

Participatory Research Mapping of Indigenous Lands in Darién, Panama

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This article describes a participatory research mapping (PRM) project to document the subsistence lands used by the indigenous populations of the Darién Province, eastern Panama. The region is the historic territory of the Kuna, Emberá, and Wounaan peoples, with a biosphere reserve, two indigenous *comarca* homelands, and one of the most active colonization fronts in Central America. Having fought for recognition of their land rights in the face of encroaching outsiders, indigenous leaders were well aware of the power and importance of cartographic information. Indeed, the Darién was the most inaccurately mapped province in the country, and indigenous leaders embraced the idea of a mapping project to document their expanding settlements and natural resources. Community representatives were trained to complete land-use assessments using questionnaires and sketch maps. They worked with a team of specialists, including the author, to transform this information into standard cartographic and demographic results. The project's simple design brought outstanding results, including the first large-scale mapping of indigenous lands in this little-known region. The methodology shows how indigenous peoples can work with researchers in data collection and interpretation to transform their cognitive knowledge into standard forms, producing excellent scientific and applied results while enhancing their ability to manage their own lands.

Key words: participatory mapping, indigenous peoples, Emberá, Wounaan, Kuna, rain forest, Panama

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This article describes one of the earliest participatory mapping projects in Latin America. It details an emerging methodology for mapping people and place used by geographers, anthropologists, and other researchers and development workers. Drawing from my research among the indigenous populations of Darién Province, eastern Panama, the case study uses participatory research mapping (PRM) to produce standard cartographic and descriptive results by putting local people and their cognitive geographic knowledge directly into the mapmaking process. The mapmaking process is situated within the context of intracultural and intercultural exchanges occurring over a much longer time, like research in process cartography (Rundstrom 1991:6). The PRM approach combines cartography and ethnography, as envisioned in cultural cartography (Harley 1990; Rundstrom 1990, 1991, 1993). To be successful, it requires attention to both the technical aspects of mapping and to the cultural contexts in which it occurs. Participatory mapping is a new way to develop geographic knowledge.

Participatory mapping projects began among lowland rain forest peoples of Central America during the 1990s. Surprisingly, before then little research focused on how

indigenous populations use the natural environments in the region, despite the fact that they occupied and used most of the remaining rain forests and healthy Caribbean coastal environments. Indeed, until the 1990s, the basic spatial relationship between indigenous peoples and natural environments was poorly understood by state governments or international conservation agencies (Ankersen 1999; Chapin 1995; Cruz 1984; Davidson and Counce 1989; Herlihy 1992; Chapin 1992; Nietschmann 1995b). This situation was compounded by the absence or inaccuracy of existing demographic and cartographic information, greatly inhibiting the ability of policy makers to reach informed decisions related to conservation, land rights, and development issues affecting indigenous territories. But indigenous populations, who lived in these so-called green areas or empty quarters of the national states were well aware of the dangers of development and colonization.

Participatory mapping provided a new way to map these remote lands and indigenous populations. This was the reason environmentalist Andrew Leake and I designed the methodology to map the indigenous lands of the Honduran Mosquitia in 1992 (Herlihy 2002; Herlihy and Leake 1997; Knapp and Herlihy 2002). At that time, we needed reliable cartographic information for our research and applied community development work on the Mosquitia corridor, and existing maps did not even include most settlements in the region. We saw how this lack of information distorted views of the region by policy makers, who saw it as an uninhabited wilderness, largely outside the effective reach of the state, and ripe for colonization and development. In contrast, we recognized the geographical knowledge local people have about their lands and their sophisticated understanding of space, scale, and mapmaking. This first experience in Mosquitia showed how local people could work in tandem with researchers to articulate and transform their cognitive knowledge of resource use into standard forms that could also empower them in the management of their lands. Leake and I also led another application of the methodology the following year in Darién Province, eastern Panama, described below. From the start, we distinguished our approach as participatory research mapping (PRM) to highlight the way our method transforms cognitive geographical knowledge into standard maps.

The idea to do a participatory mapping project in Darién arose from the successful experience in Mosquitia (Chapin 1992, 1994; González 1996; González, Herrera, and Chapin 1995). The Central American Program of Cultural Survival, directed by anthropologists Mac Chapin and Anthony Stocks, promoted the project. Chapin successfully solicited international organizations for financial support of the new project.¹ Chapin had invited two young Emberá leaders to attend the concluding Congress of the Mosquitia project. Their positive experience caused them to endorse a new proposal for mapping their communities. Chapin discussed the possibility of collaborating on a mapping project with Charlotte Elton and Raul Leis, directors of the NGO Centro de Estudios y Acción Social Panameño (Center for Studies and Social Action in Panama [CEASPA]). Leake and I were also on board as

researchers. A meeting was held in January 1993 between key players including CEASPA representatives, indigenous leaders, Chapin and me, during which everyone agreed to go ahead with the initiative. The project was subsequently approved by the indigenous authorities, as well as by the state agencies involved.

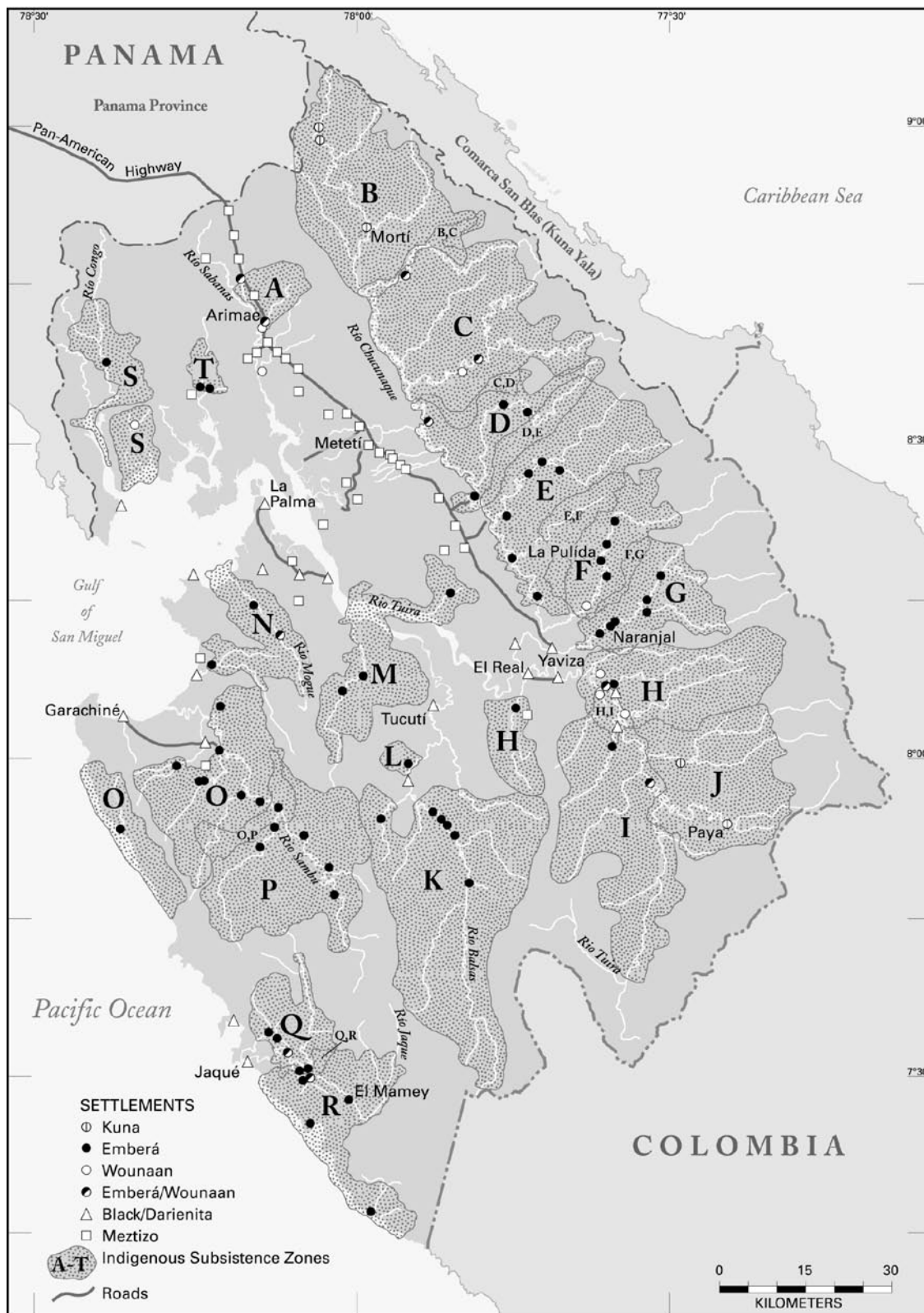
The Darién region was the Central American “poster child” for a remote, frontier and wilderness region with spontaneous Mestizo colonization, historic indigenous settlements, and diverse rain forest habitats. Famous as the only unconnected gap in the Pan-American Highway system, the region was renowned for its great parks and native peoples. The indigenous population had over the past few decades undergone radical social change, relocating their dispersed household settlements into villages while adopting a new political organization to gain legal control of their lands. Colonists were moving in along the roadway and neither the state nor the indigenous populations had a clear understanding of the changes this prompted. Informed decision making concerning the political, economic, and environmental future of the region was continually thwarted from one perspective or another by a lack of even a general understanding of how the cultural and natural landscapes of Darién were undergoing rapid change.

