

MAPPING POWER: IRONIC EFFECTS OF SPATIAL INFORMATION TECHNOLOGY¹

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Introduction

The recent growth in the availability of modern spatial information technology (SIT) – geographic information systems (GIS), low cost global positioning systems (GPS), remote sensing image analysis software – as well as the growth of participatory mapping techniques has enabled communities to make maps of their lands and resource uses, and to bolster the legitimacy of their customary claims to resources by appropriating the state's techniques and manner of representation (Peluso 1995). Over the last several decades participatory mapping has led to the successful demarcation of land claims that led to the signing of treaties (e.g., Nisga'a), compensations for land loss (e.g., Native American, Maori), and formation of indigenous territory and government (e.g., Nunavut). A community-made map was instrumental in the decision of the Sarawak High Court of Malaysia favoring an Iban village in a dispute against a tree plantation company (Borneo Wire 2001). Evidence of the perceived power of this technology to counterbalance the authority of government mapping agencies was vividly demonstrated in the Malaysian state of Sarawak where the 2001 Land Surveyor's Bill regulates the activities of land surveyors and declares community mapping initiatives illegal (Urit 2001, Thompson 2001, Majid Cooke 2003).

But, the impacts of widespread adoption of SIT at the local level are not limited to the intended objectives. Among the unintended consequences of mapping have been increased conflict between and within communities (Sirait 1994, Poole 1995, Sterrit et al. 1998), loss of indigenous conceptions of space and increased privatization of land (Fox 2002), and increased regulation and co-optation by the state (Urit 2001, Majid Cooke 2003). Consequently, mapping technology is viewed as simultaneously empowering and disadvantaging indigenous communities (Harris and Wiener 1998). Researchers working under the umbrella of Research Initiative 19 of the National Center for Geographic Information and Analysis (NCGIA) suggest that GIS technology privileges "particular conceptions and forms of knowledge, knowing, and language" and that the historical development of the technology leads to "differential levels of access to information" (Mark et al., n.d.). Rundstrom (1995) further suggests that GIS is incompatible with indigenous knowledge systems and separates the community that has knowledge from information (the "product" of GIS application).

Tensions thus exist between new patterns of empowerment yielded through SIT and broader social, political, economic, and ethical ramifications of the technology. To date, most research on the social and ethical implications of spatial information technology has been conducted in North America (Sieber 2000). Given the rapidity with which the use of SIT is becoming "necessary," there is an urgent need to examine the implications of this technology, especially in rural settings and in less developed countries, as well as among indigenous groups. We submit that the tools, families of technologies, and practices associated with SIT use are value-laden and that deploying SIT will necessarily have ethical consequences. That is, the deployment of SIT will affect the constellations of values that distinctively shape any given society, its spatial practices, and its approach to reconciling conflicts or disharmony among competing goods or interests. We further submit that because the tools and technological families gathered under the rubric of SIT were not originally developed and produced in rural communities or among indigenous peoples in Asia, it will be in such settings that the tensions associated with SIT and its ironic effects are likely to be most apparent and potentially profound.

This paper is an outcome of a National Science Foundation-funded project entitled "Spatial Information Technology and Society: ethic, values and practice" (Grant number SDEST-0221912). The project emerged out of common and yet distinct concerns among the authors that spatial information technologies – at least in certain contexts and at certain scales – can lead to consequences that raise important ethical questions. We identified three interrelated dimensions in which these consequences have manifested: in conflicts correlated with changing patterns of spatial perceptions and values; in competition related to knowledge and claims of resources; and in relation to structural or organization stresses at the institutional level. This paper evinces the efforts of its editors to critically broaden reflection on such experiences and their implications for technology transfer and evaluation. Our analysis of these phenomena is informed by studies in technology and society that examine the interplay between technological development and the social institutions that shape its further deployment. Furthermore, we examine these issues from a political ecology perspective that situates the proliferation of SITs in the context of economic and political liberalization that has brought an explosion of new property claims and protectionist strategies to forests and other environments, changing the very terms by which resources and environments are defined.

Tools, Technologies and Ironic Effects

Critically assessing the impacts of SIT requires us to clarify the relationship between tools and technologies. Tools are products of technological processes. They are used by individual persons, corporations, or nations, and are evaluated based on their task-specific utility. If tools do not work, we exchange them, improve them, cannibalize them, or discard them. In contrast, technologies consist of widespread patterns of material and conceptual practices that embody and deploy particular strategic values and meanings (Hershock 1999). Technologies are complex systems promoting and institutionalizing relational patterns aimed at realizing particular ends. Technologies cannot be value neutral, and do not occur in isolation from one another but in families or lineages (Shrader-Frechette and Westra 1997; Hershock 1999).

