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Maps of, by, and for the Peoples of Latin America

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This article, and the collection of essays it introduces, discusses the development and use of participatory mapping (PM) in Latin America. The methodology, with roots in participant observation and collaborative research, represents the fullest involvement of local people who are trained to do research or applied work with the researcher, facilitator, or team. PM transforms cognitive spatial knowledge into map and descriptive forms. Two types exist: one type, including participatory action research mapping (PARM) and participatory rural appraisal mapping (PRAM), uses mapping for social action; the other, participatory research mapping (PRM), aims at research. The PM approach developed among geographers and anthropologists studying indigenous populations in Latin America. The articles in the collection detail five different PM projects working with about 20 different indigenous populations, living in some of the region's most important conservation lands in Mosquitia, Veraguas, Darién, and western Amazonia. The projects show how PM has become a "keystone activity" in a wide range of research and development work. This novel methodology for collecting geographic information is helping to meet a variety of research and societal needs. Indeed, the superior results from some applications challenge even the most deeply rooted norms about the construction of cartographic knowledge.

Key words: participatory research, participatory mapping, indigenous peoples, Latin America

When social scientific work is undertaken at least in part to convey another people's sense of their needs, the problems are as much political as they are methodological.
Hugh Brody, 1982:xiv

More indigenous territory has been claimed by maps than by guns. This assertion has its corollary: more indigenous territory can be reclaimed and defended by maps than by guns.
Bernard Nietschmann, 1995:37

An interest in the power of maps has emerged among indigenous populations and among the developers, environmentalists, human rights activists, and researchers working with them in Latin America. These mainly non-text-based societies are adopting participatory research methods and Western-style maps as tools of empowerment in what advocates call "counter mapping," "power mapping," "social mapping," and "remapping." Generally known as participatory mapping (PM), it recognizes the cognitive spatial and environmental knowledge of local peoples and transforms this into more conventional forms. A methodology with roots in participant observation and collaborative research methodologies, PM has phenomenological ties to social action and justice. It is a new sort of community-based cartography that challenges the long-standing positivistic institutional ideals about producing geographic information.

This article introduces participatory mapping while providing a broad frame of reference for the other contributions to this special collection. The late geographer Brian Harley (1990a:2) argued, "Our discourse about maps, whether historical or modern, should be made more responsive to social issues such as those relating to the environment, poverty, or to the ways in which the rights and cultures of minorities are represented on maps." We believe this new way of mapping does this without necessarily losing its scientific rigor. This introduction and special collection will show that while mapmaking has been a tool of the powerful, today it is becoming a tool of empowerment for indigenous peoples.

Indigenous Mapmaking Then and Now

Cartographic representation is not new to indigenous societies in Latin America (Gartner 1998; Mundy 1998; Whitehead 1998; Woodward and Lewis 1998). Early historic accounts testify to the well-developed mapmaking skills of the aboriginal societies. Indigenous spatial perception and representation significantly influenced the colonial enterprise. From Cortés's time on, indigenous populations have shared their spatial knowledge to help conquerors, explorers, and researchers draw maps of their lands. The resulting maps not only guided European invaders, but also the information on them was incorporated into conventional European maps (Butzer and Williams 1992; Craib 2000; DeVorsey 1993; Guzmán 1939; Harley 1990a, 1990b, 1992; Marcus 1992; Mundy 1996; Rundstrom 1991; Warhus 1997; Wood 1992).

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Over the five centuries since the European conquest, most indigenous spatial knowledge has gone unrecorded. Native communities have maintained cognitive maps that are delineated verbally using place names that convey place and spatial orientations. Only occasionally have they converted these cognitive orientations into sketch maps for use in their daily lives. Coincident with the formation of federations and nongovernmental agencies to represent their interests, indigenous leaders learned some decades ago that national maps were symbols of state identity and not their own, seeing how maps helped outsiders formalize control over their lands and resources. During the 1990s, indigenous peoples in Latin America, working with professional geographers, anthropologists, and other social scientists, began remapping their populations and lands using participatory research.

How Much Participation Equals Participatory?

Participatory research (PR) recognizes the knowledge and wisdom of local peoples. It elevates them to a collateral position with researchers, whereby each respects the other's knowledge and abilities to meet a given objective.

A forerunner of this approach is the social science methodology of participant observation. The researcher lives in a community and participates in daily life while observing and collecting data by using questionnaires and interviews. The approach is generally tied to positivistic standards of objectivity, validation, and nonpartisanship (Bryceson, Manicom, and Kassam 1982:69; Finan 1996: 301-302; Mbilinyi et al. 1982:43). A key element is that the individual researchers, usually outsiders, collect and interpret the data through their own mental filters, mostly aiming to publish the results.

