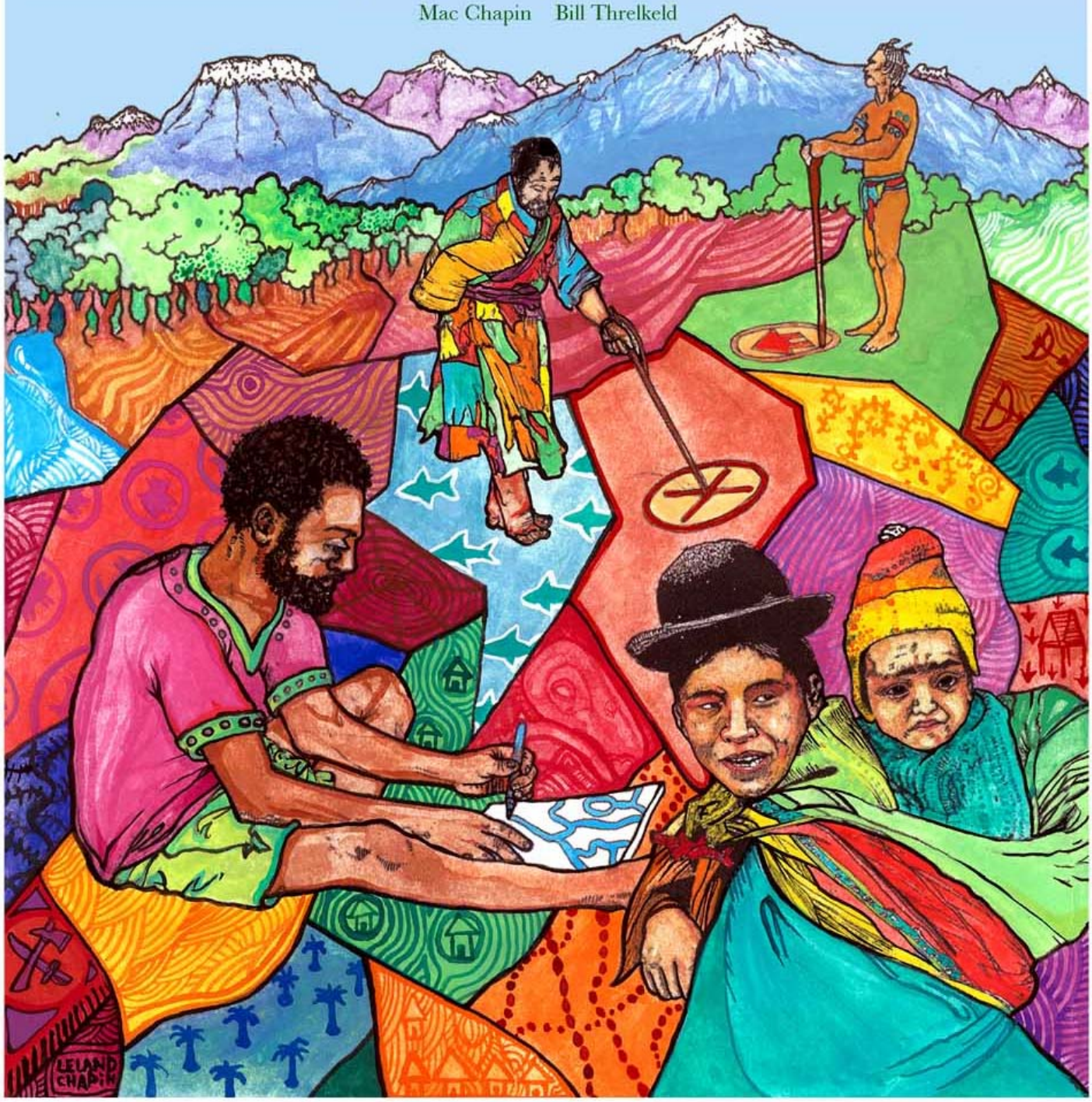
Mapping Indigenous Lands

A Practical Guidebook

Center for the Support of Native Lands

Mac Chapin Bill Threlkeld



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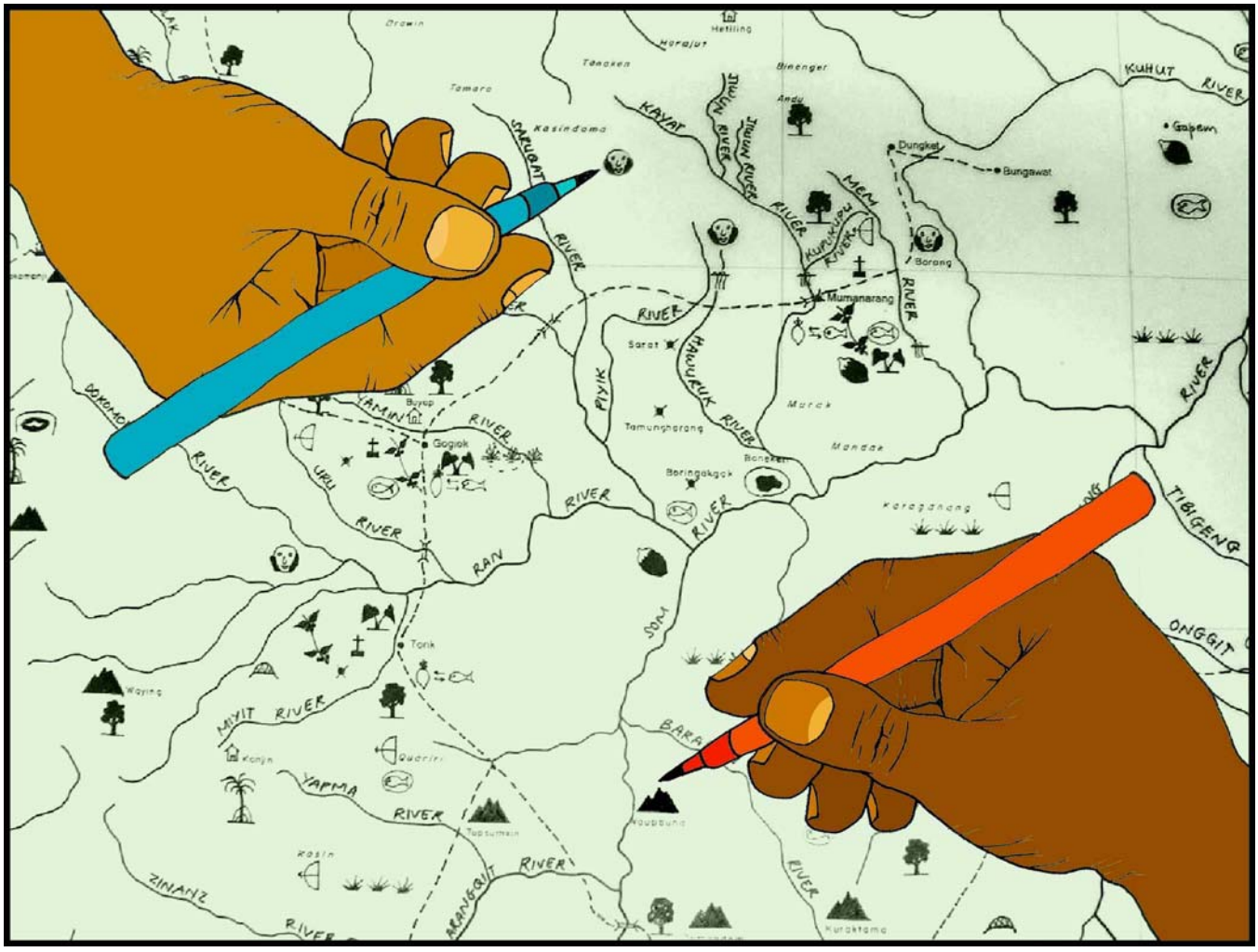

Center for the Support of Native Lands

Environmental Law Institute

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Table of Contents

1. INTRODUCTION

This is a guidebook for the mapping of indigenous lands. It describes a methodology that the Center for the Support of Native Lands has been developing since we first became involved with work of this sort in 1992. There are other methodologies currently being used for mapping indigenous lands, and many of them have proved themselves to be effective and have been applied in various parts of the world. What we offer here is one of these methodologies.

Indigenous mapping has the purpose of helping indigenous peoples to achieve political objectives, broadly defined. From the start, the primary objective has been, and will continue to be, to claim and defend ancestral lands and natural resources. Yet other purposes are invariably present and play important complementary roles. These include strengthening indigenous political organization, planning for economic development and the management of natural resources, and the documentation of history and culture for use in schools and throughout the broader public.

1.1 Historical perspective

It is only recently that indigenous peoples have been mapping their lands for these purposes. Cartography has been, over the centuries, a tool used by the powerful to carve out empires and maintain control over them. As the geographer J.B. Harley wrote in 1988, "As much as guns and warships, maps have been the weapons of imperialism." Latin America was partitioned between the Spanish and the Portuguese in 1494 with a map accompanying the Treaty of Tordesillas; and European nations used a map to divide up Africa into colonies in the late nineteenth century.

Figure 1.1
Christopher Columbus returned from his first voyage to the New World in 1493. The following year, the Spanish and Portuguese signed the Treaty of Tordesillas, which divided the newly discovered lands between the two powers. Nobody was clear as to what the New World contained, for no one had ventured inland, and the first maps were far from accurate. This did not stop them, however, from determining the extent of the Spanish Empire and the boundaries of the Portuguese territory of Brazil. The Portuguese soon expanded beyond the original line of demarcation, which was vague and difficult to pin down on the ground, and annexed a large chunk of territory far inland to the west and north.

Figure 1.2
In 1884, fourteen European nations and the United States met in Berlin to discuss how they might exploit Africa's rich natural endowment. They took a map and divided up the African continent like a pie, assigning pieces to England, German, France, Portugal, and Belgium. In this way, most of Africa became a European colony. Not a gun was fired, and no Africans were present. It was all done with a map.

A long history of mapping

Of course, indigenous peoples throughout the world have been drawing maps since the earliest times – some of the earliest surviving maps, etched in clay, have been found in ancient Mesopotamia, and those drawn with sticks on the ground have long since vanished. When we refer to "indigenous mapping" we have in mind the more recent movement in which indigenous peoples are combining participatory methods with modern cartography and using them to achieve political goals such as protecting and legalizing their lands. We wrote a more detailed history of indigenous mapping with Zachary Lamb in a 2005 article, "Mapping Indigenous Lands," now available at the Native Lands website.

Nations and empires are not natural features of the landscape; they are human constructs that have been imposed to convert large tracts of the world's surface into real estate. For this reason, cartography has been called "the science of princes," used by governments and elites to stake claim to valuable land and resources, a science of which indigenous peoples have been the greatest victims.

Indigenous peoples have been pushed or have escaped into some of the most remote corners of the globe. They have been marginalized into what the Mexican anthropologist Gonzalo Aguirre Beltrán has called "regions of refuge," areas located "in particularly hostile landscapes or…of difficult access for human beings": trackless deserts, lowland tropical forests, and the upper reaches of mountains. Zones such as the Amazon Basin in South America and the Congo Basin in Central Africa are classic regions of refuge, and they were, until very recently, off limits to outsiders because of their endemic diseases, lack of transportation infrastructure, and difficult living conditions. However uninviting they were, they at least provided indigenous peoples with some measure of protection.

Aguirre Beltrán came forth with this formulation in the late 1960s. He noted that the regions of refuge frequently held natural resources that were of value to outsiders; yet they were left largely untouched because attempts to extract them, with the technologies available at mid-century, would be both difficult and expensive. Change, however, was coming, and he correctly foresaw what the future held. "Industrial society," he wrote in 1967, "is holding them as regions of reserve destined for future use; at present, the same resources are more abundant and accessible in other regions, and they can be secured with much less effort."

That time is now upon us and these remote regions have been breached. By the 1960s, the majority of the most pernicious tropical diseases had been controlled through advances in medical technology; roads had been built into previously inaccessible areas, and motorized vehicles were being used to carry people and resources in and out with relative ease. Colonists began to stream in to stake claims to agricultural land, and multinational corporations have moved in to harvest timber, gold and other minerals, and petroleum and natural gas. Much of the land they are taking is rightfully owned by indigenous peoples; and while this is happening, the natural ecosystems indigenous peoples occupy and use are being destroyed at an ever increasing pace.

It was precisely at this time that a generalized Indigenous Movement appeared, and it has been growing in strength ever since. The initial impetus was the defense of ancestral lands and natural resources, and it has expanded exponentially in the intervening years. Changes in policies and the growth of the rule of law, still imperfect but improving in many regions, have allowed indigenous peoples to demand their rights, and one of the most powerful tools they have developed is cartography.

The first indigenous mapping was carried out in Canada and Alaska in the 1960s and 1970s. It was done in reaction to the arrival of non-indigenous colonists in territory traditionally inhabited by indigenous peoples and persistent attempts by the Canadian government to assimilate them into the general Canadian population. The legal situation of indigenous lands was tenuous for the simple reason that those who lived on them were not farmers. They subsisted by hunting, fishing, trapping, and gathering plant resources, and it was the opinion of the Whites that because they did not practice agriculture, they were not "using" the land and had no rights to it. Colonization was followed by a

series of megaprojects such as the James Bay Hydroelectric Project in Quebec and the Mackenzie Valley Gas Pipeline Proposal in the Northwest Territories. Similar projects began to appear in Alaska at this time, one of the most prominent of which was Project Chariot, an initiative involving excavation of a harbor in Inupiat territory with nuclear explosives.

As these threats converged, geographers and anthropologists came to the assistance of the native peoples with broad studies of land use and occupancy. Mapping was a core component of these studies. A methodology called the "map biography," which charts the subsistence regimen of individuals spatially through time, was developed for this work. One of the key early studies in Canada was *The Inuit Land Use and Occupancy Project*, led by Milton Freeman and completed in 1970. Covering 33 communities in the Northwest Territory, it documented past and present hunting, fishing, trapping, and gathering patterns by viewing them through the eyes of the Inuit. It recorded Inuit perceptions of their relationship to the land, compiling extensive data on history, place names, linguistics, subsistence techniques, campsites, and other cultural information. The map biography method has since been refined and, with modifications, has become the primary strategy employed for this purpose in that part of the world.

Indigenous mapping in other regions has developed largely independently from the Canadian and Alaskan experiences, with a variety of different methodologies. Most of this work has taken place in the Third World, with tribal and ethnic groups in Southeast Asia, Africa, and Latin America. It has differed mainly in that it has occurred among sedentary or semi-sedentary farming peoples rather than nomadic hunters and gatherers (two exceptions have been the Baka of Cameroon and the Bushmen in the southern part of Africa). Mapping in these regions also began much later, in the early 1990s; and, although it has also had as its primary purpose the legalization of indigenous lands, it has used different methodologies.

Methodologies in these areas have been strongly influenced by the participatory field methodologies developed under the names of Participatory Rural Appraisal (PRA), Participatory Action Research (PAR), and similar approaches. While some practitioners have kept their approaches simple, limiting themselves to community sketch maps on paper and on the ground, others have ventured to add traditional cartographic techniques such as transects, compass readings, and modeling, and they have sought to produce maps that are both rich in local knowledge and georeferenced. By the mid- and late 1990s, this essentially hybrid approach began to transform itself with the addition of increasingly available technologies such as GIS, GPS, and remote sensing.

1.2 Native Lands' methodology

The methodology we present here has several distinctive features. It can be used to map relatively large territories in ethnically complex regions. It provides a straight-forward framework that indigenous peoples can use to map their territories on their own terms. It is simple in concept and it is flexible; in this light, it can be adapted to a wide variety of cultural, political, and geographical circumstances in very different regions of the world, and it can be made to satisfy a variety of agendas. It is highly participatory and relies on a low-tech approach that is appropriate for work at the community level. It is heavy on process, and in the end the process of putting the maps together is as important as, if not more important than, the production of the maps themselves. In addition, the methodology involves a close collaborative relationship between villagers and cartographers, a back-and-forth that fosters learning in both directions. The resulting maps combine a wealth of local knowledge with scientific cartography.

This guidebook is based on our experience with indigenous mapping in three areas of the world: Central and South America, Africa, and Southeast Asia. In laying out the methodology, we draw directly on this experience with examples from projects we have been involved in. In doing this, we are providing more than an idealized sequence of steps that one should follow. We are trying to show how projects of this sort unfold in real life, where unantici-

Brief descriptions of eight of the projects we helped organize, together with locator maps, can be found in the **Appendix**.

pated complications arise and things one has taken for granted suddenly evaporate. In concept, community mapping is simple and easy to understand; in practice, it is invariably more complicated and difficult, and one must be aware of the sorts of complications that have a habit of making their appearance.

For this reason, we have included examples of confusions, dilemmas, and unforeseen glitches that marked the projects we were part of. We put on display our missteps and messes along with our successful moves, and we explain how we managed to scramble out of our difficulties; we discuss our improvisations together with our carefully thought-out maneuvers, and we make note of a number of the mistakes we made when we were trying to find our way. We learned from these experiences and we were able to improve the methodology as we went along. By holding the process we went through up for close inspection, we hope to help the reader avoid some of the same, often painful experiences.

1.3 The evolution of Native Lands' methodology

We got into mapping largely by chance. We had been working with several local groups in the Mosquitia, a remote region in northeast Honduras, since 1987. Covering roughly 20,000 km^2 of mixed mangrove forest and associated wetlands along the coast and pine savannah and tropical broadleaf forest inland, it is the home of five distinct ethnic groups – Miskito, Tawahka, Garífuna, Pech, and Ladinos – who live in more than 170 small communities scattered across the landscape. It is the most sparsely settled region of Honduras, with approximately 20 percent of the nation's land surface and less than 1 percent of the total population. No roads enter the Mosquitia and it can only be reached by plane, by boat along the coast, or overland on foot or horseback.

Figure 1.3 Source: Vince Murphy

The Mosquitia is the most remote and sparsely populated region in Honduras.

Figure 1.4 Source: Mark Caicedo

The three men in the dugout are from Tawahka and Miskito villages located along the Patuca River.

In the early 1990s, the Mosquitia was under attack on several fronts. Landless peasant farmers and cattle ranchers were advancing at an ever increasing pace along its southern and southwestern flanks; and then in 1991 a large-scale logging operation in the form of the Stone Container Corporation, a manufacturer of paper bags and cardboard boxes based in Chicago, Illinois, landed a concession to clear-cut the Mosquitia's forests in a deal with the Honduran government. We had been working at that time with two Honduran organizations on the issue of land rights. MOPAWI (Moskitia Pawisa – Development of the Mosquitia) was a Honduran non-profit organization collaborating with the indigenous peoples of the Mosquitia, and MASTA (Moskitia Asla Takanka – Unity of the Mosquitia) was a Miskito organization. Together, we decided to do something about the gathering threats, but we weren't clear on what it might be.

One of the first ideas was to have an assembly of some sort to discuss the issues and devise a strategy for action. But we soon decided against this, reasoning that it would simply be another meeting that would generate little more than talk that would rapidly dissipate in the air, like smoke. Something more tangible was needed, something that would simultaneously involve the people of the re-

gion, result in something concrete, and summarize the situation facing the people of the Mosquitia.

Native Lands was at the time working with the National Geographic Society on a map titled *The Co-existence of Indigenous Peoples and the Natural Environment in Central America*. The map showed a strong correspondence between indigenous territories and natural ecosystems and it helped frame a movement by indigenous peoples in the region to demand rights to their lands. Together with MOPAWI and MASTA, we decided to take this same concept one step closer to the ground and map in detail the extent of indigenous land use and occupancy in the region. We set out to show that the Mosquitia was not an "empty quarter" that was uninhabited, and that its natural resources were not without "owners."

The project was pieced together as we went forward. It was loosely structured with three workshops interspersed with two field periods. It was done on a very fast schedule, with the bulk of the work done over a three-month stretch, and everyone felt the intensity. Yet it was generally successful. A master map of the Mosquitia was produced and it served as an important document around which the campaign for land rights was able to rally. Much organizational activity came out of it, with the formation of seven indigenous federations in the region, all built around the cause of land legalization. MASTA became a confederation to oversee the activities of the federations. And it has to be said that many of the advances in the region are due in great part to that initial project to map the land use and occupancy of the native communities.

It became clear to us that projects of this sort were much more than a means of producing detailed maps. They were also important organizing tools, and the processes involved served to bring communities together for collective action.

The following year, we became involved in a similar project in the Darién region of Panama. Historically, the Darién covers most of Panama east of the Canal and stretches down into Colombia. The area our project took in was limited to the Province of Darién, an area encompassing about two-thirds of the eastern half of Panama down to the Colombian border, roughly 16,000 km^2. It is a region of dense tropical rainforest that has traditionally been inhabited by three indigenous peoples: the Emberá, the Wounaan, and the Kuna. They had lived in isolation until a road was built through its center, extending to the town of Yaviza, roughly 100 kilometers short of the Colombian border. The issues here were similar to those in the Honduran Mosquitia: following the road, non-Indian colonists were entering the region at an ever increasing rate. Cattle ranching was expanding with the colonists, and illegal logging was following the growing network of smaller trails and roads into

Figure 1.5

Figure 1.6
Two images of the Darién: before and after. The forest disappears rapidly after roads are built.

the formerly intractable forests. All of these forces had already penetrated deep into the Darién. Now it was a question of how to protect indigenous lands from being swallowed up by the advancing tide of "modernization."

In piecing together the mapping project, however, we ran into organizational problems. The two Panamanian organizations – the Indian Congresses (Emberá, Wounaan, and Kuna) and the Centro de Estudio y Acción Social Panameño (CEASPA) – were unable to establish clear roles, and the coordination was weak. There were difficulties with the leader of the Technical Team, who tried to take control of the project, and as if these confusions were not enough, project financing was delayed and the money arrived in spurts. The project almost blew apart at mid-stream, and although we managed to struggle through to the end and produce some high-quality, useful maps, everybody emerged from the experience badly scarred.

At this point, we held the conviction that the basic strategy for participatory mapping that we were using was sound. Difficulties had surfaced because some of the features of the original design had been faulty, and things had gone wrong when these defects had played themselves out in our implementation. We decided to go over what had happened, think through the process from start to finish, and retool our approach in a manner that would avoid the potholes and take a smoother path.

Figure 1.7 Source: Tree Kangaroo Conservation Project

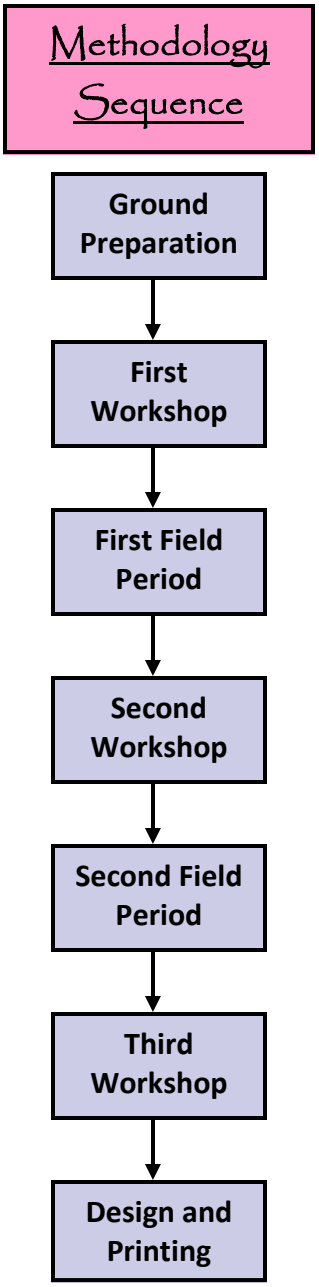
Figure 1.8

The physical characteristics of each region differed, often radically. Here we see the jagged mountainscape that characterizes much of highland Papua New Guinea contrasted with the coastal environment of the Kuna Indians of Panama, in Central America.

We began writing up these experiences at this time, to make sense of what we had been doing and to systematize the methodology. We began by sifting through the available information, comparing the different projects to see what they had in common and where they diverged. This was more complex than we at first imagined. No one who had participated in the Honduras and Panama projects had an overview of what had happened, of the dynamic of the work that had been done, for there was no master script. We had simply pieced together the components of the different projects in one way or another and pushed them forward, hoping they would move along in some sort of coordinated fashion. All of this was done on the fly, with no time taken for rumination, and in the end what had occurred was largely a mystery. The projects had been journeys into uncharted territory for everyone involved – the coordinating institutions, the members of the technical teams, and villagers – and no complete picture of how they all fit together and produced the maps existed.

We rummaged through our notes and tapped our recollections of what had taken place. Then we visited the field again and interviewed many of those who had participated. As the information grew and we began to see patterns, we gradually came to understand what had happened, and we set about systematizing our experiences. On the basis of this work, we began developing, tentatively, a refined methodology for future attempts at mapping. Most importantly, we began to write our findings down and thinking through their implications.

In 1995, an opportunity to undertake another mapping project arose, this time with the Guaraní-speaking people of the Bolivian Chaco, in a region called the Izozog. Although we had not yet finished our analysis of the earlier projects, we felt confident that we had sufficient understanding of the methodology to have another go at it. As we moved forward in Bolivia, we were able to avoid many of our earlier mistakes by modifying our approach, strengthening certain elements and discarding or altering others and adding new twists. The result was a far better project – not perfect, by any means, but more tightly organized and highly serviceable, more in tune with the needs of the communities where the mapping took place. It was also much more pleasant and tension-free.



Our analysis of the three projects led to the writing of *Indigenous Landscapes: A Study in Ethnocartography* (2001). It is an in-depth study of the process we went through in developing the methodology for indigenous mapping as we worked our way through the projects in Honduras (1992), Panama (1993), and Bolivia (1995-96).

Since then, we have journeyed to the West African Republic of Cameroon, West Papua (Indonesia), and Papua New Guinea; and we have continued our mapping work in Latin America, with projects in Suriname, Guatemala, Nicaragua, Panama (again), and Brazil. The present book is a practical guide to the methodology we developed in all of these countries, with more than a dozen projects.

Throughout this history, the general structure of the methodology has remained the same, with a sequence of three workshops and two field periods stretching out over a period of between four to six months. Within this structure, however, we have made a number of significant changes to improve both the process and the final product. Many of these changes have been suggested by the groups we have collaborated with, for they generally know what works and what doesn't.

The methodology enables villagers to collect information regarding their region's salient physical features, natural and man-made (rivers, mountains, roads, trails, villages, lakes, islands, etc.); important cultural sites (sacred places, historical sites, ceremonial centers); and zones used for subsistence (agriculture, hunting, fishing, the gathering of fruit, medicines, and so forth). They record this information on sketch maps and then work with cartographers to produce maps that are cartographically accurate and full of cultural information.

We have found that many indigenous peoples are anxious to map their lands. Yet they don't know how to go about it. They don't know where to start or how to gather relevant information for a map or how to finally produce maps that will be of any use to them. The present methodology gives them a straight-forward sequence that, if followed carefully, will allow them to move along a clearly marked trail that will take them to maps that are of high technical quality and reflect their reality with surprising richness.

1.4 Sequence of the methodology

The methodology consists of a Ground Preparation period covering between four and six months (and longer if needed), followed by a sequence of alternating workshops and field periods that stretches out over an additional six to eight months. The time period is flexible, but only within certain limits. Projects should be tight and without detours and idle periods, for the momentum needs

to be maintained throughout; yet there must be time for thoughtful, deliberative work and careful cross-checking of both the information being gathered and the layout of the maps. The sequence (shown in sidebar previous page) serves as an organizing device to keep the project from jumping the tracks and getting lost in diversions along the way. The goal is to gather information for the maps in the communities, transcribe that information onto newly constructed draft maps with the help of cartographers, and move efficiently toward the production of high-quality maps. This sequence keeps the participants' eyes on the goal and assists them to reach it.

Within this structure, however, there is room for considerable variation. Each project has its own internal dynamic, its own peculiarities and idiosyncrasies, for it comes out of a unique context. Each group has its own way of organizing and arriving at decisions, and this will have to be taken into account if the project is to move forward in orderly fashion. The political contexts of projects differ widely, and these need to be factored into the organizational fabric of each project. In other words, there is plenty of wiggle room within the somewhat rigid structure of the methodological sequence. This sequence is described below:

Ground Preparation**:** In the months leading up to the start of formal project activities, the Project Team needs to prepare itself on several fronts. It needs to make sure it has a sound administrative system. It must visit the communities in the area to be mapped, brief villagers about the project's methodology and objectives, and oversee the selection of a Community Unit of Researchers. It must visit government agencies to discuss the methodology, to make sure authorities have some acquaintance with the project and its procedures. It needs to contract a technical team that will work on the cartography. And it must scout around and find sites for the workshops and arrange the logistical aspects of the project.

This work must be thorough and done with patience, and it will cover a minimum of **four to six months**. The length of time it takes will depend on the circumstances. If villages are dispersed and remote, traveling to them will be more challenging. In addition, the political situation at the national level will be more complex in some countries than in others. For various reasons, the ground preparation in several countries we have worked in took approximately one year. This phase cannot be rushed.

First Workshop (orientation & training)**:** The first workshop is generally held in a community in the region. It is attended by the Project Director and his assistants, the Cartographers, the Researchers chosen by the communities, and a small number of Coordinators who supervise the Researchers. 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 Researchers and Coordinators return to their communities with large sheets of paper with the major rivers, roads, and other prominent features on them (features that are large enough to be accurately depicted on traditional maps), to give the Researchers a point of reference. They then begin to fill in these 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 Researchers 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 Researchers' field data are entered on the maps. 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. 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 Researchers 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 and completing the final maps): The Researchers 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 in preparation for the printing of the final maps. This workshop generally lasts **about a week**.

The design and printing of the final maps 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. 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 proof the maps carefully for correct 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.

1.5 The organization of this guidebook

This guidebook is designed to assist those interested in carrying out community mapping projects in the field. It is structured in linear fashion, moving from beginning to end in the sequence outlined above. To facilitate its use, we have included chapter sub-headings in the Table of Contents, and we have placed the icons for the steps in the sequence at the top of each page. We hope this helps to orient the reader as he moves through the forest of detail and makes it easier to move back and forth through the book as needed.

We rely heavily on examples drawn from projects Native Lands has helped organize, as a way of illustrating key points with concrete situations. The examples come in snippets interspersed through-

out the text, and we have provided numerous images that illustrate key points along the way. More comprehensive descriptions of individual projects, together with locator maps, can be found at the tail end of the book in the Appendix, titled “Project Descriptions.”

2. GROUND PREPARATION

Considerable time and thoroughness must be dedicated to the preparatory stage. This is, quite simply, the most complex and difficult part of the whole undertaking – and it is the most crucial. The basic tasks of this phase of the project are as follows:

- Assembling a Project Team.
- Visiting communities and their leaders to discuss the methodology and project objectives.
- Visiting key government agencies and explaining the project and its methodology to them.
- Making arrangements for workshop sites and organizing logistics.

Ground preparation should span **at least three or four months** and it should be thorough on all fronts; it is best to leave six months or more for this phase, for much needs to be done. Ground preparation is difficult because a number of things must be done at the same time and it often feels like a juggling act. For example, a community team can only be assembled by the communities themselves, and they must be fully informed about the project before they begin to select their Researchers. At least one Cartographer needs to be present during the visits to communities and government agencies to explain the technical component of the project. And the communities must be in agreement with the project before several other steps are taken. This results in a bit of a jumble. All that can be said is that project leaders need to be able to keep several balls in the air at once.

2.1 Assembling the Project Team

The Project Team is made up of three units, or sub-teams, that have their own tasks yet coordinate closely and work as a single body. These are:

The Administrative Unit
The Community Unit
The Technical (Cartographic) Unit

But before we get into the composition and duties of these units, two points must be made.

Participatory mapping projects should not be viewed as simply "technical" exercises that can be run by cartographers. The perceptive reader will soon realize that in projects of this sort there is a good deal more than cartography going on, and the process that unfolds is a complex *human* (as opposed to *technical*) enterprise. A number of non-technical (i.e., non-cartographic) tasks must be carried out: fundraising, the administration of funds once they are raised, the social organization of each stage of the project (including the various workshops and field periods), logistics (travel, food, and lodging), communication with people at the community and government levels, and management of diverse teams of cartographers and villagers during the length of the project. Cartography is most certainly an essential ingredient, but it is only one piece among many. What is most important is the way all of the pieces are put together and managed.

Second, there is always a strong temptation to get things underway as soon as possible, before all of the groundwork has been carried out. Once the idea of a participatory mapping project is floated there are those who want to move forward immediately. This temptation must be kept at bay until a strong administrative unit is set up and some of the pieces are assembled.