A hand-held GPS unit, for example, is a tool associated with SIT. Individuals using GPS units assess them in terms of their reliability, ergonomic design, technical specifications, and features. By contrast, SIT as a whole consists of a complex system of material and conceptual practices. They include: the extraction of raw materials; their manufacture into tools like GPS units, notebook computers, and satellites; the storage of information in massive, internet mediated databases; the advertising and marketing of these tools, the services associated with them, and the "worlds" to which they provide access; the crafting of industry specific regulatory and legal institutions; new patterns of expert testimony in legal contests over land use; and a reframing of the politics of development. As technology, SIT transforms the discourse about land and resources, the meaning of geographic knowledge, the work practices of mapping and legal professionals, and, ultimately, the very meaning of space itself.

There are two major implications of the tool/technology distinction. First, while we can refuse to use a tool, there are no clear "exit rights" from the effects of heavily deployed technologies, even if individuals elect not to use the tools produced as part of that deployment. Second, critical evaluation of a technology must go beyond assessing how well the tools specific to it perform, to examining the changes that technology brings about within and among societal systems and values. The concept of exit rights in discussions of technology and ethics invokes rights not to be subject to the use or effects of particular technologies and their associated tools.

Serious questions arise regarding the possibility of exit rights with respect to technologies that are deployed at sufficient scale to make viable alternatives practically nonexistent. For example, although one can elect to not own or use a personal computer, computing technology is so widely deployed that it is not possible to avoid its effects. In practical terms we have no exit rights from the computerized world. Similarly, one may prefer not to consume genetically modified food, but if genetically modified organisms (GMO) related technologies became dominant, there would be few practical alternatives available to general consumers.

If viable exit rights do not exist for a technology, then we cannot evaluate the ethical implications of that technology or family of technologies in terms of how well the tools they provide serve individual users. Rather, technologies can only be fully and effectively evaluated in terms of how they transform the quality of relationships constituting our situation as a whole. These relationships include those we have with our environment; with one another; with our own bodies; and with our personal, cultural, and social identities. In short, technologies must be evaluated in explicitly social and ethical terms.

Critical histories of technology deployment (see, for example, Illich, 1973, 1981) suggest that there exists a threshold of utility for any given technology, beyond which conditions arise that make its broader and more intense deployment practically necessary. That is, when a technology is deployed at sufficient intensity and scale it effectively undermines the possibility of exercising exit rights with respect to it, generating problems of the type that only that technology or closely related ones can address.

These distinctive patterns of ironic (or “revenge”) effects (Hershock 1999; Tenner 1996) have wide-ranging, systemic ramifications well outside the technology sector. For example, automotive transportation technologies were originally adopted to make transportation faster and easier and to reduce urban pollution (from horse-drawn carriages). Their widespread adoption, however, transformed both environmental and social realities in ways that eventually generated problems – for example, inhospitable urban sprawl, traffic gridlock, and massive air pollution – that could only be addressed through more and better transportation (and transportation relevant) technology. At present scales of deployment and social, economic, and cultural embedding, transportation technology and the tools associated with it are no longer truly elective.

Ironic effects demonstrate the fallacy in assuming that what is good for each of us will be good for all. The individual user of tools is not, therefore, a suitable unit of analysis in critically assessing technologies. In addition, ironic effects argue for recognizing that the causality of technological impacts is fundamentally nonlinear. Although new technologies are practically built from “the ground up” by bringing together knowledge and materials in novel ways, once they are fully realized, the technology begins exerting “downward causation” (Lemke 2000) on its component systems, bringing them into functional conformity with its own systemic needs. That is, the ironic effects generated by technologies deployed at sufficient scale are not incidental consequences, but are rather systematically conducive to the further deployment of that technology and/or affiliated technologies.

Following this argument, once spatial information technologies cross the threshold of their utility, they will become practically imperative and will begin generating ironic or revenge

effects that require further deployment of the technologies. While this may benefit individual users in anticipated fashions, the impacts at the community level are less certain. More specifically, we submit that the widespread adoption of SIT will disadvantage small, local communities that have limited access to SIT relative to other actors and stakeholders, as well as limited (material, conceptual, and professional) resources for making use of SIT in advocacy, legislative, and regulatory settings. Increased dependence on SIT will transform the relationships between human actors and their spatial environments in ways that correlate with loss of the indigenous spatial practices that were originally to be conserved through their deployment.