This article explores the mapmaking process used in the Darién project. Participatory mapping initiatives are a nexus for all sorts of exchanges, many beyond the purpose and control of cartographic projects. I do not pretend to understand or analyze all the extraresearch activities of individuals from the NGOs, indigenous organizations, communities, state agencies, or other researchers involved in the case I describe. My involvement in the project was as the researcher in charge of mapmaking. I will start by situating the project within the cultural context of the Darién region. Only seeing how rapidly and dramatically the landscapes of the region changed can one appreciate the dire need for cartographic and descriptive information at the time, a need that was felt by state and indigenous authorities alike. The step-by-step activities involved in the process are detailed in this article, including a summary description of the three major workshops leading to the concluding public presentation. My interest is to show how the process transforms cognitive into standard knowledge and how the results are useful to both state and indigenous authorities.

Lands and Peoples of the Darién Study Area

Located where Central meets South America, the Darién Province of eastern Panama, the country's largest (16,803 square kilometers) and least-developed province, is the study area (Figure 1). Its modern boundaries are largely defined by drainage basins of the Chucunaque-Tuirá, Balsas, Sambú, Congo, and Sabanas river systems draining into the Gulf of San Miguel. Only the Río Jaqué empties directly into the Pacific Ocean. The Darién is one of the most biologically diverse and species-rich regions in the world, with a diversity of tropical forest habitats including exceptional and

Figure 1. Indigenous Communities and Subsistence Zones of Darién Province, Panama, 1993 (modified from Congress Eberá Wounaan y CEASPA 1995)



little-studied flora and fauna assemblages (Duke and Porter 1970; Herrera-MacBryde and ANCON 1997; Holdridge and Budowski 1957; Lamb 1953; Mayo Melendez 1965).

Darién has always been an indigenous region, although ownership has changed hands since Balboa “discovered” the region in 1510 (Araúz 1966, 1980; Herlihy 1989a). It was Kuna territory in 1600 when the Spaniards built a small fort at El Real to protect the river route to the gold mines in the Río Tuira headwaters (Figure 1). Missionaries began grouping their dispersed family settlements into villages in 1638, but they resisted these and other efforts to force them to labor in mining operations by fighting sometimes alongside pirates to destroy the new towns. Spaniards enlisted Chocó Indians (Emberá) in the counteroffensive with their feared poison-dart blowguns from the Pacific lowlands of Colombia (Herlihy 1986, 1995; Ortega Ricaurte y Rueda Briceno 1954; West 1957). The Kuna retreated northward into the headwater streams of the Chucunaque-Tuira Basin, beginning their historic departure from Darién to cross the continental divide for the San Blas coast. Although the Spaniards abandoned the region by the late 18th century, the Kuna continued their mass exodus, with settlements remaining in only two historic areas.

Darién remained a distant backwater when the isthmus came under control of the emergent Colombian state. Small numbers of Europeans and blacks settled the province during the 19th century, forming port and fishing towns at Jaqué, Garachiné, and Taimatí (Figure 1). La Palma, the provincial capital, was settled in 1853 at a place where boats dry-docked to be careened and provisioned. Darién’s larger river towns of Yaviza, El Real, Tucutí, and Sambú developed at the upriver draft of ocean-going cargo boats and became dominated by Spanish-speaking blacks (called Darienitas), some descendants from the colonial period. Emberá families began colonizing Darién during the 18th century, becoming the dominant population in most river basins by the early 1900s when the fledgling Panamanian state was being formed. They built family compounds dispersed along rivers and streams, away from the river towns and Kuna areas. Wounaan families began to arrive in the 1940s.

Emberá and Wounaan populations broke their customary practice of settling in dispersed family compounds to group their houses around schools and missions beginning in the 1950s. Their leaders combined this strategy of village formation with the adoption of new political institutions during the 1960s to strengthen their territorial control and establish a *comarca*, which is an indigenous homeland and semiautonomous geopolitical district under the jurisdiction of the Panamanian state.² They learned from the Kuna about their chief-congress (*cacique-congreso*) political structure and the *comarca* semiautonomous district (Herlihy 1989b; Howe 1986, 1998, 2002), which the Emberá and Wounaan leaders appropriated as their own. After a two-decade-long campaign of political and territorial reorganization, the *Comarca Emberá-Wounaan* was established in 1983 (Herlihy 1986, 1995). More than 80 villages characterized the *Emberá-Wounaan*

cultural landscape in Darién Province, but no single map showed all their locations.

Mestizo colonists from central and western Panama were the most recent additions to the cultural milieu. The region was so inaccessible before the 1975 opening of the Pan-American Highway that there were only five small settled areas of agricultural colonists. The 10-meter-wide dirt and gravel road with modern bridges reached Canglón in that year and connected to Yaviza and the Chucunaque-Tuira river system in 1984 (Herlihy 1989a). It rapidly became the economic umbilical cord of the province, and trade networks reoriented toward it where possible. Dozens of new settlements developed as farmlands and pastures spread over most areas with road access. The highway has never been upgraded and, even today, may be impassable during the wet season.

