indonesia), and the Huon Peninsula of Papua New Guinea. We were invited by either the indigenous peoples themselves or by groups that

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8 Indigenous Landscapes contains a discussion of some of the problems we encountered.
9 See chapter 9 of Indigenous Landscapes.
were working with them, and the organizations that managed the projects were either indigenous or support groups or a mixture of the two.¹⁰

The reasons for mapping have differed from region to region, as has the composition of the teams and social organization of the projects. The political context has varied from volatile to edgy to dynamic yet relatively stable. The area mapped can vary in size and number of communities, and it can contain several ethnic groups. Through all of the variation, however, the basic project structure, the sequence of three workshops and two field periods, has remained constant. The methodology offers a relatively rigid structure that guides the way, and the participants move forward within it according to their own cultural norms, in their own political context. With each experience we learn something new, pick up new insights and techniques, and at this point we feel confident that the system is fully functional. Not only are the maps being produced of high quality; all of those involved, villagers and leaders and cartographers, become thoroughly engaged in the process, and they learn new skills. In several cases, the mapping team has continued on with new projects and the methodology has spread to other regions.¹¹

Most certainly, there are other methodologies that achieve roughly the same ends, and some of them have proven to be highly effective. The methodology presented here is one that we have been working with for a decade and a half. It has served us well and we know how it works, and with this in mind we want to share at least a portion of our experience with others.

**The methodology:** In outline, the methodology is simple. It consists of three workshops and two field periods stretched out over a period of five to six months (see figure 1). Village “facilitators”¹² draw sketch maps showing significant physical features, natural and man-made, sites of cultural and historical importance, and the land use patterns of the area surrounding their communities. The facilitators then work together with cartographers to produce detailed maps of their region that are full of local knowledge and are at the same time cartographically accurate according to international standards. The resulting maps can be effectively used for land titling, land use planning, resolving conflicts, and recording cultural and historical information.

We have found that while many indigenous peoples want to map their lands, they don’t know where to start or how to proceed. This methodology provides a fixed sequence of activities that is easy to understand and follow. The team that organizes the mapping can learn the sequence rapidly and impart it easily to the communities it works with, and on their side villagers pick up the sequence and put it to use in a short period of time. The sequence is fairly rigid – moving from ground preparation through a series of three workshops and two field periods to final production of the maps – yet within this

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¹⁰ For example: Among the Kuna, the Kuna General Congress was in charge; in West Papua, a local NGO with roots in the communities was the lead institution, with support from the British Department for International Development (DFID); and in Cameroon, the implementing organization was the Mount Cameroon Project, a bi-national British-Cameroonian conservation project.

¹¹ This has occurred in Suriname, Brazil, Cameroon, and West Papua.

¹² In other projects, with other cultural groups, they have been called “researchers” and “surveyors.” Each group chooses what is most appropriate in its context.
structure there is plenty of wiggle-room. Native Lands has worked in many different countries with a diversity of cultures and political, economic, and ecological contexts. The projects have all followed the same basic sequence, yet on the ground they have been organized differently. Each group has its own leadership structures, its own ways of making decisions and organizing itself, and it adapts the methodology to its own standards and needs.

**Initial project planning:** Lead-up to the actual mapping work will involve numerous variables and should be carefully done; shortcuts should be avoided. Many groups want to begin immediately once they have been presented with the idea of mapping their lands; but the more thorough the preparatory work, the fewer problems the team will experience as it moves forward. Depending on the complexity of the region, the planning process may stretch out over a period of six months to two years. The amount of time spent discussing the pros and cons of mapping and planning the process depends on a variety of factors and will differ from place to place. In some regions there will be resistance on the part of suspicious villagers or reticence because of political tensions; in others it may be difficult to raise the funds needed to complete the project; in still others there is a lack of organizational cohesion among communities.

One thing is certain: as soon as the decision is made to move forward, a project team must be formed, steps must be taken to assemble all of the project’s needed resources, human and otherwise; and the process that forms the core of the project must be carefully planned and put in place. Planning must be done to cover the entire sequence of the three workshops and two field periods before the sequence begins. Once it starts moving it does not pause until it reaches the end; there is simply no time to stop and fill in gaps. The gaps must all be filled prior to the start.