Workshop on SIT and Society

In order to test and further refine our ideas about the socio-ethical implications of SIT deployment, we convened a workshop in Chiang Mai, Thailand in June 2003. In planning and hosting the workshop we sought groups that have used SIT extensively in their community-based work. Altogether twenty-three participants that included officials from nongovernmental organizations (NGOs), project staff members, and university researchers attended the weeklong discussion. They represented eight groups in seven countries (Cambodia, China, Indonesia, Malaysia, the Philippines, Thailand, and the United States). Workshop participants were introduced to key concepts for evaluating SIT in terms of its socio-ethical effects, including the concepts of exit rights and ironic effects. Participants then worked in small groups to reflect on their own experiences in grassroots implementation and deployment of SIT. These results were shared in plenary sessions and further developed and refined through group discussions.

Discussions were guided by three interlinked and overlapping sets of questions. We first sought to understand the social and political dynamics that resulted in communities choosing to engage in mapping. Political ecology scholars argue that local processes are interlinked across temporal, spatial, and institutional scales (Blaikie 1985, Blaikie and Brookfield 1987). From this point of view the decision of local actors to adopt or reject mapping technology and activities may be a conscious strategy, or it may be the result of larger political, economic, and social relationships. In order to explore this query we posed the following series of questions to guide discussion: Why did communities engage in mapping? Who was empowered by SIT adoption? Who was disadvantaged? Who controlled the maps? How did various actors decide how maps can be utilized? What were the processes by which empowerment occurs?

The second set of questions addressed the impacts of mapping technologies and activities on communities' values. Spatial information technologies have embedded within them values such as "universality," "objectivity," "standardization," "precision," and "control" that have emerged in systemic relationship within the context of a particular historical/cultural experience. The introduction of these technologies into societies where these values have been neither prominent nor systematically integrated may have unexpectedly disruptive effects. We posed the following questions to start the discussion: Were there any changes in conceptions of space such as boundaries and the sense of place? Did maps cause boundary and land-use disputes? Were there any changes in inter-community relationships? Many of these questions would require longitudinal studies on what happened after the introduction of SIT into the community, and the discussions at the workshop were intended to prod mapping proponents to begin interrogating these issues.

The last set of questions examined the impacts of SIT on the organizational dynamics of the non-governmental organizations (NGOs) that introduced SIT into rural communities. We began with a position that the adoption of spatial information technologies by NGOs is problematic because of their social context, the potential for cooptation, and a lack of resources. The discussions were guided by the following questions: How did an NGO decide to invest in developing an SIT component to their work? How did they sustain operating costs beyond initial investments? Did the adoption or rejection of the technology affect relationships with donors? Did it affect the expectations of community members vis-à-vis NGO partners?

After the workshop, participants were invited to prepare research proposals. After consultation with the editors, seven of the eight invited groups were funded by a grant from the Rockefeller Brothers Fund. These groups spent the next year conducting research at their respective organizations and field sites. Case study writers and the editors reassembled in Honolulu in October 2004 to write papers based on what they learned from their research. The papers referred here are the product of this work.

GRASSROOTS REALITIES: SIT in Local Contexts

Why map?

Workshop participants and case study writers agreed that spatial information is useful for a variety of purposes. Communities can better plan the management of their resources, monitor the implementation of development projects, and resolve resource conflicts within their own communities. Maps can give community members more knowledge about their resources, so they can respond better to problems. This potential is most visible in many communities that adopted SIT in developed economies such as the United States. For example, GIS has been an important tool for the Agricultural Land Preservation Board of Adam County in Pennsylvania to help residents recognize the rapidity of land-use change and the extent of threats to their resources (Dayhoff 2003). In Trinity County, California, Everett and Towle (2005) found that GIS helped local people to be more aware of their resources, which has led to greater sophistication in public discussions among communities and with public and private resource management. In these cases, mapping and working with maps enhanced community capacity in negotiating access to local resources, and increased their involvement in policy processes.

The opening of political space following shifts such as the introduction of a new decentralization policy in Indonesia and the recognition of indigenous rights in the Philippines provided a context in which mapping became a critical tool for negotiation with other groups, including neighboring communities and the state. Mapping re-inserted user communities' existences onto "empty" state maps and thus strengthened their claims to lands and other resources. These effects all occurred in the context of increased local activism as a reaction to disenchantment with the state. SIT is thus viewed as a tool of empowerment and mediation for local communities.