2.2 The Administrative Unit

The administration and management of the project is key to its success. Of course, this is true of

most projects, mapping or otherwise, and it is especially true of more complex initiatives. It might therefore seem an obvious point, almost unworthy of mention. However, we feel we need to make sure it is not taken lightly. We have seen too many projects falter and either fall apart or stumble through to an unsatisfactory end because an administrative structure was not firmly in place.

The Administrative Unit generally consisting of a Project Director, an Administrator (to manage project funds), and one or two Assistants, at a minimum – is in charge of directing the project in all of its aspects. It manages the project budget, handles logistics, negotiates with government agencies, non-governmental organizations (NGOs), and private firms, and supervises the Cartographic Unit and the Community Unit. It is responsible for the smooth running of the project.

There is no single model for this. Each situation, each culture has its own "ideal" structure. In some cases, indigenous organizations representing the communities being mapped have the experience and the skills to manage projects with limited assistance from outsiders. In other cases, where strong indigenous organizations are absent, non-indigenous NGOs are needed to take the lead.

Examples:

Mapping among the Izoceños of Bolivia and the Kuna of Panama: The Izoceño project was run by the Capitanía de Alto y Bajo Izozog (CABI), the maximum authority of the Izoceño people; the Kuna project was managed from start to finish by the Congreso General Kuna. Both organizations worked with Native Lands to conceptualize the project and set it up; they then administered the funds, handled logistics and scheduling, and negotiated with government agencies and private firms for technical assistance and political support.

The Boas Plain mapping project in Cameroon: The Mount Cameroon Project (MCP), a binational (British-Cameroonian) conservation organization, managed the project. The eight communities that mapped their lands were related to each other culturally and politically and through kinship, but they were not tied together with any region-wide organization and thus had no administrative capacity. The Project Team was MCP staff (including the lead cartographer) and the MCP took the lead in presenting the project to local government officials (with the participation of the villagers) and handling negotiations with the National Cartographic Institute, the government mapping agency. Because of the loose relationship among communities, the MCP helped structure the project in just about every aspect.

The Nambluong mapping project in West Papua, Indonesia: This was a mixture of things. It was managed by the Association for Papua Indigenous People's Study and Empowerment (PtPPMA), a Papuan NGO with close ties to the communities, with assistance from the British Department for International Development (DFID), which was funding the effort. The Technical Team was composed of three World Wildlife Fund (WWF) cartographers and one cartographer and several draftsmen from the Papuan branch of the Department of Forestry. At the start, the Papuan NGO was a bit indecisive and uncertain as to what to do; they had never handled anything as complex and demanding as this effort. The lines of authority were unclear and movement was tentative. There were some confusions with logistics, the contracting of personnel, follow-up to the workshops, and supervision in the field. DFID, Native Lands, and PtPPMA had several meetings to talk things out and help them gain their footing. Gradually PtPPMA gained confidence and the project began to flow more smoothly, with continued meetings along the way. In this case, PtPPMA administered the project with assistance from DFID.

The Trio mapping project in Suriname: The Trio had a traditional organization, but it had no administrative capacity to handle a project of this magnitude. In this case, the project was set up and run by the Amazon Conservation Team (ACT), a U.S.-based NGO that had worked extensively in Suriname and had a local representative. Because the project was small and not overly complex, the

local representative was able to manage the project by himself. He had excellent contacts with the Central Bureau of Aerial Mapping, the government mapping agency, as well as with government agencies and officials. He arranged project logistics and administered funds and all went smoothly.

The Mosquitia mapping project in Honduras: Two organizations ran this project: MASTA and MOPAWI. MASTA was an indigenous confederation made up almost entirely of Miskito Indians; MOPAWI was a support organization based in the region that worked with all of the different ethnic groups (Miskito, Tawahka, Pech, Garífuna, and Ladino), and most of its staff belonged to these groups. MASTA had little administrative capacity, so MOPAWI formed the administrative unit, with a Project Director, Administrators (handling the funds), and support staff. MOPAWI had an excellent reputation in the Mosquitia and the project ran smoothly.

The Darién mapping project in Panamá: The project worked with three ethnic groups: Emberá (the majority in the region), Wounaan (a minority closely allied to the Emberá), and Kuna (a minority in the region and traditional enemies of the Emberá). In the lead on the indigenous side was the Emberá-Wounaan Congress; yet it lacked administrative capacity, and an arrangement was made with the Centro de Estudios y Acción Social Panameño (CEASPA), a non-indigenous NGO. However, there was confusion tinged with rivalry from the start and although CEASPA administered project funds, the Emberá-Wounaan refused to follow the appointed Director, who was Kuna. As a result, either several different factions were in charge or none of the factions was in charge, depending on the situation of the moment, and decision-making was inconsistent and at times contradictory. The maps were finally produced, but the project was in chaos and hostility among the various groups festered and lingered on far beyond the completion of activities.

In sum, the mix of indigenous peoples and NGOs and the degree to which they work together will vary, depending on the situation. At the same time, it must be remembered that the project should be "owned" by the indigenous participants, to the degree to which this is possible. Whatever structure is decided upon, it must be appropriate for the cultural and political context in which it is set. Non-indigenous organizations should act as facilitators, providing administrative and technical help without dictating the content or design of the maps or how data gathering should be conducted in the communities.

There is a tendency among some outside groups, when they have a strong hand in administering a project, to push their agenda rather than allow the indigenous people to follow their own. For example, conservation organizations sometimes feel that projects of this sort are ideal for gathering information on ecosystems, breeding grounds for certain species of animals, and so forth – information that will feed into management plans or scientific studies. These objectives might be important for the outsiders, but they are not necessarily of any interest to the indigenous peoples, and they may even be incomprehensible. (In one project managed by a conservation group, villagers were given the task of mapping "primary forest" and "secondary forest" – concepts that were foreign to them.) Outside facilitators must be careful to avoid impositions of this sort.

Language considerations

Explanations to the communities should be translated into the local language(s), even when there is a *lingua franca* that everyone understands. For example, in many areas of Spanish-speaking Latin America, Spanish is spoken and understood by most if not all of the indigenous peoples. Groups from different tribes use Spanish to communicate with each other. Yet even if villagers understand Spanish, it is far more effective to use the local language. The local language has more credibility and people "believe" it when they hear it spoken. When we worked in the Chaco region of Bolivia with Guaraní speakers, audiences that understood Spanish very well were more relaxed and animated when the message was given to them in Guaraní. So in each community the outsider spoke in Spanish and this was translated for the audience. We have found this to be the same everywhere we have mapped.

2.3 Visiting the communities and assembling the Community Unit

As soon as financing has been secured (see Chapter 3) and project plans are laid, members of the Project Team and tribal authorities should make a systematic sweep through the area to be mapped. They should visit as many communities as they can – all of them if possible, as a matter of courtesy – to discuss the objectives and methodology of the mapping and the practical value of producing their own maps. These presentations should be accompanied by existing maps of the region, to show how deficient they are. If they are available, indigenous maps done by communities in other regions or countries that show how the methodology works should be shown and explained. Time must be taken with this, and a question-and-answer period is important.

Figure 2.1
Mac Chapin of Native Lands explaining what maps are, how they are used, and the methodology for participatory mapping in the Izoceño village of Guirayoasa (La Brecha). The meeting was attended by leaders from Guirayoasa and neighboring villages. Maps on the back wall are from an earlier mapping project in Panama and were used as illustrations showing how the process works. Marcelino Apurani, seated in a light blue shirt taking notes was the Guaraní interpreter during the Ground Preparation stage, and he later served as a Project Coordinator.

Most people living in villages will be initially suspicious of the project. After all, the idea they are being presented with – the opportunity to map their own territory, on their own terms, and then being able to use the finished maps for their own benefit – is novel, even bizarre. This

The consequences of poor ground preparation

Ground preparation was extremely weak and disorganized in the first two projects we were involved with.

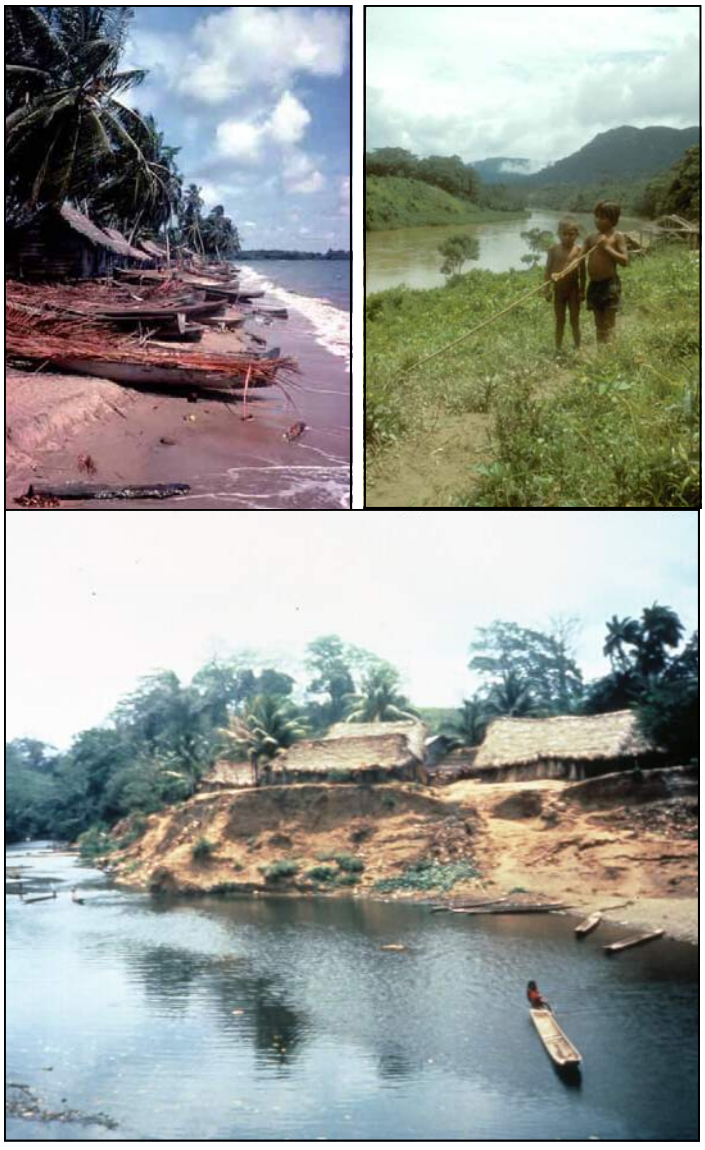
In the Mosquitia, it would have been impossible to visit all 174 communities, and because the project was set in motion suddenly there was virtually no time to prepare. As it was, a few visits to communities were made, but this was far from systematic. The area being covered was vast – 20,000 km^2 – and travel would have been extremely complex and expensive, as well as far too time-consuming, so it was simply not feasible. Instead, the project was given some advance publicity through broadcasts of the Miskito station, Radio SAMI, "The Voice of the Mosquitia." Letters describing the project were also sent to schoolteachers, religious leaders, and political authorities.

In the Darién, there were difficulties in the coordination of the three indigenous groups involved. The Emberá were the majority group and they dominated the project from the very start. The Wounaan were allied with the Emberá in the Emberá-Wounaan Congress and were semi-informed about the mapping. The Kuna, however, were traditional enemies of the Emberá and were excluded from the process until after the first workshop. This imbalance of power and the difficult terrain – most travel in the more than 16,000 km^2 region is by canoe – led to misunderstandings and a lack of coverage in the Kuna communities.

Both projects lacked adequate ground preparation, and both suffered the consequences. The Darién project in particular was marked with delays while explanations were given to the communities. People demanded a full accounting of the project before moving forward. One community in the Darién refused to participate unless paid – which, of course, was out of the question; it relented later on, reluctantly, and the information it provided was extremely thin. Criteria for selecting Village Researchers in both Honduras and Panama were not explained to most of the communities, with the result that many of those chosen were inadequate for the job.

is not the way "research" is traditionally done in rural communities. Standard practice is for outside researchers to arrive, undertake studies of one sort or another, and then leave with their findings, never to return. The communities never see the results. They will find it hard to believe that they will be in charge of planning the project, and when the maps are finished, they will be the owners.

For this reason, it is understandable that some villagers, when presented with the idea of mapping their lands, will be suspicious and reluctant to participate. It is our experience that there will always be at least one or perhaps two villages in a region that will refuse to provide information for the maps. Sometimes they can be talked out of it; other times they flat-out reject the mapping, saying that they see no value in it and they don't trust outsiders. Rivalries among villages are common, with deep distrust among them.



Figures 2.2, 2.3, 2.4 Sources: Anthony Stocks, Bernard Nietschmann
Communities are often difficult to reach because of remoteness and lack of roads. Canoes take people in and out of these communities: The Miskito village of Waunta on the Caribbean coast of Nicaragua (top left); Children from the Tawahka Indian community of Yapuwas on the Patuca River, Honduras (top right); the Kuna Indian village of Wargandi in the Darién region of Panama (bottom).

It is necessary to establish some level of trust for participatory mapping projects to function. Without it, no reliable information will be gathered. It is essential at this point for the Project Team to visit as many communities within the area to be mapped as possible to explain what is being proposed, the project's objectives and methodology, and answer any questions. Ideally, those visiting will be the Project Director, one or two of the Cartographers, and indigenous leaders. Beyond simply telling people what is being proposed, visits of this sort are a matter of courtesy. People *want* to be informed; if they are not, they can easily close the door and refuse to participate.

The truth is that explanations about community mapping are seldom sufficient to get all of the communities on board – or even to convince people throughout the project area that mapping is a good idea and they should dedicate their precious time to it. Most people will remain suspicious until they enter into project activities and begin to see the maps being produced. This is always gradual, a slow building of trust. When local authorities buy into the project, however, and it becomes clear that the villagers – not outside researchers – are calling the shots, suspicions will begin to disappear. This demands a good deal of work.

Often visits of this sort are difficult because of the remoteness of communities, bad weather, lack of money, or scarce time – or a combination of all of these. We have found that there is often an urge to get going with the actual mapping as soon as possible, without delay. Dallying around with jaunts through the forest,

spending months visiting villages, is seen as a waste of time.

But this is simply not the case. A thorough canvassing of the villages, with time spent in each village to allow people to think through and discuss the project, is extremely important for the smooth functioning of the mapping work once activities get underway. It is an important – nay, essential – step for bringing communities into the project and for selecting Researchers that will be their representatives in the project.

2.4 Selecting Village Researchers

Village Researchers are responsible for gathering information in the communities. They draw or supervise the drawing of the sketch maps and record information in their notebooks. They do not work alone; they work closely with village elders and those who know the region's landscape and history, plucking information out of their heads and recording it on their maps and in their notebooks. The Researchers are the ones who collect village knowledge and place it on sketch maps; in this way, they represent their communities.

Figure 2.5
Village Researchers from the Darién of Panama. The woman standing on the left was not a Researcher; she was contracted to make a record of the team's activities.

Ideally, each community should select one or in some cases two Researchers. The Researcher is chosen by the community, not by Project Leaders, and the community should be made aware of the fact that the Researcher should be chosen for his skill, not for his political ties. For example, the tendency, found in some societies, to choose the Chief's son should be avoided – unless, of course, he is the most highly qualified person for the job (this happened to us in one project and the person selected was **not** the most highly qualified person for the job…). The quality of the maps produced depends overwhelmingly on the quality of the Researcher. He must therefore be chosen with great care. This should be done during the Ground Preparation period, before project activities begin.

Figure 2.6
Village Researchers in the Izozog, Bolivia.

In cases where communities are very small and located near each other, a single Researcher can be chosen to gather information for several communities. Care must be taken to make sure that the communities are closely linked and free of inter-village conflicts, and that the Researcher chosen has the confidence of all of the communities.

While the community has the final word in the choice of its Researcher, villagers should be made aware of the characteristics of the ideal Researcher.

Researchers should have the following qualities:

- Be a respected member of the community. He should be mature and have a reputation for dedication and community service. This will allow him to work easily with village elders and other respected people to gather information.

- Have familiarity with the bush and subsistence areas. Because much of the information will deal with place names, areas far from the village, and areas where people hunt, fish, farm, and gather various materials, a good knowledge of most of these areas will make it easier for him to process the information he is receiving from villagers. (In the Honduran Mosquitia several teachers and pastors were selected as Researchers. Although literate and respected community members, they were unable to make sense of information about subsistence areas, for they had no experience there.)

- Be literate, as considerable writing is involved in his task. There are often cases where people are familiar with the bush and are recognized authorities on the surrounding landscape, yet they are not literate. Community members strongly believe that they should be part of the Researcher team (and we agree). When this happens, a community can choose two Researchers: one who is mature, respected, and knows the bush, but is illiterate; and the other who knows how to write yet is young and has less experience with subsistence activities. They can work together as a team.

- Be possessed of energy and doggedness in tracking down information.

- Be between 25 and 40 years of age, although there are exceptions and a need to be flexible. Younger people, although they may be literate and know the outback, often lack the respect in the community that comes with maturity. (In the Panamanian Darién project there was one Researcher who was very young. He found it difficult to approach elders and ask for information, and he ended up filling in the map from his imagination. This was caught in the Second Workshop, but by that time he had lost considerable time and was never able to bring in a complete map.) Those that are too old often have poor eyesight with advanced age, over the age of 40 (few wear glasses). This makes it difficult to write and draw maps. Also, if they have gone to school and learned to write,

The matter of gender

None of the Researchers in the projects we have accompanied have been women. Invariably, we are asked why this is the case when we give presentations of the methodology to audiences in the United States and Europe.

One answer to this question is that we are not the ones who choose the Researchers; village leaders have that privilege and in each case they have chosen only men. When we ask why this is so, we are often told that because the project will involve travel among communities, and this travel will at times be arduous and involve long distances, it is too risky for women; and they might be abused as they journey alone between communities.

A second answer has been that women do not know the bush as well as men because they seldom venture far from their communities. This argument, however, is not valid in some regions where women are involved in a variety of subsistence activities that take them far into the outback.

While these reasons may be valid – or partially valid – and outsiders (like ourselves) should not attempt to impose their notions on the process of selecting Researchers, it is both legitimate and important to bring up and discuss the matter of gender in the selection of Researchers – and, for that matter, in the conduct of the entire project. In certain circumstances, participation by women is entirely appropriate; and it is generally the case that women contribute information for the maps without being formal members of the team. The matter of gender should be at least openly discussed. In the end, this is a difficult and often sensitive topic, and the lead must be taken by the indigenous people, with little or no direction from outsiders.

this was usually many years earlier and their writing skills are extremely rusty.

It must be impressed on the communities that they must choose their Researchers carefully. The Researchers will be given an extremely important task: to gather and transmit all of the communities' information for the maps. If the Researchers are weak or irresponsible, the information gathered will be poor and confused and the final map will suffer.

2.5 The Cartographic Unit

The size of the Cartographic Unit (also referred to frequently as the Technical Unit or the Technical Team) depends to some extent on the magnitude of the project and the number of Researchers involved. If there are around 25 to 30 Researchers and the territory being mapped is relatively large, as many as three or four Cartographers and two or three Draftsmen should be enlisted. For a smaller area with fewer Researchers, two Cartographers and two Draftsmen should be sufficient.

The Cartographic Unit members should have the following characteristics:

- Sound technical cartographic skills. This includes the ability to work with pencil and pen on paper, as this is the medium used in projects of this type. Those who only know how to work with computers are not appropriate for these projects.

- Attention to detail. Participatory mapping projects involve, above all, many small details – physical features, subsistence areas, place names – far more details than are present on most standard maps. This demands considerable patience in eliciting information (from the Researchers) and recording it accurately and completely on the maps.

- Special interest in working with indigenous peoples. There must be a real concern for the issues the maps are dealing with (land tenure, history, economic planning) and a desire to be of use to the indigenous peoples. Ideally the cartographers should have direct prior contact with the indigenous people.

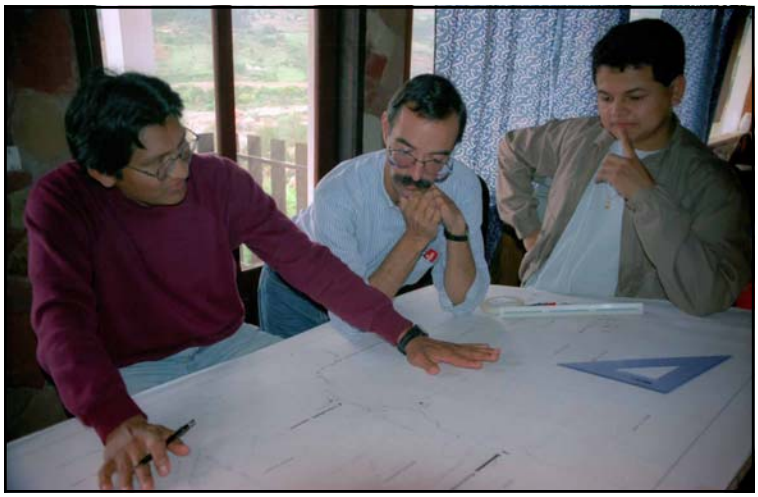


Figure 2.7
Three of the four members of the cartography team in the Izozog, Bolivia. Left to right: Nicanor González (a Kuna Indian cartographer), Jorge Castellote (a Spaniard living in Bolivia), and Alfredo Callaú (a native of Bolivia). This was one of the few projects in which no government cartographers were on the team.

- Excellent interpersonal skills and facility in working with people from different cultures. Note that some of the indigenous participants will not speak the national language well. Eliciting information will require patience and tact.

- Knowledge of the region being mapped. This is not always possible, but it should be sought. Those who are familiar with the landscape that is being mapped will immediately feel at home; those who have some familiarity with the maps of the region will have an advantage from the start.

The use of local cartographers: Where possible – and it has been possible everywhere we have worked – projects should work with local cartographic talent rather than importing foreign cartographers. Competent cartographers can be found in virtually every country, if one looks carefully, and every effort should be made to locate them and incorporate them into the team. There are several

Figure 2.8
The cartography team for the project in Papua New Guinea was made up of personnel from the Department of Land and Surveying from the University of Technology (Unitech) in the city of Lae. Left to right: Wycliffe Antonio, Raymond Bure, Lewi Kari, Farro Lulemu, Clement Tabul, and Brian Kakini.

practical reasons for working with local cartographers:

- They understand the political context far better than outsiders. Because the mapping of indigenous lands is often a touchy subject, an ability to navigate the political waters is essential. Foreign technicians often lack this knowledge.

- They invariably have contacts that can provide access to other cartographers, cartographic materials (aerial photographs, satellite images, maps), and equipment.

- They frequently know something about the region being mapped and the indigenous peoples who live there. In some cases, they have worked directly with them. This will allow them to operate more smoothly with the rest of the team.

- They have been schooled in the basics of cartography, which includes work with pen and pencil on paper. Most of the cartographers trained in the United States these days use computers and lack the traditional cartographic skills that participatory mapping uses.

Figure 2.9
Three members of the cartography team in the Darién mapping project. Left to right: Sebastian Sánchez (University of Panama), José Aizpurúa (National Geographic Institute), and Erasmo González (Treasury Inspector's Office).

Beyond this, the project constitutes on-the-job training. During the course of the project the Cartographers and the Draftsmen will learn how to use the methodology for participatory mapping. With this experience in hand, they will be able to apply the methodology with other projects. This has occurred with several of our projects. In Suriname the Technical Team carried out two projects with Trio communities, first in the southwest and later in the south-central region; in Cameroon, the Technical Team went on to carry out two additional projects in other parts of the country, with different ethnic groups; and in West Papua the team mapped four adjacent areas in quick succession.

<u>The use of government cartographers</u>: This will depend on the situation. However, we have always tried to have at least one or two government cartographers in the Cartographic Unit. There are three reasons for this.

- In some countries the most skilled cartographers work for the government, either with the official mapping agency or with a cartographic division of some ministry. Where this is the case, it is hard to find competent cartographers outside of this circle.

- Government cartographers generally have access to information that independent cartographers are unable to access. This will include base maps, aerial photographs, and satellite images.

- Using government employees on the Cartographic Unit gives the project an "official" seal of approval. It provides transparency, which would not be the case if no government people were present. This is important because of the political nature of mapping. Having a government cartographer present erases any suspicion that something subversive is afoot. It also gives the project more credibility in the eyes of the government, something that will be valuable when the maps are ready for use. While the maps are the property of the indigenous people, government participation in the process will assure that they will be accepted as valid maps.

Government cartographers

The indigenous groups Native Lands has worked with have always pushed to have government cartographers involved. In Honduras and Panama, cartographers from the National Geographic Institute formed part of the team; and in Panama (the Darién project), the Institute judged the completed maps to be so accurate that they used them to update the official country map. In Suriname, the entire cartographic team came from the Central Bureau of Aerial Mapping, which was the official government mapping agency. In Cameroon, two cartographers from the National Cartographic Institute worked on the team; and in West Papua, there was a mixture of cartographers from World Wildlife Fund in Bali, Java and West Papua, and the Papuan Department of Forestry. In Papua New Guinea, all five of the cartographers were professors at the government University of Technology (Unitech), based in Lae, PNG's second-largest city.

There is another factor, one that makes this sort of mapping attractive to government cartographers. In virtually all of these countries, cartography units are underfinanced. They lack materials and equipment and they are generally unable to undertake creative work. More often than not, they labor over tasks such as the redoing of old maps to satisfy some political need; they seldom have a chance to journey into the field or work with satellite images to create *new* maps. In short, their day-to-day routine is drab and uninspiring. We have found that once local cartographers – especially government cartographers – come to understand how the methodology works and start to produce the participatory maps, they embrace the project with enthusiasm.

Finding cartographers and draftsmen: This is sometimes problematic, as in some regions there are few skilled cartographers, especially cartographers who are available for work on a project. The best cartographers are often busy with other jobs. In some areas, the only cartographers are working with the government; in others they are working with small consulting companies. On several projects we have enlisted retired cartographers who are interested in the challenge and also in earning some extra money – and this has worked very well.

The trick is to find the lead cartographer for the team. Once this is done, he can begin to assemble the rest of the team, for he will have contacts with a network of cartographers.

2.6 Assembling cartographic materials

As early as it has been brought together, the Cartographic Unit needs to begin assembling all available cartographic materials related to the project site. These include government base maps at various scales, aerial photographs, satellite images, and any other relevant maps. The team then should evaluate the quality of these materials and the extent to which they cover the region. Then it will take steps to fill in any gaps. In some areas there will be no good base maps or aerial photographs – either they don't exist or they are tightly controlled by government agencies (the military runs mapping agencies in a number of countries and this often makes access to existing maps difficult) When this is the case, steps must be taken to secure satellite images at the scale to be used in the mapping, and new maps made from them.

When we began working with indigenous mapping in 1992, satellite images were difficult to find, and

they were expensive. Even if we found them, there were few people around who could interpret them and render them into maps. Things have changed rather drastically now. Very good quality satellite images can be obtained without cost; more powerful computers are available, with advanced software for a variety of relevant tasks; and there is no longer a reliance on aerial photographs and out-of-date government base maps. In fact, satellite images are now taking over for aerial photography, which has been discontinued in most parts of the world.

The Cartographers need to gather together equipment and materials such as drafting tables, lamps, computers, stereoscopes, pencils, pens, whiteout, and paper – everything they will need.

2.7 Coordination of the three units

As noted at the beginning of this section, the three units will work separately on their given tasks, but they need to be in close and constant communication throughout the process. They need to coordinate, for the work of each unit feeds into the mapping process in an interlocking fashion. In the end, no one works in isolation.

The Cartographic Unit has its own skills and tasks, but these are intertwined with the work of the Community Unit. Their collaboration is most intense during the workshops, where the Cartographers and the Researchers work at the same tables exchanging information and placing it on newly constructed maps that combine the Cartographers' technical skills with the on-the-ground knowledge of the Researchers.

Out-of-date maps and photos

In the 1993 project in the Darién region of Panama, the mapping got underway before there was time to review the cartographic materials. The team began working with aerial photographs from the 1970s, and these were seriously out of date. Much had changed in the Darién landscape – rivers had changed their course, villages had been moved and grown in size, new villages had been formed – and these changes were not recorded in either the government base maps or the photographs. The Cartographers began their work with what they had, but they soon found that they could not simply drop the information from the Researchers onto the existing government maps. The maps had to be corrected first – but this couldn't be done with the old photographs.

The cartographer with the National Geographic Institute made a special run to his agency to see what he could turn up. Everything was put on hold. He returned a few days later with a set of photographs that had been taken two years earlier, in 1991. Now the Cartographers went back to the maps they had been working on and revised all of them on the basis of the new photographs – but this took considerable time and the project fell far behind. If these photographs had been uncovered early on, before the mapping began, much time and energy would have been saved.

The Administrative Unit's task is to make sure this coordination works smoothly. It is responsible for project logistics, making sure travel and food and lodging are arranged for in an efficient, timely manner; it is responsible for purchasing materials for the workshops; and it is responsible for resolving any confusions or disputes that might occur during the march of the project. Its job is to make sure that the various units work together in an enjoyable atmosphere of collaboration and respect.

Beyond this, the Administrative Unit is responsible for managing project finances: recording income and expenses and monitoring these relative to the project budget; ensuring that cash is available and handled responsibly; making payments to vendors and project personnel; preparing reports for donor agencies – in short, carrying out all of the basic fiscal management functions expected of administrators.

2.8 Ground preparation with the government and NGOs

Mapping indigenous lands can be a volatile political matter in the eyes of governments. For this rea-

son, we always advocate contacts with the appropriate government agencies before mapping activities begin. In all of these projects the team needs to spend substantial time visiting government offices and giving presentations of the methodology. Principal among these has always been the official government mapping agency.

Figure 2.10
Cartography room during Second and Third Workshops for the Darién (Panama) project. The site was a conference center half an hour's drive from Panama City, with meeting halls and dormitories. There should be plenty of space in the mapping room so people can move around and meet in groups, and there should be adequate space to hang maps on the walls. There should also be abundant light.

Here there are two objectives: to explain the technical nature of the project, and to enlist support in the shape of cartographers and cartographic materials.

Project leaders should begin communicating with government agencies and NGOs early in the process, months before the mapping proper begins. Initial visits can deal with general themes; then as the project comes together and staff are hired, presentations can be given with maps, explaining how the methodology works. It is obvious that there is a political agenda behind the mapping – no one is making maps just to have maps. In most countries there are disputes over land, and this is frequently a sensitive issue. The best way to deal with this matter is to argue that good, accurate maps will provide an objective basis for rational, measured discussion of land rights. In this sense, it is a device for conflict resolution. Beyond this, the maps will be useful for sustainable development planning and conservation. As such, high quality maps can serve as an alternative to the absence of clear documentation that so often leads to ambiguity and violence.

The key is transparency. If the Project Team briefs key government agencies and officials prior to the start of activities, and then invites them to visit the project during the workshops, fears that something "secret" is underway should be dispelled.

2.9 Workshop sites

Sites where the workshops will be held need to be sought out and assessed early on. Once sites are chosen, they must be booked far ahead of time, to assure smooth planning.

We have traditionally held the **First Workshop** in the region where the mapping will take place. This is not absolutely necessary – and in some cases we have had the workshop in a larger city outside of the project area – but it has the advantage of bringing the project into the heart of the area, to a village, where local people feel at home. This is symbolically important. Beyond this, there is no reason to have it in a large city, for there is no need, at this stage, to have access to such things as electricity, facilities for printing draft maps, purchase of materials, etc.

Two considerations are important when choosing a location for the First Workshop:

- Pick a locale that has political meaning within the region. This will be a "central" area where people traditionally congregate to hold meetings and assemblies.

- Make sure all of the participants can reach the site without too much trouble. Time and expense will be considerations in making the choice.

The **Second and Third Workshops**, however, are different. They need to have a reliable source of electric power, printing facilities, access to cartographic materials, and so forth. It is also important to have the entire team together in semi-isolation, away from their families and friends, so they can concentrate on their work, which will be very intensive. Everyone needs to focus and concentrate on the tasks at hand. For this reason, we have avoided workshop sites that are in the middle of cities, where participants can walk out the door and lose themselves with other diversions.

Figure 2.11
The Second and Third Workshops for the Izozog (Bolivia) Project were held at a conference/resort center in the town of Samaipata, about two hours' drive from the city of Santa Cruz de la Sierra, the political center of the region. It was isolated and afforded ample space for the team. The photograph shows a meeting of the Researchers.