**Size of the area to be mapped:** When approaching a region, the first consideration is the size of the area for a single mapping project. The mapping methodology allows you to tackle relatively large areas, and that is its advantage – yet you should not attempt to rope off too large an area. We have found that an area with around 25-35 villages, and a population of roughly 20,000 people, is the upper limit that is manageable. The community team will have village “facilitators,” each of whom will be responsible for gathering information for his community; but this is variable, as in some regions villages are small, with fewer than 50 inhabitants, and in other regions they are large, with over 2-3,000 people. To have more than 25 Facilitators in a single project would create logistical problems that simply confuse the project. The size of the territory being mapped is of less concern – it is the number of villages and the region’s population that should determine the area being included in a single mapping project.

We have encountered considerable variation. For example, in Suriname we worked with the Trio, whose population of less than 3,000 people live dispersed throughout a territory of roughly 35,000 km²; the Kuna Yala Comarca, which has an area of more than 5,400 km², has 51 communities and a population of between 35,000 and 50,000; and the area we mapped in the Bolivian Chaco has 7,500 people living in 22 communities on a territory of 19,000 km². Projects must be adjusted accordingly. For example, the Kuna
area was complex logistically and politically with 51 communities, no roads, and travel only by foot, boat, or small plane, and the decision was made to do it in two phases. These factors, coupled with problems with funding and political turmoil at the national level that affected the Instituto Geográfico Nacional, helped to stretch the project out over three years.

**Putting together a project team:** In general (there are always variations), the project team will consist of a project director, a couple of assistants, an administrator, a cartographic unit, and a community unit. In all of the projects we have accompanied, the leaders and all of the major participants have been men; the only roles women have played is in administering project funds (women are generally seen as more responsible with money than men) and, to a lesser extent, supplying information for the sketch maps in the communities.

The **Project Director** should be a person with strong management skills. He must be able to make decisions, deal with the various individuals and groups working directly with specific projects (the community team, the cartographers), handle relations with community leaders and government representatives, and keep the program on course. He may or may not be indigenous, depending on the circumstances. He must understand the methodology of the mapping work and feel strongly committed to it and be able to promote and defend it to a range of audiences (there will always be those who need to be convinced). Together with several assistants, he will be responsible for scheduling, logistics, purchase of materials, contracting, etc.

The **Administrator (Accountant)** is responsible for the management of program funds. The project administrator\(^\text{13}\) will work closely with the project director.

The **Cartographic Unit**: Work with local cartographers rather than importing them, so they can learn skills and continue the work (they will also understand political and cultural etiquette better than foreigners). They need to have experience with drafting paper maps, as most of the work will be done by hand;\(^\text{14}\) but as computer technology rapidly spreads, GIS skills are important. The cartographers must be respectful of the people in the communities and be able to communicate easily with them. There should be at least two senior cartographers with both strong skills and experience. They can work with younger, less experienced cartographers or students who possess basic cartographic skills. Beyond these skills, the methodology will be a novel experience for all those involved, yet it can be learned with relative ease.

The **Community Unit** is made up of “facilitators” who will be responsible for gathering information and creating sketch maps in the communities and a handful of “coordinators” who will supervise the work of the facilitators and generally oversee the project from the indigenous point of view. There is no single model for how these teams are put together, although the communities themselves select their own facilitators. The number of

\(^\text{13}\) In many projects the administrators are women because they are seen as more responsible with money.

\(^\text{14}\) This eliminates some of the younger cartographers, who often have learned their profession only with computers. It eliminates virtually all cartographers being trained today in the United States.
facilitators depends on the nature of the communities in the area. If communities are large and complex – say, with over 2,000 people divided into several conflictive clans – it is best to select at least one, and perhaps even two, facilitators. If communities are small – with fewer than 100 people – then a single facilitator can handle two or more communities, given that they are closely tied together with economic and social relations. Just how many facilitators are used will be a decision of community leaders.

The facilitators will be responsible for gathering information for sketchmaps showing the region’s physical and cultural features and land use patterns. They will need to pull this information from a wide variety of people in the communities they cover (travelers, traders, hunters, medicine men, and so forth).

We have found that facilitators should have most if not all of the following characteristics:

- They need to be respected members of their communities (for they need to gather information on sketchmaps)
- They must know how to read and write
- Their ideal age is between 25 and 45 (if they are younger they will not have sufficient standing to gather information; if they are older their eyesight is often failing and they will have trouble drawing maps and writing)
- They must be strongly committed to their community and the communities of the region.

The Coordinators will be respected leaders in the region (not just in their community). If the region has different language/cultural groups, they should be known and respected across language and culture boundaries. Their duty is to supervise the work of the facilitators and make sure that all of the communities in the mapping area are collaborating.