Another level of participation is reached in collaborative research, where the researcher works with local people to apply research to meet the needs of a population (Hackenberg 1990; Stull 1988, 1990; Stull and Schensul 1987). The researcher collects and interprets information with the cooperation of the locals who also see the research as desirable. Collaborative research generally displays a humanistic concern for the people being studied.

Participation reaches its highest levels when the "researched" is no longer the quiescent object of study. Not all participation in research, however, is participatory in this sense. Participant observation and collaborative methodologies rarely assign data collection and interpretation to local peoples. Participatory research employs them directly in the research process, from design and implementation to data collection and interpretation. Theorists and practitioners characterize it as collective, community-based investigation, education, and action for structural and personal transformation (Maguire 1993:157; Park 1993:4).

Participatory research in this sense was, perhaps, first conceptualized in Tanzania during the 1970s (Hall 1975, 1993; Tandon 1981). This was when social scientists began to challenge development experts, policy makers, and other researchers to look at the knowledge of local peoples and to put them first in development and research (Cernea 1985; Chambers 1983; Oakley and Marsden 1984). Advocates contend that the PR methodology originated from the dissatisfaction with positivistic research paradigms and that it represents a departure from past methodologies carried out largely by university-based scholars. It was an alternative way to produce scientific knowledge that decentralizes the process and puts it in the hands of the people. It breaks down the researcher-researched, subject-object dichotomy of knowledge production and brings the participation of local people into the process, simultaneously serving as education, development of consciousness, and mobilization for action (Brown and Tandon 1983; Yeich and Levine 1992). The approach responds to critical appraisals of the means and ends of social science research and the relationship and objectivity between the researcher and researched (Bryceson, Manicom, and Kassam 1982:67). PR guarantees local people the rights to benefits of the research by integrating compensation and empowerment into the heart of the process. It is committed to the rights of the local peoples, recognizing their intellectual property, control, and use of the information produced.

This type of research with nonacademics was uncommon in the past (Hall 1993:xviii, xix, 1999; Kassam 1982: 6). By the mid-1970s, however, the participatory approach was being used widely around the globe, with an international network of researchers forming even as scholars and practitioners were rushing to analyze, refine, and systematize the emerging approach (Hall 1975, 1993, 1999; Kassam and Mustafa 1982).

Probably no single scholar, discipline, or theoretical orientation can claim exclusive rights to the development of participatory research. Some advocates trace its origins to Paulo Freire (1970a) working in adult education in Brazil. He put forth the notion of "conscientization," referring to the way in which the poor and disenfranchised in Latin America are brought to a heightened awareness about the forces they confront (Bryceson, Manicom, and Kassam 1982:71; Chambers 1994a:954; Hall 1999:33; Park 1993:8). Others credit Kurt Lewin's (1946) work in social psychology stressing the need for "action research" where groups define common problems and overcome them (Perez 1997; Yeich and Levine 1992). Action research aims at studying communities to change them (Brown and Tandon 1983; Elden and Chisholm 1993). Orlando Fals-Borda (1979, 1987) demonstrated how the popular knowledge and wisdom of local peoples could be as valuable or more valuable than that produced by formal scientific structures. Participatory research captures the ideal of goal-oriented, experiential learning and transformative pedagogy (Hall 1993:xv; Park 1993:3).

The participatory research methodology revolves around the dialectical exchanges between community representatives and participatory researchers. Community representatives, called "surveyors," "local researchers," and "local knowledge specialists," bring their own knowledge to the undertaking

and they work with the researchers directly. The participatory researchers, called "facilitators," "technical assistants," or "investigators," help locals articulate their objectives into an appropriate research design. They should recognize and respect the local peoples' abilities to produce research data and understanding. Ideally, there is a reciprocal understanding between the researchers and community representatives of each other's capabilities and limitations for designing a methodology that uses but does not overestimate the abilities and resources at hand. It is a process informed by both "top-down" and "bottom-up" experiences. A pragmatic approach, it allows for the use of a diversity of research techniques—mapping in the present case—to deal with a wide array of real world problems as perceived by the people experiencing them (Kassam and Mustafa 1982; Park et al. 1993).

Participatory researchers ideally have in-depth knowledge of the community being studied. Some advocates argue that they should know the communities personally and scientifically before starting, studying the history and society through available records, interviews, observation, and participation in community life (Freire 1970b; Park 1993: 9). Participatory researchers and collaborating agencies acknowledge the need to stimulate communities to support an undertaking, the role of rallying force often being filled by the researcher. At the same time, researchers need to recognize that local groups have unrecognized potential and emancipatory powers to solve problems (Park 1993:3, 9).