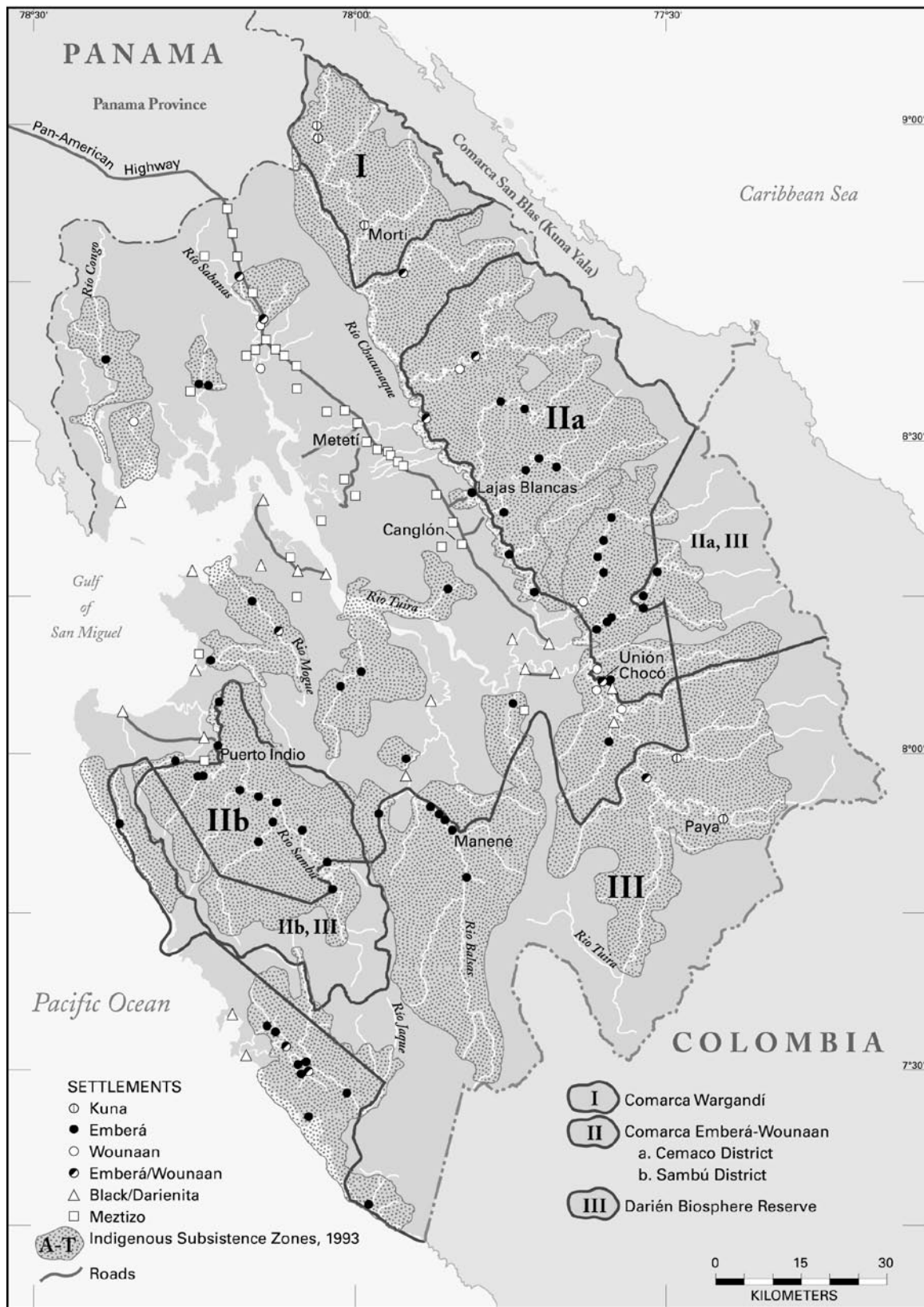
Protected Indigenous Lands in Darién

The Panamanian state has helped protect the indigenous character and forested habitats of the Darién, despite opening the region to one of the most active colonization fronts in Central America. Nature reserves established to protect forests include the settlements and lands of the region’s indigenous populations. The Darién National Park was established in 1980 primarily to protect nature, but it was declared a World Heritage Site in 1981 and a Biosphere Reserve in 1983, in recognition not only of its diverse neotropical ecosystems but of its potential to protect the cultural heritage of the Darienitas, Kuna, Emberá, and Wounaan populations living there. State authorities have made some effort to limit outside colonization, but they have not recognized indigenous land rights within the biosphere reserve, except where it overlaps with the *Comarca Emberá-Wounaan* (see Figure 2). With illegal drug trafficking and the Revolutionary Armed Forces of Colombia (FARC) activities in the area today, indigenous liberties have been further compromised.

The *Comarca Emberá-Wounaan* covers a quarter of the Darién Province, divided into two disjunct districts of Cémaco (2,880 square kilometers) and Sambú (1,300 square kilometers), centered on the Chucunaque-Tuira and Sambú river basins respectively (Figure 2). It is now home to about 60 percent of their populations in Darién, including small numbers of Mestizo and black families and one small non-Indian town. Indigenous families within its boundaries have legal land rights established in Panamanian law (Decreto Ley 22 of 1983; Decreto Ejecutivo 84 of 1999). Nevertheless, land and resource conflicts, national-level political opposition, drug trafficking, and other destabilizing forces continually threaten *comarca* security (Herlihy 1989b, 1995; Memoria 1993).

A new *comarca* was established for the Kuna communities of the upper Chucunaque River in 2000. The Chucunaque Kuna communities of Wala, Morti, and Nurra formalized their *comarca* campaign in a 1988 proposal to the Panamanian legislature (Guionneau-Sinclair 1991:153-54). Following a decade of negotiations, the relatively small 775-square-kilometer *Kuna Comarca of Wargandi* was established.

Figure 2. Protected Areas and Indigenous and Subsistence Zones of Darién Province, Panama, 2000



Elsewhere, outside bounded reserves,³ Emberá-Wounaan and Kuna communities work for legal control of their lands. Perhaps the most serious threat comes from the advance of agricultural colonists, cattlemen, and lumber companies along the Pan-American Highway. In response, the Organización Indígena Tierra Colectiva Emberá Wounaan (Indigenous Organization of Collective Emberá-Wounaan Lands [OITCEW]) formed during the mid-1980s to work for control of native lands in the biosphere reserve, along the highway, and outside the comarcas. Now officially called the Congress of Collective Embera-Wounaan Lands, it has no legal land base.

Beginning the Project

Indigenous leaders, having experienced such remarkable territorial changes, were understandably very interested in the mapping project. They learned the importance of accurate maps during their comarca campaigns, and they recognized problems with state maps that mislabeled or failed to show their settlements. Many felt either misrepresented or underrepresented, and they saw the mapping project as an opportunity to change this situation. Emberá authorities were also concerned about problems related to the invasion of comarca lands by colonists. They had a keen sense of the power of maps and understood the usefulness of systematic, “scientific” documentation of their lands for dealing with a variety of issues.

Native land issues were heating up as the mapping project began in late May 1993. Indigenous groups were taking drastic actions to influence the government to approve new comarca lands. Promoted by the Coordinadora Nacional de Pueblos Indígenas de Panamá (National Coordinating Organization for Indigenous Communities [COONAPIP]), the strategy was to paralyze transport along the Pan-American Highway (Contreras 1993; Francois 1993; González 1993). COONAPIP, with representation from the Indigenous General Congresses and traditional authorities, presented a petition to the national legislature calling for, among other things, the establishment of the Kuna Comarca of Wargandí and legalization of Emberá-Wounaan community lands in Darién outside the comarca limits under petition of the OITCEW. To be successful, the project would have to distance itself and its participants from these conflictive activities.

State agencies supported the project with some caution. The Instituto Nacional de Recursos Naturales Renovables (Panamanian National Institute for Renewable Natural Resources [INRENARE]) sanctioned the initiative and allowed Francisco Herrera, director of the Human Ecology Program, to participate from time to time in workshops clarifying issues related to the conservation and development of indigenous lands. Mac Chapin and I proposed a significant collaboration with the Panamanian National Geographic Institute-Tommy Guardia. Officials there were concerned about the volatile indigenous land rights struggles occurring at the time, but they also recognized the seriousness of our research and the

need for more reliable maps of the Darién. The director José A. Saénz and subdirector Denis Fuentes endorsed the project providing access to maps, air photos, cartographic services, and the full-time involvement of one of the institute’s draftsmen. Project staff and researchers were also summoned to explain the project to officials at the Panamanian Ministry of Government and Justice, where officials held the most cautionary stance toward the project because they were well aware of its potential relationship to the volatile indigenous land rights situation.