Project leaders need to make arrangements for the location of the workshop and the logistics involved. They need to start months before the process begins, scouting out sites and contracting the most appropriate place for the workshops. This workshop is ideally held in or near a city rather than a village in the field for the following reasons:

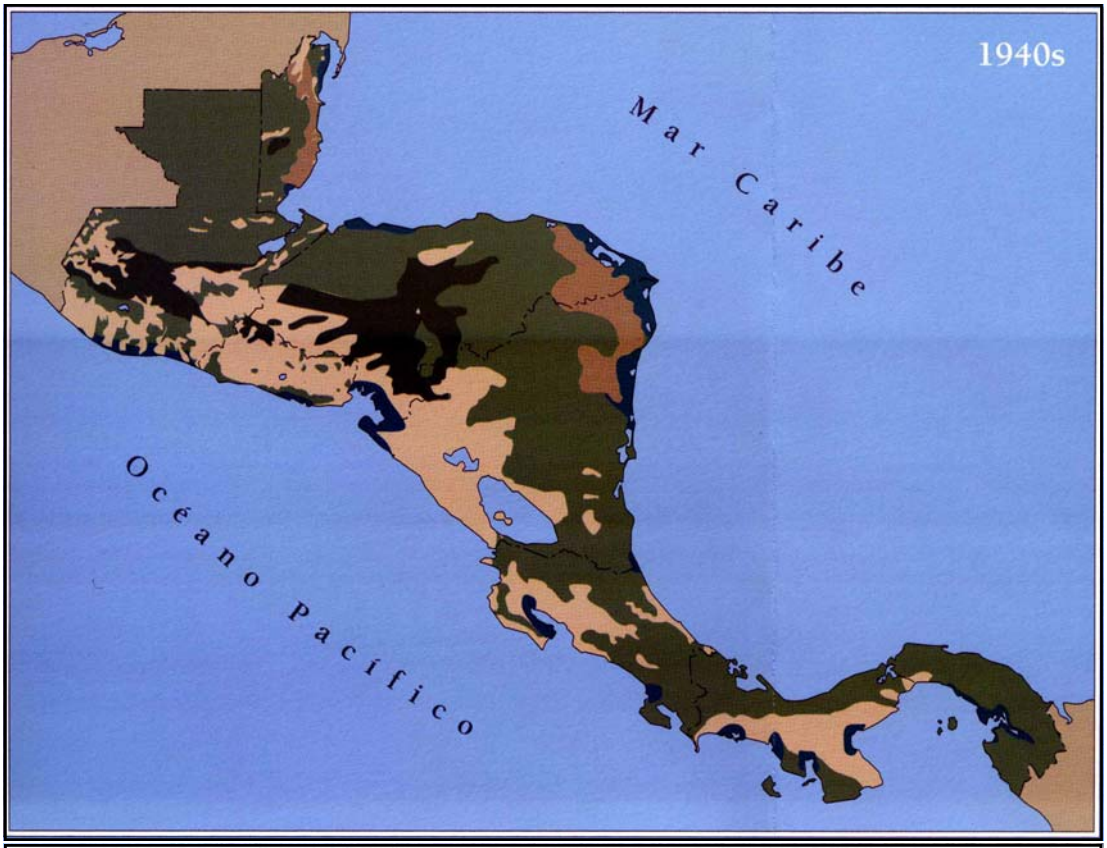
- **Electricity**. It is important to have reliable electricity to have light to do the cartographic work. Some tasks will be done at night, when electricity is necessary.

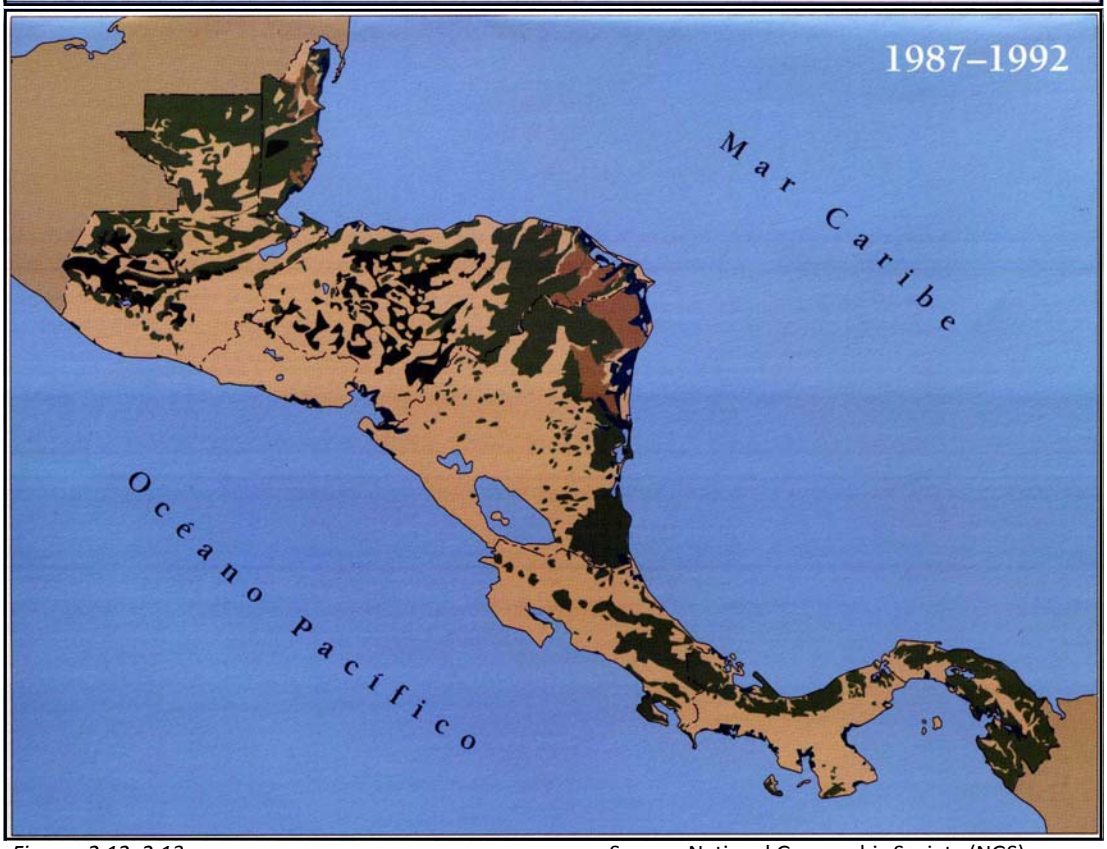
- **Printing**. The Cartographic Unit works on rough drafts of the new maps, then must take them to a printer who can make clean copies. These are again marked up with new notations and must be copied again. When the workshop is finished, the Researchers need to take copies back to their communities. Copy machines can only be found in the larger cities. Various other services involving specialty firms – reproduction of satellite images, changing scales, and so forth – can only be found in larger cities.

- **Equipment**. Materials such as pens, pencils, paper, whiteout, as well as equipment will be needed during the workshop. These should be assembled before the workshop begins, but there are always needs while the workshop is underway, and these can only be satisfied in the larger cities.

- **Official Visitors**. The visits of government and NGO officials to the workshop should be encouraged, and these can only take place in large cities; in a small country, the capital city could be the best place to be.

- **Comfort**. Care has to be taken in the selection of the site for the Second and Third Workshops. The site should be as self-contained as possible: the best arrangement is a facility with several large rooms (one for the cartographic work and others for group meetings, sleeping quarters, etc.), a kitchen and dining area, and reliable electricity. Conference centers, research stations, even rustic inns or resorts, are ideal. The project's budget, which is usually austere, will determine the final choice. Depending on the size of the team, adequate housing in a comfortable setting is essential (this will allow for visitors, who often come in groups of 10 or more). The site should be semi-isolated (to minimize distractions and build group cohesion) yet within relatively easy reach of a major population center (to facilitate access to materials, services, information, and people when needed). Total isolation is undesirable as it makes it difficult for the team to relax during off-days and time is consumed when team leaders must travel long distances to find materials and services.





Figures 2.12, 2.13 Source: National Geographic Society (NGS)

An estimated two-thirds of Central America's original forest disappeared during the second half of the twentieth century. A similar process is underway in virtually all of the tropical regions of the world. These maps, entitled *The Co-existence of Indigenous Peoples and the Natural Environment in Central America*, were produced as part of a special supplement to *Research & Exploration, A Scholarly Publication of The National Geographic Society* (Spring, 1992).

2. ADDENDUM: PROJECT DESIGN

Before proceeding, some thoughts regarding project development are due. An essential first step is to evaluate the task facing the mapping team: What is the nature of the territory to be mapped? Four questions must be asked before the project gets underway:

- What is the ideal size of the territory that is to be mapped?
- How many communities can be mapped in a single project?
- What is the population density of the territory and the size of communities?
- How many Village Researchers are needed?

It has already been noted that this methodology allows the team to map relatively large territories containing many communities. But how large and how many? The broad answer is that the upper limit is determined by what is **manageable from a practical standpoint**: if the territory is too large, there are too many communities, and too many people, project logistics will be strained; if there are too many Village Researchers, supervision in the field will be difficult and the atmosphere at the workshops will be cluttered and confused. Let's look at each of these variables.

Size of territory: In projects we have helped organize there has been considerable variation in the size of the area mapped. Thus, we cannot say that there is an "ideal" size. Rather, there is an ideal upper limit, as will be explained. The variation in our work can be shown with a few examples:

- Southwestern Suriname: 21,000 km²
- The Honduran Mosquitia: 20,000 km²
- The Izozog in Bolivia: 19,000 km²
- The Darién in Panama: 16,800 km²
- The Comarca Kuna Yala in Panama: 5,400 km²
- The Boa Plain in Cameroon: 420 km²
- The Huon Peninsula of Papua New Guinea: 250 km²

Number of communities: There has also been considerable variation in the number of communities within these territories, as follows:

- The Honduran Mosquitia: 174 communities
- The Panamanian Darién: 82 communities
- The Comarca Kuna Yala: 51 communities (in two phases, of 32 and 19 communities)
- The Huon Peninsula: 37 communities
- The Izozog of Bolivia: 22 communities
- The Boa Plain in Cameroon: 8 communities
- Southwestern Suriname: 1 community and numerous small camps

Population density and community size: In all of the areas we have worked in, the population density is low and community size is small.

- Suriname had the lowest population density, with between 2,000 and 3,000 people spread across an area of 21,000 km²; almost half of the people were living in a single community, while the rest were spread about in small household camps.
- The Izozog of Bolivia held roughly 7,500 people distributed among 22 communities. Community size averaged around 350 people.
- Kuna Yala in Panama had about 35,000 people living in 51 communities; the largest of these had over 8,000 inhabitants, and there were several with a couple of thousand people. Most communities, however, had less than 1,000 inhabitants.
- The Huon Peninsula in Papua New Guinea had a total population of roughly 11,000 people living

in 37 communities.

Number of Village Researchers: There has been far less variation in the number of Village Researchers. The variation has been in the relation of Researchers to communities.

- The Comarca Kuna Yala: 26 Researchers (in two phases, of 16 and 10)
- The Honduran Mosquitia: 22 Researchers
- The Izozog of Bolivia: 22 Researchers
- The Panamanian Darién: 21 Researchers
- The Huon Peninsula of PNG: 14 Researchers
- The Boa Plain of Cameroon: 11 Researchers
- Southwestern Suriname: 7 Researchers
- West Papua: A special case (see box)

Researchers in West Papua

It is hard to say how many Researchers participated in the mapping project in West Papua, for their numbers fluctuated through time. We began with a relatively small number at the First Workshop. There was a good deal of suspicion initially as to what the project was about, so few showed up. As we moved through the Second Workshop and the villagers began to see that they were indeed being consulted and the maps were being produced for them rather than for outsiders, they came to participate in greater numbers. By the time the Third Workshop was held their numbers had swollen exponentially and we had over 100 villagers, including many elders and leaders, at the workshop facility. All of them were contributing in one way or another, and it would be difficult to say who should be considered a Researcher and who was simply an observer.

The large influx of participants reflected the involvement of villagers in the project, and it was extremely positive. Luckily, the project budget was able to cover their participation.

Certain patterns emerge when we begin to put these figures together. Some examples are:

Southwestern Suriname: Here, the project involved an extremely large territory, but there was only a single village of between 500 and 1,000 people (many moved in and out according to the seasons), and most of the inhabitants lived dispersed in hunting and gathering camps. There was a total of between 2,000 and 3,000 people in the entire region. The seven Researchers were living in the one village, Kwamalasamutu, yet they had traveled throughout the territory and knew much of it well. Kwamalasamutu lies to the south, along the Sipaliwini River. As a result, this area was most familiar to the Researchers and was the most thoroughly documented on the map. The northern reaches were more thinly represented.

The Honduran Mosquitia: By contrast, the 20,000 km² Honduran Mosquitia constituted a relatively large territory that contained 174 communities containing a total population of more than 55,000 people. The size of the territory by itself was not too large, but the number of communities put it way over the limit. There were only 22 Researchers to cover the 174 communities, which meant that all of them had to work in multiple communities – some of them with up to 10 and even 12 communities to cover. This arrangement stretched the team of Researchers far too thin and the quality of the data suffered.

The Izozog of Bolivia: Our first two mapping projects were in the Honduran Mosquitia and the Panamanian Darién; both suffered with an overload of communities and a dearth of Researchers to cover them. In our third project, in the Izozog, we determined to set this straight. We decided to provide for one Researcher per community. This worked very well and we decided that this, or some slight variation off of it, was the model we were seeking.

The Comarca Kuna Yala in Panama: The Kuna project presented a special case. Although the territory was only 5,400 km² in size (relatively small), it covered land and sea and was extremely complex both logistically and politically. The team therefore decided to divide it into two phases, the first with 32 communities and the second with 19 communities.

The Huon Peninsula of Papua New Guinea: The territory was small – 250 km² – and there was a large number of communities – 37 – but the communities were small and closely related by kinship and trade, and a total of 14 Researchers was able to handle the territory with relative ease. Beyond this, the territory was divided by language, for there were three language groups contained in this small area. A bit complex, but it was all handled smoothly by local leaders.

The Boa Plain of Cameroon: The size of the area mapped was small (just 420 km²), as was the number of communities (8), and there were 11 Researchers (three communities had two Researchers). In the cases where two Researchers were present, one had extensive experience in the bush but was illiterate and the other was literate but lacked experience in the bush. They had complementary skills and worked together as a team.

Summary: Several general points can be made regarding size of territory, number of communities, and number of Researchers.

Territorial size: Under normal circumstances, 21,000 km² would be too large a chunk to bite off. The mapping in Suriname only worked because of the low population, the existence of a single village, and a dispersion of semi-permanent camps. There was no need to transport people over great distances because all of the Researchers were located in the single village. At the other end, 420 km² in the Boa Plain region was extremely easy to manage.

We recommend that no territory larger than 20,000 km² should be taken on in a single project. Anything smaller than this is acceptable; but the key factor with any territory is the ease of travel.

Number of communities and Researchers: These two variables are closely linked and are the key to defining the area to be mapped. We have found that the best arrangement is to have one Researcher per community; in some cases a single Researcher may cover two communities (or more if the communities are very small and closely related), and in others two researchers may work in a single community. The number of communities should not be over 25 or 30 – and even this is at the high end. More than this makes the project difficult to manage.

What to do with a territory that is larger than 20,000 km² and/or contains more than 25 communities? Take it on by phases. The Kuna broke their project into two phases because of the number of communities (51). In Papua, there were several phases. The Papua team began with a region called Nambluong, which was roughly 540 km²; then projects were begun in the neighboring regions of Kemtuk, Kressi, and Dempta. The main advantage of doing projects in phases is that the team becomes experienced in the first phase and can put their expertise directly to work in subsequent phases. To facilitate this process, we suggest that key people who will participate in later phases accompany the work of the first phase.

We have found that one Researcher per community – and at times two per community – is the best arrangement. The person chosen as Researcher is known in the community; he knows the area he is mapping and can process information he receives from other villagers; and since he has been chosen by the community, access to information will be open – something that is often not the case with people who are not members of the community.

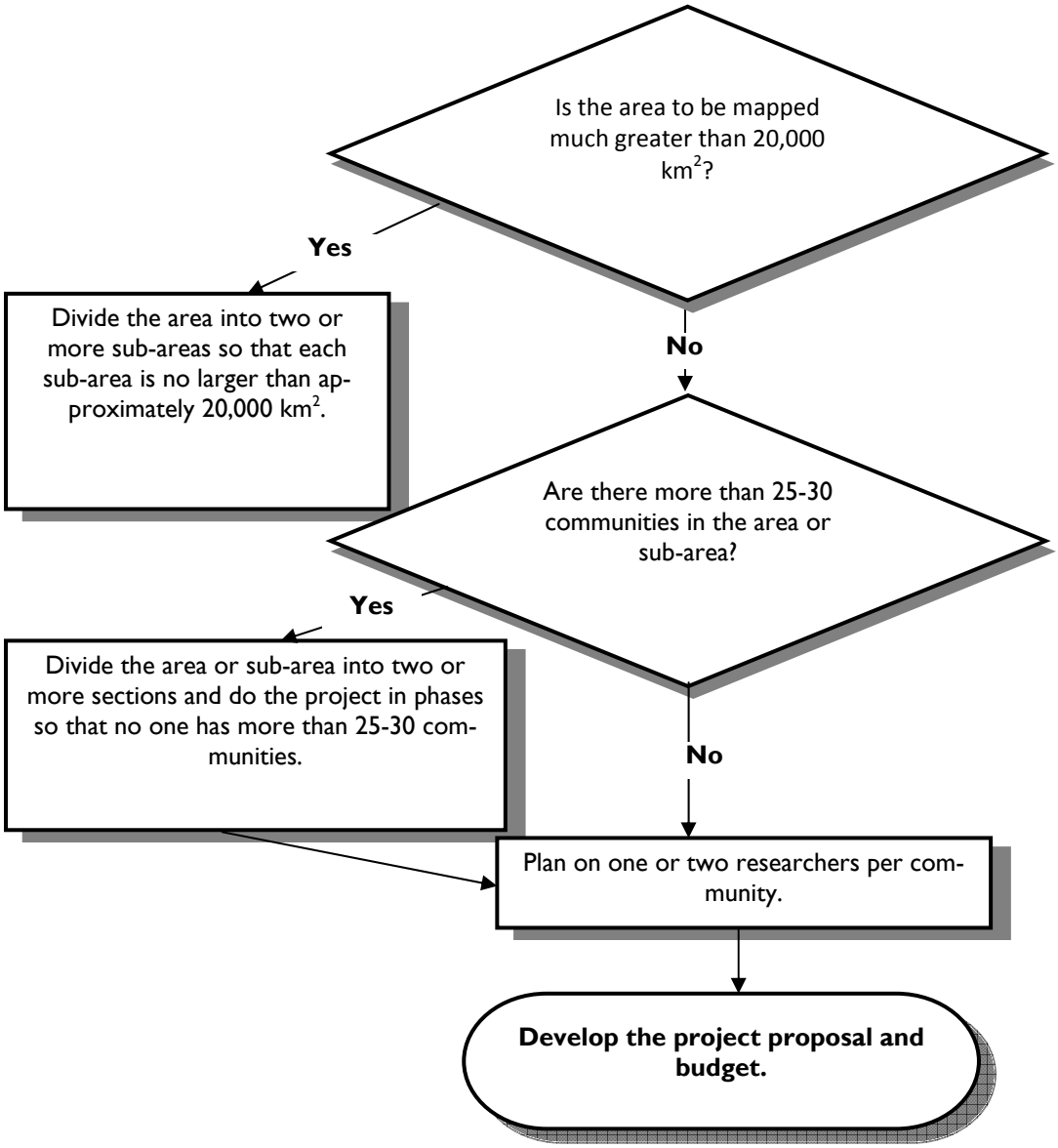
There may be slight variations on this, depending on the situation. Where communities are small and physically close to other, larger communities, there may be some lumping, in which one Researcher, generally from the larger community, works with both communities. In other cases, there have been two Researchers working as a team in a single community: one who is knowledgeable about the

countryside and subsistence but illiterate, the other who knows how to read and write yet has little experience in the wild.

Projects should limit themselves to no more than 25 or 30 Researchers – which means that there should be no more than 25 to 30 communities being mapped at any one time. The number of communities may be increased slightly if there is lumping, with some cases in which a single Researcher is covering two or even three communities. But more than 25-30 Researchers makes the project difficult to manage logistically; moving all of these people in and out of the rural area to the workshop site, accommodating them in the site, and organizing their work with the Cartographic Unit would be a nightmare.

If the region to be mapped has more communities than this -- upward of 50 and up to 100 – it should be done in two or more phases. This was done on the Comarca Kuna Yala in Panama, where 51 communities were mapped in two phases (33 communities in Phase I and 18 in Phase II); and in West Papua, where several contiguous regions were mapped; at least four separate projects were undertaken, some of them simultaneously.

Defining the Project Area Flow Chart



3. FINANCES: PREPARING A PROJECT PROPOSAL AND SECURING FUNDS

The participatory methodology presented here is relatively comprehensive and ambitious. It involves large numbers of people, considerable travel to remote places, and food and lodging during three workshops. The heart of the process stretches out over a period of six or seven months, and there needs to be a small core staff that will shepherd the project from the very beginning – starting with Ground Preparation – through to the end, culminating with the production and distribution of the maps. All of this requires financing.

Fundraising for the mapping should be initiated as soon as possible after the decision to move forward is taken, so as not to lose momentum. The search for project funding begins with a proposal, or at least a concept paper, and a budget in some form. The level of detail in both documents will depend on the requirements of a potential donor. Some have guidelines, some do not.

3.1 What to include

When writing a proposal for a mapping project, the core pieces are as follows:

- **Explain the Problem.** Describe the geographical region in which the mapping will take place (including a location map, however crude), population and number of communities, subsistence activities, political organization, and culture. Discuss the problems faced by the people and how the mapping project will help to resolve them. What are the objectives for this project?

- **Explain the Approach/Methodology.** This is an explanation of what will be done to solve the problem. Describe how the mapping project will be structured, who the people on the project team will be, who will be responsible for what, and how the project's components will be coordinated. What follow-up activities will demonstrate how the indigenous maps will be put to use?

Accompanying the proposal is the all-important **project budget**. In Native Lands' experience, the total cost of a project will range between $75,000 and $175,000 (including in-kind contributions). This wide variance is created by a variety of circumstances. Some countries are more expensive than others; the logistical challenges vary from region to region (indigenous areas are frequently remote and of difficult access); some participating institutions are in a position to contribute in-kind support, while others are not; some projects are simply more complex than others; and some stretch out over a longer period than others.

Figure 3.1 is a sample budget format that lays out the major categories that we have used to construct a project budget for the methodology described in this guidebook. Of course, there are other ways to put together a budget; but we have found this format to be effective. It suggests a way to organize the budget information that donors are likely to request, and it will help you keep track of the project as it moves forward. Some donors will have their own guidelines for presenting the budget.

3.2 Line item descriptions

Local salaries/fees/honoraria – These costs will differ from country to country. They must be itemized by position, at least for internal purposes. Below are the types of positions that are required. The **bolded** positions are essential; the others are less essential, to be filled if there is a need and the budget permits.

Figure 3.1 **Sample Budget Format for a Mapping Project (with typical line items and layout)**

Budget for: [title of mapping project]

Line Item Description	Amount Requested	Other Sources of Funding	In-kind Support	TOTAL
Local salaries/fees/honoraria *(community researchers, coordinators, cartographers and draftsmen, administrative staff)*				
Travel *(travel related to pre-workshop logistics, for the community researchers, coordinator(s), and others to and from the field and workshops, for outside specialists who may be needed for the project)*				
Workshops *(food and lodging requirements for participants; facilities for workshops)*				
Research materials, supplies, equipment *(source materials -- base maps, aerial photographs, satellite imagery; cartographic supplies -- tracing papers, pens, colored pencils, erasers, etc.; cartographic equipment -- map tubes, drafting tables, adjustable lamps, technical pens and templates, etc.)*				
Map design and printing *(map production specialists and facilities; linguists; review and approval of proof sheets by communities; final printing and delivery)*				
General administrative costs *(office rent, utilities, insurance, administrative supplies and equipment, etc.)*				
TOTAL				

Budget Notes [as needed]

- Project Management Unit: **Project Director**, **Administrator**, Administrative Assistant(s)
- Technical Unit: **Cartographer(s)**, **Draftsman(en)**, Aerial Image Interpreter
- Community Unit: **Coordinator(s)**, **Researchers**, Interpreters, Linguists, Cooks, etc.

Some positions will be needed over a longer period of time than others, and adjustments will have to be made. For example, the Project Director and Administrator will be required through the life of the project. The Community Researchers will be needed for a much shorter period of time. The Technical Unit may vary in size during different stages of the project. The budget should be prepared with careful consideration of the timelines for each position. If an outside specialist is required to help set up the project and oversee the initial key workshops, that specialist will collect a fee and the budget should reflect it.

Salaries and honoraria

To insure that the mapping moves forward in timely and orderly fashion, the bulk of those involved should receive some form of payment. Community Researchers, for example, will be devoting up to six months of their time to the project. They cannot be expected to volunteer their time without pay because they need to feed their families for the duration of the project. For this reason, they need to receive some form of compensation for their time. This will differ from country to country, from region to region, and should be calculated with local standards in mind.

The project is intensive work. It moves forward virtually without a break, jumping from initial workshop to the first field period to the second workshop and on through to the end. If this is to be done efficiently, the added incentive of cash or some other form of payment will help considerably.

Travel – These costs vary widely depending on the size of the area mapped, the distance between the workshop site(s) and field, the number of Community Researchers involved, and the type of transportation required (plane, boat, ground). It must be said, however, that indigenous regions tend to be remote and of difficult access, so that moving in and out is frequently time-consuming and expensive. Travel costs begin during the ground preparation stage as project leaders will need to meet with the communities involved and with governmental and non-governmental offices, to inform them of the project and encourage support. Once the core work of the project is scheduled, travel costs become significant as the people involved move to and from the communities and around the communities. There are often unexpected travel expenses so it is wise to add in some additional money to this line item.

Workshops – The sequence of workshops will require fairly predictable costs associated with food, lodging, and meeting expenses. Sometimes a workshop site can provide both work areas and lodging; in other circumstances, they are distinct locations. Meals may be prepared on site or catered. It is always wise to budget additional funds for the period of time in which the workshops are underway. Often, there are unforeseen expenses. For example, participants may get sick and require medicines, a visit to the doctor, or even hospitalization. Equipment may break down and need to be replaced. Unexpected guests may arrive at the workshops, and they will need to be accommodated. It is not possible to foresee every possible expenditure; frequently the unanticipated costs will occur during the workshops.

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Research Materials, Supplies, Equipment – These costs can vary widely, depending on whether materials and equipment can be loaned to the project or must be purchased. Calculating these costs is really the domain of a competent cartographer, one who will recognize the needs of the project and will be familiar with local availability and pricing of cartographic source materials, supplies, and equipment. If such a person cannot be consulted, the project director and administrative staff will have the difficult task of estimating costs on their own, perhaps seeking advice from local businesses and government offices.

As with other budget categories, for potential donors it is probably not necessary to itemize the vari-

ous materials, supplies, and equipment that will be needed, unless there is an extraordinary expense involved. However, internally, administrators will need to keep a sharp eye on these expenses.

Map Design and Printing – As with the previous category, there are a number of technical matters to consider when estimating the cost of map design and printing. Cartographers are the most appropriate people to handle this task, for they will have the contacts and know what to ask. The method of production will determine cost. Will the maps be produced through traditional cartographic techniques (i.e., pen and ink or scribing) or a digital process (i.e., with geographic information system software)? Other critical questions: Can production and printing be done locally, or will they have to be done in a distant city or even another country? How many maps will be produced and on what quality of paper?

Items to consider in the budget

Research materials

Base maps/other maps ♦ Aerial photographs ♦ Satellite images

Supplies

Colored pencils ♦ Correction fluid ♦ Regular & technical pens ♦ Markers ♦ Tape (clear/masking) ♦ Large sheets of paper ♦ Erasers (pencil & ink) ♦ Notebooks ♦ Tracing paper (roll)

Equipment

Map tubes ♦ Stereoscopes ♦ Rulers & triangles ♦ Backpack ♦ Map measure ♦ T-squares ♦ Flipchart & easel ♦ Planimeter ♦ Drawing templates ♦ Drafting tables ♦ Calculators ♦ French/flexible curves ♦ Magnifying glasses ♦ Computer ♦ Pencil sharpeners ♦ Erasing shields ♦ Desk lamps ♦ Dusting brushes ♦ Map weights

These questions are best answered in consultation with experienced technicians. If all you can get is a rough estimate, it is best to overestimate the time and human and material resources you will need to print the maps, so as not to be caught short. Native Lands' experience has shown that this part of the project invariably takes longer than it should and ends up costing more than projected.

General Administrative Costs – This category, known variously as "Overhead" or "Indirect costs," should not be overlooked (as it often is, especially by those who have not prepared many budgets). These are the operating costs of any organization that all projects must share. They might include a portion of the rental and utility costs for the office, the cost of maintenance, repair, or replacement on supplies and equipment used in the project, the cost of accounting, audits, and general insurance expenses, and the cost of telecommunications services (phones, internet access).

Normally, the amount calculated for this category is a set percentage of the total project budget. The Project Administrator will be in the best position to determine the project's fair share contribution to indirect costs. Sometimes donors stipulate a standard amount that they will allow. If a donor does not allow indirect costs to be included in the budget, then these costs should be converted to direct costs, to the extent possible. Any indirect costs that are not covered in the grant request should be described as in-kind contributions (see discussion in box next page).

Budget Notes – Almost any budget should have at least a few explanatory footnotes. Doing so allows for a clean presentation of the numbers without the clutter of myriad explanatory texts in the budget columns themselves. Footnoted numbers and text are used to:

- explain what numbers are included or excluded in terms of products or services to be purchased (e.g., the rental of a site for a workshop might include lodging and meals);
- identify line items that stand out and beg some explanation (e.g., "charter flights" might sound like luxury travel but, for some remote areas, it is definitely not luxurious and it is often the only option available);
- explain line items that appear redundant (e.g., travel for community researchers vs. travel for

other team members);
- define currency exchange rates;
- list contributors who provide cash or in-kind support;
- demonstrate how an amount has been calculated;
- in general, help the reader interpret the budget.

Remember that while proposals serve the crucial function of bringing in money, they are also important for project planning. For this reason, they should be detailed and carefully put together. It is also important to remember that one of the primary goals of these projects is to create a process with a great deal of community participation. This means involving many people, often from very remote villages, and this means covering their travel to and from the field. If the budget is very slim, there will be a tendency to cut corners. This will mean restricting the number of people from the communities, cutting back on travel expenses, and generally paring back the budget in as many areas as possible, including room and board for the workshops. A general rule is that a complete budget will allow for more participation. Conversely, a lean budget will mean diminished participation by villagers. The maps may be attractive in the end, but the process will be substantially impoverished.

In-kind contributions

These are contributions that are non-cash donations such as work carried out with no remuneration, the use of office space or equipment, and food provided by the communities. Donors like to see that their contributions are, in some way, complemented with other donations. For a mapping project, some common, in-kind supports include:

From the Communities
- Meals, lodging, and meeting facilities during the first workshop (as the first workshop is often held in an indigenous community)
- Local transportation and expert assistance during the field periods

From Collaborating Institutions
- Any contributing personnel not paid by the project
- Any office space, equipment, and supplies, and so on not covered by an indirect costs line item (for example, a government mapping office could calculate a value for its work space, use of its equipment and materials, etc.)

By carefully considering the value of resources contributed by the communities and collaborating institutions, it is easy to demonstrate tens of thousands of dollars of support provided in-kind.

3.3 Meeting with donors

Finding donors for this kind of work is often difficult and time-consuming; there is no recipe for success. Sometimes project leaders will spend more time trying to hunt down project funding than they spend doing the project. Receiving the entire amount from a project from a single donor is the exception rather than the rule. It is more common to have money flowing in from two or three or more donors to complete a project budget. Difficulties often arise because donors invariably have different requirements, expectations, and timelines. Some will fund one line item but not others. The timing for proposal approval and the arrival of funds is different with each donor, and this can cause delays in the work and shortages in specific budget line items.

It is essential that all of the money for the project be assembled **before** project activities are initiated. Once the sequence starts, it moves forward rapidly and needs to be allowed to follow its course without interruption through to the end. To have to stop at midstream to search around for

more money to continue will divert everyone's attention and (1) take important momentum out of the project; (2) cause undue anxiety among project leaders; and (3) possibly lead to breakdown. Everyone will be fully occupied once activities are underway and there is simply no time to stop and look for funds.