Participatory research commonly aligns with the activities and needs of social movements (Hall 1993:xv). Different from past social science research that deposited knowledge in scholarly warehouses, the results bring empowerment to peoples who have historically been excluded from participating in the construction of information about their lives needed for collective social action. Some might argue that participatory research should be used to bring about beneficial social action and a more just society. Others consider this definition too restrictive. Different versions of participatory research, varying by their degree of activism, have existed from the start (Bryceson, Manicom, and Yusuf 1982; Kassam 1982:4-6; Kassam and Mustafa 1982; Park 1993:1-3, 1997:8).

Participatory action research (PAR) is distinguished by its use of the methodology to meet a societal need. William Foote Whyte (1989, 1997:110-112; Whyte, Greenwood, and Lazes 1989) argues that there can be action research without participation and participatory research without action. PAR, however, has the underlying social purpose of empowering people to make decisions and take actions. Fals Borda (1987: 329) describes it as a combination of theory, action, and participation committed to further the interests of an exploited group: it "claims inspiration from phenomenological and Marxist trends adjusted to regional realities and factors; it challenges established academic routines without discarding the need to accumulate and systematize knowledge, and to construct a more comprehensive and human paradigm in the social sciences." This activist posture of participatory action research need not mean that the results are not systematic. A PAR network was started at Cornell in 1991 to support research for social change. The idea is to foster research that combines knowledge generation with learning and action for positive personal, organizational, and social change (Anonymous 1999). PAR has become a broad tool for implementing social policy related to the management of the environment and development of rural communities (Barton et al. 1997; Burkey 1993).

Participatory rural appraisal (PRA) is another version of participatory research in development studies. Robert Chambers (1994a:953) describes it as a growing family of approaches and methods to enable local peoples to develop and analyze their own knowledge of life and conditions to plan and act. PRA grew out of rapid rural appraisal that began in the late 1970s in response to the shortcomings of existing rural and agricultural field research methodologies. It is most distinctive from other participatory research in that the outside researchers or development experts act as "facilitators" who allow for the free-flowing development of the methodology and design of the research. Locals collect their own data, with their own methods, for their own purposes. Less attention is given to standardization and intercultural transmission of the results (Chambers 1985, 1994a, 1994b, 1994c; Lamb 1993; Perez 1997:3).

Participatory research, whether aimed at basic or applied results, has been undertaken from a variety of political, economic, social, and environmental orientations, under the direction of participatory researchers from a wide variety of academic and professional orientations. The approach mediates between quantitative and qualitative analysis and can actually supply both types of results at the same time. The rapid adoption of the participatory research approach is reflected in the growing literature on the topic by a wide array of researchers and specialists. Participatory researchers are, in increasing numbers both inside and outside universities, beginning to provide concrete examples of how local peoples working in tandem with them can produce superior results.

Combining Participatory Research with Mapping

Participatory mapping (PM) is a new way to produce geographic information about people and place for research and applied work (Herlihy 2002; Knapp and Herlihy 2002). The methodology, like participatory research itself, has phenomenological roots linking it to social movements and justice. It is both a qualitative and quantitative approach that can, at the same time, be humanistic and scientific.

The use of local people's spatial knowledge in research and development work is not new. Geographers, anthropologists, sociologists, and other social scientists, as well as development workers, commonly elicit spatial understanding from native informants. Without literary traditions, rural folk share elaborate cognitive maps with others through the use

of toponyms that give geographic orientations. While these place names permeate daily discourse, only sometimes are mental maps transformed into more permanent sketch maps for use in their daily lives.

The use of sketch maps to gain spatial perspectives has become core to many development and research projects. Peoples' sketching and participation in mapping does not necessarily mean that an undertaking is participatory. Indeed, researchers using participant observation and collaborative research approaches commonly rely on native informants for sketch maps, place names, and other descriptive information.[1]

Participatory mapping is a catchall label that refers to an array of community-based research and development approaches deploying local people to map places. PM takes participation to its logical conclusion by giving research and administrative responsibilities directly to trained community representatives. It is defined as a methodology that recognizes the cognitive spatial and environmental knowledge of local peoples and transforms this into more conventional forms.