A one-day planning workshop was held in late April 1993 to discuss the organization and implementation of the project (Diaz R. 1993). The meeting included representatives of the Center for Studies and Social Action in Panama (CEASPA), the Center of Popular Legal Assistance, the Comarca Emberá-Wounaan, the Kuna communities, INRENARE official Herrera, Chapin, and me. Indigenous leaders explained that the General Congress of the Comarca Emberá-Wounaan had approved the project earlier that month. An overview of the Mosquitia project helped focus discussion regarding indigenous involvement in the different levels of the undertaking. CEASPA would administer project funds and organize the logistical needs. Cultural Survival’s Central American Program director Chapin provided funds to CEASPA, which hired a project administrator, Olimpia Dias, to manage the project’s financial and logistical details.

The research team integrated a variety of professional expertise and institutions. Andrew Leake and I designed and led the mapmaking process. The way the project was administered, we were never on site at the same time. Leake led the first training workshop, as detailed below. I knew the region well from dissertation and postdoctoral research during the 1980s, when I used participant observation and collaborative research to map the land use and culture history of the communities in the newly formed Comarca Emberá-Wounaan at a time when formal maps were seldom seen in Darién (Herlihy 1989c). Cartographic technicians José Aizpurúa from the National Geographic Institute and Erasmo González from the National Census Bureau, along with geographer Sebastián Sánchez from the University of Panama and Kuna natural resource specialist Nicanor González, joined the research team to assist in the cartographic work. Indigenous leaders selected three “regional coordinators” to supervise the fieldwork, including Genaro Pacheco as the representative of the Emberá-Wounaan General Congress, Facundo Sanapi as the Regional Chief of the Comarca Emberá-Wounaan, and Gerales Hernández as the Kuna leader from Wargandí. All members of the research team received modest salaries.

The project aimed at producing reliable cartographic and demographic information on indigenous land use in Darién. The previous Honduran experience demonstrated the mapping process needed to be as systematic, professional, and objective as possible, involving both state and indigenous groups, to ensure that results were understood and acknowledged by all. The project had two objectives: 1) to produce cartographic information about the indigenous use of lands

and natural resources in Darién; and 2) to develop and disseminate the results at a national forum on the Darién and its native peoples. The project aimed secondarily at education and political activism.

Attempting to distribute the work evenly between surveyors, the researchers and indigenous coordinators divided the study area into 20 survey zones (Figure 1). Each zone included a group of related communities with overlapping land use areas, usually corresponding to a given river valley. The regional coordinators initiated a community-based process to select representatives from each zone to work as surveyors. Their efforts were aided by the indigenous advisory councils (Consejo de Nokorã in Emberá; Chi Põrnaan in Wounaan) of the Comarca Emberá-Wounaan, by the Kuna *sailas* (chiefs) of Wargandi, Paya, and Púcuro, and by leaders of the OITCEW from communities in the Darién Biosphere Reserve and along the Pan-American Highway. Four criteria were used to screen candidates, who were expected to be: 1) native and resident of their survey zone; 2) able to read and write; 3) respected among the local population; and 4) knowledgeable on the natural environments used by the communities in question. All 20 surveyors were male.⁴ The surveyors were generally highly regarded individuals and most had held positions of village leadership or worked as teachers or church pastors.

Workshop 1 and Fieldwork

The Darién PRM project was executed through a series of three workshops with two intervening periods of fieldwork. The first workshop was to train surveyors. It was held in late May 1993 in Arimae, a mixed Emberá-Wounaan village along the Pan-American Highway (Figure 1). The five-day event, designed and led by Andrew Leake, began with an open dialogue between the participants about the project and with general discussion about the inhabitants, geography, and land use of the study area. Emberá, Wounaan, and Kuna leaders, coordinators, surveyors, and researchers all participated in an open but structured forum. The 1992 Mosquitia example was presented as background. The workshop focused on the objectives, methodology, definition of work zones, as well as the roles of the coordinators, surveyors, and researchers (Andrew Leake, personal communication, May 28, 1993).

Draft questionnaires for collecting the field data for mapping, designed by Leake and me, were evaluated and modified through a collective effort between the researchers, coordinators, and surveyors. The subsistence land use questionnaire had eight questions designed to record the specific toponyms, showing resource-use locations where villagers farm, fish, and hunt; collect forest materials, fruit, and medicinal plants; cut timber for dugouts and cash sale; and those areas where outsiders do the same. Two additional questions documented the compass directions and geographic "landmark" features community members used to delimit village lands and forests used by the community. The household census questionnaire was also critiqued. Information about the gender, age, and primary language of each person in the household was collected.

A basic services questionnaire was also finalized to inventory the presence of health centers, nurses, drinking water, schools, schoolteachers, transportation, and radio communications, as well as nonagricultural economic activity.

Leake used didactic approaches to teach the surveyors how to administer questionnaires and register oral responses. Mock interviews were held with families in Arimae to help surveyors to develop culturally appropriate interview styles. The Spanish-language questionnaires were translated into Emberá and Kuna languages for surveyors who felt more comfortable working in their native language.

Leake gave surveyors simple instructions about how to draw sketch maps with ink and paper. Simple line maps help communicate cognitive geographic information in a way not so different from how villagers etch ephemeral maps in the soil to communicate place and location. The surveyors were asked to draw a map together with community members, locating the places where villagers carry out subsistence activities. No additional parameters were given for the sketch maps.

A simple contract was drafted and signed with each surveyor concerning work requirements and remuneration. Each developed a chronogram of his activities and an itinerary with travel budget, which was approved by the researchers, an activity that concluded each workshop. Following workshop 1, participants left Arimae for their respective work zones, traveling mostly by dugout and on foot. The Congreso Emberá-Wounaan made announcements endorsing and explaining the project using radio broadcasts and word-of-mouth along river traffic-and-trade networks. The project was known, if not completely understood, by village leaders who informed their communities. Most surveyors were responsible for three to five communities, and the surveyors normally collaborated with the village leaders (the Emberá *noko*, the Wounaan *chi pör*, and the Kuna *sahila*) to hold a community meeting. Generally, the village authorities were helpful in encouraging community participation, especially those individuals with the greatest knowledge of the area.

Village meetings were primarily for completing the subsistence land use and basic services questionnaires. In most communities, a large number of men and women participated, while in some, village authorities united a smaller number of knowledgeable individuals. Women, while not interested in work as surveyors, contributed greatly to the community meetings. The surveyors, most using the indigenous language versions of the questionnaires, recorded the participants' responses to each question in the form of place names or brief geographical descriptions.

Sketch maps were sometimes drawn in the large community meetings, but many surveyors reported greater success working with smaller groups of experienced woodsmen. Onlookers inspected and critiqued their draftsmanship, some adding input. The resulting sketch maps were hand-drawn on blank paper in pencil and black ink. Some surveyors alternatively drew sketch maps of each major settlement in their survey zone. A few didn't draw maps at all. Many found it

easier to complete the household census during the evening hours when villagers were home.

Workshop 2 and Fieldwork

Workshop 2, led by the coordinators and me, was designed to transform field data into cartographic and tabular forms. It was held during the second half of June at the old U.S. Canal Zone School in Gamboa, owned by the Smithsonian Tropical Research Institute. The surveyors and researchers worked, roomed, and boarded at the picturesque site along the edge of the Panama Canal. Nearly all the surveyors arrived with their field data complete, including the questionnaires, household census, and sketch maps. Their enthusiasm was high and the caliber of their work was beyond our expectations. The workshop lasted two weeks, but some surveyors stayed longer to work with the researchers to complete their zonal maps.