This is a tricky point because it is often the case that people want to begin working as soon as possible, even before all of the funds have been raised. This tendency, which can be very strong, should be resisted. In an early project in the Darién of Panama (1993) we gave in and started working with just over half of the projected funds in hand. Trying to manage the project and fundraise at the same time brought on anxiety of the highest order, especially when we came to the brink of bankruptcy and considered taking out a loan – which is something one should *never* do, even in the direst of circumstances. We finally managed to raise the necessary funds, but by the time we finished everybody was a nervous wreck. (We ended up pulling in cash and in-kind contributions from more than a dozen organizations – a complex situation that only added to the confusion.)

The "scientific" quality of maps

There is a widespread belief that maps produced by indigenous peoples are not "scientific." When we approached private foundations for support for some of the earlier projects, several of them replied that they were not interested in funding this sort of thing: while it might be interesting, or even important, from a social point of view, it was not scientific. When we tried to explain the Darién project to the Director of Panama's Instituto Geográfico Nacional (IGN), he smiled and shook his head: The notion that Indians wandering about in the jungle with colored pencils and sheets of paper might produce something of value was for him absurd. Yet when we finished the project, one of his cartographers who had worked with us showed him that the maps produced were the most detailed and accurate ever done of the Darién. Several months later, the IGN used the project maps to do an update of the official map of Panama.

In fact, maps done with this methodology combine "scientific" cartography with a thoroughly systematic, "scientific" gathering of local knowledge to produce maps that are of the highest quality. And they are useful to boot.

One reaction on the part of donors is that the amount requested is a lot of money for a couple of maps. We have heard this sentiment expressed on numerous occasions. The reality, however, is that projects of this sort do a good deal more than produce "a couple of maps," and the maps are of a very special kind.

First, the maps themselves are unique. They are unlike any other maps in that they contain a wealth of information that is not found in the usual government-issued maps. Government maps of remote indigenous areas are notoriously inaccurate and lacking in information, for they have invariably been put together without any visits to the region or consultation with local communities. The maps produced with the participatory methodology, in contrast, provide a more accurate and intimate portrait of the land and its people.

Second, when a donor supports participatory mapping projects, the donor is making possible a very rich process that involves (1) extensive interaction among villagers as they gather information about their region for the maps; (2) collaboration among villagers, technicians, representatives of NGOs, and government officials; and (3) the acquisition by villagers of skills to read, interpret, and use maps – all valuable skills in negotiating land and natural resource rights with outsiders. Beyond this, there is a tremendous sense of accomplishment and pride among villagers that put together *their* maps, on *their* terms, with *their* information. This will serve to strengthen the communities and give them greater self-confidence.

4. THE FIRST WORKSHOP

The First Workshop generally lasts from three to four days and is an orientation to the project.

It includes a discussion of what maps are and how they are used; selection of the information to be included in the maps that the Project Team will produce; training on how to produce sketch maps; a session of practice-drawing sketch maps; and preparation of the Researchers for their work in the field.

We have always held the First Workshop in the region rather than in a major city, in one of the villages or in a small town. It is led by the Core Project Team and is aimed primarily at the Village Researchers and the Coordinators, who have been selected by the communities.

4.1 Careful planning

The Core Project Team, Indigenous Leaders, and members of the Cartographic Unit need to meet well in advance of the workshop to agree upon the agenda, decide on the materials that will be necessary, and arrange the logistics of the workshop. The workshop needs to be carefully planned. In several earlier projects, we paid too little attention to this and the results were less than perfect: time was lost while needed materials (paper, colored pencils, map tubes) were tracked down, the workshop agenda was incomplete with key elements being omitted, and lodging arrangements were inadequate. There was even in one case some embarrassing public bickering about what should or should not be included on the agenda. All of this can be avoided with solid planning.

Remember that the First Workshop sets the tone for the entire project. If it is well run and provides a clear and thorough orientation to the objectives of the project, the methodology for creating maps, and the overall scheme of the project, then there will be fewer misunderstandings and confusions down the line. In short, a well coordinated, coherent introduction to the project will give everyone confidence in its validity.

4.2 The roles of the various participants

At this stage in the process, the mapping project involves four major groups, three of which make up the sub-units discussed in Chapter Two:

- The Core Project (Administrative) Unit
- Indigenous Leaders
- The Technical (Cartographic) Unit
- The Community Unit

Each group has its own role as they piece together a set of detailed maps over a period of six months to a year. Yet they do not work in isolation. They need to coordinate their actions and move forward as a single team. The roles of the different sub-teams are as follows:

The Core Project Unit: The Core Project Unit is made up of a Project Director, an Administrator, and perhaps some assistants (depending on the complexity of the project). It is responsible for setting up the first workshop, inviting the various participants, arranging for travel and food and lodging, and structuring the presentations.

Indigenous Leaders and Elders: It is important to have indigenous leaders and elders present at the First Workshop. They give an official stamp to the mapping work, and their prestige will help in convincing the Researchers of the importance of the project. They should be given a basic understanding of how the methodology functions, so they can speak with conviction. And they should be encouraged to accompany the Team as it moves forward with project activities.

Figure 4.1
The mapping team for Phase I of the Kuna project (2003). The Project Director, Valerio Núñez is standing on the far left with his arms crossed, and virtually all of the others are community Researchers. The National Geographic Institute cartographer, José Aizpurúa, is standing second-from-the-right; and Teobaldo Hernández, a Kuna geographer, is standing at the rear in the center with a broad smile. The only non-Kuna member of the team was Aizpurúa.

Figure 4.2
The mapping team in Papua New Guinea (2006-07). Village Researchers and Cartographers from Unitech (all on the right-hand side, four standing and one seated); Toby Ross of the Tree Kangaroo Conservation Project (stretched out on the grass in front), and Mac Chapin (standing far left). The photo was taken in front of the site of the Second Workshop at Rainforest Habitat, a small zoo on the grounds of the Unitech campus.

Figure 4.3
The mapping team in the Izozog of Bolivia (1995-96). All of these are Community Researchers with the exception of Evelio Arambiza, the Project Director (standing fifth from right in striped sweater) and Mac Chapin, standing in center.

The Cartographic Unit: The Cartographic Unit needs to be present at the first workshop for two reasons. First, it can explain the basic principles of mapmaking (including concepts of scale, orientation, and symbolism) to the Village Researchers and provide them with guidance for work on their sketch maps in their communities. Second, the cartographers – many of whom will be non-indigenous technicians – will have a chance to interact with the rest of the team. The cartographers will see the region to be mapped and meet the people; and the indigenous people will meet the cartographers. This is a good start to a long and intensive process that demands good personal relations and teamwork.

The Community Unit: The Community Unit consists of the Village Researchers and the Coordinators. They are in the workshop to receive orientation for their work in the field, which follows the workshop. The Village Researchers receive guidance in gathering information and doing sketch maps in their communities; the Coordinators will be their supervisors in this and need to understand the broader aspects of the project.

4.3 Introduction to maps: What maps are, how they are made, what they are used for

The Project Team should bring a variety of maps of different types: maps of the country in which it is working (e.g. Panama, Honduras, West Papua, Cameroon, etc.); a world map (and a globe, if available); a number of thematic maps (these can be found in atlases and show such things as population distribution, rainfall, soils and agriculture areas, forest cover, and protected areas); and historical maps. If they exist, they should bring government base maps at various scales of the region that is to be mapped in the project. In short, bring lots of maps. They are very useful in showing the different aspects of cartography, the practical application of maps, and the deficiencies of traditional mapmaking in the region.

Maps are **representations** of geographical landscapes; they are not **reality** but **images** of reality. Thus a map of any country can be tiny, reduced so that it fits on a piece of letter-sized paper, or it can be somewhat larger, a fold-out. These are images of the country, which is huge. The same can be said of maps of the world – a globe, for example, is a good deal smaller than the real world.

What are maps used for? Various things. Some of the main uses are the following:

- To claim and defend land
- To plan for social and economic development
- To document culture and history
- To educate (in schools or environmental training)

One of the most powerful uses of maps is to claim and defend territory. Governments and elites have traditionally used maps to rope off large areas of land as property. National boundaries are not natural features of the landscape. They are imposed to show ownership. The period of colonial expansion by European

What can maps do?

- National maps define property that belongs to the governments who administer them. Political maps of regions show national boundaries of the countries within the region.
- Protected natural area maps show national parks, conservation areas, wildlife sanctuaries, and the like.
- Indigenous territory maps delineate areas owned or occupied by indigenous peoples.
- Concession maps delineate areas set aside for timber, gas and oil, and mineral exploitation.
- Thematic maps show rainfall patterns, forest cover, ethnic groups, population, etc.
- Other uses of maps: e.g., education (note that maps are used in schools; in their schools the teachers show maps of the country, the region, the world, of China, Europe, Russia, the United States, and so forth). It is unlikely that the participants in the workshop have ever seen a detailed map of the area in which they live.

nations from the 15th through the 19th centuries was a busy time for cartographers, who were actively involved in staking claims over land. Once again, the geographer J.B. Harley's observation is apt: "As much as guns and warships, maps have been the weapons of imperialism." Notice that national boundaries are often placed on top of the traditional territories of indigenous peoples, chopping them into pieces. Two clear examples of this are the Maya region of Mesoamerica and the Island of New Guinea.

Maps are also used for planning social and economic development. They can show which areas are most appropriate for a certain kind of land use: mountainous zones are best for forest cover, leaving agriculture for lowland, flat areas; areas of abundant water are best used to grow certain crops, while dry areas are suited for other crops that require less moisture. Maps of urban areas can be used to document the needs for social services.

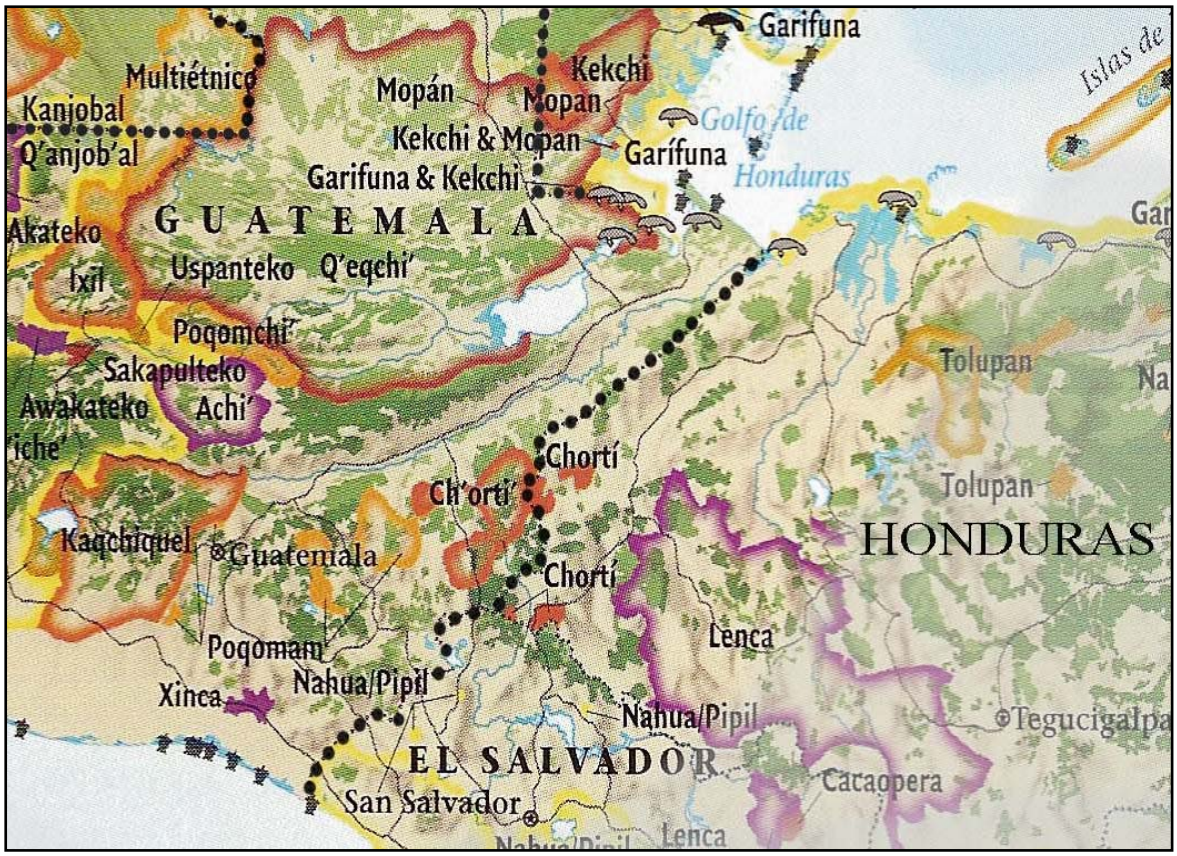


Figure 4.4 Source: NGS

Thirty Mayan language groups are found in Mexico, Guatemala, Belize, and Honduras. They were there before these countries were formed, and some of them span national boundaries. For example, the Chortí span the Guatemala-Honduras border and the Mopán and Q'eqchi' have communities in Guatemala and Belize (where their names are spelled Mopan and Kekchi). (Belize is located to the northeast of Guatemala.)

Figure 4.5

Source: www.papuaweb.org

In the late nineteenth century, the Island of New Guinea was divided into two halves. The eastern half belonged to Germany (in the north) and England (in the south); later this half became a possession of Australia. The western half belonged to Holland and was called Dutch New Guinea until 1962, when it was passed over to the independent nation of Indonesia. For years its name was Irian Jaya; but in 2007 its name was changed to Papua Barat (West Papua). It is presently a province of Indonesia. The eastern half of the island gained independence from Australia in 1975 and is officially called Papua Niugini (Papua New Guinea).

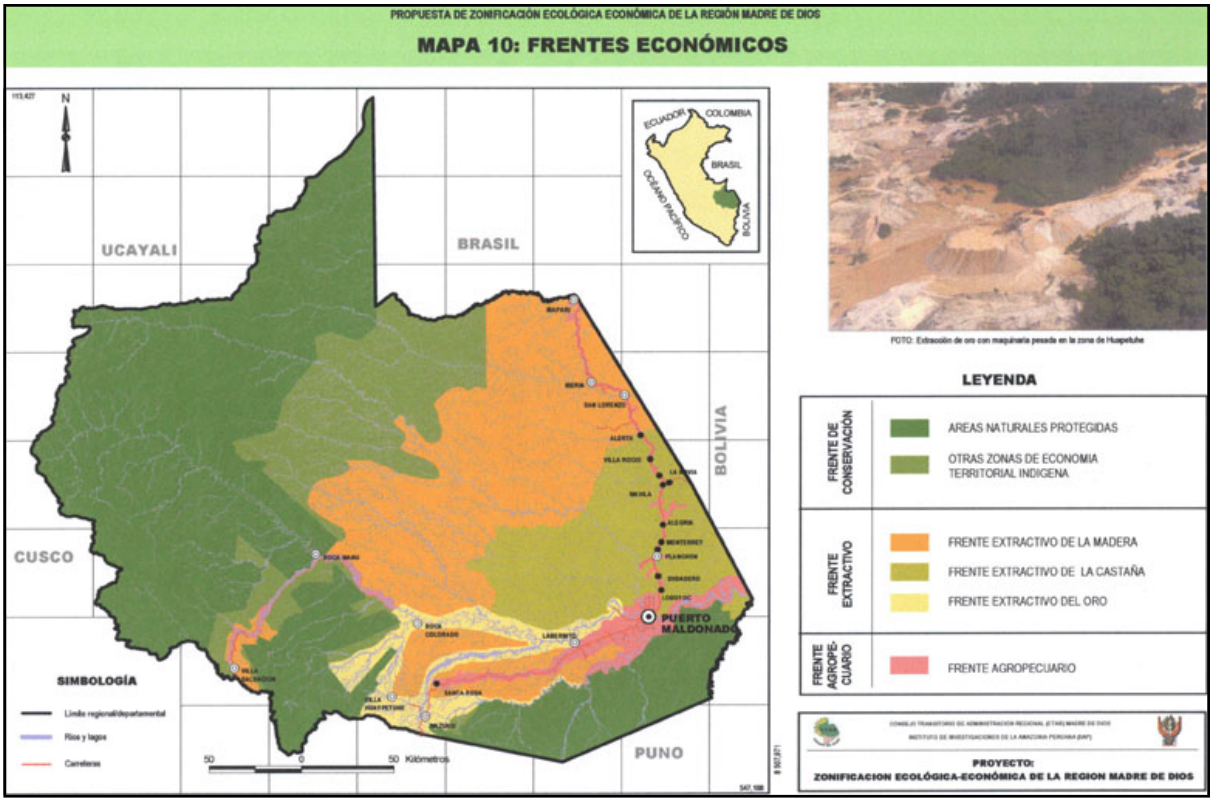


Figure 4.6

Source: www.iiap.org

Thematic map of the Madre de Dios region of Peru, showing the "Conservation Front (Protected Natural Areas & Other Indigenous Territories)" in green; the "Extractive Front (Timber, Brazil Nut, & Gold)" in orange through yellow; and the "Agricultural Front" in pink.

Figure 4.7 Source: www.infraest-energ-sudamerica.org

IIRSA is the acronym for the Iniciativa para la Integración de la Infraestructura Regional Sudamericana (Initiative for the Integration of South America's Regional Infrastructure). Launched in 2000 by the Banco Interamericano de Desarrollo (BID), it is a multi-million-dollar Project to develop the region's transportation, energy, and telecommunications systems. It is made up of more than 400 projects, including the construction of highways and deep water ports on rivers, that will facilitate the extraction and transportation of natural resources out of the region. South American governments have long sought this sort of integration, yet environmentalists and indigenous peoples fear that IIRSA will bring serious negative impacts.

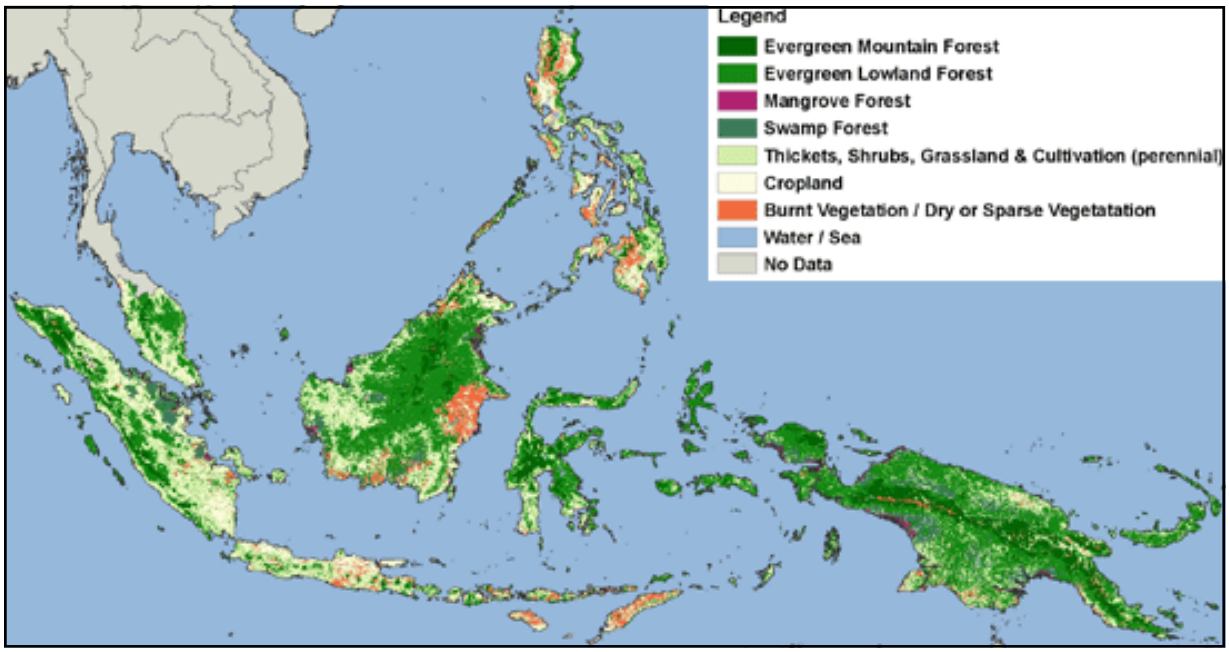


Figure 4.8 Source: www.tem.jrc.it

Forest Cover Map of Insular Southeast Asia covers the countries of Malaysia, Singapore, Indonesia, Brunei, East Timor, the Philippines, and Papua New Guinea.

4.4 The matter of scale

Maps are smaller than the area on the earth's surface they depict. Thus, we can have a map of Africa on a letter-sized sheet of paper, and a globe of the earth the size of a basketball – clearly smaller than the territories they represent. This differential is represented by what is termed "scale." Scale is expressed as a relationship, generally in three different ways:

First, scale can be expressed **verbally**, as "One centimeter on the map equals one mile on the ground" or "One centimeter on the map equals 100 miles on the ground." This is relatively simple and can be understood easily.

Second, it can be expressed as a **numerical ratio** or a **representative fraction (RF)** of map distance to earth distance. For example, a scale of 1:50,000 means that 1 of any measurement on the map equals 50,000 of the same measurement on the earth's surface. Thus, every centimeter on the map represents 50,000 centimeters in reality, on the ground.

Third, scale can be expressed with a **graphic scale bar**, which is a ruler printed on the map that is used to convert distances on the map to actual ground distances.

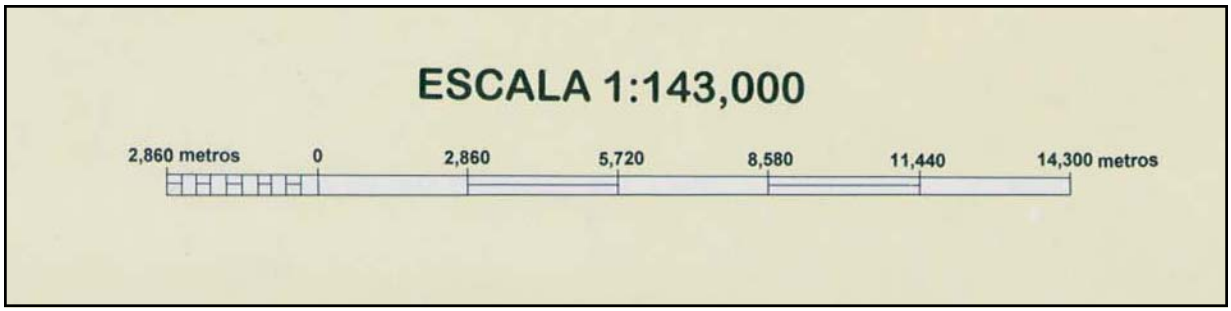


Figure 4.9

An example of how scale can be shown both as a numerical ratio and with a graphic scale bar. This is taken from the largest of the Kuna Yala maps. As can be seen from the ratio, one centimeter on this map equals 143,000 centimeters, or 1.43 kilometers, in reality.

4.5 Government maps vs. indigenous maps

Begin by taking out a government base map covering the area to be mapped. Study it carefully with the participants. You will all see that, for starters, it contains very little information. There are very few named places and many of the physical features are missing. This gives the impression that the area mapped is empty of human activity – and governments frequently use this apparent "emptiness" as a justification for giving out large tracts of land to logging companies, or designating areas suitable for colonization. "No one is using the land," they exclaim; and they see this as a blank check to do as they please with it.

Much of the information it does include is wrong. Names of rivers and mountains will be in the national language (rather than the indigenous language). Names that are in the indigenous language are frequently misspelled. Names will be misplaced.

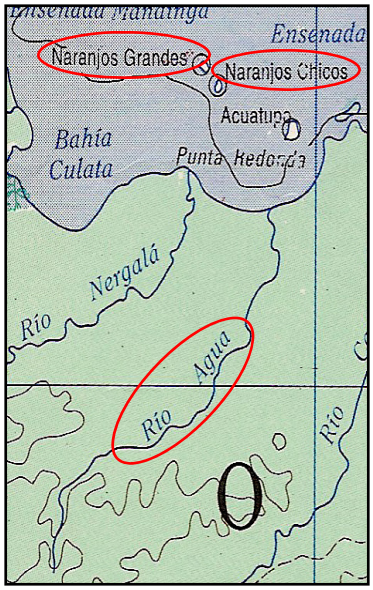


Figure 4.10
Government Map.

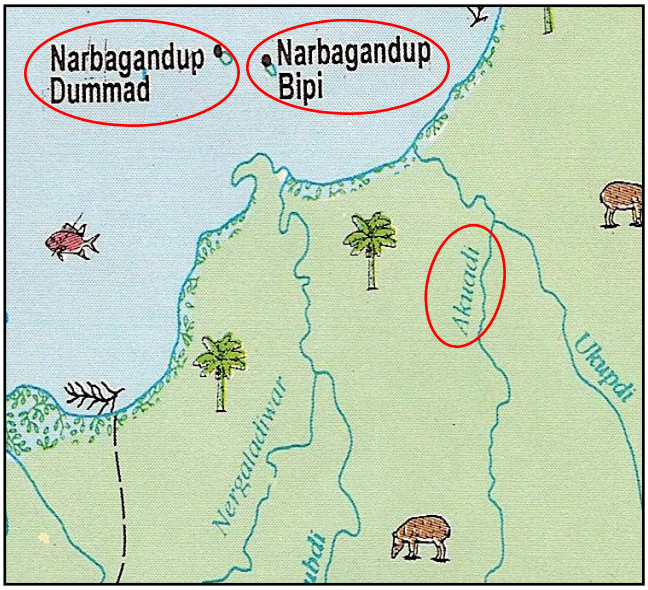


Figure 4.11
Kuna Map.

In Panama, government maps label the Kuna region "San Blas," while increasingly the Kuna are calling it "Kuna Yala" (Kuna Territory). The many inhabited islands have either confused Kuna spelling or Spanish names. For example, in the government map above there are two island villages with the Spanish names Naranjos Grandes (Large Citrus Trees) and Naranjos Chicos (Small Citrus Trees), a translation of the Kuna word "naras," which means "citrus tree." Yet the Kuna word for the islands is "narba," which is another kind of tree, not "naras." The real names of the islands appear on the Kuna map: Narbagandup Dummad (Large Narba Trees Island) and Narbagandup Bipi (Small Narba Trees Island). Similarly, a river that the Kuna call Akwadi (Rock River) appears on the government map as Río Agua (Water River).

4.6 One has to ask:

Why are these maps so deficient?
Why do they have such bad information?

The simple answer is that most of these maps have been made with the use of aerial photographs in the central office of the government mapping agency, far from the field. Unless one has the opportunity to visit the region and consult with the people who live there, everything beneath the canopy will remain a mystery. When this is the case – and it is extremely common – either the cartographers have to guess what might be there or leave the maps blank.

Beyond this, most governments only put what is of importance to themselves on their maps. Small villages, the proper location and names of tributary rivers and hills and wetland areas, places where subsistence activities are carried out – all of these are insignificant in the government's scheme of things, and they are therefore not placed on its maps. What would happen if villagers were allowed to make their own maps? How would they do them? What sorts of features would they chose to include on their maps?

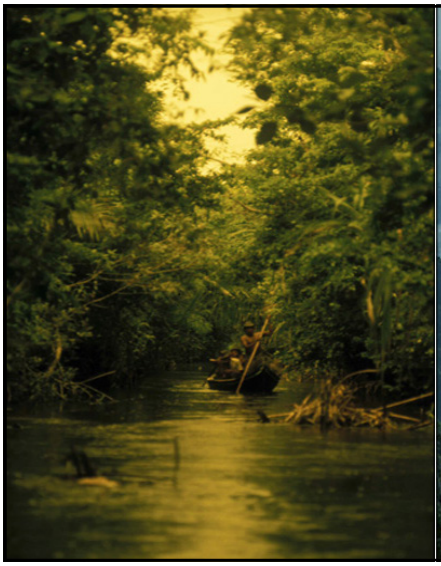


Figure 4.12

Figure 4.13

Aerial photographs and satellite images cannot penetrate thick jungle canopy to see what lies below. The image on the right is of dense rainforest in the Comarca Kuna Yala, the homeland of the Kuna in Panama. The image on the left shows Kuna men poling their dugout canoe down one of the numerous tiny streams that lie beneath the canopy. Because they are imperceptible from the air, steams like this are not included on government base maps.

4.7 Deciding what to include in the map

Over the years, we have found that the features seen as important fit into three major categories, as follows:

- The salient **physical features**, natural and manmade (rivers, streams, tributaries, swamps, hills, mountains; villages, roads, trails, bridges, etc.)
- Areas of **subsistence** (agriculture, hunting, fishing, the gathering of fruit, medicines, firewood, building materials, wood for sale, etc.)
- Areas of **cultural, spiritual, or historical significance** (sacred sites, petroglyphs/caves/ruins, abandoned villages, cemeteries, etc.)

In a group session, make a list of elements to include on the maps on a blackboard or on sheets of paper. The list should be made by the Researchers, Coordinators, and community leaders – it should **not** be made by outsiders (e.g., Cartographers, people not from the communities). Begin with the physical features, natural and man-made, and list them out; do the same for areas of subsistence and areas of cultural, spiritual, or historical significance. Lots of people will participate in this listing and there will be a tendency to make the list very long. This must be resisted – perhaps not so much during the first listing, but as the final cut is being made: too many categories will clutter the map and render it unintelligible, hard to understand.

Make sure that the categories do not become too specific: there is no room on the map for different species of game animals, gathered or cultivated plants, or different sizes of hills (during the first run in West Papua we had several different types of spiritual crocodiles). Game animals should be consolidated into a single category ("hunting area") unless there are one or two species that are exceptionally important. In this case, there might be a general category for hunting and a more specific one for the important species. The same principle applies for fishing, gathering, and farming.

Many of the categories are the same or very similar in every culture. Rivers of all sizes tend to dominate the landscape in the tropical latitudes (one exception in our work was the Izozog, which is very dry; here they had one large river that held water during half of the year and no smaller rivers).

Features common to all cultures or unique to individual cultures

- Canada and Alaska: The indigenous people do a good deal of trapping (along with hunting, fishing, and gathering plant materials) – something that is rare or non-existent in most of the tropical regions.
- West Papua: The people in the lowlands place special importance on plantations of cacao and *sagu* palm, and these were placed on their maps.
- Panama: The Kuna included coconut plantations (coconuts are a commercial crop) and areas where the wild *weruk* palm grows (the fronds are used for roof thatch); and they placed village cemeteries along the mainland rivers (which was not the pattern with other groups).
- The Bolivian Chaco: The Izoceños noted areas where wild honey can be found, and water holes for cattle..
- Suriname: The Trio included stands of bamboo along the rivers and Brazil nut trees, which grow wild in clusters, along with temporary camps occupied by households during parts of the year.
- Nicaragua: The Rama maps showed areas of intrusive colonization by mestizo settlers; these were symbolized by drawings of cattle, which are favored by the colonists but are only a minor element of Rama subsistence.
- Cameroon: Villagers included "beaches," which are areas along waterways used for markets (boats bring in merchandise).
- Papua New Guinea: Researchers chose distinct features of importance in their culture: sites of ancestral battles, pandanus and betelnut patches, *tumbuna* story (oral history) sites, *haus man* (men's huts) and *haus meri* (women's huts).

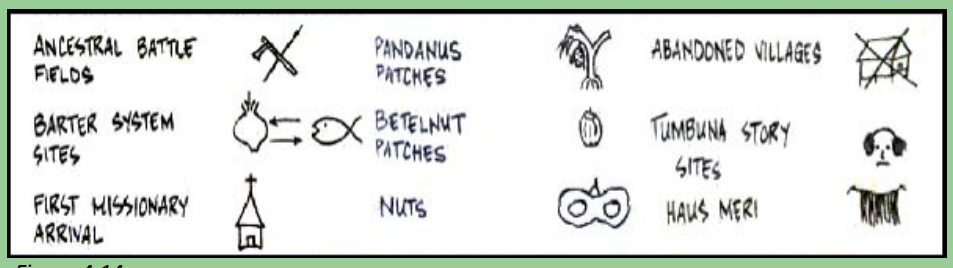


Figure 4.14
A list of features and symbols developed at the first workshop in Papua New Guinea.

Figure 4.15
One of the first tasks facing Researchers when drawing a sketch map is to pencil in the legend. This one is taken from a Kuna map. It shows a collection of features with a mixture of Kuna and Spanish. The symbols in Kuna are *weruk* (a palm used for roofing), *pirya* (whirlpool), *diwar* (river), *aili* (mangroves), *yauk* (sea turtle), and *nainu* (farm); the rest are in Spanish: *cerros* (mountains, hills), *cementerio* (graveyard), *cacería* (hunting), *coco* (coconut grove), *camino* (trail), *arrecifes* (reefs), etc. There was no particular reason that the legend was in two languages; it simply shows the bilingual nature of the region.