The method arose from the need for better maps of indigenous lands in Latin America. Areas where native peoples live have some of the poorest cartographic coverage in their respective states. Standard topographic and political maps provide overviews at scales of 1:500,000 and 1:250,000, but they do not provide enough detail for most research and development needs. Topographic maps at larger scales (between 1:50,000 and 1:100,000) are rarely "actualized" with recent cultural data. The settlement and land use information is usually so incorrect or outdated that it is of limited value. Government census maps are generally considered more reliable for up-to-date settlement data. Census workers, however, have been notoriously unreliable when working in some remote areas and official maps reflect this with blank spaces and misinformation. It is sometimes in the state's interest to ignore indigenous population in the remote "empty quarters" to maintain these areas under the designation of "national lands" for resource exploitation. It is also true, however, that many indigenous areas were simply beyond effective national control and without easy road access.

Indigenous and peasant societies in Latin America and the social scientists working with them began to harness the powers of mapping in the 1990s.[2] Nongovernmental organizations (NGOs) became widespread actors in indigenous regions in the previous decade, but by 1990 indigenous organizations had begun to organize national-level movements throughout the region (Brysk 2000; Dean and Levi 2003; Maybury-Lewis 2002). The international legal environment has also changed over time. For example, the International Labor Organization adopted Convention 107 and Recommendation 104 in 1957 to protect the rights of indigenous peoples. This was upgraded in 1989 in Convention 169, which has been ratified by Bolivia, Colombia, Costa Rica, Guatemala, Honduras, Mexico, Paraguay, and Peru. The ruling of the Inter-American Court of Human Rights favoring the rights of the Miskitu community of Awas Tigni in Nicaragua has further reinforced this atmosphere of international legal support, as well as the use of PM as an approach for dealing with land rights issues (Macdonald 2002).

Working with federations and NGOs, indigenous leaders realized that national maps represent national identities and not their own (Orlove 1993; Rundstrom 1990, 1993). They watched quietly as government agencies and outside commercial interests used state maps and mapmakers to formalize control over their lands and resources. The 1990s, however, brought unprecedented involvement of local communities in all types of research and development. These societies embraced participatory research methods and Western-style maps as tools of empowerment in "a quiet cartographic revolution" to map and gain control of their lands (Herlihy 2002).

The history of cultural and indigenous mapping provides a backdrop to the more recent thrust of participatory mapping. Although some census-based or field-based cultural maps were produced to advance the agenda of the state or serve the needs of missionary organizations, other such maps were in fact intended to call attention to the importance of local peoples and argue for a pluricultural vision of national space. For example, geographers William Davidson and Melanie Counce (1989) focused scholarly attention on the importance of mapping contemporary indigenous populations in Central America while others focused on the Andean countries (Chirif and Mora 1977; Knapp 1987, 1988). The importance of this sort of cartographic depiction of indigenous populations became evident as researchers further explored the relationships between indigenous settlements, natural resources, and conservation areas (Chapin 1992; Cruz 1984; Herlihy 1992).

Out of this backdrop, a mapping project was born in 1992 to map the land use of the indigenous Miskitu, Pech, Tawahka, and Garífuna communities of the Honduran Mosquitia. Over the two preceding years, geographer Peter Herlihy had collaborated with the NGO Moskitia Pawisa (MOPAWI) and their associated Tear Fund volunteer environmentalist Andrew Leake on the establishment of the Tawahka Biosphere Reserve in the Mosquitia rain forest corridor of Honduras (Herlihy 1997; Herlihy and Leake 1990). Anthropologists Mac Chapin and Anthony Stocks, who were then codirectors of the Central American Program of Cultural Survival, asked Herlihy and Leake, with MOPAWI, to design a workshop on indigenous lands and natural resources in Honduras for the 500-year anniversary of the European "discovery." Without sufficient resources for the countrywide initiative, they focused on the need for better cartographic coverage of indigenous areas in Mosquitia. Herlihy and Leake designed a participatory methodology based on their past experiences. It was successful in showing how local people can work with researchers to transform their cognitive knowledge of geography into maps and descriptive information, empowering them in the representation and management of their lands (Herlihy and Leake 1997).

The method diffused rapidly and initiatives developed up and down the Central American isthmus during the 1990s.

Cultural Survival, through Chapin's lobbying, promoted another initiative in 1993 among the indigenous populations of Darién, eastern Panama, where Herlihy and Leake worked together again, now with a Panamanian NGO, to refine the methodology (Chapin and Threlkeld 2001; Denniston 1994; González, Herrera, and Chapin 1995; Herlihy, this volume). The next year, mapping projects began with indigenous-peasant populations in three distinct areas of the Mosquitia region. Anthropologist Stocks started a long-term initiative using the approach in the Bosawas International Biosphere Reserve[3] in Nicaragua's part of the Mosquitia corridor (Stocks, Jarquín, and Beauvais 2000; Stocks, this volume). Geographer Barney Nietschmann was also involved in the exchange, adopting the methodology for an innovative offshore application with indigenous peoples along the Miskito Coast (Neitschmann 1995). And then, anthropologist Ted Macdonald documented community lands at Awas Tingni (Anaya and Macdonald 1995; Macdonald 2002). Elsewhere in the region, Nietschmann later directed a mapping project among the Maya communities of southern Belize (TMCC/TAA 1997), before his untimely death.