The Darién study area presented numerous cartographic challenges. The PRM methodology called for accurate large-scale base maps for plotting land use information. We wanted to draft simple base maps that would be meaningful to the surveyors and contain physiographic features important to the communities. National cartographic sheets, with unfamiliar scales, grid and coordinate systems, contour lines, color patterns, and national toponymy, were complicated and unfamiliar to most surveyors, but they contained the basic geographic features that are core to how the natives see their lands. We drafted simpler base maps with settlements, rivers, streams, mountains, and other geographical features. Large-scale cartographic coverage of Darién, however, had never been completed. Only one swath across the isthmus was ever mapped at 1:50,000 scale, when it was considered as a possible canal route during the 1960s. While these maps were seriously outdated and lacked most significant cultural features, the landforms had not changed so much. These cartographic sheets were used to draft base maps for 6 of the 20 survey zones. The National Geographic Institute gave us access to archive aerial photographs taken during 1990-1992 at about 1:60,000 scale. The photos provided excellent coverage of indigenous settlements and land use areas. The research team classified each image, labeling the same geographic features delineated using the cartographic sheets. Classifying images was easier when the researchers and indigenous surveyors worked together. With a little orientation, most surveyors could identify land cover features in individual air photos, especially those of their respective survey zones. We made a mosaic of the photographs covering each survey zone, and then we traced a new base map off the composite image. The base maps for 8 of the 20 zones were produced in this manner. The base maps of the remaining six zones, with no other alternative available at the time, were made from the Panamanian census maps at 1:50,000 scales, which we knew to contain inaccuracies.

Locating each geographic feature and resource-use location on the zonal base maps involved an interactive

analysis between the surveyors and researchers. Using the questionnaires, sketch maps, and air photos, the surveyors and researchers worked painstakingly at plywood drafting tables to locate thousands of place names and resource-use sites onto the new zonal base maps. The accurate plotting usually meant finding the site in relation to a river bend, confluence site, contour point, peak, or other prominent physiographic feature. The plotting of each toponym, settlement, and resource-use location involved relating the surveyor's geographic knowledge to the sketch maps, base maps, and researcher's knowledge. Fixing a site's location involved "virtual trips," traveling up and down rivers, streams, and ridge lines in the mind's eye to determine distance and location. And it helped when the researchers had knowledge of the indigenous peoples and their sense of terrain, scale, and distance-time relationships in the study area. Surveyors from adjacent zones frequently joined in around the drafting tables, most enjoying the process of cross-checking the evolving map. During this process, corrections and additions were made to the original zonal base maps.

Village and dispersed household settlement sites were first mapped. Refining our original design from Mosquitia (Herlihy and Leake 1997), I designed an alphanumeric code to fix resource-use locations, which were shown with letter symbols on the map to identify sites of agriculture (A), fishing (P), hunting (C), subsistence (Ar) and commercial (Arc) logging, and collecting of forest materials (M), medicines and fruits (M/F). For example, the code A_{2,3} meant that both community 2 and 3 have agricultural land at site A on the map. The information was structured for future Geographic Information Systems (GIS) analyses. With the resource-use sites plotted for each community, the researchers and surveyors delimited a boundary around them defining the area used for subsistence and cash-earning activities. These "subsistence zones," excluding certain distant resource-use locations exploited only infrequently, were mostly within a day's walk from a village.

The toponymy of each of the 20 zonal maps was carefully checked. Except for the foreign-origin place names in common use, indigenous toponyms were used. The zonal maps were then redrawn, with the surveyors overseeing draftsmanship and transcription. For easier presentation in village meetings, each community's subsistence zone limit was highlighted in a different color.

While the cartographic activity involved a small number of surveyors, working in one room of the schoolhouse, the rest of the group participated in a seminar studying their lands in Darién. The indigenous coordinators led the seminars. They facilitated open dialogue with each surveyor on topics ranging from their field experiences to the use and management of their lands (Table 1). The researchers and special invitees helped introduce environmental, geographic, political, historic, or administrative concerns, but the surveyors and coordinators debated and articulated these themes. As they expressed their understandings or concerns, they improved their expository skills and confidence. Most enjoyed sharing

Table 1. Themes Discussed at Workshop 2

Experiences during survey/fieldwork

Condition of natural environment and resources by work zones

Settlements (indigenous/nonindigenous)

Use of resources between communities and ethnic groups

Commercial activities in each zone

Oral history of indigenous communities

Relations of each zone with government organizations and nongovernmental organizations

Status of protected areas

Development aspirations

Establishment of new communities

Zonification of resources to protect nature and culture

Organization of indigenous communities

their experiences with fellow participants. For the majority, this was a singular experience unlike any other, and they became quite engaged in learning about their lands and natural resources. A stenographer took a running memorandum (Memoria 1993) of the workshops, detailing the surveyors' understanding of not only the mapping process, but also the dynamic cultural, political, economic, and environmental events in Darién at the time.

The surveyors returned to their communities after the second workshop to meet again with local members. The simple fact that the surveyors returned so quickly engendered greater interest in the project. The surveyors recounted that when villagers saw the draft zonal maps they became more inspired to participate and provided even more details. Most surveyors held formal village meetings; others opted to work in smaller groups to criticize, revise, and validate the draft zonal maps.

Workshop 3 and Final National Forum

Everyone involved in the project reconvened at the Gamboa schoolhouse in mid-July for the final nine-day workshop. The researchers, surveyors, and coordinators worked to make corrections and additions to the zonal maps, some of which still required major revisions. Each surveyor oversaw the final black-ink redrafting of their zonal map to ensure its accuracy. At this point, the subsistence zone limits for each individual community were removed and only one overall subsistence zone boundary was delimited on each of the 20

Table 2. Themes Discussed at Workshop 3

Experiences during the correction of the maps

Condition of natural environment and resources

Settlements (indigenous and nonindigenous)

Populations (history and location)

Commercial activities

Indigenous use of lands

Use of resources between communities and ethnic groups

Cultural values of indigenous communities

Natural resources of indigenous lands

Overview of process of delimitation of indigenous lands

Relations with government and nongovernmental organizations

National Organization for the Protection and Use of Natural Resources

Alternatives to socioecological pressures on indigenous lands

Zonification for protecting nature and natives

zonal maps. The eight zonal maps based on air photography were enlarged to 1:50,000 scale by the Panamanian National Geographic Institute, and the entire set of 20 zonal maps were then reproduced as standard maps at 1:50,000 scale (Congreso Emberá Wounaan y CEASPA 1993). We also drafted smaller-scale composite maps at 1:250,000 and 1:500,000 scales for the concluding forum, showing only the communities, principal rivers, and subsistence lands for each zone.

The seminar continued during the third workshop to readdress ongoing themes and introduce new ones (Table 2). The seminar was also used to develop the preliminary content for the final forum. The researchers and coordinators developed a tentative list of topics to be covered, additional themes were added, and a presenter was selected for each theme. The surveyors developed short, dynamic presentations that touched basic themes related to indigenous life in Darién. We wanted to provide those attending the event with a basic understanding of the nature and challenges faced by indigenous peoples in Darién. Each surveyor wrote his own presentation, which was then critiqued by other surveyors, coordinators, and researchers. Practice sessions helped with their formal delivery.