Participants also discussed the processes by which empowerment occurred and who was empowered. Mapping has enhanced tenure security in Indonesia, Thailand, Cambodia and the Philippines, yet it also benefited local governments by providing them with free information. In Sarawak, a community map was instrumental in the legal victory of an Iban village against a

tree plantation corporation. But this rights-through-mapping legal power was quickly curbed as the 2001 Land Surveyors law was passed to regulate community mapping. Others have cautioned that mapping also helps outsiders gain knowledge for furthering their own interests. It can be difficult to determine who “owns” the maps and the information they contain. Fox (2002) argues that if local people do not have control of their maps, they may not be any better off than they were before their lands were mapped. In the case study from Sumba, Indonesia, Hardiono et al. (2005) note that the NGOs and mapping facilitators that make the maps control the SIT databases and hence control access to the information they contain.

Even if the community can control the maps, it is important to understand the multiple interests and actors found within communities, the processes by which decisions are made within communities, and the political and economic relationships between communities and other social actors (cf. Agrawal and Gibson 2001; McDermott 2001). Workshop participants encountered competing local/village institutions that oversaw access to the maps and spatial information ranging from formal village governments, to traditional or customary institutions, to functional village committees. Bujang (2005) provides an example in which entrusted community leaders colluded with a corporation, using community maps to support the corporation’s plan to lease customary lands for an oil palm plantation.

NGOs who initiate or sponsor community mapping projects play key roles in influencing which actors benefit from the adoption of SIT. For example, the two case studies from Indonesia chose divergent strategies. PPSDAK, a Kalimantan-based NGO chose to revitalize traditional customary institutions (*adat*), entrusting them with control of the maps, while Koppesda, a Sumba-based NGO chose to support a functional committee on forest conservation, therefore bypassing traditional leaders. The implications of these decisions can be far reaching in the restructuring of power relations and property institutions that govern resource access and utilization.

Impacts on Communities’ Values

For many indigenous groups in Asia, the use of SIT in participatory mapping is primarily intended to “re-insert” their existence onto maps – to claim rights that had not been acknowledged by the state. Vandergeest and Peluso (1995) describe the process by which rights to resources are acknowledged by the state as territorialization. When resource rights have not previously been recognized and space has not yet been territorialized, mapping activities have greater impact on traditional ways of governing human environment interactions and seeing the world, than they do in communities where legal rights and territorialized space already exist. For example, if villagers engage in mapping in order to increase the security of their land claims, they need to follow through with land titling once they have mapped the land. But the land titling process is controlled by outside authorities, and has significant implications for the villagers’ relations to the land, their neighbors, and their community.

Mapping efforts initiated to recognize collective rights to land resources can lead to land privatization that is in practice exclusive rather than inclusive. One participant from Indonesia told a story of a woman who facilitated the mapping of her village and then sold the land to outsiders. Participants pointed out that mapping also disadvantaged nomadic groups that do not claim exclusive territories and therefore are generally not represented in the mapping process.

Workshop participants and case study writers from Malaysia, Indonesia and Thailand reported that customary boundaries were traditionally flexible. These boundaries responded to changing needs within the community and extended across and overlapped administrative boundaries as well as the boundaries of neighboring communities. Participants observed that these boundaries have become less flexible today and often cause disputes when they overlap with neighbors' boundaries. They noted, however, that changes in the sense of place and boundary conceptions are not exclusively caused by mapping activities, as they are also subject to changes in the political economic context, such as expansion of roads, markets, decentralization policy, land tenure, and other factors.

Mapping can force communities to confront latent issues with regard to the management of natural resources. This can lead to new opportunities for consensus building, but it can also lead to conflict by making it harder to compromise positions, creating new disagreements within and between communities. Prom and Ironside (2005) report in their case study that one of the ironic effects of SIT observed in Cambodia is that mapping efforts initiated to resolve conflicts between local communities and government agencies resulted in increased conflict between and within villages. As long as boundaries remain fluid and flexible, defined only in each person's mental image of the landscape, conflicts between competing interests (within villages or between villages) can be minimized. Once boundaries are mapped, however, conflicting images of reality cannot be overlooked any longer and must be addressed.