Nearing the decade's end, three more projects were completed in Mosquitia. Funded by the Honduran and German governments, Herlihy (2001) and a team of researchers and local surveyors used participatory mapping to design a zoning and management system for the residents of the Río Plátano Biosphere Reserve. Anthropologists Charles Hale, Edmund Gordon, and Galio Gurdián teamed up with geographers Peter Dana and Karl Offen on a World Bank project to map community land claims along the Nicaraguan Miskito Coasts (Dana 1998; see Gordon, Gurdián, and Hale, and Offen, this volume), and most recently along the Honduran Miskito Coast as well. These initial experiences showed the enormous potential of the methodology, which has since been adopted by colleagues and students of these initial pioneers.

Participatory Mapping Methodology

Some generalizations can now be made about this rapidly developing methodology, despite the significant technical and philosophical differences between projects and practitioners. Most fundamental is the use of local people to map place. The methodology rests on the philosophy that local populations have some of the best and most detailed knowledge of their surrounding lands and resources and that knowledge can be collected and interpreted geographically. The methodology combines participatory research with cognitive mapping, fusing spatial and environmental knowledge with technical understanding and cartography.

Participatory mapping transforms cognitive knowledge into map, graphic, or written forms. The approach relies on local people's knowledge of specific sites and geographic features. Community representatives are trained by and work with the participatory researcher or technical team to do parts of the research or applied work, often in collaboration with NGOs, state institutions, federations, or other organizations. Generally this has meant holding community meetings, administering questionnaires, recording place names, drawing sketch maps, building diagrams, collecting field data, and plotting cognitive information about place directly onto standard cartographic sheets. Community representatives have easily mastered such skills, even collecting Global Positioning System (GPS) observations and interpreting air photographs and satellite images.

PM focuses on the dialectic between the community members, their representatives, and the researchers to transform cognitive spatial knowledge into cartographic and descriptive information. The approach relies on the spatial abilities of local people who, while not accustomed to interpreting standard cartographic data, use ephemeral sketch maps and specific place names to describe the lands and resources they use in their daily lives. The way they transform these cognitive images into hand-drawn lines in sketch maps is central to the approach. Place names are used to locate and describe places, define boundaries, justify claims. Trained surveyors negotiate and harmonize with the communities to agree on place names, natural landmarks, zoning limits, boundary lines, land use regulations, and more. PM revolves around the exchange between the researcher-facilitator and the community representatives, which develops more easily when there is a mutual understanding and trust.

Like participatory research, PM has two variants, one focusing on social action, the other on research. Participatory action research mapping (PARM) links research with action to meet societal needs. Here, mapping is one tool commonly used within PAR and PRA methodologies. Community representatives work with researchers or other professionals to draw or create a model of their lands and surroundings as part of learning and transformative processes in rural development. PARM researchers act as facilitators, handing the planning over to local people. The resulting maps and diagrams take form as simple line drawings on blank paper or as ephemeral etchings or models on the ground. PARM can be very useful for understanding the geographical layout of settlement and resources, but it is not as much about producing conventional maps as it is about providing communities with collective learning for assessing environmental or social concerns (Chambers 1994a, 1994b, 1994c; Eghenter 2000; Lamb 1993; Mathrani 1993; Peluso 1995; Rocheleau, Thomas-Slayter, and Edmunds 1995).

Participatory research mapping (PRM), the other variant, applies the participatory methodology to make standard maps and descriptive information. Education, empowerment, and social action can be objectives of PRM, but intercultural communication and Western-style accuracy, validity, and standardization of the results are essential. Combining cartography and ethnography, PRM focuses as much on the technical aspects of the mapmaking process as on the cultural context in which it occurs. The methodology harnesses cognitive geographical knowledge and involves the dialectic between the community representatives and researchers to transform this into standard maps and descriptive information, respecting the fallacies of

map accuracy and authenticity (Herlihy 2002 and this volume; Herlihy and Leake 1997).

