Scale, Knowledge and Space:

Spatial Organization of Environmental Knowledge in Northern Thailand

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The task of incorporating traditional knowledge into the scientific management and conservation of the world's forests is becoming increasingly important. [2] Internationally, organizations and governments have recognized that forests provide multiple goods and services to both local communities and to the global commons. Managing forests for their multiple attributes thus requires cooperation across scale; between national forestry departments and local communities. [3]

There remains significant debate regarding the role of local people in state-led forest management and the importance of traditional knowledge to the goals of sustainable forest management and conservation (Berkes and Folke, 2002; Brown, 2002; Chatty and Colchester, 2002; Terborgh, 2002). However, state-led conservation of increasingly inhabited forest combined with the political economic reality of shrinking budgets and growing civil society indicates an increasing trend towards decentralization and dictates a continued effort to integrate traditional and scientific management and knowledge (Enters and Durst, 2000; FAO, 2003).

Forest management would benefit from a greater integration of stakeholder interests, knowledge, and management institutions. Indeed, FAO identifies such integration as the necessary institutional environment for managing forests sustainably (FAO, 2003). Unfortunately, conflicts throughout tropical forests attest to a continued and growing tension and little cooperation among interests across scale. Local resource-use appears to be in conflict with regional, national, and international conservation demands. Many of these conflicts occur in and around scientifically managed protected areas that have demonstrated a strong commitment to privileging western scientific knowledge over local knowledge. "The assumption has always been that wildlife conservation is the prerogative of naturalists, trained ecologists and foresters, and

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[2] Local, indigenous and traditional knowledge are used interchangeably in the literature and all carry unfortunate connotations. 'Local', while sounding neutral, denotes a spatially bound knowledge and risks not being specific as to the type of knowledge. 'Indigenous' enforces an 'us-them' distinction and forces a measure of indigenousness that is difficult to confirm (Ellen et al. 2000). 'Traditional' enforces a 'traditional-modern' dualism and can imply stasis. This paper will use the term 'traditional' environmental knowledge for two reasons. First, it is probably the most popular term. Second it importantly infers long term interaction with an environment. I will sometimes use 'local' interchangeably.

[3] Scale refers to the nested jurisdictions of resource management institutions such as global, national, regional and local. While institutions generally operate within one of these jurisdictions, their actions and policies shape practices at other scales.

that modern biological science is the only discipline needed to carry it out" (Kothari *et al.*, 1995:190). Scholars and practitioners can help expand the toolbox of conservation practitioners by developing the means of integrating local and state management and knowledges in the conservation of forests that are undeniably home to people and nature alike[4]. Nothing less could possibly allow for the cross- scale and cross- sectoral cooperation necessary to the efforts of managing forests for the provision of multiple goods and services.

This paper examines the links between knowledge and space across scale to contribute to the task of integrating knowledge used and produced through traditional environmental management (henceforth traditional knowledge or TK) and knowledge used and produced through state environmental management (henceforth state scientific knowledge or SSK[5]). This paper understands traditional and state environmental management to be examples of applied science and it understands knowledge to be produced through social relations, experience and practice. Knowledge is not only *used* by a resource management institution but it is *produced*, maintained and adapted through the practices of such institutions; knowledge is thus inseparable from the institutions and practice that create it. I employ Berkes' (Berkes, 1999) definition of knowledge as knowledge-practice-belief complex to assert the connection between knowledge and practice.

The environmental practices and social institutions that produce knowledge also produce a spatial organization to that knowledge; spatial patterns, behavior, and meaning are dimensions beneficial for the understanding of environmental knowledge and associated management systems. Resource management institutions and the knowledge they produce have a very specific spatiality associated with them. Lefebvre (1991:31) states that "...every society - and hence every mode of production... - produces a space, its own space…." Management institutions operating at different scales, through distinct sets of social relations, and thus producing distinct environmental knowledges also produce distinct spatial organizations (e.g. boundaries, land-use patterns). Though space is evidently an important aspect of knowledge expressed in management institutions, it is a dimension thus far under-emphasized in resource management and conservation literature. This paper addresses this gap and argues that documenting the spatial organization of traditional and state knowledge-practice-belief complexes will contribute to our understanding, not only of traditional and scientific management institutions, but also of the challenges to and possibilities for their integration. The current investigation

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[4] Integration of this sort is much further along in the fields of agricultural extension and development practice, where scholars and practitioners have long recognized the value of both scientific research and the participation and knowledge of rural people (see Chambers *et al.* 1989; Rocheleau 1994).

[5] In the Thai Royal Forestry Department, foresters employ a scientific framework in their management; they draw on their training in forestry science and refer to it in order to legitimize their management actions. I will therefore refer to state knowledge as state scientific knowledge in order to emphasize this point.

identifies instances of convergence, compatibility, and conflict between the spatial organizations associated with TK and SSK in order to inform more effective cross-scale partnerships in environmental management.

The paper demonstrates the importance of the spatial dimension of environmental knowledge and management to the incorporation of TK and SSK in areas slated for conservation. I draw on research in Northern Thailand where the expansion of protected areas to meet national and global needs has met strong resistance by local residents. These conflicts carry distinct implications for potential future cooperation and integration because the establishment of protected areas entails a transition of a landscape from management by traditional knowledge and its associated institutions to management by state knowledge and its associated institutions. The establishment of a protected area also constitutes a spatial re-organization since it imposes a particular kind of conservation space – one distinctly different from the space produced through local environmental management and practices. Environmental knowledge mobilized through state-led resource management institutions is different from that employed at the local scale. Examining the spatial expression of these different knowledges provides unique insight into the similarities and differences between TK and SSK that can help inform their integration. I address the following questions: Are the knowledges and associated spatial organizations of state and local resource management institutions significantly different? Are they in conflict or do there exist moments of convergence and compatibility?