Base maps and cartographic resources: The cartographic team needs to round up all of the available maps, aerial photographs, and satellite images several months before the mapping proper begins. These materials need to be carefully evaluated for quality and to look for gaps in the information. It is necessary to have base maps at a scale of either 1:25,000 or 1:50,000 to begin work. Maps of this sort do exist in some countries, but those done for indigenous areas are invariably lacking in information and full of errors. Rivers are misplaced (or they have moved over the years) and mislabeled (they either have names in the national rather than the indigenous language, or they have the indigenous names misspelled). Because maps of remote areas have been traditionally produced in capital city from aerial photographs with no groundtruthing, features covered with clouds or forest canopy are often invented. In some countries and regions, base maps are unavailable. Examples of this from our experience are West Papua and the Chaco region of Bolivia; both areas are under military control and official mapping agencies are controlled by the military.
In West Papua the team had to create its own base maps. This was done by blowing up Landsat images to 1:50,000 and tracing out maps; unfortunately, enlarging Landsat images to a scale of 1:25,000 produces images that are too blurry and indistinct to be useful. Ikonos images are far more detailed and distinct when enlarged, but they are terribly expensive – far too expensive to be used over the entire province. The Landsat images, by contrast, are free (the cost comes with the enlargement and printing). For this reason, it is probably best to work at a scale of 1:50,000 rather than 1:25,000 – unless Ikonos images are available either free or at low cost.

Scale of maps: In most projects there are two scales at which the cartography team works: (1) a large scale, either 1:25,000 or 1:50,000, to show detail; and (2) a smaller scale, from 1:100,000 to 1:250,000, to put a larger region on display with less detail. In West Papua we worked at 1:50,000 initially, to get detail over a wide area, and then produced a smaller map to show the entire Nambloung region. In the Kuna Yala Comarca, the team worked at a scale of 1:50,000 and produced eight maps, each covering a section of the Comarca, and then produced a single map of the entire region at a scale of 1:163,000. The smaller, simplified maps are used primarily for political and legal purposes, to show a larger piece of territory; the larger, more detailed maps are used by villagers for land use planning.

Project length: Of course, the time needed for specific projects to unfold depends to some extent on the size and complexity of the area to be mapped. When a large area with many communities is being contemplated, it must be broken up into smaller units so that it will be manageable. Given that a project team has defined a manageable unit, we have found that the ideal time for running a project from start to finish is at least one year, including finalizing and printing the maps. Preparatory work, including scoping out the feasibility of the project, gathering all of the cartographic materials, and briefing the various sectors that will be involved, is variable and may take longer. The technical core of the project, consisting of the three workshops and two field periods, will take approximately five to six months, and design and printing of the final maps may stretch out over an additional six months.

Project financing: The cost of a project will depend on the country, the location within the country, and the size of the area being mapped. We have found that around $100,000 from beginning to end is a minimum figure, no matter the location.15 The majority of the cost is in team salaries (including the facilitators and coordinators, who should be compensated for their time), travel, lodging during the workshops, materials, and printing.16 While there is variation in the cost, a general rule is that all of the financing should be secured before setting forth with project activities. The mapping work moves

15 We tried to do two projects in Central America with $50,000 for each one. There was too much skimping on items such as travel, room and board, salaries, and consultation for map design and printing, and both projects were characterized by tension and internal strife. One of the projects was never finished. We consequently recommend that there should always be enough money to do the basic activities plus some sort of cushion for the inevitable unexpected occurrences.
16 Native Lands charges a minimal fee for guidance (this is one reason we are chronically near bankruptcy). In a number of cases, the project team has continued working on other mapping initiatives and they have done this without our support.
forward rapidly with scarcely a break from start to finish and the attention of the project team must be focused on the work in the field. On one of our earlier projects we began activities when we had no more than half of the required funding in the bank, hoping to pick up the remainder as we went along. This was a huge mistake, as we had trouble working on the project and raising funds at the same time; we ran into a delay of several months in the middle and barely made it through to the end.

**Sequence of the Technical Core of the Project**

**Ground Preparation:** This should take place on two general levels: the communities in the area to be mapped, and with the government. The project team, including indigenous leaders, needs to visit the communities to be included in the project to discuss the basic outlines of the project, the methodology, and the objectives. It should not be presented as a done deal, but more as an open question: What do you think of mapping your area? and there should be room for ample discussion, for some people will be suspicious. The more complete this phase is, the less resistance the project will find during implementation. During this time, villages within the area to be mapped should select their own facilitators, those who will represent them and gather information for the maps. The length of time involved in this phase depends on a variety of factors, including remoteness of the area, linguistic and cultural makeup, and political complexity.