Participatory mapping therefore provides a new tool for understanding human-environment relationships. The methodology aligns closely with the concerns of cultural and political ecology in geography and anthropology (Bassett 1998; Blaikie 1985; Blaikie and Brookfield 1987; Hecht and Cockburn 1989; Schmink and Wood 1987; Watts 1983; Zimmerer 1996). PM, like studies in political ecology (Blaikie and Brookfield 1987:17), encompasses the shifting dialectic between society and resources and also between groups within society itself. The new way of mapping embodies the notion of progressive contextualization (Vayda 1983) in the way it builds and validates geographic knowledge at various scales, from the individual to the community, regional, and state levels. Unlike other analyses in political ecology that deconstruct a situation for explanation, PM constructs knowledge beginning with cognitive mental constructs and converting these to consensual images and then into conventional map or descriptive forms. It is a bottom-up methodology because it builds on the understanding of place from the individual level to progressively larger social aggregates at progressively smaller scale, working from mental maps to regional maps. It is a powerful tool capable of producing qualitative and quantitative, as well as scientific and humanistic, results concerning the relationships between societies and environments.

Applications of the Methodology

Participatory mapping has proven to be a remarkably successful methodology for producing accurate maps and descriptive data. The approach calms some concerns over representation through the involvement of community representatives. All the while, intended or not, mapping has broader social and political impacts, both internally and externally to the communities involved. And it can be a very political process! Even place names have politics and the baptizing and rebaptizing of place is interwoven with a group's claim to it. The methodology validates cognitive geographic knowledge and provides a mechanism to transform this into superior scientific and applied results. Indeed, this so-called countermapping has challenged the long-standing positivistic institutional ideals about collecting cartographic and other geographic information. More broadly, the resulting maps, descriptive information, community awareness, and training from mapping projects contribute to the empowerment of communities in their negotiations with the state over the administration and management of their lands. The approach generally reinforces the cultural politics of place, ethnicity, and identity. Still, Alcorn (2000:13) cautions that the magic of mapping can be good or bad, observing that the community-based 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. And this can have unforeseen political consequences to the communities, researchers, and state agencies involved.

PM has become a "keystone activity" around which conservation, land, development, and an array of human-environment issues can be addressed (Herlihy 2001, 2002). First and foremost, it is a methodology for mapping people and place. Governments have shown interest in the approach because of the generally poor cartographic coverage in indigenous-peasant areas. With its simplicity of design, PM has been central in recent natural resource conservation and protected areas management, where goals related to land use, biodiversity conservation, and land tenure are addressed during the mapping process.

The approach has been used to study a diversity of issues related to indigenous societies and the environment. With a growing number of uses in recent years (Bennagen and Royo 2000; Eghenter 2000; Poole 1995a, 1995b, 1998; Weber, Butler, and Larson 2000), it has been used: 1) to document spatial information about human land use and occupancy; 2) to design conservation plans; 3) to survey biodiversity; 4) to protect and manage conservation areas and indigenous reserves; 5) to delimit and demarcate land claims and titles; 6) to educate and empower communities; and 7) to build consensus and promote conflict resolution over land and natural resources. The use and elaboration of the method will undoubtedly find new applications in research and development work.

PM projects have helped disadvantaged communities reclaim their heritage and defend their lands. They have brought local people into the management and control of their lands and resources, while promoting resource conservation, land tenure security, and local-state relations. The widespread community participation in a PM project means that the communities involved have more often than not appropriated the results for their own use. And today, there is even greater potential for peoples' participation in digital storage and display of the results through Geographic Information Systems (GIS), but this type of geomatics is beyond the technical and financial capacity of all but a few populations that have been involved in mapping projects.[4]

Participatory Mapping's Future and This Volume

Contributors to this volume hope to inaugurate critical reflection on the rapidly evolving and extremely powerful participatory mapping methodology for research and applied work. We hope to shed light on the significant differences in what any given mapping project represents. Participation does not equal participatory and levels of involvement vary greatly. The selection of the research techniques, technologies, and philosophies of the methodology shapes the research results. For example, the dimensions of one community's land claim would look very different if defined by one type of land use rather than another (e.g., hunting versus agriculture). Strong and influential differences related to scale, mediums, mapping criteria, level of participation, and more can be seen in the projects discussed.

This collection samples some of the more significant participatory mapping projects undertaken in Latin America during recent years, revealing much about the evolving paradigm. The five different projects discussed worked with about 20 different indigenous populations living in some of the region's most important conservation areas. We have not edited the individual contributions to conform to the terminology and template presented above. Nor have we tried to pigeonhole the projects presented in this collection as one variant of mapping or another. We believe that this area of research and social action is in its developmental stage, and it is important to keep the integrity of each contributor's own terminology.