Figure 4.16
Marcelino Apurani, one of the project Coordinators in the Izozog, explains the sequence of steps in the mapping process to Village Researchers. Marcelino was the Guaraní interpreter for village visits during the Ground Preparation stage.

Footpaths, hills, swamps, and mountains are prominent features in most places. Subsistence generally includes farming, hunting, gathering, and fishing (an exception is in Canada and Alaska, where there is no agriculture). By the same token, sacred places and historical sites are found in every region.

4.8 Choosing symbolism

Once a list of features to be included on the maps has been decided upon, the next task is to choose the symbols that will be used to represent these features. We have found that people want to use picture symbols for the different features and activities. For the participatory mapping, villagers have the freedom to choose whatever symbols they want. This is generally decided among all of those present, often with some sort of contest and considerable discussion. Some of the symbolism varies little from one culture to another, although the artwork may. Fishing areas, for example, are always represented by some kind of fish (there aren't too many alternatives with this; the only difference might be the type of fish). Areas of sea turtles, as found in the Kuna region, are symbolized by a turtle (it is hard to imagine any alternative to this).

Other categories, however, are represented by symbols that vary from culture to culture. Hunting areas, when generalized, can have different forms: a peccary in the Izozog, a tapir among the Kuna, and a bow and arrow among the Trio and also the highlanders of Papua New Guinea. Cultivated areas may be a single plant (a banana tree for the Kuna or corn for the Q'eqchi'– showing the importance of these plants for the two groups) or an entire farming plot, as in Suriname. The Kuna chose a hammock strung between two poles for cemeteries, for this is how they place the deceased in their

graves. Sacred places vary in shape and representation from culture to culture. Plantations may be represented by polygons with a single plant within it, as in Papua or by clusters of trees, such as the coconut plantations of the Kuna.

The point is that each group chooses what features it wants to put on its map and how it will represent them.

4.9 Keeping notebooks

Researchers will be keeping notebooks that run parallel to the sketch maps they are drawing. These notebooks contains complementary information and information that does not fit on the map. They consist largely of explanations of what is on the maps. There are two types of information they should record in their notebooks:

- **Cultural, historical, and linguistic information**: Frequently there are stories attached to the places on the map; they illustrate some cultural practice or an historical event. Many cultures name places after events that occurred there, or after incidents or heroes in their oral histories. Some names also have interesting linguistic derivations and some have two or three alternative names (at times in different languages). Often the meanings of place names are known only by elders and are on the verge of being lost; and frequently there are disputes as to the origin or meaning of place names. All of this is important information and should be put in the notebooks. We have found that during the mapping process, both Researchers and villagers become very interested in recording their way of life, and especially their history.

- **Information that will assist the cartographers in transferring the data from the sketch maps onto the newly constructed, georeferenced maps**: Researchers should ask local informants about distances; this is usually expressed in time: "It takes 2 hours walking to get from this place to that place." With this, it is possible to calculate – roughly – distance. Researchers should record the number of streams/tributaries along a stretch of large river on both the right and left sides; the shape of rivers and streams (wide curve, sharp curve, thick here and thin there, etc.). Researchers can describe a hunting area by location – "The area is located on the far side of such-and-such hill between two rivers" – and they can give special characteristics of the hunting there, what kinds of animals. All of this information is very useful to the cartographers when they are looking at aerial photographs or satellite images and trying to draw the new maps.

The history of a name

Among the Kuna there are often two or three names for island communities. Some are in Spanish, others in Kuna, and most of them are still used. For example, one island is called Akwanusadub ("River Agate Island") and also Corazón de Jesús. Another has two Kuna names, both commonly used: Niadub ("Demon Island") and Digantiki ("Strong Water", a reference to the strong ocean currents near the island).

Another island community is called Urgandi ("River of the Canoes") in Kuna and Río Sidra ("Cider River") in Spanish. These names of the latter community demand further explanation, and this is the sort of information that should be in the notebooks. Ur ("canoe") refers not to wooden canoes but rather to spiritual alligators, which are the canoes of the evil spirits. And it turned out, after the Researcher dug into the origin of the name Río Sidra, that earlier historical records talk about the abundance of cedar trees on the mainland near the island. At first, it was called Río Cedro ("Cedar River"), but somewhere along the line it got distorted into Sidra, which is out of place, for cider is not a product of the region. Thus it became clear that in its early years the community was surrounded by spirit alligators and stands of cedar trees – not wooden canoes and cider.

None of this rather complicated history could be placed on the map.

4.10 Practicing with sketch maps

Now that the team has chosen the features it will put on their maps and the symbolism, the Researchers need to practice drawing sketch maps. At least a full day should be set aside for this activity. Pieces of paper and pencils are brought out and the Researchers, working in small groups, will choose an area and begin to draw it. The scale should be roughly 1:50,000, although in some cases more detail is sought and the scale could be 1:25,000. Researchers working in groups should be from neighboring areas so they are all working on the same piece of landscape. Their first task is to draw a legend in a corner of the map, showing the symbolism they will use for all of the features on the map; then they draw an orientation arrow showing the four cardinal points.

To get them started on the map proper, the Cartographers might trace out one of the major rivers, or some other major feature, to give the Researchers a frame of reference; then the Researchers begin to pull information out of their heads and place it on the paper. Maps gradually appear, slowly at first and then with greater speed as the Researchers catch on. The transfer of information from their heads to the paper speeds up and they realize that they are actually drawing a map. This gives them confidence. What they have is skeletal, of course, but they can see where it is going.

The Cartographers will supervise this effort, helping out where needed. One thing they want to regulate is scale: at times the Researchers will concentrate too much effort on the community, depicting buildings and streets; this is too detailed and it will not leave them enough space to travel into the countryside surrounding the community and show areas visited for gathering and hunting. The community should not take up any space on the map. It can be represented by a dot or some other minimal symbol, and the focus of the map should be on the land surrounding the community.

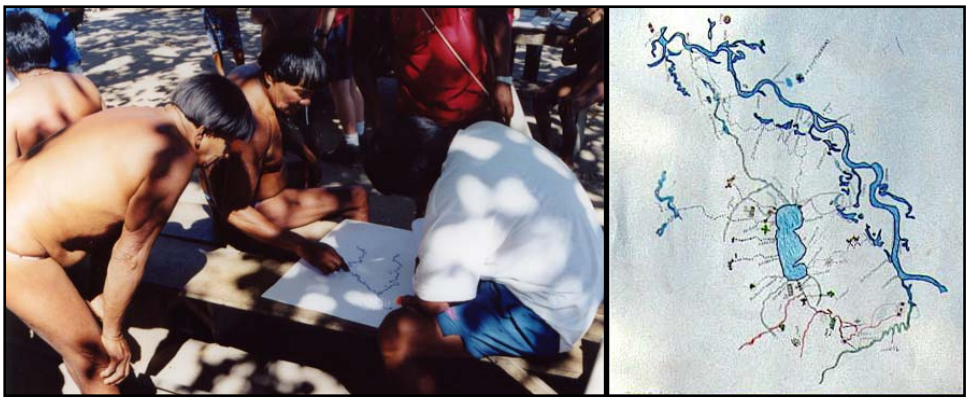


Figure 4.17
Elders working with a young Researcher on a sketch map during the First Workshop in the community of Kamayurá in the Upper Xingu, Brazil.

The Cartographers watch for signs of clutter. Either the symbols might be too large or too many (these are both common faults of the Researchers during the practice); they must be adjusted. For example, some beginning Researchers fill their maps up with trees to show forested areas. The maps they are working on should show correctness of orientation (north, south, east, west); consistency of representation (using the same symbolism throughout); an absence of clutter; and naming of key features.

After some hours of this, when the maps are relatively full, they should all be taken and posted on a wall. The group can then study them informally for about half an hour, discussing them among themselves. At the end of this, those running the session can call attention to the maps one by one, and the group can make comments. The cartographers are in a position to provide a professional perspective and offer advice.

This process may be repeated if it is deemed that the team does not yet have a good grasp of the

Figure 4.18
Reviewing practice sketchmaps during the First Workshop in Cameroon (left) and Papua New Guinea (right).

methodology for drawing sketch maps. The workshop will be coming to a close and the Researchers must begin to think about how they will enter their communities and begin their work.

4.11 Preparing for the field

As soon as they arrive in their community, the Researchers will be expected to provide villagers with an account of the workshop, the project, and the information they need to gather for their community maps. This will consist of what they have just learned in the workshop: what is a map; why a map should be done; objectives of the project; data-gathering methodology; and so forth. A slightly abbreviated version of this presentation can also be given to local government representatives when necessary.

Figure 4.19
Cartographer Nicanor González provides technical guidance for drawing sketch maps to the Village Researchers during the First Workshop in the Izozog region. Nicanor is a Kuna from Panama and had worked on Native Lands' earlier project in the Darién.

Each Researcher should give a short verbal explanation of these things to the workshop participants. The talks will be critiqued and repeated if needed. In certain political contexts a letter explaining

Figure 4.20
During the First Workshop in West Papua, Coordinator Abner Mansay and Cartographer William Kayoi (in striped shirt) hold up a Kuna sketch map to show Village Researchers what a well drawn sketch map looks like. A satellite image of the northern part of West Papua is tacked to the wall behind them. Korneles Riwarin, another of the Project Coordinators, is seated in front of the door.

the project and giving authorization to the Researcher can be provided. It should be signed by a person of authority, generally an indigenous leader, along with the Project Director. This may or may not be necessary, but it gives the project a more "official" character.

Field Materials

- large sheets of durable paper
- sheets of scratch paper
- a plastic map tube
- a small backpack
- colored pencils
- pens
- white-out
- erasers
- a ruler
- notebooks
- a compass (optional, but must be given with training)
- an "official" mapping project T-shirt (optional, but a very nice touch)

5. THE FIRST FIELD PERIOD

With the First Workshop completed, the village Researchers head back to their communities to work on their sketch maps and fill in their notebooks.

Figure 5.1
In Cameroon, the entire mapping team – including the Project Director, the Cartographers, and the Researchers – visited all of the communities in the project (there were only eight, so it was relatively easy) at the start of the First Field Period. In this picture, the Project Director, Henry Ekwoge (standing at right in blue shirt), is delivering an introduction to village leaders. This was followed by the Researchers' explanation of the project and a talk by the Lead Cartographer, Harrison Ebong.

They will spend up to one month in the field. This is a good length of time for this activity – although slightly less or more time may be decided upon for different reasons. One month generally gives the Researchers enough time to meet, formally and informally, with their fellow villagers and gather the information they need, without losing the momentum of the project. A somewhat longer period, perhaps two months, might be programmed for various reasons, and this should be done if circumstances dictate, but more than this is unadvisable. The momentum would be lost ; there would be a good chance that everybody would lose the thread and be rapidly diverted by other activities and thoughts. A period of one to two months provides room for considerable interchange among villagers; they will be able to resolve disagreements that always surface regarding placement of physical features and names, and it generally gives villagers time to integrate themselves into the process. It also gives them time to recall stories associated with places on the map. Places often have stories attached to

Earning trust in West Papua

West Papua is a province of Indonesia. It is a turbulent region, with a growing separatist movement against the Indonesian government. The government has given villagers' lands to people from other parts of Indonesia through its "transmigration" program; it has given timber and mineral concessions to foreign firms on their lands. Studies have been done by numerous foreign scholars, with little benefit to the local people.

In 2002, Native Lands helped set up a mapping project in the District of Nambluong, not far from the capital city of Jayapura. It was managed by a local NGO with roots in the Nambluong region and financed by the British Department for International Development (DFID). During the First Workshop, participants were polite yet hesitant; they were waiting to see how things would develop, without embracing the project. In the Second Workshop they were slightly more open but still reserved. They talked openly about how "the villagers are suspicious" and were not giving all of their information for the maps. Of course, the Researchers themselves were "villagers," and it was clear that they themselves were still somewhat suspicious.

By the time the Third Workshop rolled around they were able to see how things were developing: the field data from the First Field Period had been transcribed onto newly created, cartographically accurate maps, these had returned to the communities for verification, and now they were involved in the final correcting and fine-tuning. At this point they were ready to embrace the project as their own. We had far more people at this workshop than had attended the first two workshops. Many elders showed up to be part of the process, everyone was open, and information was free-flowing. Everyone was in good spirits. Not trusting words, they had waited to see how the project unfolded on the ground, and it was not until well into the project that they were satisfied.

them. These provide a depth and richness to the project.

5.1 Entering the community

The first step for the Researchers once they arrive in their communities will be to present the methodology and objectives to leaders and villagers. Just how the material is presented depends on the cultural norms of the group. In our work, it has been done either with village leaders or in a village assembly; at times the Researchers meet first with community leaders, then with a larger group of villagers, with the leaders present for their input. The earlier ground preparation visit (or visits) should have given villagers some idea of what the project is about. Now the Researcher is back in his community and ready to work, this time with a more complete understanding of what the project is about. This merits a fresh, and more thorough, explanation.

Invariably, some of the villagers will question the project. Who are these maps for? Why are we doing maps of our lands? Who will they belong to? What will be done with the maps? They will be suspicious from past experience. Many have seen outside researchers come into their communities over the years, do studies, and then disappear with the information. Nothing is left behind and there is no benefit to the community. What is being proposed is a very novel experience: in the past, outsiders have mapped them; they have never mapped themselves.

Figures 5.2 & 5.3 Source: PtPPMA
Villagers discussing how they will gather information in their communities in the Nambluong area of West Papua.

Just the fact that the indigenous people themselves are managing the process should serve to allay some of these suspicions. Some, but not all. Not everyone will be convinced that they will be in charge of the mapping. It must be made clear that this research is being done by the villagers and it is for the villagers – and this message must come from village or tribal leaders, not from outside technicians. The maps, when completed, will be the property of the villagers and they will be used for their benefit. Of course, words are one thing and actions another. It is often the case that the villagers will only become fully convinced that the mapping project is theirs after they have seen it in action for some time, through the Second Workshop and on into the Second Field Period.

5.2 Gathering information on sketch maps and in notebooks

Different cultural groups will have different ways of bringing together the information needed for the sketch maps. One method that has **not** worked is for the Researcher to call for an assembly of many villagers and begin asking them for information. This was tried in a few of the earlier projects we set up, and it was more conducive of chaos than the systematic gathering of data. Everyone wants to speak at once, contradictions and debates erupt, and moving forward expeditiously becomes impossible.

In some cases, Researchers have been shy about seeking out a wider selection of informants, and they have relied exclusively on one or two people in the community for all of their information. This should be avoided. The best way to assure that this is not happening is with supervisory visits during the field period.

Figure 5.4
One of the Researchers from Cameroon drawing a map on the ground with a stick. He was a valuable member of the team because he was a professional hunter-turned-park guard, and he knew the region very well.

From our experience, the best way for the Researchers to go about gathering good information for their sketch maps is by first explaining to village leaders what must be done. The leaders then help to pull together a group of specialists from within the community, people who have a thorough knowledge of places, names, wide expanses of the territory, the history of the region. Four or five people is a manageable number. The Researcher begins working intensively with these people to fill in the information for the map. As the map begins to take shape and the map is seen by more villagers, others should be brought in to add and amend information.

Figure 5.5 Source: TKCP
A cloud forest in Papua New Guinea.

Figure 5.6 Source: Mount Cameroon Project
Mount Cameroon.

Often there is someone in the village who draws very well, perhaps better than the Researcher (sometimes the Researchers are terrible artists). Where possible, recruit this person to help with drafting the map. If this involves payment of some sort, either the Researcher can take the needed money from his own stipend, or he can talk to project leaders about an extra sum. This is very important, as we want to have the best sketch maps possible.
Again, Researchers will be looking for three types of information:

- The salient physical features, natural and man-made (rivers, streams, tributaries, swamps, hills, mountains; villages, roads, trails, bridges);
- Areas of subsistence (agriculture, hunting, fishing, the gathering of fruit, medicines, firewood, building materials, wood for sale);
- Areas of cultural, spiritual, or historical significance (sacred sites, petroglyphs/caves/ ruins, abandoned villages, cemeteries).

The Researcher should begin with the significant **physical features** of the territory. This will pro-

Figure 5.7 Source: Native Lands, Peter Herlihy, Vincent Murphy, Andrew Taber
Subsistence activities vary in importance from region to region. Agriculture is a basic subsistence activity, as for this Kuna man standing in his farm carrying manioc tubers; the Emberá of the Darién region of Panama are skilled hunters (here with four dead peccaries); fishing is the major source of protein for the Miskito of Honduras; cattle ranching is a central activity in the Izozog of Bolivia.

vide the frame of reference for the other features of the map, which are subsistence activities and areas of cultural, spiritual, or historical significance.

Along with the sketch maps, each Researcher will also be jotting down information in his notebooks, information that does not fit on the maps. This information-gathering should not be passive; it will involve active questioning and following leads. Two types of information will be recorded:

- Cultural, historical, and linguistic information.
- Information that will assist the cartographers in transferring the data from the sketch maps onto the newly constructed, georeferenced maps.

5.3 Follow-up in the field

During the field period the Project Team needs to make systematic visits to the communities to make sure the Researchers are on track. We cannot assume that all of the Researchers will function with competence as soon as they hit the ground. This is, after all, the first time any of them have ever taken on a task like this before, and it is a very big task. And of course even if the First Workshop has gone smoothly, some Researchers will understand the process better than others. Some will have trouble getting started.

Consequently, the Researchers can-

Meeting the villagers in Cameroon

There are always variations. In Cameroon, the First Workshop was held in the provincial city of Limbe. When it was completed, the Researchers returned to their communities along with the Project Director, the Cartographic Unit (including two government cartographers), and a representative of Native Lands. The core team stayed in the field for eight days, visiting each of the eight communities and local government officials. This was possible because there were only eight communities and they were all located near each other, and we had no trouble visiting all of them. (Most regions, by contrast, are more remote and involve communities that are difficult to reach.)

In Cameroon, a formal presentation was given in each of the communities with leaders and assorted community members present. The Researcher was expected to lead off with an explanation of the project, its objectives, and the work he was to do in the village. The Project Director followed, filling in some of the gaps in the Researcher's presentation and reinforcing his work. The leader of the Cartographic Team then spoke, covering technical aspects, and finally the representative of Native Lands said a few words, to give the project a slightly international flavor. With this completed, we all sat down and drank palm wine out of bamboo cups and the project was officially underway.

The Project Team was also able to evaluate the sketch maps as they were developing over the first week and provide orientation to the Researchers.

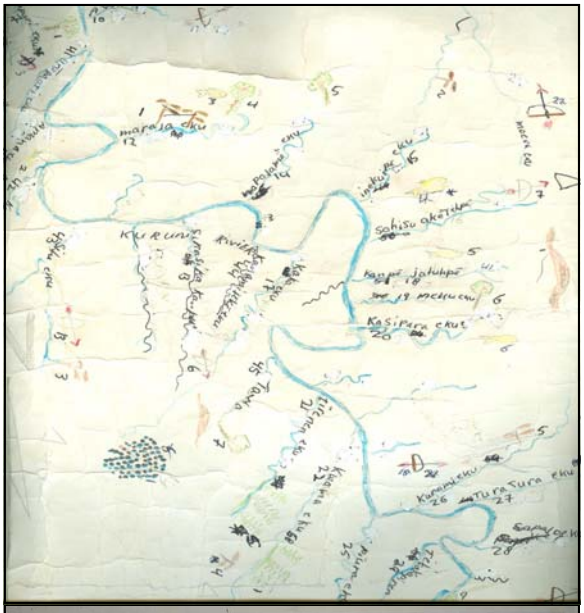
The unsupervised Researcher

During the mapping project in the Darién in Panama, one Researcher in a remote village was not visited during the First Field Period – and on top of this, the Ground Preparation phase had skipped his community altogether. He was young and too timid to approach village elders, who held most of the information he needed to fill his map. To produce his sketch map he used his own limited knowledge and filled in the gaps with pieces of landscape plucked from his imagination. His largely fictional map was exposed during the Second Workshop and things were eventually set straight with a field visit by one of the Coordinators, but considerable time had already been lost and his final map was deficient.

not simply be sent back to their communities and abandoned. The Project Coordinators and, if possible, some members of the Cartographic Unit should make at least two visits to the Researchers in their communities to see how they are doing and help them out when needed. The Coordinators and the Cartographers can help directly by explaining the project more clearly to the communities. They can assist the Researcher with technical advice on gathering information and drafting a sketch map. They can also arrange for Researchers who understand the process well to assist those that do not.

Support in the field is a strong key to success. In several of our earlier efforts we failed to pay much attention to this aspect. Visits by project leaders were sporadic and few, and some villages were not visited at all. The maps produced in these projects were extremely

Figure 5.8
Sketch map of the Marea region in the Darién, 1993.



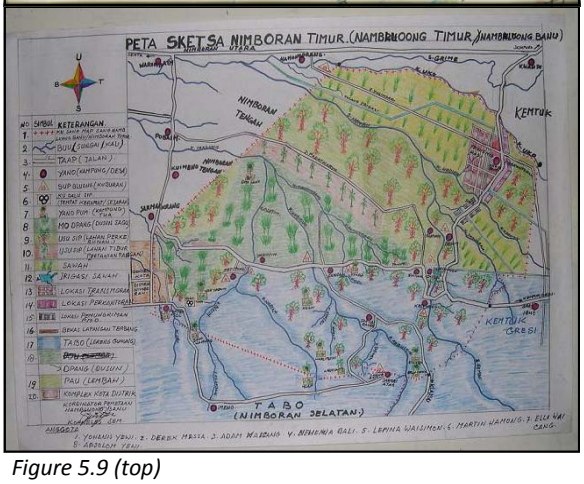


Figure 5.9 (top)
Sketch map done by the Trio of Southern Suriname, 2000.
Figure 5.10 (bottom)
Sketch map of the Nambluong area in West Papua, 2002.

uneven. A few were excellent, but most of them were weak and confused; some were even fabrications, as the example in the sidebar discusses.

Visits to the field involve planning and can be costly and time-consuming. If the area being mapped is remote and logistically challenging – which is generally the case – schedules must be coordinated, modes of transportation provided, and expense money for gasoline, food and lodging, and vehicle rental lined up. Some Researchers will require special assistance, which can require money, and this must be anticipated. It is important that project leaders be flexible and respond quickly to needs. This line item should be worked into the budget from the start.

It is our experience that some members of the Project Team, including one or two Cartographers, should visit the field during the first week or 10 days to see how things are going. They can gather several of the Researchers together and go over the maps they are working on, and they should meet with village leaders to get their impressions of how the work is progressing. The Coordinators can help organize all of these meetings. It is also a good idea to organize a more formal meeting at the half-way point to bring together the Researchers, Project Leaders, and Cartographers to assess progress thus far and outline what has to be completed during the second half of the field period.

5.4 Facilitator-to-facilitator communication

After the first week of the fieldwork period, or as early on as possible, Researchers in nearby villages should visit each other to discuss the process and compare notes. They should have their maps with them and be prepared to discuss their strategies and problems in some depth. Some Researchers will be accomplishing their task well, others will be slower. Some will be confused and unable to move forward in timely fashion, others will be operating with clarity and purpose. Some will have difficulty drawing their maps: how do they handle scale, proportion on the paper? Others will be having difficulty explaining the process to villagers. During these meetings, the stronger Researchers can help orient those having difficulties. They can share tips on how to work with informants, how to ask questions and record the information, and how to draw the maps.

Figures 5.11 & 5.12 Source: PtPPMA
Two years after the mapping project in the lowland Nambluong region of West Papua, some of the team members were contracted to undertake another project in the highlands, in communities near the city of Wamena. These images were taken during the first field period, when villagers were gathering information for the sketch maps.

In short, project leaders must be very active in their communication with the Researchers, and they should encourage communication among the Researchers in the field, right from the start. The credibility of the final map depends overwhelmingly on the quality of the data gathered in the First Field Period.

6. THE SECOND WORKSHOP

Figure 6.1
Village Researchers in Papua New Guinea transferring information from their sketch maps to newly constructed, cartographically accurate maps with assistance from Arthur Ganubella (seated on left in gray shirt), a geographer from the government Department of Environment and Conservation.

The Researchers have finished their **First Field Period** and are bringing their information from the field to the **Second Workshop**. The Cartographic Unit will have set up their materials and equipment at the site of the Second Workshop in preparation for the work to come. These will include:

- **Cartographic materials**: topographical maps, aerial photographs, satellite images. These can be spread out on the mapping tables and pinned to the walls.
- **Work materials**: sheets of paper and vellum, pencils, pens, erasers, white-out.
- **Equipment**: lamps, light tables, lettering devices, rulers, and other tools of the trade.

The Technicians will receive the Researchers when they arrive and collect their sketch maps and notebooks, setting them aside in individual packets. Ideally, all of the Researchers should arrive at the same time so that general orientation can be given to them as a group and work can get underway.

Size and complexity of area being mapped

In our first two projects, in the Mosquitia of Honduras (1992) and the Darién of Panama (1993), the Second Workshop ran for roughly one week. This was clearly too short a time, especially because in these two projects there were too many communities to be mapped (174 in Honduras, 82 in Panama) and too few Researchers to cover them (22 Researchers in Honduras, 21 in Panama). We were inexperienced, and in both cases there was simply too much information to transcribe and far too little time. Not only was coverage difficult, it was impossible. Consequently, the data on these two maps were both superficial and questionable.

In subsequent projects we reduced the number of communities, got better coverage from the Researchers (a single Researcher for 1 or 2 communities), and expanded the length of the Second Workshop to a minimum of ten days to two weeks. This reduced pressure substantially on everyone involved and improved the quality of the work.

The mapping in Panama's Comarca Kuna Yala was done in two phases because of the number of communities (51), the difficulties of travel among communities, and the political complexity of the region. The area mapped was roughly 5,400 km^2, covering land and sea. Most of the communities are located on small islands just off the coast, and villagers journey from community to community by foot, boat, or small plane; the only road entering the region is at the far western end and travel is difficult. The Kuna divided the project into two phases to cover 32 communities in the western end first, then 19 communities in the second phase. An added advantage of this arrangement was that Kuna personnel from Phase I were able to help train the staff in Phase II, which made the process smoother and speedier.

6.1 Objective of the Second Workshop

The primary task of the **Second Workshop** is to bring the Researchers together with the Cartographers to **transcribe** the field data onto new, freshly constructed maps. The new maps will be georeferenced according to cartographic norms and they will be filled with information supplied by villagers. It is a process that combines and crosschecks the community sketch maps with aerial photographs, satellite images, and existing maps of the region. This is a very intense period involving considerable back-and-forth between the Researchers and the Cartographers and close attention to detail.

The work is sequenced with three broad task areas that are, at least at first, done separately:

- Correcting, filling in, and naming the significant physical features of the maps (rivers, waterfalls, hills, trails, roads, swamps, lagoons, bays, islands, coral reefs, etc.).
- Plotting land use patterns (farming, hunting, fishing, gathering, etc.); placing names on these places where they exist.
- Detailing areas of cultural importance (sacred sites, spirit domains, ceremonial areas, etc.).

Note that existing maps (both government and non-government) will have some of the significant physical features on them. Yet many will be missing and some of them will be erroneously placed and inaccurate. Often the names on them will be poorly spelled or flat-out wrong. It is common practice to have names in the national language rather than the local, indigenous language. Both the placement and the names of these features will have to be corrected before moving on to fill in areas of land use and cultural importance.

Depending on the size of the area being mapped and the complexity of the data, from two to three weeks should be set aside for this activity. Projects covering relatively small areas with few communities can get by with a shorter Second Workshop.

Remember that this methodology is new to everyone in the project. While the Cartographers may be skilled at drafting maps and working with GIS software, few have handled such a wealth of field data – and indeed, many Cartographers have never been exposed to field data at all. The Researchers, on their side, have never worked with maps or dealt with Cartographers, and certainly never on activities of this sort. Consequently, the first few days will be marked by lots of head scratching. The Cartographers will feel that they are being inundated with more information than they can handle. Cross-referencing back and forth from sketch maps to aerial photographs and satellite images to government base maps for the purpose of placing the data precisely will require practice before it feels comfortable. For their part, the Researchers will have to get used to their interaction with the Cartographers. They will be, for the first time, learning the elements of cartography and how maps are put together by trained professionals. And, of course, the Cartographers and

Figure 6.2
Village Researchers (standing) in West Papua work with Cartographer Ketut Deddy to trace a map of the Nambluong region from a Landsat image. The team was unable to lay its hands on base maps for the area and thus had to construct their own map.

the Researchers have never before worked together.

Becoming accustomed to this new routine will take several days, but when it comes, it comes fast. During the third day of the Second Workshop in Suriname the Lead Cartographer, Raboen Kartoinanagoen (who had the appropriate nickname of Karto), looked up from his work and said with a pained expression: "We are never going to be able to do this. There is far too much information. I have never done anything like this before." He was referring to the richness of detail on the village sketch maps – it was overwhelming at first. But as he and the rest of the team got the swing of things it came more easily and pretty soon everyone was moving along at a much faster, more assured clip.

An incentive for cartographers

It is common for government cartographers to spend the bulk of their time working on maps in their offices, never visiting the field. To construct new maps, they have traditionally used aerial photographs, and more recently they are shifting to use satellite images – but they seldom have recourse to field data, and visits to the region being mapped are rare. Much of their time is spent copying old maps and putting a new emphasis on them for use in different contexts and tasks, such as planning and zoning or the designation of protected areas. This is drudgery devoid of any creativity. When they see an opportunity to work with copious field data, they invariably jump at it. This is a strong incentive for participating in projects of this sort: the chance to be creative.

6.2 Use the best information first

When the Researchers arrive from the field, the Cartographers will take them aside individually and evaluate their packets of materials (sketch maps and notebooks), and question them about their field experiences. The Cartographers will then classify each Researcher's information as complete or incomplete, strong or weak, or however is appropriate, and store the packets with a written assessment of each. In past projects, the Cartographers have begun the transcription process with the Re-

Topographical maps

Most official base maps are filled with topographical lines, which fill in all the empty space with what looks like finely knit spider webs. Few people other than trained cartographers know how to read these lines – which show elevation – and for the general public they are little more than clutter. In order to place all of the cultural information from the communities and make it visible, we have removed these lines, leaving empty space on which to work.

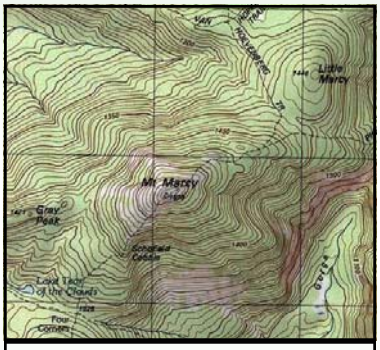


Figure 6.3 Source: NGS
Topographical map of Mt. Marcy in the Adirondacks. Note the cluttered feel of the lines.

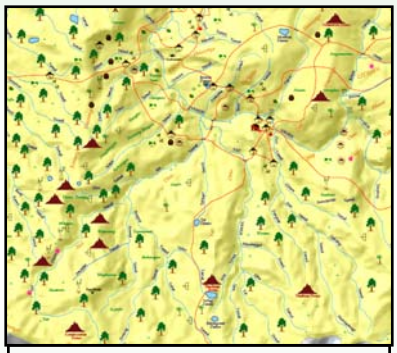


Figure 6.4
Topographical shading in Papua New Guinea, which leaves room for other features to be displayed.

The topography of a region is not the main feature of these maps, but it is often desirable to give some indication of it, especially where it is dramatic. The area mapped in Papua New Guinea is extremely mountainous, and it was important to show this. The Cartographers did not use topographical lines on the finished maps, for this would have filled in too much space and obscured the cultural features. Instead, they used a subtle shading technique that is often used on maps to show rugged mountainous landscapes. In this way, the topography was indicated without cluttering the map.

searchers with the most complete packets of information, as they will be easier to work with. Working with the best packets first enables both the Cartographers and the Researchers to learn the methodology more efficiently. Later, when they have become accustomed to the crosschecking and transcribing, they can move on to work with the incomplete, weaker packets of information.

6.3 Working with base maps, aerial photographs, and satellite images

These are the basic materials used by the mapping team to produce cartographically accurate maps into which the cultural information of the Researchers can be poured. Obtaining this sort of information is often a problem, for either there are no base maps available or, if base maps exist, they are at the wrong scale. The lack of maps might be due to the remoteness and unimportance – from a government's point of view – of the region being mapped, or because the government does not want to distribute any cartographic documentation for security reasons. Recently in some parts of the world, digitized base maps are available and they can be obtained and modified to get the scale needed. Yet we have found that nothing much is available for most of the areas that indigenous people want to map.