Many participatory mapping proponents argue that they have no choice but to map. For them, today's villagers are already "caught up in a mapping world" and do not have an "exit option." They can refuse to map, but they cannot escape the implications of living in a world in which others will eventually map their lands. Villagers recognize that being included in official government maps can be as disadvantageous as being excluded from them (Majid Cooke 2001). Mapping is a precondition for protecting their territory and resources, since it is not possible to claim an unmapped area in contemporary politics. Even if a community refuses to map within the boundaries of a protected territory, such as on a Native American reservation, the outer boundaries must be established and recognized.

Furthermore, as SIT becomes a practical imperative, it ironically may disadvantage many small communities who do not have access to it. Likewise, resolving the conflicts caused by mapping draws attention to the importance of "boundary" and "territory" over other nonspatial aspects. This shift eventually makes SIT indispensable for asserting and defending communities' rights. In Indonesia, Malaysia, and Cambodia (see Bujang 2005 and Pramono 2005), many communities have realized "the power of maps" and are anxious to have their resources mapped. Yet the NGOs who assist in participatory mapping are unable to respond to all community requests for mapping. Communities that do not have maps become disadvantaged as "rights" and "power" are increasingly framed in spatial terms.

SIT and NGOs

We define non-government organizations (NGO) as organizations that work on a voluntary basis; rely on external funding; work with the poor and marginal members of society; have a small staff; and have a flexible, not-for-profit, independent, and non-partisan nature (cf. Korten

1990). The urban and middle class nature of most NGOs as well as their dependence on funding from outside sources places their independence and performance in doubt.

Participants in the workshop felt that their decisions to adopt SIT as an important component of their activities varied, but reasons external to the NGOs were at least as important as those from within. Donors, and how NGOs perceive donors' priorities, have a relatively large influence on many NGOs. Pramono describes how consultants from other international organizations – e.g., the East-West Center, the World Wildlife Fund, ICRAF, or the USAID-supported Biodiversity Support Program – proved to be instrumental for NGOs in Indonesia in their choice of mapping strategies. Furthermore, Hardiono et al describe how the shift from sketch mapping to GIS in Indonesia was influenced by discussions with these international actors. Donors' priorities, however, continue to evolve, and an NGO that received donor support to acquire SIT may not receive support to maintain the technology. It can also be difficult for an NGO to meet the timetables imposed by donors.

Success in using maps as tools for negotiating land rights in Indonesia and Malaysia has led to increased demand for mapping by neighboring communities. Both Pramono (2005) and Bujang (2005) report that in their case studies, this has created a shortage of technically trained people, and that it is difficult to acquire and keep trained staff. There is also a gap in expectations and work culture between staff members trained in SIT sciences and those trained in social sciences that could lead to the separation of participatory mapping activities from the broader objective of NGOs (Hardiono et al., 2005).

Recognizing the potential socio-ethical impacts of SIT, there was a strong consensus among workshop participants that advocates of participatory mapping need a clear protocol to follow when introducing SIT into a village. This protocol should require outside actors to communicate clearly with each community prior to the mapping project. The NGO must clarify the purpose/objectives of collecting information, agree with villagers on what information can be mapped, and explain potential consequences of recording the community's spatial information on maps that can then be copied and distributed outside the community. Most importantly, outside facilitators must communicate to villagers that they can agree to accept or reject the mapping exercise.

Carrying out the protocol, however, is not sufficient in assuring that villagers would be aware of the full implications of mapping. As Bujang (2005) explains in his case study, in spite of the facilitators' efforts to organize meetings to discuss mapping issues, many villagers failed to attend the meetings. In some cases, the meeting schedules conflicted with the need of villagers to attend to their farms. In others, some villagers disagreed with the goals of participatory mapping and thus refused to participate in the conversation. Hardiono et al. (2005) and Sarem et al. (2005) highlight the problem of conceptual gaps between mapping facilitators or NGOs and villagers. In spite of the effort to consult with villagers and village leadership throughout the mapping process, the fact that many villagers had never seen or worked with maps made it difficult for them to fully comprehend the potential problems.

Finally, participants felt that unlike in North America, the use of SIT at the community level in Asia has largely been limited to producing one-time maps and neglecting the reality that working with spatial information is a process requiring revisions and changes. Thus far little

attention has been given to building local capacity to revise and remap as circumstances change. Embedded within this context is the challenge of balancing the need for higher levels of technology against local capabilities. Some workshop participants speculated that the “non-professional” appearance of community maps gave government agencies reason to question the legitimacy of the maps. The papers by Saipothong et al. (2005), Zheng (2005), Hardiono et al. (2005), Prom and Ironside (2005), and Sarem et al. (2005) argue that as technology complexity increases, community access to the technology decreases. While paper maps are generally available to all at the local level, digital data presents a structural barrier that may prevent a large proportion of community members, as well as some NGO staff, from accessing the spatial data.