The Indigenous Culture and Resources Forum was a two-day event held at the El Panamá Hotel in Panama City in late October 1993—at least 500 people attended. The meeting

Table 3. Indigenous Presentation at the “Indigenous Cultures and Resources” Forum, October 26-27, 1993

Day 1

- Opening remarks
- Presentation of the project
- Actual situation of the environment and natural resources in Darién
- Cultural background on indigenous groups
- Traditional Emberá and Kuna dance
- Human settlement and history in Darién: indigenous and nonindigenous
- Land Use: agriculture, fishing, collecting
- Interethnic and communal use of resources
- Recovery and delimitation of indigenous territories
- Comarca Emberá-Wounaan
- OITCEW
- Propuesta Reserva Wargandi

Day 2

- Indigenous rights and international agreements
- Relation between indigenous people and protected areas: Darién Biosphere, Moque Reserve
- Relations with government agencies and NGOs
- Indigenous cultures and the Pan-American Highway
- Zoning and the creation of indigenous territories
- Management plans and the sustainable use of resources
- Conservation and protection of natural resources in the Comarca Emberá-Wounaan
- Indigenous experiences in the management of natural

served as a public forum, where surveyors, coordinators, and researchers reviewed and debated their efforts. The forum was designed to present the composite map “Indigenous Lands of the Darién 1993: Zones of Subsistence” and summary demographic results. The event promoted the understanding of indigenous cultures and their relationships with natural resources in Darién (Table 3). For their part, the indigenous leaders wanted to present a picture of their own lives and

concerns and share their vision of indigenous peoples’ rights. They hoped to foster intercultural communications with other Panamanians and emphasize the indigenous concept of natural resource patrimony. They also used the forum to denounce drug trafficking, uncontrolled colonization, and the destruction of the flora and fauna (Gutiérrez 1993). Government ministers, military leaders, indigenous authorities, scientists, environmentalists, and newspaper reporters participated, as did invitees and representatives from other indigenous groups, NGOs, and international conservation and development organizations. The event was heralded as a remarkable success (Herrera C. 1993).

Transforming Geographical Knowledge

The participatory research mapping methodology transformed indigenous cognitive geographical knowledge into standard maps. The approach recognized the interrelationships between the mental images in a person’s head and the formal printed map. Cartographer Denis Wood (1973:53-54) has recognized three types of maps: 1) an *individual mental map* is the external manifestation, in the form of sketches or drawings, of a person’s own spatial experiences; 2) a *consensual map* reveals information regarding space agreed upon by a specific group and compiled from individual mental maps or other sources; and 3) a *standard map*—what we see every day in our newspapers, books, and on television—is universally regarded as useful at a given point in time and space. Wood (1973:53) observed that the “internal manifestation of the consensual image is what allows a person to recognize an external image as his own, the same applying to the standard map: the internal representation of a standard map is that which allows a person to accept the standard map as useful.” He (ibid.:56-58) concluded that standard maps are mental maps—not individual mental maps but consensual mental maps.

Darién natives maintained ancestral cognitive geographical knowledge of their lands. Without literary traditions, they relied on mental maps for describing places and fixed specific locations using toponyms and oral descriptions. Linear features were scratched into ephemeral maps on any appropriate surface at hand for describing the geographic features of places. The lines, like the native discourse about them, flowed along the rivers, streams, coastlines, travel routes, trails, roads, and ridge lines. These sketch maps showed personal views of an area’s geographical structure (Wood 1993: 81; Gould 1972:262) and no individual’s sketch map gave a consensus view of community lands.

The surveyors worked with villagers to sketch maps of their survey zones. The resulting consensual maps portrayed the local geography of each zone. They reflect the combined experience of the villagers involved in the undertaking. These nongeometric, consensual images of local geography varied greatly in scale, detail, accuracy, and design. “The best among them, crafted with copious detail and admirable talent, are works of art with great scientific value” (González, Herrera,

and Chapin 1995:32).⁵ Nevertheless, only a small number of toponyms were shown on these maps, along with a select number of natural and cultural features. Taken alone, they were insufficient for standard, cartographic mapping.

The PRM methodology delegated many additional research functions directly to the surveyors. They were entirely responsible for collecting the field data, including not only drafting the sketch maps, but also administering the questionnaires in open community fora. They worked together with the research team to develop workshops, design questionnaires, analyze census information, record toponyms and resource-use locations, draw sketch maps, draft standard maps, validate maps and information with communities, and formulate new ideas about their lands and resources. Clearly, their success depended on how well they interacted with community members.

The Darién PRM focused on the systematic collection of toponyms to locate the resource-use site and define subsistence lands. Toponyms are descriptors of place that fix location cognitively, as well as on hard-copy maps. They tell us much about past occupancy, even in remote rain forests (Davidson and Cruz 1991). Indeed, toponyms often embed the meaning of that place in their etymology. The surveyors administered the questionnaires about land use activities in community meetings and recorded thousands of the specific place name responses to where indigenous villages carried out subsistence and cash-earning activities.

The PRM methodology emphasizes the dialectic between the researchers and surveyors to transform the toponyms, sketch maps, air photos, and other information into standard maps and descriptive form. The surveyors' mental maps and knowledge of local geography coupled with the consensual sketch maps provided essential tools for guiding the researchers' understandings of scale, distance, direction, and location. The researchers' understandings of the study area and its indigenous subsistence economies were key to interpretations. The process depended on the ability of the researchers and surveyors to exchange geographical knowledge. They shared visual representations and multiscale imaging in the mind's eye and on scrap papers at the drafting tables. Conceiving geographical space was crucial to accurately plot resource-use sites.

This is not to say that there were not difficulties with the project. From the start, the administrative structure of the project was decentralized, without strong institutional support or a decision-making structure to help with the day-to-day operation of the project. U.S.-based project administrators Mac Chapin and Bill Threlkeld were not on site and were primarily engaged with political and funding concerns connected with their organizational break with Cultural Survival. The actual administration of the project fell on Olimpia Diaz, who single-handedly managed the numerous and significant financial and logistical concerns connected with more than 30 employees of the project. Institutionally, CEASPA was supportive but lacked experience and sufficient personnel, having never undertaken a project of this magnitude in the remote Darién region.

Surveyors reported many obstacles to their work. Villagers were sometimes unimpressed or skeptical of the comarca government's sanctioning of the mapping project, being suspicious of the "hidden" political and economic motives for the project. Some surveyors felt communities had not been given sufficient explanation about the project or their roles as surveyors. Traveling in Darién also presented logistical problems. Rains and high river waters made travel difficult and dangerous, and transportation between communities was sometimes hard to find. Coordinating meeting times with villagers was also problematic. A couple of communities outside the comarca boundaries were initially reluctant to provide information. Elsewhere Emberá villagers were reticent to work with a Wounaan surveyor, and vice versa. Most everyone complained that the time allotted to do the fieldwork was simply too short.

The workshops always had too much to do—and limited time. I led the mapmaking workshops, but also had to share my experience concerning other matters with CEASPA and indigenous authorities as they solicited my opinions on many issues. Developing the 20 large-scale base maps for recording the results was challenging. Some members of the research team had difficulty interpreting questionnaire results with limited field experience in the study area. Without a good understanding of the study area (especially time-distance relationships), it was hard for them to locate places on large-scale maps. This meant more of the questionnaire analysis fell directly on me, requiring long hours to finish within the schedule planned for the workshops. The project was demanding, but everyone worked hard, with a sense of purpose and camaraderie, in an effort to finish what we all new to be a landmark project within the limited time and budget.