Aerial photographs and satellite images

In projects during the early 1990s we used aerial photographs to cross-check the base maps, where these were available. Aerial photographs are generally very clear, and they can be seen in 3-D with a stereoscope.

At that time, there were satellite images but they were hard to get hold of and expensive, and few people were trained to interpret them. By the year 2000 satellite images and those who interpreted them had evolved to the point where they could be reliably used, and Landsat images were free on the Internet. Today, satellite imagery has generally replaced aerial photography except for use in specific areas under special circumstances; it is hard to find complete photographic coverage of a region, and often all that is available is satellite imagery. This can be manipulated and enlarged to the desired scale.

There are numerous technologies available and the field is evolving rapidly. Landsat has been the standard for our participatory mapping projects because it is available and it is free. When blown up to 1:50,000, the images are just starting to go fuzzy, but they still have good enough resolution to pick out features of the landscape. They are right on the edge; to enlarge them further renders them too blurry to be useful.

Other satellite technologies with greater resolution are available, but they are presently too expensive to be used extensively. One of these is Ikonos, which is extremely clear in comparison to Landsat. We were able to use Ikonos to show the transmigration areas in West Papua, but that was as far as it went. Even that limited coverage was very costly. The next few years will most certainly see advances in this field, and prices should drop accordingly.

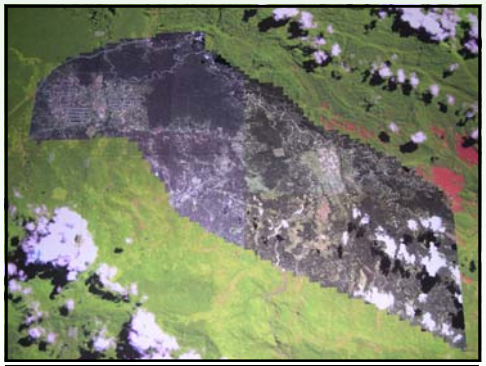


Figure 6.5
The gray patch is Ikonos and the green part surrounding it is Landsat. The Ikonos patch covers a transmigration settlement in West Papua.

We have observed a number of community mapping projects in which villagers are given base maps, or photocopies of base maps, and told to fill them in with information of various sorts. This approach has several problems and should be avoided. First, the base maps often have numerous errors; if they are being used to record information, these errors will persist, for there is no way for the Researchers to correct them. Second, the base maps are cluttered with topographical lines and there is little space for adding more information; any information that is added is hard to read. Third, simply adding information to a map that is already made is not a creative experience. When given the chance to produce new maps from scratch, the Researchers and the villagers that help them gain a much greater sense of ownership of the maps and of the entire project. This is lost if they simply add bits of information to maps that are already made.

Contexts differ and so do strategies. Many of the strategies are determined by the available technologies, which are evolving rapidly and creating ever new opportunities for creativity.

COMMENT: Technologies should be brought into projects in **support** of the participatory process, not to **replace** it. This point needs to be emphasized, for as GIS, GPS, and remote sensing improve and become more accessible and inexpensive, there is a strong tendency for them to swamp projects. It is our experience that the greater the reliance on technology, the farther projects recede from communities and the less participatory they become. Remember: *participatory mapping projects are carried out by villagers with technical assistance provided by cartographers; they are **not** mapping projects carried out by cartographers with villagers serving as informants.*

6.4 Situations and options

In the Darién region of Panama in 1992, we had almost complete coverage with government base maps and aerial photographs. The photographs were of high quality and came out in 3-D with use of a stereoscope, allowing the Researchers to see the contours of the hills and valleys. Unfortunately, the set we had was from the 1960s and out of date, which led to a number of misleading depictions on the map, for tropical landscapes often change dramatically through the years. Later a newer set of photos was found and corrections were made, but the process was delayed and then had to be rushed as we neared the end, resulting in a number of confusions.

In the Izozog of Bolivia in 1995, we were unable to get hold of any aerial photographs (the government mapping agency was under the control of the military, which is always secretive; and the region was a transshipment area for cocaine trafficking, with numerous clandestine airports). At that time, we were also unable to find satellite images. Consequently, we had to construct the maps from government base maps, with the only cross-checking coming from the Researchers. We could have gotten around these deficiencies with today's remote sensing technologies.

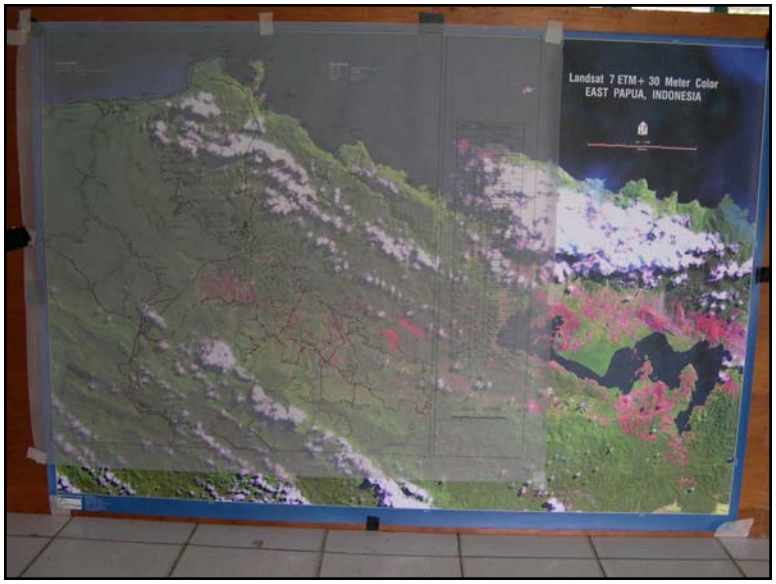


Figure 6.6
In West Papua the team had no base maps of the area being mapped. Here we can see how they created their own map from a Landsat image. The village Researchers, of course, were the ones who did most of the tracing, for they knew the terrain intimately.

In Kuna Yala, Panama, in 2003, the team worked at a scale of 1:50,000. The Panamanian government's mapping agency, the Instituto Geográfico Nacional, had base maps at this scale for only half of the area being mapped. We searched around and

were able to secure accurate maps of the entire area from the Government Treasury Inspector's Office (*Contraloría de la República*). The Cartographers spent a good deal of time erasing the topographical lines in the maps, leaving the more prominent features, such as major rivers and coastlines intact, while at the same time opening up space on which to transcribe the village data. With these "clean" maps in hand, they worked with aerial photographs on the west end of the region, but these were lacking for the east end, so we used a large print-out of a satellite image at 1:50,000 (graciously supplied by the cartographic division of the National Geographic Society).

In West Papua (2002-2003) we were only able to find a single map of the region to be mapped, at a scale of 1:250,000. It was not useful; it was inaccurate and lacked detail. To get the maps we needed, we had to blow up a Landsat image to 1:50,000 and trace out new base maps; these were then verified in the field with GPS and appropriately adjusted.

6.5 "Zoning" the maps

At this point, the Cartographers and the Researchers begin to work together to transcribe the field data onto newly constructed, cartographically accurate maps. One convenient way to work is by first dividing the entire region being mapped into "**zones**" that include several communities covered by a small number of Researchers. There is no fixed rule for the size of the zones. Some will be relatively large with few communities, while others will be smaller with a greater number of communities. Yet the rule of thumb is that the zones should be manageable, so they can be dealt with by a small number of Researchers (four or five, six maximum) as a coherent and comprehensible unit. Researchers working in each zone should have at least some knowledge of the area surrounding other communities in the zone; and there is invariably overlap with nearby communities.

Language groups in Papua New Guinea

The Island of New Guinea, encompassing the Indonesian Province of West Papua and Papua New Guinea, is the most linguistically diverse region in the world, with an estimated 2,000 distinct languages. In Papua New Guinea, the project covered a relatively small area, just over 370,000 hectares. But there were 37 communities within this area and three language groups – Yopno, Uruwa, and Som.

The area was divided into four zones for the transcription work. There were six Cartographers – five from Unitech and one from the Department of Environment & Conservation – and they divided up among the four tables where the work was being done. In all, there were 16 Researchers and three Coordinators, and everybody was involved in putting the sketch maps together. Thus we had all of the Researchers and Cartographers working simultaneously on the maps, and occasionally we would break for group sessions. As we came to the end of the Second Workshop, everyone decided to break up the four zones into the three language groups and begin working on three separate maps, one for each language. Along with these three maps, the teams produced a single composite map showing all three together.

The zones are generally defined by their similarities, in addition to their geographical proximity. Further, they should be defined by local people, not by the Cartographers (who most likely don't know the social or political characteristics of the area). Zones might be closely connected by kinship or exchange networks, or, in linguistically complex areas, they might be defined by the different local languages. In all projects, Researchers within the different zones will work closely; but all of the Researchers will gather together in group sessions to work on the larger composite map containing all of the zones together. The zone arrangement allows a number of Researchers to work simultaneously with one or two Cartographers.

The situation in Papua New Guinea was ideal. Everybody was involved in the transcription process during the Second and Third Workshops. There were four groups working simultaneously, each with one or two Cartographers and a collection of Researchers, and the work went fast.

The ideal, however, may be difficult to reach. When the Cartographic Unit is small, say, two Cartographers and five or six zones, then it will be impossible to have all of the zone groups working simultaneously. In several projects this has happened and resulted in some of the Researchers being unoccupied part of the time. They can of course observe the transcription process other groups are going through, but they should not be intrusive. In this way, they can learn something of the methodology of transcription.

6.6 The transcription process

Every Cartographer will have his own "style" of working with the Researchers; and each culture will have its own rules for interactions of this sort. Yet two general points can be made:

Mentoring

Some Researchers will grasp the transcription methodology more rapidly than others. The strong Researchers can work with the weaker ones to train them. This can be done by working in groups with different Cartographers. Relationships between the strong and weak Researchers can be continued once they get back into the field for the Second Field Period.

What to do with unoccupied Researchers

Those Researchers who are not working with the Cartographers will have free time on their hands. Activities of some sort should be planned to keep them occupied, so they are not just hanging around with nothing to do. Meetings can be held to discuss issues that have come up; documentaries or slide shows of various kinds can be shown (always popular are ones about other indigenous groups or environmental issues); and talks can be given about political matters or history. Speakers from outside are often brought in to talk about government policies, conservation, or other matters; or short field trips can be organized. Some thought should be given to this before the workshop gets underway.

Figure 6.7
Participation increased during the course of the mapping project in West Papua. At the Third Workshop there was a large group, including elders and village leaders, and they had numerous meetings to discuss issues involving the maps and regional politics. They also got several documentaries (one about illegal logging in Papua New Guinea) and a film about the assassination of Chico Mendez, the Brazilian rubber tapper.

It is unwise to let those Researchers who are not working on the maps leave the site. After all, a semi-isolated (or completely isolated) site was initially chosen so the team could work together and focus on the mapping. If people are allowed to come and go there is always the danger that some will drift off and fail to return in timely fashion, and their attention can wander.

In a number of projects another option emerged when nothing was structured: the Researchers came together on their own or with the encouragement of the Coordinators to create their own activities. Most of the Researchers, in our experience, gain a strong interest in their own history and culture – an interest that often was not there before the mapping project got them to question elders in their villages. In several projects, the Researchers and the Coordinators have organized special sessions in which they present the history of their villages. Preparing for these presentations is another way to occupy their time constructively.

- **Communication**: At the start, both the Cartographers and the Researchers will be unfamiliar with the process. It is important to establish fluid communication. This is a time when close relationships are built, for everyone is involved in a single, very intensive and important task. It is a time of bridging cultures – and although they may be from the same country, professional cartographers and villagers have, in a very real sense, very different cultures. If there is blockage in the communication, bring in some of the indigenous leaders – the Coordinators are perhaps the most appropriate candidates – to ease communication. At times there will be language problems; these can be resolved with interpreters on the Project Team. Once the ice is broken, which usually takes a few days, the interaction of the Cartographers and the Researchers becomes much smoother and open.

- **Details**: Cartographers and Researchers alike must pay close attention to detail. Patience and thoroughness are at a premium here; it is counterproductive to try to rush through this process, for it is by its very nature laborious and time-consuming. At times there will be difficulty locating features on the map and it might take several hours to place them correctly. Note that these maps are full of place names; physical features must be carefully located, the shape of rivers and coastlines must be determined, and areas of land use need to be plotted. Remember that the wealth of information and the accuracy of its depiction are the two most important defining characteristics of maps of this sort.

6.7 Physical features

Work should begin with the physical features in order to create a frame of reference onto which land use and cultural features can be placed. This proceeds by moving back and forth over the sketch maps, aerial photographs, satellite images, and base maps to find proper placement for the features; the Researchers' notebooks can be mined for additional

History

In most projects the Researchers realize while interviewing in the communities that they are losing their collective history. The old men are dying and the younger men have not shown an interest in learning what they know. No one has recorded their knowledge. The mapping project ideally will be a catalyst for a renewed sense of community history.

During the Izozog project in Bolivia, a growing interest in local history was perceived by project leaders, who began inviting elders to the workshops to talk to the younger Researchers. This was well received by all and when the mapping was finished, the team went on to produce a book about their history.

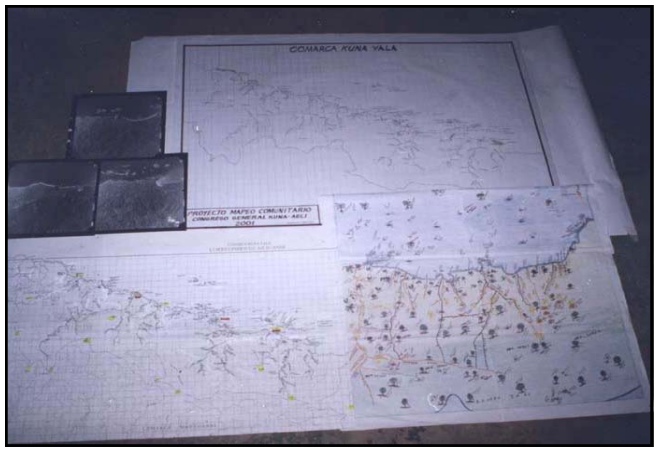


Figure 6.8
Kuna Yala project: materials set up for work, with aerial photographs (upper left), sketch map (lower right), and the new map onto which information from the sketch map and the aerial photographs is being transcribed.

Figure 6.9
Trio project, Suriname: Raboen 'Karto' Kartoinanagoen (red shirt) works with fellow cartographers Johnny Sodipo and Ramon "Somo" Somohardjo to place features on the map.

information. Often the sketch maps are incomplete and must be filled in by the Researchers' memory or information jotted down in the notebooks. General guidelines in this work are as follows:

- Use existing data: The cartographers need to take the available information – government base maps, aerial photographs, satellite images, and community sketch maps – and begin to fashion new maps with cartographic standards. In most cases, this can be done by tracing out the main, most prominent features of government base maps. The Cartographers should start with placement of the largest features, ones that are clearly marked on existing base maps and are (relatively) correctly placed. The veracity of their placement can be checked against aerial photographs and satellite images, and also by reference to the testimony of the Researchers. These will be features such as large rivers (and some of the smaller rivers that branch off from the major rivers and are visible in the aerial photographs and satellite images), roads, coastlines, communities, and so forth. This will form a skeleton that can be filled in with the finer details.

Teaching cartography

During the transcription process, the Cartographers will have ample opportunities to teach the Researchers the basic features of cartography. There is no better way to do this than on the job, working with maps, informally. By contrast, lecture-style teaching is not effective. In this way, the Researchers will learn how to read, interpret, and use maps. These are skills that will be invaluable when they later use the maps to negotiate land rights, involve themselves with planning, and so forth.

Figure 6.10
Papua New Guinea: Unitech Cartographer Raymond Bure takes time during a workshop to teach Researchers the fundamentals of cartography.

- Lack of data: At times, however, there are no government base maps or aerial photographs available. In this case, the best option is to enlarge satellite images to the desired scale and trace out maps on which to work. This strategy was used in West Papua, where no maps or photos could be obtained.

- Locating smaller features: The proper placement of feeder streams and small tributaries depicted on the sketch maps can sometimes be fixed by reference to **depressions** in the vegetation shown on aerial photographs or high-resolution satellite images. These depressions are also seen on base maps, depicted with **topographical lines**.

Figure 6.11
The Upper Xingu region of Brazil is laced with meandering rivers, one of which was cut off and isolated as a horseshoe lake.

It is also common for streams and even major rivers to change their course over the years. Changes in rivers are visible with the creation of "horseshoe" lakes that are river loops that are short-circuited and cut off from the main body of the river. These isolated pieces of rivers then begin to go through a new cycle in which they become gradually covered with vegetation and are transformed into swamps and wetlands. If the base maps and the most recent aerial photographs are old – 30 or 40 years old, which is common – the most recent testimony of the Researchers will serve to chart the changes.

Figure 6.12
Kuna topographer Enrique Arias uses a stereoscope to view 3-D image of the Kuna Yala coastline in aerial photographs supplied by the Instituto Geográfico Nacional. He cross-checks this with a Researcher's sketch map (bottom right) to help locate features on the new map (left).

Figure 6.13
There was no aerial photography coverage for the more remote area of Kuna Yala to the east near the border with Colombia, and the team had to do with satellite images. Enrique Arias studies this image, which was blown up to a scale of 1:50,000, the same as the aerial photographs and the scale at which the mapping project worked.

Dotted lines and streams under the canopy

In Suriname, detailed and relatively accurate maps had been done in the 1960s by the Dutch covering the area the Trio project mapped. This was an area of dense tropical rainforest that showed unbroken canopy over most of the area. The cartographers worked with high-resolution aerial photographs that showed depressions in the canopy, but no streams were visible through the vegetation. They depicted the depressions with dotted lines, indicating that there *might be* streams under the canopy, but one could not be certain one way or the other.

In the field, the Trio Researchers drew sketch maps that placed the streams what were unseen by the aerial cameras, and gave them names. It turned out, of course, that some of the dotted lines of the Dutch cartographers represented real streams while others did not. The sketch maps showed which depressions had streams and which did not. In some cases, the twists and turns of the depressions on the original base maps, made from aerial photographs, were useful in that they showed the courses taken by the streams.

Figure 6.14

Figure 6.15

In many areas there are rivers and streams that are seasonal, drying up during part of the year and running full during another. This affects the way people travel and it often determines seasonal patterns of subsistence. If people want their maps to reflect these differences, they should adjust their maps accordingly. In the mapping work in the Xingu region of Brazil, a distinction was made between permanent and seasonal rivers, which determined modes of travel. Seasonal variation with hunting, fishing, and trapping also plays a central role in the mapping done by Canada's indigenous peoples.

The shape of physical features is important: the bends in a river, the size of a hill or mountain, the path taken by a trail, the size and shape of a coconut plantation. Often this information is not clearly depicted on the sketch maps; the proportions are often distorted. To get things right, the Cartographers need to question the Researchers carefully. If aerial photographs are available, one tactic is to use stereoscopes to take the Researchers on a "cartographic journey," to get them to visualize the features more completely. Stereoscopes bring aerial photographs into three dimensions – the mountains and hills jump out from the flat surface, rivers are seen cutting through the trees – and the Researchers are able to check the information in their notebooks as they travel across the contours of the landscape.

The matter of confidentiality

There are always certain kinds of information that are not for public viewing, and these should not be placed on any maps that can be seen by a general audience. Some groups do not want to place sacred sites on their maps; for others there are no such restrictions. In some regions, such as parts of Canada, information about hunting, fishing, and trapping sites is not for general consumption. We have not encountered any groups that are willing to map areas where precious metals such as gold are found.

All of this should be thoroughly discussed and decided upon. Some groups may decide to place "secret" information on maps and then keep them under lock and key; others will decide simply not to place sensitive information on the maps. Some groups, especially in Canada, the United States, Australia, and New Zealand, are trying to devise computerized systems that will protect this type of information. This will be a contentious issue for some time to come.

6.8 Boundaries vs. land use

When people are presented with the idea of producing a map, they often immediately think that the objective will be to establish boundaries. Some mapping projects do this, but the methodology here is designed to map land use, not boundaries. It is used to map the use areas of communities that are often overlapping with the use areas of other, nearby communities. While there may exist some lines that represent "boundaries" of one sort or another, the reality of many – if not most – regions inhabited by ethnic groups is that they are characterized by shared use areas for activities such as hunting, fishing, and gathering. There are no "property" lines that represent exclusive possession by one group over another. Where these exist, they can be mapped; but the reality is that they often do not exist, and boundaries should not be drawn.

Figure 6.16
West Papua: Korneles Riwarin leading a two-day session on how to handle overlap of common use areas among the various districts in the map. The overlap areas are in red.

In the Darién region of Panama there are three indigenous peoples: the Kuna, the Emberá, and the Wounaan. The Emberá and the Wounaan live together and share use areas; the Kuna have their own use areas that do not overlap with the use areas of the Emberá and Wounaan. Contiguous Emberá and Wounaan communities share use areas, and Kuna communities have common territories

they use for hunting, fishing, and gathering wild resources. Thus, there can be **external** boundaries encompassing the entire tribal group, but there are no boundaries **internally**, for among communities of the same tribal group, there is a tradition of shared areas.

In the Bolivian Izozog there are 22 communities stretched out in a line, running north to south, along the Parapití River. The Parapití is flush with water during half of the year and bone dry the other half. At the northern end there is a swampy area called the Bañados del Izozog that retains water year-round, and it is replete with game and fish. Consequently, villagers from all of the 22 communities use this area for subsistence throughout the year. It is common property. This was discussed early during the mapping project and it was decided unanimously that no community boundaries could be placed on the map.

In our first mapping project, in the Mosquitia of Honduras (1992), the Cartographers drew boundaries around communities. These lines encompassed use areas, and the map clearly showed areas of overlap of common use areas among communities. Unfortunately, this later caused considerable trouble, for some communities took their boundary lines and claimed that the lands they encircled belonged to them.

The mapping project in West Papua began with a single district, Nambluong. Because of the dispersed settlement pattern, it was never entirely clear – at least to us – how many communities were within Nambluong, but there were never any problems with overlapping use areas on the maps the villagers were doing. That is, until it was discovered that the area covered by Nambluong overlapped with neighboring districts. There were areas of mutual use. Suddenly there was a need to figure out how to handle this on the maps that were being produced.

The project had been set up to work first in Nambluong, and then jump over to work in the neighboring districts of Kemtuk, Gresi, and Demta. Representatives of these districts had been invited to participate in the Nambluong project, and a discussion involving them took place to reach consensus. A large group representing the various interests spent two days going over the matter and in the end devised a strategy to depict common use areas cartographically.

We strongly encourage the participation of numerous communities in mapping projects, so that these shared use areas can be dealt with. In different parts of Indonesia – Kalimantan and West Papua – there were mapping projects carried out with single communities, one after the other, and there was a focus on drawing boundaries. Aside from covering very little ground and spending considerable sums of money, this had the effect of defining territorial boundaries of some communities at the expense of others, and it caused conflict.

Mapping should encompass a larger area than the project itself and involve a number of neighboring communities. This approach is cheaper, covers a large area, and allows communities to discuss issues involving land use, overlap areas, and boundaries. This, in the end, will benefit all those involved.

6.9 Land use areas

Once most of the physical features are placed on the map, the next task is to locate land use areas: hunting, fishing, farming, gathering of various materials, etc. Some of these are relatively easy; for example, fishing and farming areas are generally not difficult to document; the same is true for specific plants, such as clusters of Brazil nut trees (in Suriname) and the swampy areas where the *weruk* palm is found (in Kuna Yala, Panama). Hunting is sometimes more problematic, especially in tropical forest regions. Game animals do not congregate in specific spots and stay put; they may have preferred areas with abundant food or conditions for shelter, but many of them tend to roam over wider territories. The gathering of wood for construction likewise can be done over a vast area and cannot be restricted to any particular place (several groups have discussed this and rejected it as a useful category).

Decisions must be made as to how the various use areas are best represented on the map: With points in the form of individual symbols or with polygons? Some use areas lend themselves best to polygons, such as plantation areas, farmland, and cattle ranches, all of which cover wide expanses. Other use areas are most appropriately represented by individual symbols, such as beaches where sea turtles lay their eggs, markets, and places where wild honey is abundant. Some groups decide to use numerous individual symbols covering a large use area, as did the Kuna with their coconut plantations.

6.10 Cultural and spiritual information

The third type of information (after physical features and land uses) falls in the category of culture, history, and religion. This is often the most delicate of the three features of the map and it should be discussed and decided upon during the early stages of the project. Some groups want to place sacred sites on their maps, others do not; some want to map culturally important places, others opt not to. The Kuna placed sacred domains called **galu(mar)** on their maps, arguing that they are spiritual and invisible to the mortal eye, and consequently no one could use the maps to find them. The Trio in Suriname decided not to include these features on their maps. Suffice it to say, in this realm it is essential to respect the wishes of the communities.

6.11 Noting gaps, looking forward

If the Cartographers and the villagers are working steadily and smoothly over a period of weeks, with lots of interaction and questioning, they will be locating large amounts of information on the maps. At the same time, they will be noting gaps, contradictions, vagueness, and uncertainty. Ques-

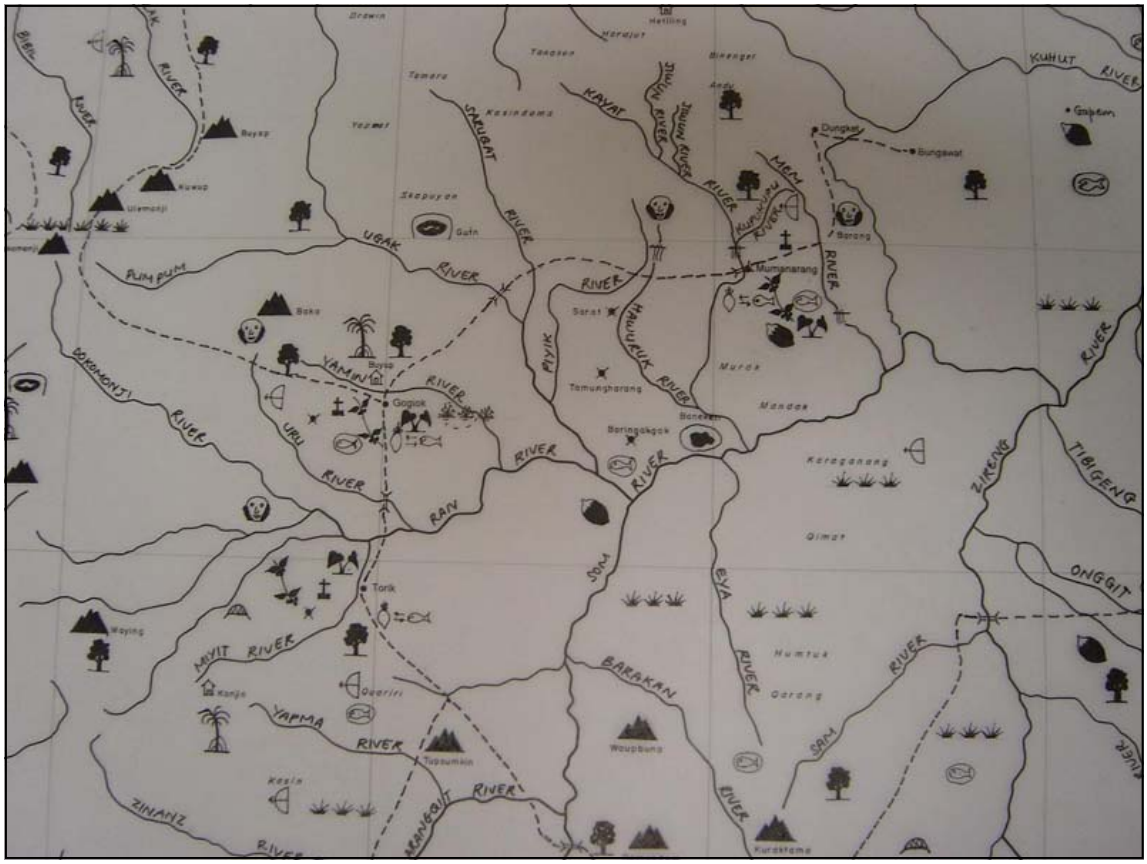


Figure 6.17
Papua New Guinea: Draft map that will be taken back to the community during the Second Field Period for correction. Details will be added, modified, and corrected in the field in preparation for the Third Workshop. Note the use of the word "river." In later versions, the local term for "river" was used.

tions will remain. Where precisely are these three rivers you have in your sketch map? Why is this area of your sketch map so empty of information? Why are the accounts of villagers so different from the evidence on the aerial photographs? When two contiguous Researchers are in disagreement about the number of rivers in a region, which one is correct? And so forth.

The Cartographers and Researchers need to be noting down these incomplete areas in the notebooks of the Researchers. They will be taken back to the community for the Second Field Period, together with the draft maps they have been working on, so they can fill in the missing information. The Cartographers have also placed question marks (?) on unclear areas of the maps.

As the Cartographers finish up sections of maps, they will pass their drafts – which are quite messy, full of cross-outs, erasures, and changes – over to the Draftsmen, who will produce clean copies of the draft maps. They will then have multiple copies made of these clean versions and the transcription process will continue to add new details.

The final product of the workshop will be a set of clean draft maps that the Researchers can take back to their communities during the **Second Fieldwork Period**. These maps are not the **final** maps, but still working drafts. They will contain gaps, confusions, contradictions – hopefully at a minimum – and these must be filled in, corrected, and straightened out back in the community. At this point, the Researchers should return to their communities carrying lists of questions jotted down in their notebooks, and the maps should have question marks over confused areas.

7. THE SECOND FIELD PERIOD

At the end of the Second Workshop, the Cartographers will have prepared detailed draft maps of the various regions/zones. These are generally done in ink. They will be incomplete, with gaps in the information and notations where there are questions about the location and course of rivers and streams, place names, distances, boundaries of subsistence areas, and so forth. The areas with lingering questions are marked on the maps (often with a large "**?**") and cross-referenced with the notebooks, where longer questions can be written out. The task of the Researchers is to return to their communities and sit down with villagers to fill in the missing information, clear up confusions, and generally fill in the maps to everyone's satisfaction.

7.1 The learning still to be done

We had initially thought that this phase of the project was of little importance, nothing more than a brief visit to check on some of the map's details and do some minor touch-ups. We soon realized, however, that it was far more than that. It was in reality a very important piece of the project and had to be given much more time.

In our first two projects (the Mosquitia of Honduras and the Darién of Panama) this period was short. We were inexperienced and weren't clear on how much time was needed, and there were time constraints. The Lead Cartographer had a tight schedule and the project was squeezed into a rapidly-run schedule. In the Mosquitia the Second Field Period lasted a mere 13 days – and in the Darién the Researchers had no more than 6 days, which barely gave them enough time to travel in and out of their communities. Beyond this, in both projects all of the Researchers were covering multiple communities (in the Mosquitia, some Researchers were responsible for more than 10 communities, a number that was absurdly large). The Second Field Period was inadequate in these two projects and the maps suffered as a result.

We sought to remedy this situation in later projects, and we have come to appreciate the importance of this phase of participatory mapping projects. We now recommend a minimum of one month for the Second Field Period, and the reality is often closer to two months. At the same time, to have it longer than two months is to risk losing momentum.

Look at it this way: The entire project, from start to finish, is a learning experience. As it unfolds, participants gradually become aware of their own landscape – its natural and cultural resources – and the way maps are put together to reflect the different aspects of that landscape. All of this is new and has to be assimilated slowly and by increments, and it should not be rushed. The Second Field Period is a crucial period of discovery and reflection – "discovery" because villagers see for the first time how maps are constructed, and how information they have provided finds its way into the maps; and "reflection" because they are dredging information about their region out of their own experience, comparing it with other villagers, and discussing it among themselves.

As our understanding of the methodology evolved, we began adding new features. It will be remembered that Cartographers visit the Researchers in the field during the First Field Period. This is done so they can make sure that the Researchers are on track, that they are clear on how to gather their information, and how to construct their maps. Where there are problems, the Cartographers offer advice. The same principle applies in the Second Field Period. In this instance, however, the Cartographers have a more specific idea about what is needed, for the Researchers have been sent back into their communities with specific questions and tasks.