SUMMARY

The papers written for this project do not seek to discredit the use of spatial information technology in community-based management. Rather we seek to understand the social and ethical implications of this technology so that those who chose to use it to meet social objectives can do so wisely and with an understanding of the unintended consequences that may accompany its use. We seek to enhance the knowledge of the scientific community regarding the ethical, organizational, and power implications of spatial information technology, as well as to provide social activists with criteria for deciding whether they want to use this technology in their fieldwork.

Workshop participants and case study writers confirmed that mapping and working with maps enhance community capacity to negotiate access to local resources. It develops technical and analytical skills in understanding both the immediate locale as a familiar place and its complex relationships to surrounding locales and regions. This wider perspective affords greater insight into current and likely patterns of interdependence, enabling better responses by communities to their own problems. As such, SIT is a useful capacity building resource for supporting the broader goals of community-based management.

It is important to understand that SIT comes in a variety of forms, and its conceptual and technical accessibility to participating communities could be uneven. Sketch mapping and 3D maps are easier to understand and are effective in engaging even illiterate villagers in conversations regarding natural resource management. But these maps are often considered to have limited credibility – a perception that markedly reduces their effectiveness when negotiating territorial rights with outside interests. However, efforts to “formalize” SIT – away from sketch mapping toward technical cartographic mapping and GIS – could backfire. The case studies revealed that in remote villages in Asia, adoption of technologically complex SIT could marginalize many of the targeted communities. Participatory mapping proponents therefore must strike a balance between being able to produce maps and spatial information that are “credible” but that remain relevant to villagers in solving their immediate problems.

Reflections by practitioners as represented in the Chiang Mai workshop and the case studies, however, also identified several ironic effects of mapping that could undermine the goals of community-based management. While mapping is useful for bounding and staking claims to ancestral or traditional territories, it also facilitates a shift toward exclusive property rights and provides outsiders a legal means to gain access to common property resources. Common property resources are managed through rules and practices that include the control of

knowledge about the location of valuable resources. By making knowledge accessible to all, mapping weakens existing common property management systems. Mapping generally promotes practices that shift attention and concern away from a fluid human/environment relationship to a relationship with quantifiable limits implied by boundaries/borders. The newly acquired authority to define and exert control over the use of space has thus begun to compromise the customary uses and governance it was intended to protect.

The impacts of SIT must also be seen in the broader context of how the participating communities are positioned in adopting the technology. Communities in the United States utilize SIT as a tool for capacity building. It is not intended to reform the structure of rights and access, but to enhance their ability to manage resources. By contrast, for many indigenous groups in Asia, the use of SIT in participatory mapping is primarily intended to claim rights that had not been acknowledged by the state. These new spatial practices, however, also bring about new ways of conceiving space and new patterns of relationship centered on spatially determined resources. The adoption of SIT and participatory mapping thus serves to infuse new values into user and user-affected communities. In indigenous groups and in smaller rural communities these new values can dramatically affect an array of existing paradigms, acting as catalysts for change in social organizations and in local dynamics of power and prestige.

The adoption of SIT and participatory mapping in Asia has increased the capacity of indigenous groups and local communities to assert territorial rights and to promote decentralization of resource governance and management. But the adoption of this technology has also increased the need for the further adoption of SIT by other rural communities, practically eliminating exit options. As workshop participants concluded, the more we map, the more likely it is that we will have no choice but to map. Yet, we submit that this need not be seen as a caution against mapping, but rather as an injunction to develop critical clarity with respect to mapping based on a comprehensive understanding of both intended and likely unintended consequences of our actions. Resource managers who engage in mapping must do so with clear protocols for explaining these often quite complex consequences to rural communities prior to the mapping exercise. Meeting this challenge will require not only building technical skills, but also transferring skills for looking critically at context and for identifying factors needing response. They must also work to establish a sustainable trajectory of community capacity building – a trajectory that insures continued, sufficient resources for the community to participate in negotiating political and economic relations that are continuously being transformed, sometimes in response to the adoption of SIT itself.

Endnote:

¹ This paper is slightly revised version of Fox et al. (2005).

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