The Results and Native Empowerment

The PRM methodology helped indigenous peoples with little formal education work with researchers to transform their cognitive knowledge into standard cartographic and statistical forms easily understood by themselves and outsiders. The collective effort and solidarity to do research was unprecedented in the region. Endorsement by the Emberá-Wounaan General Congress played a pivotal role in enabling community involvement. The comarca's administrative structure and communication networks greatly facilitated the effort. The support of state agencies was also important, and the project would have been impossible to implement without the help of the National Geographic Institute. CEASPA did an excellent job with the organization of the workshops and final forum, as well as in managing all the personnel issues of such a large group.

The PRM project met its objectives and benefited the Darién indigenous population in several ways. Most tangible was the cartographic, demographic, and land-use information about the distribution of the indigenous populations. The 1993 household census results showed 82 villages in the province and 14,749 indigenous inhabitants (73% were Emberá, 16%

Wounaan, 10% Kuna, 1% other). Over half the region's population lived inside the Comarca Emberá-Wounaan, including 40 villages and 8,235 inhabitants (83% Emberá, 16% Wounaan, 1% other). The Darién Biosphere Reserve had 15 indigenous communities and a population of 2,547 (80% Emberá, 18% Kuna, 2% other), with overlapping boundaries and land use areas in the Comarca Emberá-Wounaan (Figure 2). The Kuna Comarca of Wargandi had three Kuna communities and 1,061 inhabitants. There were 17 Emberá-Wounaan communities located outside protected status.

The project documented the spatial extent of natural resource use, providing a measure of indigenous territorial influence in the province. Results detailed where communities use lands for subsistence and cash-earning activities, illustrating the overlapping nature of indigenous land use as well as their relationship with functional political and conservation boundaries. Each subsistence zone generally had a small number of villages and associated hamlets with close ties due to their proximity, kinship, and resource use. The questionnaire results showed that subsistence zone boundaries defined here through the use of cognitive maps (surveyor's mental maps, community's consensual sketch maps) and toponyms differed greatly from those defined by compass directions and geographic landmark features. Our results showed that these latter geodesic point-line boundaries were less accurate and easily politicized ways of defining indigenous community lands (contrast with Dana 1998 and Gordon, Gurdian, and Hale, this volume).

The mapping authenticated indigenous toponymy in Darién. Conquest of the Americas often meant replacing indigenous place names with European ones. It was colonial policy in western Panama to "rebaptize" places with Christian names (Castillero 1995:141). Historic isolation from the colonial and national society meant it was not necessary to rename places in Darién. Moreover, indigenous languages remained unwritten until the recent work of missionaries and anthropologists (Loewen 1963; Sherzer 1983). The PRM put indigenous-language toponyms on maps for the first time. Many surveyors were grateful to see ancestral names inscribed formally on maps. Government officials and other experts recognized the results as the most culturally accurate mapping of the region to date. The large-scale zonal maps put thousands of place names and resource-use locations on the map for the first time. A final color map at 1:500,000 scale was published by the National Geographic Institute. It included the communities, subsistence zones, and vegetation cover (Congreso Emberá Wounaan y CEASPA 1995) and gave even broader circulation and recognition of the project's results and Darién's indigenous heritage.

The PRM had significant, albeit less tangible, results for to the education and political empowerment of the indigenous populations. Coordinators and surveyors benefited from learning basic geographic information and simple research techniques. By the end of the third workshop, most participants could easily draw sketch maps and read standard cartographic sheets and air photos. They learned enough about regional

conservation and development issues to field questions during village meetings.⁶ The PRM also reinforced indigenous identities. The surveyors had knowledge of, and some were involved in, the social movements for the establishment of comarcas in the region. They reported that never before had they come together to discuss such things. The PRM also brought land and natural resource management issues to the attention of villagers in even the most remote corners of the province, especially those related to the Comarca Emberá-Wounaan and the Darién Biosphere Reserve. For advocates of participatory research, it was particularly important that native kinsmen were the messengers. The surveyors have continued to use these skills in support of their communities. The Kuna natural resource specialist Nicanor González, who worked with the research team, even helped develop a new mapping project in Bolivia.

The Darién project aimed at creating a positive environment for exchange of information and ideas through research and education, with the conviction that it could help formulate better indigenous-state relations. The approach validated local knowledge of geography and addressed some concerns over representation and the legitimacy of mapmaking. The project worked with the National Geographic Institute to facilitate a collective indigenous-state understanding. The process focused on research to educate the indigenous people about their own use of resources while influencing the organizations and individuals charged with formulating related state policy. Derek Denniston (1994:30), a researcher at the Worldwatch Institute, observed:

By centering the forums around the scientific maps and technical evaluations, the Indians built a graphic and credible base from which to launch political campaigns on several issues, including legalizing communal homelands, stemming the incursions of colonization by settlers and development by multinational companies, and resolving the relationship between Indian homelands and national protected areas.

At the concluding forum, Clasmere Carpio, the chief and highest traditional authority of the Comarca Emberá-Wounaan, declared that this project contributed to the government's attempts to improve the map of the republic explaining, "we are giving another example to the national government of how to coordinate with us for solutions to our problems" (Herrera C. 1993). Regional Emberá Chief Facundo Sanapi, who worked as one of the project's regional coordinators noted that "the benefits are not only for the indigenous people living in Darién, but for the national government" (Medina 1993). Chief of OITCEW Arsenio Bacorizo envisioned the project as a model for other Latin American governments (Herrera C. 1993).

Are Maps Dangerous for Indigenous Peoples?

There is no doubt that maps of any form are subjective, imperfect cultural artifacts that often have undeserved authority

(Craib 2000; Monmonier 1991; Orlove 1993; Rundstrom 1993:vii; Wood 1992; Wright 1942). Participatory mapping only pretends to make them less so. What is increasingly clear is that the maps produced through participatory research are not merely end products of a cartographer or research team, they are artifacts indicative of a process still in motion.

The participatory research mapping recognized the intellectual property, control, and use of the information produced by everyone involved, especially the indigenous peoples. In recognition of this obligation, I made sure the results were reproduced, with copies of the original map set including the 20 large-scale zonal maps given to the Congreso Embera-Wounaan, the National Geographic Institute, and CEASPA. The general results were even designed for broader circulation in the indigenous forum and press. Chapin and Threlkeld (2001:83) assert a misunderstanding on my part over “credits for and ownership of the completed maps.” According to them (*ibid.*:84), I held to a form of “academic thinking” in which I saw myself as the principal investigator who manages the project from start to finish, whereby “the research being undertaken belongs, in a very real sense, to the Principal Investigator, and everything he produces is his intellectual property.” Even though the participatory design reproduced the results, Chapin politicized questions about the ownership and intellectual property rights to research materials that I was safeguarding for the Emberá until they developed their own archive for storing them, suggesting I was somehow stealing the information. I returned the original materials to the comarca authorities.

This nonsensical critique not only denies my pivotal position as the research PI in the participatory process and my knowledge about the methodology, indigenous peoples, and study area. More importantly, it denies the very basic axiom of the research design and objectives that put maps and results in the hands of all the major participants.

The Darién PRM was designed with the conviction that the cartographic and demographic results should not be archived away or controlled exclusively by any state, indigenous, or private authorities. The nativistic rhetoric from the distant U.S.-based project administrators Chapin and Threlkeld (2001:118) is inconsistent with the intent of the PRM approach when they suggest the “maps belong to the Indians.” On the contrary, intercultural exchanges and information sharing gave form to the maps and also gave them validity, authority, and power. The project sought to supply students, educators, activists, managers, and legislators—indigenous or not—with reliable, standardized information to address indigenous land-management issues. This was not a “salvage” or academic enterprise designed exclusively to document indigenous knowledge “before it is lost.” It was not just a question of recovery and documentation of indigenous knowledge, but one of respect and revitalization (Kemp and Brooke 1995:27). The PRM provided native peoples with geographic information while promoting indigenous-state relations based on mutual respect and benefits of collaborative projects.