The mapping team needs to visit government agencies to explain the methodology and to enlist collaboration. It should be done as a matter of course everywhere, to allay any possible suspicions; but it has been done in very tense regions such as Cameroon, Suriname, and West Papua, where it was absolutely necessary. Some projects that have avoided government altogether have run into serious problems and their maps, when produced, have not been accepted.

**First Workshop (orientation & training):** The first workshop is generally held in a community in the region. It is attended by the facilitators chosen by the communities, a small number of coordinators who supervise the facilitators, the cartographers, and the Project Director and his assistants. Leaders from the area should also be present. The purpose of the workshop is to explain what maps are and how they are used; run through the methodology and what is to be expected of everybody; have the villagers select what they want to put in their maps and the symbolism they will use; and practice drawing maps under the supervision of the cartographers. This generally lasts four or five days.

**First Field Period (gathering data & sketch mapping):** After the first workshop, the village facilitators and coordinators return to their communities with blank sheets of paper and pencils and begin drawing sketch maps with three general types of information: (1) significant physical features, natural and man-made; (2) land use; and (3) culturally important sites. They do this by questioning elders and those who know about the region. The Cartographers visit them in the field during this period to supervise their efforts and provide help where needed. This generally takes from one to two months.
Second Workshop (transcription of data): The facilitators and coordinators travel to a second workshop to begin working with the cartographers to transcribe the information from their sketch maps onto newly constructed, cartographically accurate maps. Existing base maps at a scale of 1:50,000 generally need to be corrected and modified to become accurate, and where base maps don’t exist they must be constructed from scratch using satellite images. While this is being done, the facilitators’ field data are entered on the maps. Beyond this, there is always considerable information that is not present on the sketch maps; this is still in the heads of the facilitators and the coordinators and must be teased out and added to the maps that are being produced. The second and third workshops are held in a city to facilitate the more complex needs of the cartographers, such as printing out copies of the maps as they are being drafted, having a reliable source of electricity, and being able to purchase or otherwise access materials when needed.

Village leaders should also attend this workshop, as there will be substantial time for discussion of key issues such as land use, boundaries and overlaps, the management and conservation of natural resources, and political themes of various sorts, such as the uses to which the maps will be put once they are printed. Linguistics and map symbolism invariably crop up in discussions. The cartographers hold teaching sessions on how to construct and read maps.

At the end of this workshop, the villagers and the cartographers will have produced detailed yet incomplete draft maps of the different village areas of the region being mapped. Deficiencies in the maps – confusions, gaps, and so forth – will be marked and the Facilitators and Coordinators will know what areas need working on during the second field period. The second Workshop generally lasts from 10 days to two weeks, depending on the complexity of the work.

Second Field Period (verification of data): The facilitators and coordinators return to their communities with their draft maps to check what is on them and add information where needed. Villagers will see that the maps are indeed returning to the communities and will have more confidence in the project’s intentions. They will take ownership of the maps and discuss them internally, socializing them and thinking about how they will use them once they are finished. This phase can take from one to two months, to ensure that the maps are seen by many villagers and discussed widely.

Third Workshop (correcting maps & adding information): The facilitators and coordinators return to the city for the final go at the maps. Here they work with the cartographers to transcribe the additional information they have brought with them. They continue discussing issues of importance, now that they have a clearer idea of what the maps are and how they might be used once printed. They discuss map design. This workshop generally lasts about a week.

Design and Printing of Final Maps: This usually takes longer than anticipated (it always has for us). While some of the design will be done during the third Workshop, numerous specific details are overlooked and need to be added as printing nears. One lesson we have learned is that one cannot simply turn final drafts of the maps over to the printers
and leave them for printing. The maps set up for printing must be carefully proofed right up until the end. Community leaders versed in the languages used – for in many areas there is a diversity of languages, such as New Guinea, the Mosquitia of Honduras, and the Darien of Panama – need to look the maps over to look for two primary things: spelling and the location of features. Those who do the printing are not fluent in the languages on the maps and will be unable to tell if a word is misspelled. Only villagers can check on the spelling and assign physical features to their correct location.