Herlihy describes the 1993 application of the PRM approach to transform cognitive spatial knowledge into standard maps and descriptive information on the land use of the Emberá, Wounaan, and Kuna in the Darién region of eastern Panama. This project, started within months of finishing the first PRM project in Mosquitia, showed the adaptability of the approach to different geographic and cultural settings and revealed how maps can be made working with local people even in the most uncharted terrain. The project relied on teamwork, the collection of toponyms, the drawing of sketch maps, and the interpretation of air photos. The resulting maps were embraced by local people as part of their ongoing effort to define their control over resources in this remote area.

Turning to western Panama, Derek Smith shows how PM can be applied by a lone researcher on a modest budget for dissertation research in geography, specifically studying the cultural ecology of indigenous hunting among the Buglé people. Trained surveyors worked with Smith to document the spatial patterns of hunting. This project, conducted in 1999-2000, links PM with GIS to understand interactions between native peoples and their surrounding environment, showing how PM can reveal as much about natural landscapes as cultural ones.

Anthony Stocks describes the nearly decade-long, multifaceted application of participatory mapping for research and management of indigenous lands in the Bosawas Reserve at the southern end of the Mosquitia rain forest corridor in north-central Nicaragua. Sketch maps remained important in this project in addition to the GIS, which was only available in the capital. By 1999, six indigenous territories had been mapped and zoned. Stocks suggests that these may approximate the boundaries of 19th century rubber territories. The applied research and social action demonstrates how this type of mapping can play an ongoing role in the management of reserves and conservation areas with resident populations. However, it is also clear that mapping is not enough, and must be combined with a vertical and horizontal process of political dialogue and, ideally, harmonization, so that anyone who works in this complex arena soon learns humility.

Richard Chase Smith and his colleagues Mario Pariona, Erneto Tuesta, and Margarita Benavides demonstrate how the type of information produced through participatory mapping contributed to the development of a native communities information system in Peru. Peru has benefited from over 30 years of development of native titles and territories in the context of a sometimes-supportive government and strong intercommunity organizations. However, the resulting data and maps are often unreliable. With funding from Oxfam America and participation by local NGOs and organizations, PM has been deployed here as part of a broader PRA tool package. The authors discuss some of the technical and social difficulties associated with making the resulting GIS widely available and give case examples of how the maps have been useful in addressing specific resource issues.

Edmund Gordon, Galio Gurdián, and Charles Hale provide another concrete example of how the approach both documents and transforms its subject of study. Their World Bank project deployed PM to define the boundaries of multicommunity land claims (blocs) along the Atlantic coast of Nicaragua. The project helped address the important research question of how to simultaneously recognize the constructed nature of identity, while retaining an activist concern for empowerment and resource control. The authors suggest that an ongoing history and memory of struggle may provide for the kind of continuity that other potential markers of identity may lack. As with the other examples, maps provide a stimulus for dialogue and ongoing resource politics rather than constituting a definitive solution in their own right.

In the collection's final article, Karl Offen shows how this same mapping project empowers the Miskitu, reinforcing their identity politics with the places and territories mapped, while at the same time transforming and politicizing indigenous conceptions of their own relationship to the land. Nicaraguan discourses of Indians as inauthentic and rootless, and concerns about resources, are dealt with through the mapping process.

Taken together, the authors contribute to the view that participatory mapping projects are investigating reality in order to change it. Their very nature leaves education and empowerment in their wake. The collection provides concrete examples of how PM both documents and transforms its subject of study. The change can be as simple as putting a place name on a map and recognizing it in a different medium. Or it can be complex, documenting land use activities to transform them into use zones, regulations, or land claims. Plotting place names or sketch-map information onto standard maps only transforms and recognizes the cognitive spatial information in a different medium, without diminishing society-nature views related to it. PM can, nonetheless, radically change how a community sees its lands and claims to them.

The maps, tabular data, and descriptive results from the mapping projects have been recognized for their accuracy, improving cartographic coverage of little known and poorly mapped regions and providing important technical information needed for land management. On another front, the projects have to varying degrees helped formulate more productive working relationships between indigenous groups and outside agencies. They have helped put indigenous people

on the map and on common ground with state agencies and other authorities.

The projects show that participatory mapping is very much a political act that is nested in broader sociopolitical conditions. Sometimes this involvement is only at the local level, but usually it reaches to regional, if not to national and international levels. Mapping reinforces indigenous cultural identities and connections to place. Indigenous groups scrutinize the PM projects, but they want to be involved and to influence how things are done. With good reason, leaders are suspicious of outside research and projects. And even the most ardent optimist recognizes maps as potentially harmful. Issues of intellectual property rights, distribution, and storage of the results are best agreed upon before beginning.