The PRM provides a new way to research indigenous geographical knowledge. It produces alternative data derived by, from, and for the communities themselves. The approach was shaped by ethical decisions concerning what information local people do or do not want to collect and share with outsiders. For quite some time, there have been concerns that this type of research might lead to “social espionage” (Bryceson, Manicom, and Kassam 1982:81). Indeed, it is never easy to know why research is being done or whose interests will be served in the end (Brody 1982:xii). The release of information to outsiders can have repercussions beyond the control of the participants. However, long-time advocate of participatory research Budd Hall (1993:xix) eloquently notes:

If the research process is genuinely and organically situated in a community, workplace, or group which is experiencing domination, then we need not, I believe, be afraid that the knowledge which is being generated will be used for purposes that the community or group does not need or wish for.

Similarly, researchers should not fear that documenting indigenous knowledge into standard formats somehow diminishes it. Doing so does not deny the existence of alternative views. Putting a toponym on a map, for example, does transform the cognitive geographical knowledge from verbal into hard-copy map medium, but it in no way erases other society-nature views related to it. In fact, the standard maps and demographic information offer indigenous groups new mediums for intercultural communication that can empower them in the protection of their homelands.

Participatory maps and mapmaking have generally not threatened indigenous peoples. On the contrary, use of PM results have favored the native peoples. Indigenous political leaders now harness the power of maps and geographic information for campaigns over territorial control, natural resource management, and the protection of their basic human rights. The Chucunaque Kuna of Wargandi, for example, used their zonal map as a new tool in their decade-long struggle for their comarca. Their map became the basis for delimiting the Kuna Comarca of Wargandi that was legally established in 2000. The Tuirá Kuna of Pucuro and Paya, whose lands are within the Darién Biosphere, have also used their zonal map to solicit legal control of their lands—thus far without success. Emberá and Wounaan leaders from OITCEW and its representative communities who live outside comarca and protected areas have likewise used their zonal maps for communal land-titling proposals. Indigenous leaders have also recently used the maps in negotiations with the large international development projects. The Darién PRM provided a foundational process and results for the management and protection of indigenous lands and resources (Candanedo 2000; González 1996).

Future Applications

The Darién PRM demonstrated the flexibility of the methodology for working with different ethnic groups, in different

environments, for distinct objectives, using different research techniques and technologies, at different scales, and with different types of information to map place. The results have shown the political power of participatory maps and mapmaking. Involvement in participatory mapping, however, does not necessarily imply a political or territorial struggle. This particular project focused on research, and it was not aimed at resolving land issues. It did, however, provide useful cartographic information needed for the sound management of the region.

Participatory mapping can be used for a variety of social, political, and economic ends, and the overall caliber of the results depends on the quality of the research process itself. After the Darién experience, participatory mapping initiatives took root during the 1990s along the Central American isthmus. These projects have been led by geographers and anthropologists and have had widespread support from international conservation agencies. Applications have been associated with indigenous lands and natural resource issues. For example, mapping projects began with indigenous and minority populations in three different areas of the Mosquitia region in Nicaragua in 1994: one mapped the offshore resource use areas of the Miskito Keys (Nietschmann 1995a, 1995b, 1997); another mapped indigenous territories in the Bosawas International Biosphere Reserve⁷ (Stocks, this volume; Stocks, Jarquín, and Beauvais 2000); and the third delimited community lands at Awás Tingni (Anaya and Macdonald 1995; Macdonald 2002). Two other participatory mapping projects were completed in Mosquitia during 1997-1998: one mapped community land claims along the Nicaraguan coast (Dana 1998; see articles by Offen, and Gordon, Hale, and Gurdíán, this volume); the other mapped land use and designed a zoning and management system for the Río Plátano Biosphere Reserve (Herlihy 1999, 2001). Elsewhere a participatory mapping project produced an atlas of indigenous land use for the Maya in southern Belize (Coc 2000; TMCC/TAA 1997). The approach has worked well for land use mapping, but it can also be used to define boundaries between ethnic groups and different communities. It also offers potential for land titling, delimitation, and demarcation purposes.

Consensual map expression has been largely the domain of Western cultures and state governments, and indigenous populations have not usually been involved. Participatory mapping projects are changing this, as native peoples are beginning to put themselves on the map in both a cartographic and a political sense. While the underrepresented or oppressed should organize themselves to address their problems, practically speaking they usually need help. Participatory mapping shows that local people can be active participants in the construction of knowledge about their lands. Not only can they express internalized or cognitive images of their lands, but they can also work with researchers to produce standardized information. Indeed, mapping experiences increasingly show how superior research and applied results can be obtained using the participatory approach.

¹Denniston (1994:31) argues that it was not until the Honduran map had been produced that conservationists recognized the scientific value of the “Indian maps” and only then were project staff able to obtain funding for the Panamanian project. Financial and logistical support for the project came from national and international organizations concerned with natural resource conservation and the rights of indigenous peoples, including Asociación Nacional para la Conservación de la Naturaleza (ANCON), the Biodiversity Support Program, the Frontera Agrícola Program, Conservation International, Cultural Survival, the Smithsonian Tropical Research Institute, The Nature Conservancy, the Pew Charitable Trusts, The Wildlife Conservation Society, World Wildlife Fund, National Geographic Society, and World Resources Institute.

²Comarca status means indigenous peoples accommodate certain state interests with respect to sovereignty, security, and resource exploitation but control internal cultural, economic, and political affairs. They are entrusted with the management of natural resources together with state agencies and retain their rights to use them for their cultural and economic well-being.

³Other smaller forest reserves at Canglón (316 square kilometers), Punta Patino (263 square kilometers), Chepigana, and Mogue (covering smaller areas) (Herrera-MacBryde and ANCON 1997:231) also include the lands used by native communities.

⁴Although gender was not a selection criterion, all those chosen by the communities were male, despite our pleas to include females. The research, including traveling between communities and understanding distant land use areas, was not considered appropriate for women, and none were interested in doing it at the time.

⁵Chapin facilitated the publication of one of the most colorful and visually pleasing sketch maps as the back cover of *World Watch*, a publication of the Worldwatch Institute (Denniston 1994). As Janis Alcorn (2000:13) cautions, the “magic” of the mapping process can be good or bad and the “mapping movement is prone to co-option by consultants and NGOs using the maps for their own ends, such as for project reports or proposals.”

⁶Chapin and Threlkeld (2001:70, 75,117), through a glossy in-house report published by their NGO Native Lands, criticized my involvement in the mapmaking, but neither of them were present for any part of the mapmaking workshops (except a site visit to Gamboa with other influential visitors). Their critique claims to reveal my innermost, unexpressed thoughts, what “was working at the back of Herlihy’s mind.” One of their claims, for example, was that I was not interested in teaching or training the surveyors or technical team, but they themselves observed that “the indigenous peoples have learned at least the rudiments of cartography,” concluding that this understanding was “absorbed, largely informally.” Of course, I worked hard to teach the surveyors as much as I could about every aspect of the research, as did the other researchers, and we had considerable success. Their nativistic posture that the “indigenous peoples put themselves on the map” (Chapin 1994) would erase the essential role of the researcher through their politicized rhetoric.

⁷The word “Bosawas” is commonly used in place of the acronym “BOSAWAS,” which is formed from the first letters of the place names that comprise the Bosawas International Biosphere Reserve: Bocay River, Saslaya National Park, and Waspuk River. The Bosawas International Biosphere Reserve is commonly referred to as “Bosawas” or “Bosawas Reserve.”

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