Some issues (a short, preliminary list)

Does Western cartography distort indigenous perceptions of the world? This is a running debate that is being carried out largely between GIS people and post-modernists. On the GIS side, it is occasionally said that spatial technologies are able to store and organize large amounts of data, including indigenous knowledge, and they are therefore important tools for preserving traditional cultures. “It has been suggested,” writes Johnson (1997:4), “that GIS has the ability to reflect a worldview held by many aboriginal people; one that celebrates a holistic rather than reductionist conceptualization of the environment.” On the other side of the divide we find Rundstrom (1995:45): “…the Western or European-derived system for gathering and using geographical information is in numerous ways incompatible with corresponding systems developed by indigenous peoples of the Americas…GIS technology, when applied cross-culturally, is essentially a tool for epistemological assimilation, and as such, is the newest link in a long chain of attempts by Western societies to subsume or destroy indigenous cultures.”

I suppose this can be argued back and forth endlessly, and my sense is that we would never arrive at any firm conclusions. However, two points in favor of mapping with Western cartography and GIS can be made. First, it is our experience that indigenous people are clear on the need to adopt the technologies of the Western world to defend themselves. It is a matter of mapping themselves or being mapped by others, and the former is by far the most palatable alternative. Second, indigenous peoples have been adopting alien technologies since the beginning. Examples are found in agriculture and animal husbandry. Yes, these adoptions have changed the cultures of the people that have taken them in, but they are often necessary for survival and they often bring some benefit (such as the adoption of steel tools). Everywhere we have worked, indigenous peoples have enthusiastically embraced mapping and they have used the maps for their own benefit. They generally see the mapping process as a way to recover their traditional culture and history, which are slipping away as elders die and the modern world seeps in.

The nature of maps: There is often confusion as to what maps are, for they can be both “technical” and “political” in nature. Professional cartographers tend to see them in their technical garb, for their concern is with the production of maps. They use a collection of specialized skills, technical skills, for drafting maps, and this is their frame of reference. The political nature of maps surfaces when maps are put to use. They can be used to defend and claim territory, to control natural resources, to strengthen political organization, and a variety of other things.
When beginning a mapping project in a politically sensitive area, we have found that the first stop should be with a government agency that makes maps. In Panama and Honduras we have worked through the National Geographic Institutes; in Cameroon – an extremely sensitive part of the world – we approached the National Cartographic Institute; in Suriname, we contacted the Central Bureau of Aerial Mapping, the government’s mapping agency; and in West Papua – another very sensitive area – we went to the cartographic unit of the Department of Forestry. We asked for their collaboration in the project, and in each case the cartographers were more than join the team – as technicians. This gave us two things: experienced cartographers (plus access to their cartographic resources) and an official perch with the government. Because of this official connection, the governments of these countries accepted the final maps as legitimate. This paved the way for the indigenous owners of the maps to use them as political tools.

**Conceptualization of indigenous mapping projects:** This involves an inversion of the usual way mapping projects are visualized. It is important from the outset to conceive of projects as community-based initiatives that happen to have a technical component. Don’t think of them as technical exercises that are set in communities. The more thoroughly villagers and their leaders are involved in the process, the more control they will be able to exercise over the process. Technicians – GISers and cartographers – should not be in charge of projects of this sort; they should be providing technical assistance, not running things.

Situations vary, of course. In some cases – as with the Kuna in Panama – the indigenous people can run things largely by themselves. In other cases, where local organization is weak or non-existent, a non-indigenous organization might be at the helm. This was the case in Papua New Guinea, where a U.S.-based organization – the Woodland Park Zoo in Seattle – controlled the budget and the tempo of the project and coordinated the work of villagers and cartographers from the local university. But in either case, the social-organizational character of what is being done is the backbone. In this sense, we must view indigenous mapping projects as run by local people (or intermediary facilitators) with technical assistance from cartographers. They are not projects run by cartographers and GIS specialists using local informants.

We have found that this inversion of the traditional form of cartography projects is rapidly understood and adopted by indigenous people. By contrast, it takes a good amount of time for it to sink into the heads of the cartographers.