This collection collectively speaks to indigenous peoples' aspirations for autonomy and its examples demonstrate how mapping projects have had significant impacts on political and legal conditions affecting indigenous lands claims. Policy makers easily understand maps, and information movement between indigenous and state authorities becomes more fluid when they are present. In the end, the authors are not idealistic in their portrayal of native peoples, but most would probably agree that indigenous peoples should at least be given control over the management of their lands together with state agencies. Some of the research presented here is directly applied to political and social activism.

In the rapidly globalizing and interconnected world of indigenous societies in Latin America today (Brysk 2000; Dean and Levi 2003; Maybury-Lewis 2002; Smith, Burke, and Ward 2000), PM provides a simple tool of great practical and political use that helps local communities deal with global issues. International organizations and state agencies now commonly endorse this approach for the management of natural resource and determination of land rights. Yet, contradictions exist between state policies that sanction participatory management and the state agencies that fail to implement the results of such efforts (Herlihy 2001). PM initiatives are likely to be more closely scrutinized as policy makers learn of their powerful applications to defend minority groups' rights to land and resources. This approach was recently used to justify indigenous communal land rights in a ruling of the Inter-American Court of Human Rights favoring the Miskitu community of Awas Tigni (Macdonald 2002), and the methodology offers enormous potential for resolving land conflicts and territorial issues. These developments can, however, threaten state control over land and resources, questioning the very core of state power and authority—territorial control. After all, mapmaking has always been a state enterprise in Latin America. No doubt attempts will be made to inhibit the use of PM for social action.[5]

Participatory mapping, nevertheless, has unresolved issues. The epistemological basis for the mapping, the role of popular knowledge, and that of the outside researcher should always be addressed (Comstock and Fox 1993). Projects have widely different standards of reliability and validity, and great variation exists in their design, objectives, and the quality of results and involvement of the local people. Development agencies have an array of community-based approaches for mapping community boundaries. These activities often result in empowering local people to demand land rights that may or may not be based on sound research. When used carelessly, the results can be less desirable. In the end, we hope this collection will provide readers with a glimpse into this extremely powerful research methodology that may well prove to be one of the more important contributions to the understanding and solution of social and environmental problems in Latin America during the 21st century.

Notes

[1]Sketch mapping of indigenous populations has a focal place in much ethnographic research in geography and anthropology. With a historic tradition exemplified in the scholarship of anthropologist Franz Boas and geographer Carl Sauer, field researchers in both disciplines have commonly mapped native populations through orienteering and interviewing local informants. Only seldom, however, were these early intercultural sketch maps actually drawn by the indigenous peoples themselves. Many of the so-called Inuit maps were exactly this sort of simple sketch map made by an untutored native with a minimum direction from the nonindigenous collector (Rundstrom 1987:65-66; Spink and Moodie 1972:2). A more recent example of indigenous people working in tandem with researchers to record spatial information was the Harvard Chiapas Project. Anthropologists worked with villagers of Tzotzil-speaking Maya communities to draw sketch maps, interpret published maps and air photographs, and help local residents incorporate their knowledge into maps (Collier 1975:217). Another outstanding example was the use of the mental maps of rubber tappers to document land use in the Chico Mendes Extractive Reserve (Brown et al. 1995).

[2]An early prototype occurred in Canada among the Dene people of the Mackenize District during the 1970s. The objective was to provide a record of land use and occupancy of the Dene in the Northwest Territories. The project used trained surveyors to record information from key informants with the help of outside experts who helped design the methodology, provided orientation sessions, and helped translate the findings (Brody 1982; Jackson 1978; Nahanni 1977). Similar approaches were being employed elsewhere at the same time (Chambers 1994b: 1253; Jackson 1993:50).

[3]The 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."

[4]The use of computer-based Geographic Information Systems (GIS) analyses is in its infancy among indigenous populations in most parts of Latin America. The analytical powers of GIS offer enormous possibilities for helping indigenous communities protect and manage their lands, but this capacity has to be built patiently over years (see Jarvis and Stearman 1995; Smith 1995; Smith et al., this volume). The situation is different in Canada where indigenous peoples have been using GIS in land management for more than a decade.

[5]Apparently this is presently the case in Malaysia. Janis Alcorn (in Eghenter 2000:iii) ponders whether even conservation organizations are fully aware of the power of community mapping, which may undermine their own agendas if not used carefully.

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