And there are variations. In some projects, the Researchers have a very productive time during the First Field Period. They gather a substantial amount of information and produce relatively complete sketch maps. Consequently, there is little new information they need to collect during the Second Field Period, and they don't need to spend much time correcting the draft maps and searching for

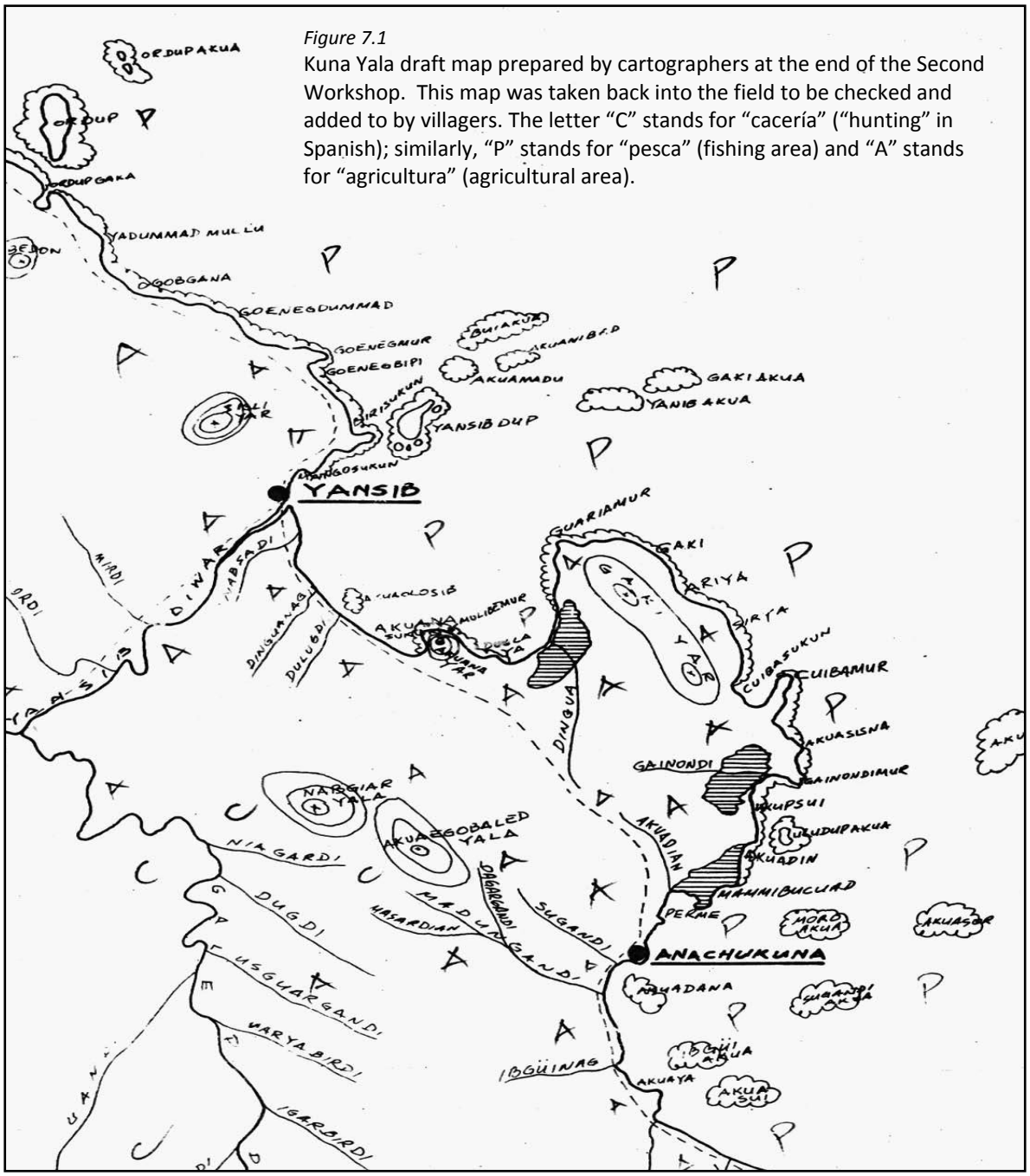


Figure 7.1
Kuna Yala draft map prepared by cartographers at the end of the Second Workshop. This map was taken back into the field to be checked and added to by villagers. The letter "C" stands for "cacería" ("hunting" in Spanish); similarly, "P" stands for "pesca" (fishing area) and "A" stands for "agricultura" (agricultural area).

new information. The Second Field Period is important, most certainly; it allows the Researchers to review the maps with villagers and verify the information. But the gaps are small and the corrections are few.

In other projects, however, things may be very different. It occasionally happens that for one reason or another the First Field Period is less than productive. The data gathered is sparse and the sketch maps are weakly developed. It is sometimes the case that villagers are not fully convinced of the validity of the project when it is in its initial stages; they are suspicious and doubt that the maps will end up being the property of villagers, as promised.

7.2 Earning trust

The challenge of earning villagers' trust is generally most difficult in projects in areas of conflict. This has happened to us on several occasions. Villagers were hesitant to commit themselves fully during the First Field Period, for they had been promised similar things in the past and been disappointed.

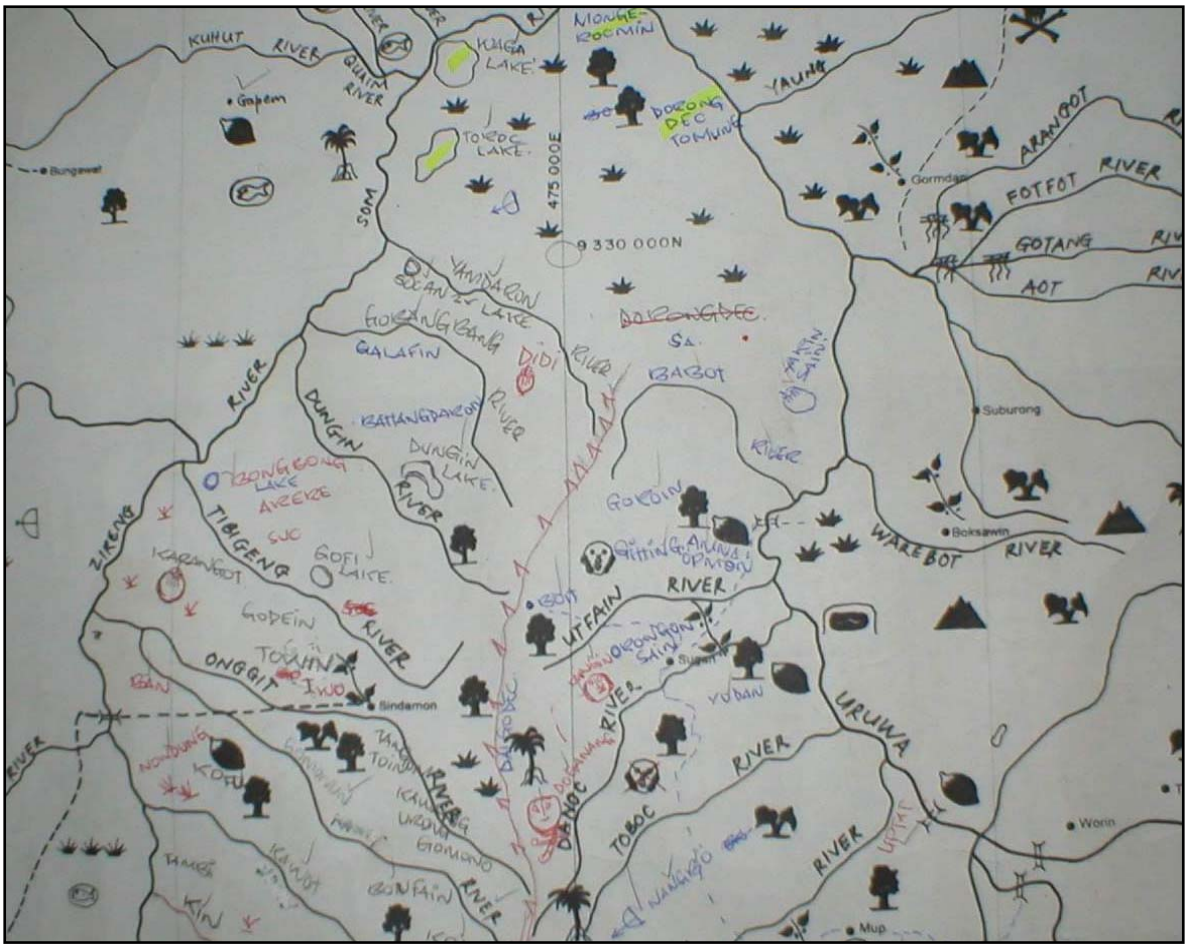


Figure 7.2
Papua New Guinea draft map that has been corrected and filled in with additional information. The new information appears in blue and red ink. It has just been brought to the Third Workshop, where the new information will be included in a final draft map, which is the last step before printing the completed maps.

They wanted to see how things were going before they would let down their guard.

In one mapping project where this unfolded, the First Field Period brought in no more than a small amount of information. As a consequence, the maps produced in the Second Workshop were less than satisfactory. They had many gaps in them and there were numerous contradictions and confusions as to names of places, the location of sites, and so forth. The Researchers were at first suspicious of the project; they doubted that the final maps would be their property and benefit them. As we moved forward, however, they gained confidence in the project, realizing that they were the ones who controlled the process. This happened during the Second Workshop. When they returned to their communities for the Second Field Period they had a much stronger sense of commitment. They worked very hard, gathering lots of solid information for the draft maps, and this made up for their slack performance during the First Field Period.

In other words, it is necessary to be flexible and allow enough time for the two Field Periods. If adequate information is not gathered in the First Field Period, it can be gathered in the Second Field Period. If, on the other hand, the First Field Period is very productive, you might want to spend less time with the Second Field Period. We recommend at least one month for this activity. Two months might be better, depending on the circumstances.

Finally, it is a good idea to have the Cartographers visit the Researchers in the field during the Second Field Period, perhaps half-way through. This is best done by bringing the Researchers together in a central place and having the Cartographers spend two or three days with them going over their

maps and discussing the process. At this time the corrected drafts can be evaluated so that weaknesses can be detected and corrected. If roughly a month is left after this visit, there will be ample time to pull in the remaining information.

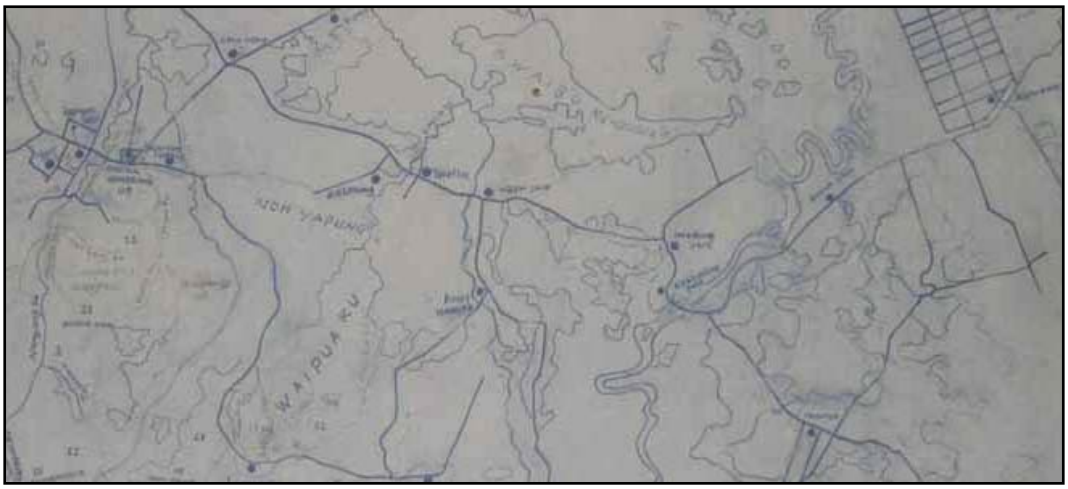


Figure 7.3

The Cartographers in West Papua produced drafts in the form of blue line prints and these were taken by the Researchers into the field, where corrections and additions were placed in pencil. The information collected in the First Field Period was weak; consequently, there were numerous additions to the draft during the Second Field Period.

8. THE THIRD WORKSHOP

This is the final workshop of the project. The **Third Workshop** will last one to two weeks, depending on several factors. The Researchers have just spent one to two months in their communities consulting with fellow villagers and making the final corrections and additions to the draft maps. They should at this point have a relatively complete record, recorded on the maps, of the significant physical and cultural features of the territory their communities occupy and use for subsistence and other activities.

Figure 8.1
Geographer Arthur Ganubella (center) from the PNG Department of Environment and Conservation works with Researchers to place the new information onto the most recent draft maps.

They are now returning to the Third Workshop to work again with the Cartographers to incorporate their new information into final draft maps. This should be relatively straightforward, for by this time they fully understand how the process works. They have established relationships with their fellow Researchers and with the Cartographers; they know how to work together. There will be a sense of accomplishment, that they are reaching the end of a stimulating and worthwhile project. There is general recognition that the project has involved a substantial amount of work and the maps, when they are completed, will be very special and useful to the communities.

8.1 Objectives of the Third Workshop

The Third Workshop involves several specific tasks:

Transferring the new information onto newly created draft maps. The same techniques used in the Second Workshop are used again here. Everyone has already learned how to do this, so at this stage it will be very easy.

This can be a simple process, lasting just a handful of days, or it can be much longer and more complex. This will depend on the success of the Second Workshop. If the Second Workshop was fruitful and the draft maps produced were full of good information, less work will be needed at the Third Workshop. If, however, little was accomplished in the Second Workshop – for whatever reason – then the Third Workshop will have to be more intense, to catch up.

Figure 8.2
Cartographer Brian Kakini of Unitech (left) working with Researchers in Papua New Guinea.

The Project Team will be able to judge what will be needed with an evaluation of the Second Workshop during the Second Field Period and plan for the

Third Workshop accordingly.

Discussing and refining the legend. As the team moves through a project, it should periodically review the elements in the legend to make sure they are important and should be kept. Some elements will be discarded, some will be lumped together, and others will be modified. Features that seemed relevant at the outset come to be seen as less relevant, and they are eliminated.

For example, "building materials" has been selected in the First Workshop in a couple of projects and then eliminated later because these materials are found in many places rather than specific areas; another similar category is "firewood."

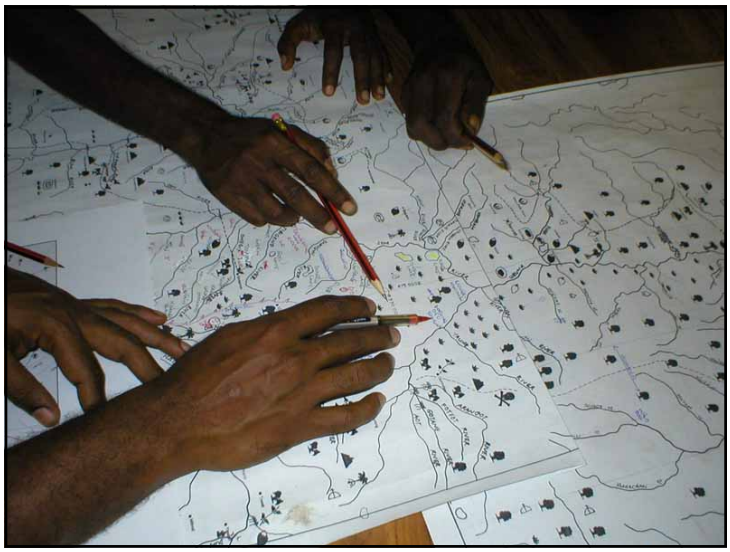


Figure 8.3
Everyone gets involved in adding data to the maps.

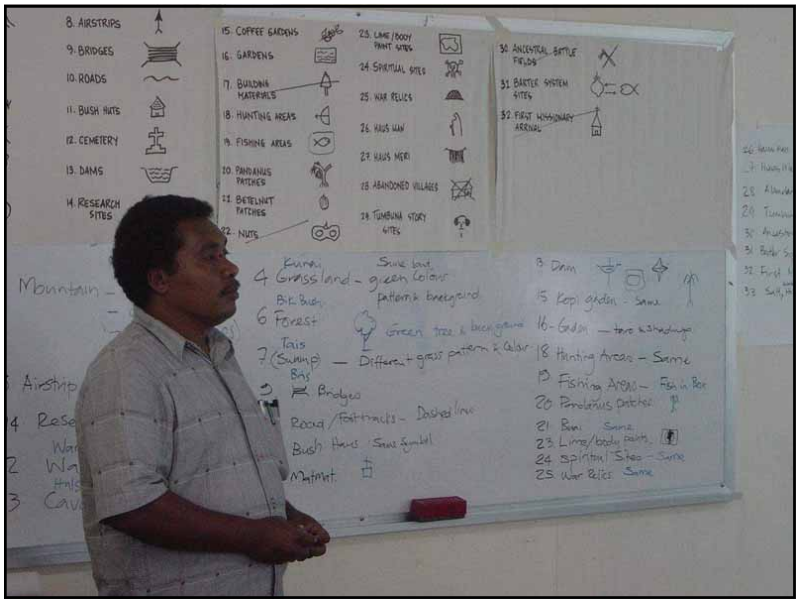


Figure 8.4
Cartographer Wycliffe Antonio leads a session reviewing the legend for the Papua New Guinea project. Note that several items have been crossed out: "building materials," "nuts," "ancestral battle fields," and "first missionary arrival." Reviews of the legend should be carried out during the Second and Third Workshops, but the latter is the most critical, for it is the last chance to modify the legend before the final maps are printed.

In Papua New Guinea, "mountains" and "mountain ranges" – which had been separated initially – were joined together. And so forth. This is generally a time to weed out some of the smaller, less significant features to reduce clutter on the maps.

Discussing and deciding on symbols. This is the last chance to choose the artwork for the individual symbols. It is always a good idea to see if everyone is still in agreement that a particular symbol is agreed upon. For example, the symbol for "hunting" is often discussed at length: should it be a specific animal, such as a peccary (used in the Izozog of Bolivia), a tapir (in Kuna Yala of Panama), or a type of bird (as in West Papua), or a bow and arrow (as in Suriname and Papua New Guinea)?

This is also a good time to discuss the size of the various symbols and the shape they have.

Going over the design of the final maps. A number of details need to be decided upon at this time, as follows:

- **Types of maps and scales.** If a large area is covered, there will usually be a single map covering the whole area and a number of larger maps covering specific regions within that area. These will differ from region to region, depending on the size and shape of the area mapped and the needs of the people. For example:

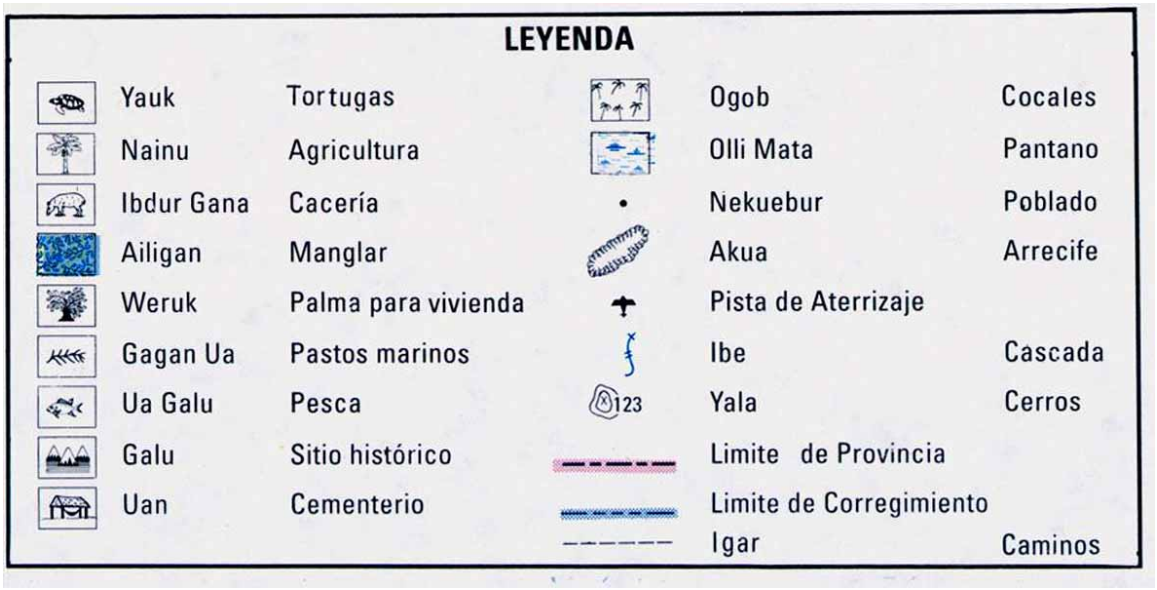


Figure 8.5
Final version of the legend for the Kuna Yala map in Spanish and Kuna.

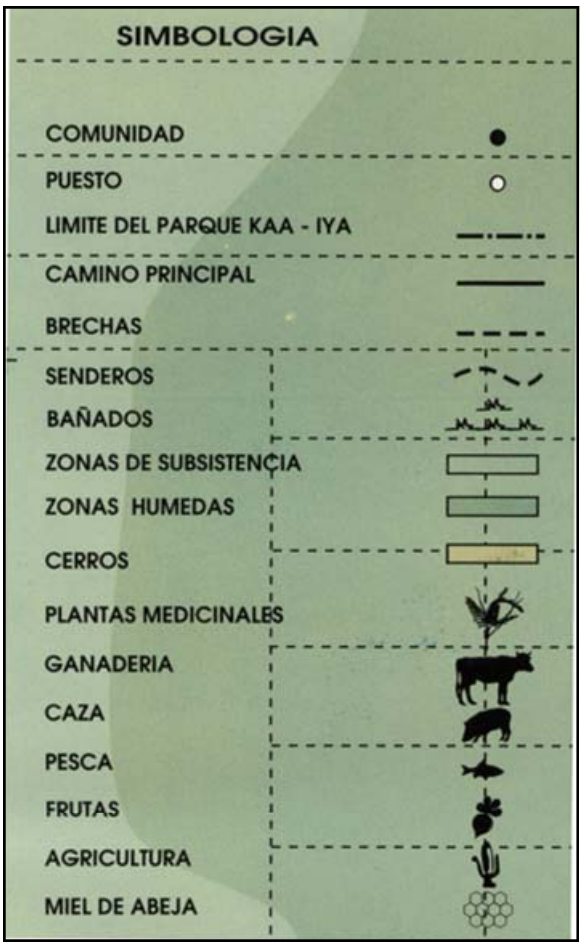


Figure 8.6
Final version of legend for the Izozog map, Bolivia, done only in Spanish.

- In the **Darién** of Panama a single 1:500,000 map covered the whole area (16,802 km^2) and twenty 1:50,000 maps covered regions within that area.

- In the **Izozog** of Bolivia a single 1:250,000 map covered the entire area (19,000 km^2) and four 1:75,000 km^2 maps covered regions within that area.

- In **Suriname**, maps at a scale of 1:284,000 were printed for Kwamalasamutu and Tepu. The single maps for the two regions were seen as sufficient.

- In **Kuna Yala**, Panama, a single 1:143,000 map was printed for the entire region and this was supplemented by eight more detailed 1:50,000 maps of specific regions.

- **Number of maps to be printed.** The larger, more specific maps will be useful for the communities in the areas covered and will probably not be distributed more widely; thus fewer copies will be needed. The maps covering the entire area will be for wider distribution and therefore should be printed in larger numbers. As the number of maps printed increases, the price per map goes down, so this is always a factor in deciding how many to print.

- **Type of paper.** This should be of high quality, thick and strong, so as to withstand the weather and poor storage conditions of rural villages. It makes no sense to work hard and

collect mountains of information and then print the maps on cheap paper that will not last. If possible, copies laminated with clear plastic should be made available in the communities.

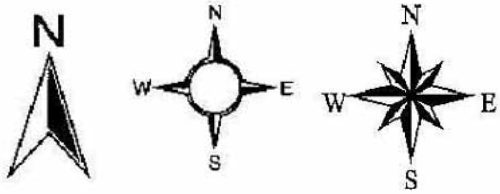


Figure 8.7
Examples of directional markers commonly used on maps. Something similar to one of these might be chosen, or a new one can be fashioned using local artwork.

- **General design of the maps.** By the same token, it is senseless to expend energy producing maps that are sloppily designed and less than attractive. You want to create maps that are beautiful as well as cartographically accurate and full of information. They should be maps that people will be proud of and want to put on their wall.

- **Map border.** Some groups have wanted to have traditional designs defining the border of the maps.

- **Photos and drawings.** A nice touch is to have photos and drawings inhabiting the dead space in the maps. Photos are traditionally of the mapping process itself or of local village scenes; drawings usually consist of local art work.

- **Compass rose (direction marker).** Every map should have a direction marker showing the cardinal points. There are many standard designs for this, some fancy, some simple. They can also be done with traditional designs.

- **Credits and logos.** There should be an acknowledgment of the team members and the institutions that were involved in the mapping project. At times there is a short description of the region and its people, or a brief account of the mapping project.


Credits

Communities within the YUS LLG, Kabwum District, Morobe, PNG
Village Mapping Coordinators & Researchers
- *Dono Ogate* - *Nanneh Kehi*
- *Namo Yaoro* - *Heson Ame*
- *Tommy Narete* - *Timmy Sowang*
- *Robbin Bahao* - *Steven Fononge*
- *Bernard Yowatu* - *Francis Findeng*
- *Mathew Tombe* - *Arat Wek*
- *Weo Bafinuo* - *Anno Dakop*
- *Mang Asare* - *Wareke Mazinau*

Department of Surveying and Land Studies, PNG University of Technology, Lae, Morobe Province, PNG
- *Wycliffe Antonio* - *Lewi Kari*
- *Brian Kakini* - *Raymond Bure*
- *Clement Tabul* - *Smyly Bannerman*
- *Job Suat*

Department of Environment and Conservation, National Government of PNG, Port Moresby, PNG
- *Arthur Ganubella*

Division of Mining, Environment and Natural Resources, Morobe Provincial Government, Lae, Morobe, PNG
- *Robin Kiki*

Conservation International's Melanesia Program, Port Moresby, PNG
- *Kepsiok Kumilgo*

Conservation International's Indonesia-Pacific Field Division, Australia
- *Randal Storey*

Center for the Support of Native Lands, Arlington, Virginia, USA
- *Mac Chapin*

Figure 8.8
A portion of the credits section from the map of the Som region in Papua New Guinea. This is a good example because it includes all the organizations and individuals who were involved with the project.

- **Language and orthography.** It is often the case that several different languages are spoken within the mapping area:

    - In the **Mosquitia** of Honduras there were five languages: Spanish, Miskito, Garífuna, Tawahka, and Pech. They decided on Spanish, as everyone understood it. This was our first foray into participatory mapping and we were too inexperienced to give language much thought. Beyond this, the field work was rushed, with too many communities and too few Researchers operating. If there had been any attempt to record all of the different languages, the project would have been unmanageable. As it was, without taking this dimension into consideration, the sheer size of the undertaking was barely manageable.

    - In **Suriname**, three languages – Trio (the Indian language), Dutch (the national language), and English – were used on the legend, while Trio was used for features on the map.

- In **Kuna Yala**, Kuna and Spanish were used on the legend, while Kuna was placed on the map.

- In **Papua New Guinea**, the legend had five languages: the three local languages (Yopno, Uruwa, and Som); Tok Pisin (New Guinea Pidgin); and English. The local languages were used within each territory – thus neither "river" (English) nor "wara" (Tok Pisin) appear on the maps. Instead, the local languages of the three areas were used: *mik* was used for "river" in the Som area, *yamuk* labeled "river" in the Uruwa map, and *pakbe* was used on the Yopno map.

The orthography of unwritten languages must be standardized. If there are any linguists around who know the language or languages used, bring them in.

As the Third Workshop draws to a close, there is a strong tendency for everyone to think that the project is finished. Nobody needs to do any more work. This is simply not the case. While most of the Researchers will return to their communities and resume their customary life again, a core staff must take all of the work from the Third Workshop and soldier on to get the final version of the maps printed. At least one Cartographer needs to stay on to oversee the design of the final printed map.

8.2 Printing of the final maps

Production of the final maps generally takes longer than anyone expects. The collective energy of the Workshops has dissipated and it is often hard to continue moving forward. Yet there is still a good deal of work to be done. All sorts of details must be pulled together, and while many project activities have come to a close, it is crucial that the final stretch is given full attention. The project must set aside adequate money for this phase of the project (something that is often overlooked). You will want to have nicely printed maps on high-quality paper; you will also want to make sure that community leaders and some of the Researchers are on hand to review drafts as they are made, leading up to the final printing. All of this takes some money, along with hard work and attention to detail.

Tasks and considerations:

Finding a printing shop that can design and print the maps. This should be looked into early on in the project, to have something lined up when the work on the ground is finished. This will often be a private company, but at times it involves a government mapping agency. This can be a complex and difficult matter and should not be taken lightly. In some countries professional printing firms are difficult to find, and sometimes they don't exist.

Mistake in Kuna Yala

Getting the maps printed in Panama, through the Instituto Geográfico Nacional, was extremely difficult. There were political scandals running riot through Panama's capital city and all government agencies were being scrutinized. Work within the Instituto slowed down and at times went dormant. As the process crept forward ever so slowly the Kuna Project Team became more and more lax in its oversight. Finally, the cartographers at the Instituto were ready to print the maps. They invited the Kuna team over to review them. The Kuna were so anxious to get their maps after so much delay that they gave the maps a quick look and said OK, print them. When they came off the presses the Kuna had a chance to look at them more closely – and they realized, much to their chagrin, that there were numerous errors. The result was that all of the maps had to be redone. In the end, the project was delayed even further and was more expensive.

The moral is that it pays to be patient, meticulous, and thorough.

At times the only firms available are not up to the standards one wants; at this point, a decision must be made regarding using what exists and getting less quality or going abroad and getting a more pro-

Figure 8.9
Cartographer José Aizpurúa of the Instituto Geográfico Nacional in Panama scribes the drainage system on a wax sheet over a light table. This photograph was taken in 2004, when the Institute was still producing all of its maps in this manner. It has since graduated to GIS.

fessional job done. The maps from Suriname, for example, had to be printed in the United States; and the Papua New Guinea maps were done in Australia.

In other projects, the only competent printers were found in capital cities far from the site of the mapping, and logistics proved difficult. This complicates matters because villagers – community leaders and at least a selection of the Researchers – will be needed to review the drafts as they are made.

Having the maps printed by a government mapping agency. In our two earliest projects – the Mosquitia of Honduras (1992) and the Darién of Panama (1993) – much effort was made to have the government mapping agency involved. They had the capacity to produce the maps, at a price we could afford (the Mosquitia budget was dangerously small), and the mapping teams contracted them for the job. Ten years later the Kuna enlisted the Panamanian mapping agency, the Instituto Geográfico Nacional "Tommy Guardia," to help with the cartography on the maps and then to design and print them. In all three cases the decision to take this route was at least in part political. By producing the maps, the government would be putting its official stamp on them, assuring that the government could not reject them as inadequate. The final maps were, in a very real sense, "official" government maps.

At the same time, the agencies worked slowly and it took months to finish the maps. At the time, they had no GIS capability and the maps were hand-done by scribing – laboriously tracing out the features with a stylus on a wax-covered sheet and then pasting in the names letter by letter.

It must be said that private firms are often better equipped than government agencies, and they are not encrusted with bureaucracy and politics – they do the job they are paid to do. If they are available and within one's price range, they are generally preferable. They almost always work faster than government agencies.

Do not think that the final draft maps can be dropped off with the printer and forgotten about. The printer will need to digitize the drafts and the maps being produced must be checked and re-checked carefully. They must be meticulously proof-read. This is so because the printer's staff will not know local names or places. Names, for example, are invariably in languages that are only known by the people in the communities mapped, and it is inevitable that many spelling errors will result in the transcription. No technicians in printing firms in Papua New Guinea know Som, Uruwa or Yopno, yet all of the names on the maps are in these languages. No technician in a printing office in the provincial capital will know anything about the placement of rivers and mountains in the interior of the Huon Peninsula.

For this reason, villagers who possess this knowledge must be brought in to review the technicians' transcriptions to make sure they are accurate. Once the maps are printed there is no way to correct them, so every effort must be made to check and re-check and triple-check the drafts at every stage in the process, right up until the time they are fed into the printing presses. The project must have adequate funds to insure that this happens.

Be careful: It is easy to lose momentum during this phase of the project. This has happened in a cou-

ple of the projects we have been involved with. It generally happens when an NGO is managing the project, especially an NGO that has other programs going. It will often assign less importance to the mapping than the indigenous leadership, and because it has control of the budget, it can afford to put the project on the shelf while other priorities are taken care of.