**We are not simply producing maps:** Another closely related point is that participatory mapping projects do not have the sole purpose of producing maps. The process is equally, if not more, important than the pieces of lined paper that come off the plotter. Over a period of up to six months, village researchers work closely with community members and cartographers to gather information on their territory and place it on new, cartographically valid maps. This is a unique process for the villagers, something they have never done before or even conceived of doing, and as the work progresses they...
become aware that what they are doing is of vital importance to them. As they move forward with their maps, they become involved in lengthy discussions of issues of land use, traditional versus state rules, boundaries and overlaps and mutual use areas, categories of information, linguistics, and more, and they will be learning valuable skills. The villagers will be learning how to read and use maps, and even how to put maps together. Villagers from throughout the region, people with different languages and customs, will be thrown together with a common task, often for the first time, and we have seen antagonistic tribal groups come close together – if not bosom buddies.

This is an empowering experience that energizes people and gives them a strong sense of ownership over the maps they are producing. It focuses their attention on key matters of land tenure relations with neighboring groups, the conservation and management of natural resources, subsistence and economic development; and it prepares them to deal with outsiders who appear in the form of extractive industries such as timber operations in West Papua and Papua New Guinea and petroleum companies in Ecuador and Peru, extensive soy bean cultivation in Brazil and Bolivia, or non-Indian peasant farmers among the Kuna in Panama or along the fringes of the Mosquitia. Gaining title to their land is one thing. Being able to defend the land and make it produce is something altogether different.

“Choose the methodology that best suits your needs”: There are numerous methodologies out there that can be used for mapping indigenous territories. Some are more complete than others; some work with considerable local involvement, others with less; some are fast, wrapped up in a couple of weeks, and others stretch out over several months or even years; some produce very sophisticated georeferenced maps, while others offer only hand-drawn sketch maps; some are cheap and others are expensive. Different methodologies serve different purposes: some are better for bolstering legal processes for titling land, others are more appropriate for strictly cultural matters. And some methodologies are more effective than others.

Faced with all of these possibilities, how is an indigenous group to go about choosing the most appropriate one for its particular needs?

Unfortunately, if we are somewhere in the Third World there is seldom a choice. Chances are that no other opportunities will come along, so they are in the position of taking whatever it is that appears on the scene. The problem is that some of those who come along with assistance do a poor job

Providing mapping to a large number of people: There is a tremendous need and very few means available for indigenous peoples to map their own lands. Nancy Peluso has noted that while cartography was once “the science of princes” – available only to elites – it is “unlikely to become a ‘science of the masses’ simply because of the level of investment required by the kind of mapping with the potential to challenge the authority of other maps” (1995:387). So what can be done?
Hard to say. A large part of any answer has to do with money and political will. Who wants to do this on a larger scale and who has the money to carry it off.

An interesting case is presently developing – or at least trying to develop – in West Papua, where Native Lands worked in the lowland area of Nambloung in 2002-2003. The project was successful and the mapping team has gone on to do other projects in neighboring districts. They also did some advising for groups in the highland region of Wamena and have positioned themselves as the community mapping experts in the province. The head of the Department of Forestry is now proposing to use the methodology to map all of the customary land in West Papua. He is confronted with growing conflict over land rights – all of the land belongs to the Indonesian government – and he is anxious to have local communities map their territories and legalize them, so that confusions over ownership can be eliminated and the communities can negotiate directly with timber companies. At the present time, the government has granted over 80 concessions to Indonesian and foreign companies, yet fewer than 20 are functioning, primarily because of conflict of various degrees.

A project of this sort being proposed by the Department of Forestry, on such a large scale, would be, to put it mildly, a very ambitious undertaking. If carried out smoothly and efficiently, it could bring enormous benefits to the native population of West Papua, and it may even be beneficial to the provincial government. If it becomes tangled up in government bureaucracy and politics, it could be a disaster. The British Department for International Development (DFID) is supporting the initial stages of a scaled-up program and Native Lands, working with some of the cartographers from the Nambloung project, will be providing advice. At this point it is hard to say where this initiative will go.

Concluding remarks: I have presented some of the experience Native Lands has accumulated over the past 14 years. We have worked in a wide variety of contexts with a diversity of cultural groups, and the methodology we have developed as become increasingly efficient and effective, and satisfying, over time. In these projects we limit ourselves to guiding the process at the start and gradually diminish our role, to the point where the project team – including the administrative, technical, and community components – is managing everything. At this point, we stay on the sidelines and offer bits and pieces of advice where needed; but effectively they are on their own. In several countries, the project team has gone on to carry out further mapping projects by themselves. Some of these have been more successful than the initial project.

This paper covers only part of the ground. There are other issues that I have not covered here. I hope that the participants in the Forum will help me balance out the subject matter of this paper, contribute their insights into the mapping process, and steer me clear of any confusions I have stumbled into.
References