Figure 8.10

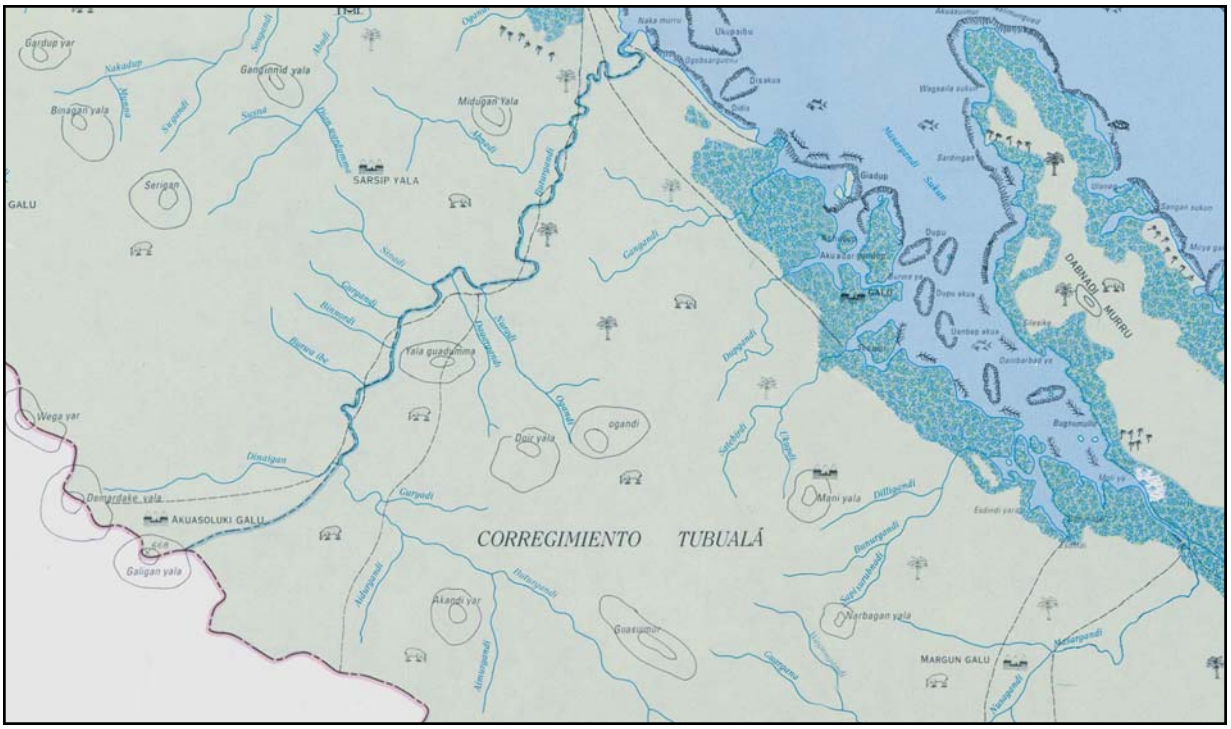


Figure 8.11

Two sections taken from the final Kuna Yala maps. The top image is of the entire region, at a scale of 1:143,000; the bottom is from one of eight zone maps, at a scale of 1:50,000.

In the project in Cameroon, a consulting firm working with USAID money had partial control of the project. When the final draft map was finished, the head of the consulting firm somehow convinced the Project Team that he could get the map printed. He took it away and shipped it off to London, where it sat for a couple of years. Luckily, the Project Team still had a copy. This was converted into a serviceable map – not the best map possible, but something the communities could use in their negotiations with the government (in which they were successful). But this should serve as a lesson that you should never allow anyone to take the map away. A second point is that projects generally move along better if the local people control the project from start to finish.

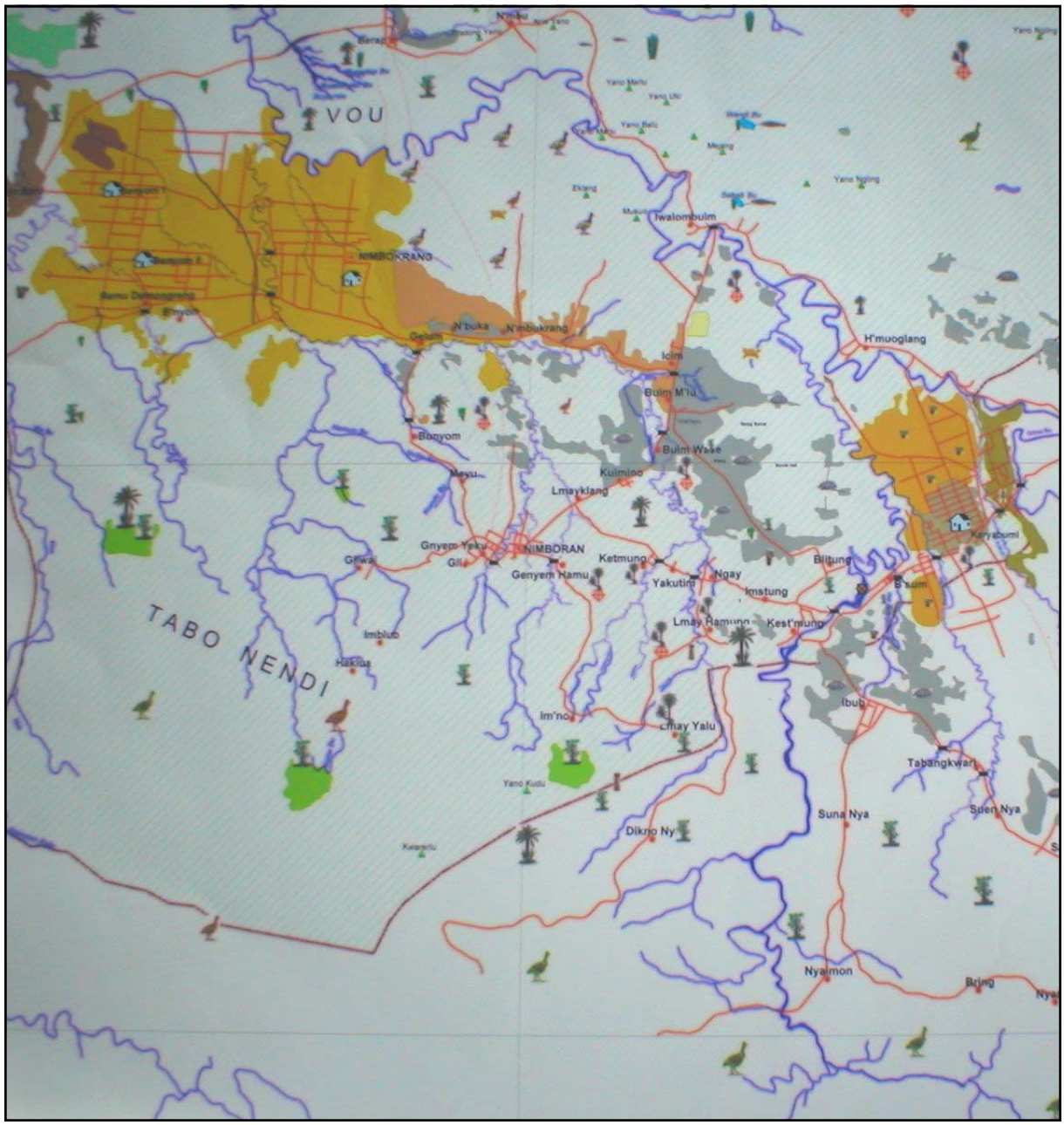


Figure 8.12
A portion of the final map of the region of Nambluong, in West Papua. The golden polygons are transmigration settlements.

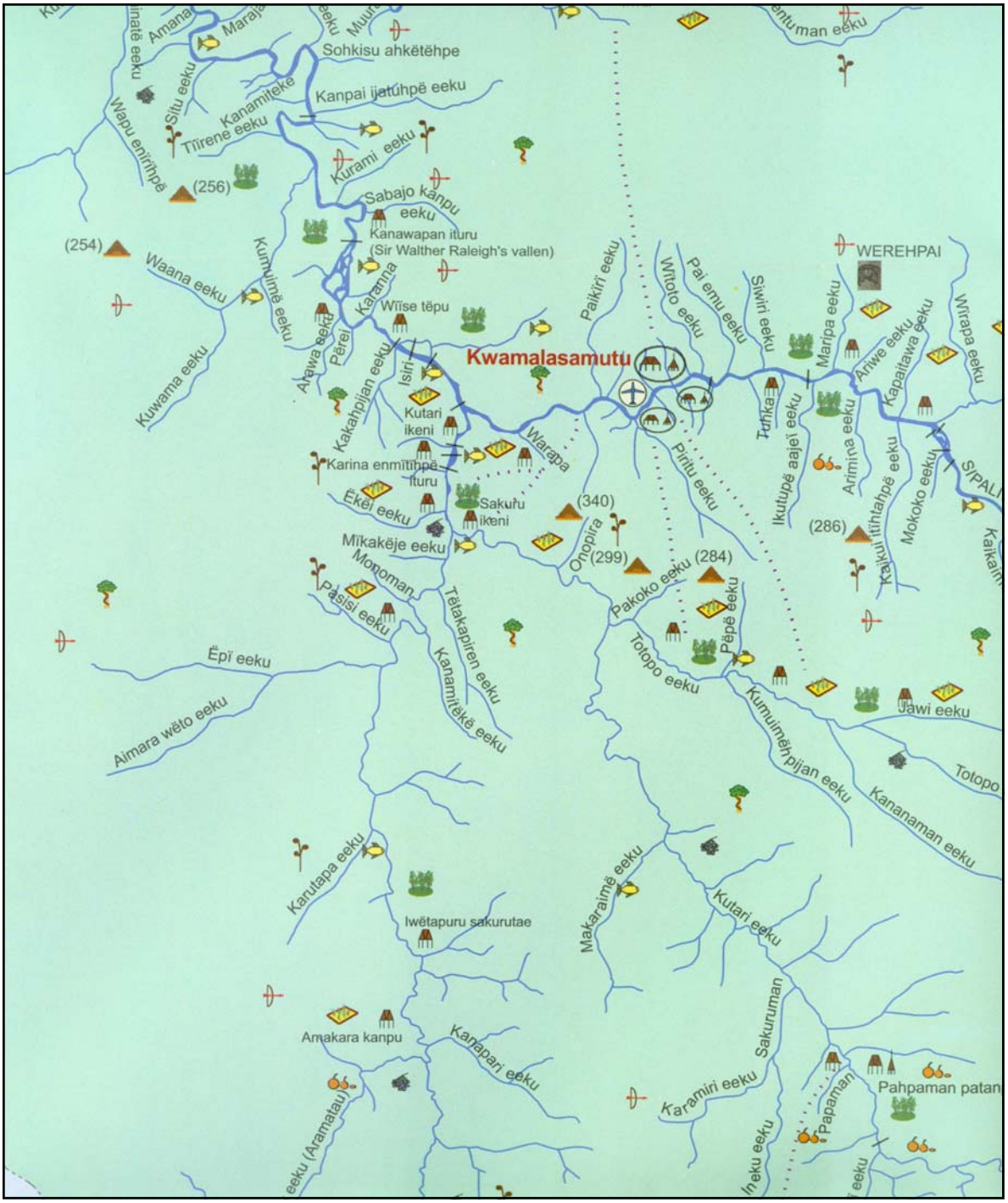


Figure 8.13

A portion of the final map of southwest Suriname, surrounding the village of Kwamalasamutu; the scale is 1:284,000.

Appendix: Project Descriptions
(1) The Mosquitia, Honduras (1992)

The Region and the People

The Mosquitia is an approximately 20,000 km² expanse of relatively intact wilderness in the extreme northeast corner of Honduras. It is covered with a mixture of mangrove forest and associated wetlands along the Caribbean coast, with pine savannah mixed with broadleaf forest inland.

More than 50,000 people, distributed among the Garífuna, Miskito, Pech, Tawahka, and Ladino (mixed descent) peoples, inhabit over 170 communities. The region is isolated, with no roads connecting it to the rest of the country; it can only be reached by boat along the coast, by small plane, or by trekking overland on foot or horseback. It is consequently the most sparsely populated area of Honduras, covering some 20 percent of the nation's land surface yet containing barely 1 percent of the population.

- **Origin of the mapping project:** Native Lands had been working with MOPAWI in the Mosquitia since 1987. The idea of mapping the land use area of the communities of the Mosquitia emerged out of joint discussions.
- **Implementing organizations:** The lead was taken by MOPAWI (Moskitia Pawisa – "Development of the Mosquitia"), a support organization that had been working in the Mosquitia since 1985, and MASTA (Moskitia Asla Takanka – "Unity of the Mosquitia"), a Miskito organization that was constituted as an NGO in 1987. Technical assistance came from the Instituto Geográfico Nacional, the government mapping agency, and a geographer from Southeastern Louisiana State University.
- **Objectives of the mapping:** Both MOPAWI and MASTA were concerned about peasant colonization fronts advancing on the Mosquitia from the west and south. In addition, the government of Honduras had made an under-the-table deal with the Stone Container Corporation, a U.S.-based company with plans to clear-cut a large piece of the region. MASTA and MOPAWI saw the mapping as a way of documenting land use and proving that the region was not "empty," as some politicians were arguing. The maps would serve as a basis for declaring the region an indigenous reserve.
- **Financing:** Native Lands provided most of the financial support, while MOPAWI made a substantial in-kind contribution.
- **Difficulties:** This was the first mapping project we did and there were numerous difficulties: the budget was too small for the load of activities; we tried to cover too many communities with too few Researchers; and there was not enough time to adequately cover such a large area.
- **Maps produced:** A single 1:500,000 map of the entire region was printed with assistance from the Instituto. Seventeen more detailed 1:50,000 maps of the various "zones" were left in draft form, never to be published. This was a missed opportunity, for the more detailed maps would have been useful.
- **Results:** The mapping project served to focus the attention of the people of the Mosquitia, for the first time, on the need to protect the region. It also brought the plight of the Mosquitia to national and international attention. MASTA drafted a 16-page document titled "Model for Land Legalization in the Mosquitia," and this began a process of negotiation with the Honduran government. Several proposals for protected areas of various sorts have resulted. The Stone Container Corporation's bid for a timber concession was frustrated, and other proposals for opening up the Mosquitia for exploitation have been successfully confronted and blocked (thus far).

Figure A.1
The Mosquita region of Honduras, where Native Lands' indigenous mapping methodology got its start. The project team mapped the entire region – roughly 20,000 km^2 – a major undertaking for which it was unprepared. The maps were adequate but could have been much better with more careful planning.

(2) The Darién, Panama (1993)

The Region and the People

The Darién, with a total surface area of 16,802 km² and a total population of approximately 22,000 people, is the most sparsely settled and least known province in Panama. It holds the largest stand of intact forest in the country and until the early 1970s was inhabited almost exclusively by three indigenous peoples – the Emberá, the Wounaan, and the Kuna – and Darienitas, Afro-American descendants who have lived there for centuries. The Emberá and the Wounaan achieved Comarca status (giving them a level of regional independence) for some of their ancestral lands in 1983, with the establishment of Emberá Drua. The Kuna did not have a Comarca. A single main road runs south through the center of the Darién as far as the town of Yaviza, but most transportation to and from the villages is accomplished along rivers by canoe.

- **Origin of the mapping project:** An Emberá had visited Honduras for a forum highlighting the Mosquitia mapping project, and he took his impressions back with him. Shortly after, Native Lands began talking with Emberá leadership and the decision was made to organize the mapping project.
- **Implementing organizations:** The Emberá-Wounaan-Kuna Congresses and the Centro de Educación y Acción Social Panameño (CEASPA) jointly managed the project. The government mapping agency, the Instituto Geográfico Nacional "Tommy Guardia" provided technical assistance and produced the final maps. Native Lands provided a Kuna cartographer. The cartographer that had worked on the Mosquitia project was also on the technical team.
- **Objectives of the mapping:** The primary objective was to claim and protect the indigenous peoples' ancestral lands. More than half of Emberá and Wounaan communities were situated outside the Comarca boundaries, and the Kuna had no Comarca status. Since the mid-1970s there had been massive in-migration of non-Indian colonists from the interior provinces of Panama and a resultant spread of cattle ranching, illegal logging, and land speculation. All of this was dwarfed by the prospect of the construction of the last stretch of the Pan-American Highway through the Darién, which would bring a flood of people from all over South America.
- **Financing:** A budget was pieced together – with great difficulty – from 18 different donors. While we managed to pull together enough money to carry out the project, this sort of approach is not recommended, for its piecemeal character caused delays and extreme anxiety.
- **Project Team:** Administration was handled by CEASPA; the community work was managed by one Kuna and two Emberá Coordinators; and the technical unit was run by a geographer from Southeastern Louisiana State University.
- **Difficulties:** Major difficulties were encountered in the diffuse management of the project and the lack of coordination among units; the lack of adequate ground preparation by the technical unit; and the confusions that accompanied our fundraising brought us very close to breakdown.
- **Maps produced:** A single 1:500,000 map of the entire province and twenty 1:50,000 maps.
- **Results:** The mapping project brought the three indigenous peoples into the heart of negotiations underway over land and the sustainable management of natural resources in the Darién. The Kuna of the region of Wargandi used their maps to secure their Comarca in 2000, and the Tagarkun Yala Kuna initiated their own legal process. The Emberá and Wounaan communities outside Emberá Drua formed their own organization and sought to legalize their lands under a category called "tierra colectiva," or collective lands.

Figure A.2
Darién Province in Panama was extremely isolated until the mid-1970s, when a road was put through to the town of Yaviza. Since then, it has been steadily colonized by peasant farmers from Panama's interior provinces, land speculators, and loggers. It is also a transshipment point for drugs out of Colombia.

(3) The Izozog of the Bolivian Chaco (1995-96)

The Region and the People

The Izozog is a roughly 19,000 km² tract of land flanking the Parapití River in the Bolivian Chaco, some 8 hours by 4-wheel drive vehicle to the south of Santa Cruz de la Sierra, the capital of the Department of Santa Cruz. The more than 7,500 inhabitants of the region are Guaraní living in 22 communities along the river, divided evenly into Lower and Upper Izozog. The Izozog is governed by the Capitanía de Alto y Bajo Izozog (CABI) (the Captaincy of Upper and Lower Izozog); there is a single Capitán Grande for the region, Captains for Upper and Lower Izozog, and Captains for each of the communities. There is some farming along the river, which is supplemented by hunting, seasonal fishing, and the maintenance of livestock.

- **Origin of the mapping project:** Wildlife Conservation Society (WCS) was working with CABI to establish a protected area, the Kaa-Iya National Park, which would be co-managed by the Izozeño community. The Director of WCS's international program knew about Native Lands' mapping work and thought it would help with the planning process.
- **Implementing organizations:** CABI managed the project, with assistance from WCS, and Native Lands provided technical assistance in structuring the project. An attempt to secure assistance from the Instituto Geográfico Militar, the Bolivian government's official mapping agency, was unsuccessful. In the end, the technical team consisted of a Spanish cartographer living in Bolivia, a Kuna cartographer from Panama, and two local draftsmen.
- **Objectives of the mapping:** For CABI, the primary objective was to provide documentation for the legalization of their lands as a collective territory. CABI's second objective was to strengthen its political organization of the region and bring the outlying communities under its wing. CABI also sought to raise community awareness of the importance of the region's biological, cultural, and historical heritage. WCS was focused on the Kaa-Iya park, which was located on the border of Izoceño lands, and it hoped to bring the Izoceños into the project in this way.
- **Financing:** All of the financing was secured from a single donor, the Biodiversity Support Program (BPS), a USAID-funded project.
- **Project Team:** The Administrative Unit and the coordination of the Community Unit were managed by CABI; one of the cartographers was contracted by CABI and another, a Kuna from Panama, was provided by Native Lands.
- **Difficulties:** The lack of support from the Instituto Geográfico Militar and the absence of aerial photographs, coupled with the unavailability of satellite images at that time, rendered the cartographic work less precise than we would have liked. Organizationally, the project ran smoothly.
- **Maps produced:** A single 1:250,000 map of the region and four slightly more detailed maps at 1:75,000.
- **Results:** The mapping made the communities much more aware of the finite nature of their natural resources and the need to manage them more efficiently. It promoted greater cohesion among communities and helped them develop a united front against outside encroachment. The maps served as a basis for their campaign to legalize their lands through the government provision called Tierra Comunitaria de Origen (TCO); this they successfully achieved by 2005, as the first indigenous group in Bolivia.

Figure A.3
The Izozog, Bolivia.

(4) The Boa Plain, Republic of Cameroon (1998-99)

The Region and the People

The Boa Plain is roughly three hours north of Limbe by car. It covers a 42,000 ha area of lowland and flooded forests, mangroves and other types of marine wetlands. Approximately 50,000 people live on the Plain; some 21,000 of these make their home in small agricultural communities, with the remainder living in densely populated villages near the coast. Three clans – the Bakolle (or Bamusso), Balundu, and Barombi – predominate, while the remainder of the population is made up of Cameroonians from other regions and Nigerians. The mapping work was done with eight agricultural villages that were pinned in by government land owned by the Cameroon Development Corporation (CDC) to the north and the Mokoko Forest Reserve to the south.

- **Origin of mapping project:** In early 1998, Native Lands was invited by the Central African Regional Programme for the Environment (CARPE) to travel to Cameroon to look into the possibility of mapping work in several regions, including Djoum to the South and the area of Mount Cameroon near Limbe. Assistance was requested from the Mount Cameroon Project (MCP), a bi-national Cameroonian-British effort, to work with villagers on participatory biodiversity conservation.
- **Implementing organizations:** The Mount Cameroon Project organized and administered the project. It contributed the Project Leader, the Lead Cartographer, and other assorted staff, and provided space for the workshops and vehicles for transportation. Two Cartographers were provided by the National Cartographic Institute; and Native Lands contributed technical assistance in structuring the project. Also on the Project Team were representatives of CARPE and the Center for Environment and Development, an NGO based in the capital city of Yaoundé. The villagers did not have an organization.
- **Objectives of the mapping:** No more than 830 ha were "legally" available to villagers for agriculture, so they were farming and gathering resources in a substantial area of CDC lands, which totaled some 17,000 ha. Now the government was planning to privatize CDC land, as part of a structural adjustment plan imposed by the International Monetary Fund (IMF). This would provoke the eviction of the villagers and leave them no other alternative than to move into the Mokoko Forest Reserve. The mapping was seen as a way to document villager land use and petition the government to grant them rights to CDC land.
- **Financing:** MCP provided the bulk of the funding, with some additional support from CARPE.
- **Difficulties:** MCP ran the project very efficiently, with considerable local participation and negotiation with municipal and government leaders in the area (which was absolutely necessary for political reasons).
- **Maps produced:** A problem surfaced at the end of the project, when the contractor for CARPE shipped the final map off to England for printing and it was lost. Luckily, MCP had retained a copy and this was distributed among the villagers.
- **Results:** When the process began, villagers were fatalistic about the annexation of the CDC lands they used for subsistence by the government. It would happen and there was nothing they could do about it. As they got into the mapping, however, they became invigorated and began campaigning the government to abandon their plan to privatize the CDC lands. In this they were successful.

Figure A.4
The Boa Plain in Cameroon.

(5) The Trio of Suriname (1999-2001)

The Region and the People

Suriname is a former Dutch colony on the northern coast of South America, sandwiched between (English) Guyana and French Guyana. Close to 95 percent of the population lives within a few kilometers of the coast, and the interior is virtually uninhabited. The mapping was done with Indians collectively called Trio who inhabit the southern reaches near the Brazilian border. Native Lands worked with two projects, in Kwamalasamutu (roughly 21,000 km^2 and approximately 3,000 people) and the contiguous area surrounding the village of Tepu to the east (approximately 11,000 km^2).

- **Origin of the mapping project:** Native Lands was approached by the Amazon Conservation Team (ACT), which had an active program in Suriname and had worked with the Trio for many years. The Trio had tried unsuccessfully to draw a map of their territory to defend themselves from potential logging interests, and they therefore welcomed this initiative.
- **Implementing organizations:** ACT's Suriname representative organized the project, providing its administration and the logistical arrangements. The Central Bureau of Aerial Mapping provided five cartographers and Native Lands structured the project. The Trio had 7 Researchers on the project, and the First Chief and his Assistant were present during much of the project.
- **Objectives of the mapping:** The Surinamese government had made a provision for resolving the issue of land ownership for the Indian and Maroon communities of the interior, but nothing had been done. The project was seen as a way of showing the government how they might begin mapping the interior lands, and thus work toward moving forward on this front. It was also seen as an important way of showing ownership and blocking timber concessions that had been granted to companies from Malaysia and Australia.
- **Financing:** The Alton Jones Foundation provided funds for both projects.
- **Difficulties:** Both projects moved along smoothly, with no problems. To a great extent this was because the project team was small in both Kwamalasamutu and Tepu, and the cartography unit came from a single agency (the cartographers were all of Indonesian descent and were excellent cooks, so the field time was quite pleasant).
- **Maps produced:** Two maps at a scale of 1:284,000 were printed, for Kwamalasamutu and Tepu.
- **Results:** The maps were well received by the Suriname government authorities and there was talk about replicating them for other areas of the southern half of the country; but nothing ever came of this, either for lack of funds or political will. The Trio were very proud of their accomplishment and this helped them gain some visibility in the country; yet the Trio are few in number and their organization is very weak, so there were few advances beyond this point.

Figure A.5
The seven Researchers in Suriname were all from Kwamalasamutu, the one village in the region. Thus the mapping was most detailed in that area.

(6) Kuna Yala, Panama (2001-2003)

The Region and the People

The Kuna live in the Comarca Kuna Yala, a semi-autonomous indigenous reserve granted to them by the Panamanian government in 1938. Located along the northeast coast of Panama, it covers an area of roughly 5,400 km². It is divided almost equally between land and sea, extending north from the ridge of the continental divide and out seaward to encompass more than 300 small coral islands. Census figures are imprecise: from 35,000 to 50,000 Kuna are spread out among 51 communities, the majority of which are located on small islands just off the coast. Only Kuna are allowed to own land within the Comarca, and a single road, just made serviceable in the last few years, connects Kuna Yala to the rest of Panama. The road provides limited access to the region; most travel is by foot, boat, or small plane.

- **Origin of the mapping project:** The Kuna knew about Native Lands' mapping work from an earlier project in the Darién region of Panama. They approached Native Lands and asked for assistance.
- **Implementing organizations:** The Kuna General Congress, which is the maximum authority for the Kuna people, managed the project. The entire project team was Kuna, with the sole exception of one of the Cartographers, who was borrowed from the government mapping agency, the Instituto Geográfico Nacional "Tommy Guardia." The Kuna Congress signed an agreement with the Instituto to produce the final maps. Native Lands provided technical assistance in structuring the project.
- **Objectives of the mapping:** The Kuna have legal title to the Comarca, yet they were anxious to annex a strip of land outside their border that they have traditionally used for subsistence. The mapping would document their use areas. Second, they felt that the process of putting the map together would serve to integrate the more isolated communities into the Kuna General Congress and strengthen the Kuna nation politically. Third, they were negotiating a large grant from the Spanish Embassy and both the Kuna and the Spaniards felt that a detailed map would be an important planning document. Finally, they wanted the maps for use in the schools and in a campaign of environmental education.
- **Financing:** The Kuna General Congress raised all of the funds for the project from two sources: the Asociación Española de Cooperación Internacional (AECI) and the Inter-American Foundation.
- **Difficulties:** There were two major difficulties. First, the funding from the two donors was not coordinated. A large chunk of the money was delayed for close to a year, creating shortages and considerable tension. Second, there were delays in the printing of the maps due to political difficulties at the national level that affected the Instituto's work.
- **Maps produced:** A single 1:143,000 map of the entire Comarca, along with eight 1:50,000 maps covering the entire region.
- **Results:** The Kuna are well organized and their General Congress is able to negotiate with the Panamanian government. They have been using the maps to have lands just outside the western end of the Comarca annexed. They have also been using the maps in local schools and as a tool for environmental education throughout their region. A road has just penetrated the Comarca for the first time in their history, and the maps are another tool they can use to stem the incursion of non-Kuna colonists into the Comarca.

Figure A.6
The Comarca Kuna Yala in Panama.

(7)Nambluong District, West Papua (2002-2003)

The Region and the People

West Papua is the western half of the Island of New Guinea, and politically it is a province of Indonesia. The Island as a whole is linguistically the most diverse region in the world, with over 2,000 different languages. The native peoples of West Papua have been subject to numerous abuses from the Indonesian government and are pushing, through various means, for independence. In this project, we worked with local villagers from the District of Nambluong, in the north-central lowlands, near the capital city of Jayapura.

- **Origin of the mapping project:** In 2001, the director of a Papuan NGO, PtPPMA, traveled through Washington, D.C., with a representative of the Biodiversity Support Program, a USAID-sponsored program housed in WWF's headquarters. He stopped by Native Lands' office; we explained our mapping methodology to him and he thought it fit their bill. Sometime later the British Department for International Development (DFID) decided to support the project.
- **Implementing organizations:** The project was managed by PtPPMA with assistance from DFID. DFID was collaborating with the Indonesian Ministry of Forestry, and through them the project got a cartographer from the Papuan office of the Ministry; three other cartographers came from the WWF offices in Bali, Java, and West Papua. Also participating were leaders from the neighboring districts of Demta, Kemtuk, and Gressi, with the notion of carrying out a similar process in their districts later on. Native Lands provided the methodology for the project and participated in all of the workshops.
- **Objectives of the mapping:** The primary goal was to gain some sort of legal control over their lands, so they could stop the Indonesian government from granting concessions to foreign timber companies. They also had two transmigration settlements inside the District and they were seeking compensation from the government.
- **Financing:** The project was supported by DFID.
- **Difficulties:** There was some distrust initially, for obvious reasons, and PtPPMA had some administrative problems in the beginning. But once the project got moving and people saw that they were indeed the beneficiaries of the mapping, things smoothed over and there was widespread participation at all levels.
- **Maps produced:** A 1:75,000 map of Nambluong District.
- **Results:** The map was presented to authorities in a well attended meeting and the mapping team became celebrities in the region. They were taken to the highlands, where they taught the methodology to groups that went on to carry out their own mapping projects. The people of Demta, Kemtuk, and Gressi (who had participated in the initial project as observers) went on to successfully map their districts. And the Director of the Papuan Ministry of Forestry made an attempt to use the methodology to map all of the customary lands in West Papua (this was unfortunately unsuccessful for financial and political reasons). The people of Nambluong were able to get compensation for the transmigration settlements, and they gained control over their territory and are now able to negotiate with companies interested in timber concessions.

Figure A.7
The Nambluong region is close to the city of Jayapura in West Papua.

(8) Huon Peninsula, Papua New Guinea (2005-2006)

The Region and the People

The area mapped covers approximately 250,000 hectares of rugged highland terrain and coastal plains, ranging in elevation from 4,000 meters to sea level. It encompasses 37 villages, with a population of roughly 11,000 people distributed among 13 wards, more than 100 clans, and three language groups: Yupno, Uruwa, and Som. These are also the names of the three major rivers of the region; thus the area is referred to as the YUS watershed area.

- **Origin of the mapping project:** In early 2005, the Director of the Tree Kangaroo Conservation Project (TKCP), which is run out of the Woodland Park Zoo in Seattle, Washington, approached Native Lands about the possibility of helping with a mapping project in highland New Guinea. The Director had been doing research on tree kangaroos in the Huon Peninsula for some 10 years and was involved at the time with local villagers on a conservation project there.
- **Implementing organizations:** The TKCP organized and managed the project through its representative, who was based in the nearby city of Lae. The technical team was made up of cartographers from the Department of Land and Surveying at the PNG University of Technology (Unitech); and Native Lands served as technical advisor and accompanied the project from start to finish. Researchers were local villagers from the three language groups. Also accompanying the project was a geographer who was also a representative of the government's Department of Environment and Conservation.
- **Objectives of the mapping:** Villagers were in agreement with TKCP on the establishment of a community-run protected area. A detailed map of the region would help with planning and give people a much better idea of the natural resources of their area.
- **Financing**: Funds were provided by the Woodland Park Zoo, the Roger Williams Park Zoo, the National Geographic Society, and Conservation International.
- **Difficulties:** The project ran with relative smoothness despite the fact that travel between the highlands and Lae (for the workshops) was a hardship. Everyone was highly motivated. There was a snag at the end, after the Third (and final) Workshop, when arrangements were made for the final review, design, and printing of the maps. This occurred in large part because the TKCP representative, who had been administering the project, left his post in Lae and went to live permanently in Australia. Coordination with the Cartographic Unit broke down and everyone got involved in other projects.
- **Maps produced:** The plan was to produce a single map of the entire region, including the Yopno, Uruwa, and Som areas. This was to be supplemented with larger individual maps of each of the three areas. They have yet to be printed.
- **Results:** It is too early to see the results of this project.

Figure A.8
The Huon Peninsula, Papua New Guinea.