The paper proceeds as follows. The second section of the paper investigates the characteristics of traditional knowledge and state scientific knowledge. I assert that the observed differences between TK and SSK are not inherent but stem from their embeddedness in different contexts; knowledge is produced through the social relations, experience, and practice in which it is embedded. Thus an integration of TK and SSK must address not only knowledge as information, but also the social relations and practices through which knowledge is produced, the institutions that manage and transmit knowledge and the belief system underpinning the knowledge; referred to as their entire 'knowledge-practice-belief complex' (Berkes, 1999).

The third section of the paper argues that space is an integral dimension to the knowledge-practice-belief complexes of both SSK and TK. Just as knowledge is produced in relation to a particular social and environmental context, so is space. The spatial organization of resource management strategies is intimately linked to the kinds of knowledge produced and mobilized through management institutions operating at different scales. An understanding of this spatial dimension is crucial to the task of integrating SSK and TK into a more robust and effective conservation practice that can address both the needs of local populations and the demands of the global commons.

The fourth section illustrates this approach in an examination of a landscape in Northern Thailand that is in the process of becoming a national park and thus is in transition from local to state management. The case study demonstrates the consequences of introducing state knowledge, management, and spatial organization while ignoring the knowledge, management, and complex spatial organization of local livelihood strategies.

The conclusion reflects on the connections between scale, space, and knowledge within the context of resource conflict and conservation. I discuss the implications of the findings for the incorporation of traditional knowledge into conservation and assessment efforts.

Traditional Knowledge (TK) and State Scientific Knowledge (SSK)

There is considerable literature detailing the characteristics of traditional knowledge and asserting its legitimacy for environmental management in the face of the dominant scientific paradigm adopted by state governments. While some of this literature romanticizes traditional knowledge and asserts its difference from scientific knowledge employed by the state, the intention of much of the literature and the purpose of this paper is to identify instances of complementarity and convergence in order to inform their integration. While advocates of TK understand it as necessarily embedded in context, they often juxtapose it to a scientific knowledge that they understand to be produced in isolation from its context. However, both TK and SSK are embedded in the management institutions and practices that produce them; they are knowledge-practice-belief complexes. Treating all knowledge as produced through practice and embedded in context shifts emphasis away from the different characteristics of knowledge towards understanding the observed differences as a outcome of the practices and institutions through which such knowledge is produced and expressed. This shift shows promise for the meaningful integration of SSK and TK.

In the 1980s a group of scholars and practitioners began championing TK as an alternative to what was viewed as the failed centralized development solutions of western science (Brokensha *et al.*, 1980; Chambers *et al.*, 1989). They asserted its inherent difference to scientific knowledge in order to show its value in the pursuit of a more sustainable development. The central assertion of this literature is that local rural peoples, through their long-term cumulative experience in a particular landscape, have detailed and informed knowledge of their environments and farming systems. The majority of these early TK studies follow the thinking of Levi Strauss who in 1962 argued that traditional knowledge and scientific knowledge were undeniably distinct in that “the physical world is approached from opposite ends in the two cases: one is supremely concrete, the other supremely abstract” (quoted in Berkes *et al.*, 2000:1251; Levi-Strausse, 1962:269). Traditional knowledge and scientific knowledge were thus posited as

inherently different; traditional knowledge is practical, integrative, and concrete while scientific knowledge is reductionist and abstract. Traditional knowledge was stated to at least rival if not surpass western scientific knowledge in its ability to solve problems and inform a locally appropriate sustainable development. These assertions informed a movement towards participatory research and participatory development that sought to integrate scientific and indigenous knowledge.

From a review of the literature there seems to be a general consensus with Berkes' (1999:8) definition that TK is

> a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment.

The literature accepts that TK has three important characteristics that are captured in this definition, namely that it is dynamic, holistic, and embedded in place. Scholars of TK claim its embeddedness as its most defining feature, giving rise to the other two characteristics. TK arises from the intimate relationship between a culture's worldview, its resource use practice, management institutions, and its landscape. It is produced through long-term, practical, concrete engagement with a particular environment and accumulates incrementally through trial and error (Amanor, 2002; Ellen *et al.*, 2000). Local science and practice as documented at a particular time, is thus a momentary expression of a continuing process of learning and experience (Rocheleau, 1994). It is dynamic and flexible, continually in the process of adapting to changing conditions (Berkes *et al.*, 2000; Stolzenbach, 1994) and continually in the process of innovation. TK is therefore not insular or static but actually hybridizes itself through interactions with distinct knowledges. Embedded in culture and place, TK regularly does not distinguish between 'nature' and 'society' but is instead holistic in its understanding. Roué (2002:346) states that indigenous people

> are not in need of a paradigm revolution to become interdisciplinary… [because] indigenous experts have always possessed an integrated and systemic vision of the functioning of the ecosystems of which they consider themselves an integral part.

Long-term association with a landscape also gives rise to a relatively detailed knowledge base. While it is its embeddedness in place and culture that many argue make TK unique and valuable, it is also this embeddedness that many argue distinguishes it from Western science.

The literature on TK defines scientific knowledge, in contrast to traditional knowledge, as abstract, generalizable knowledge produced through structured observation and controlled experiments, allowing for the extrapolation of findings beyond the specific instance in which the knowledge was produced. SSK is described as "characterized by disembeddedness;

universalism; individualism; nature-culture/ subject-object dichotomies [and] mobility" (Berkes, 1999:10). This characterization is in strict contrast to the assertion above that TK dynamic, holistic, and embedded in place. The differences between TK and SSK are thus argued to be fundamental and epistemological.

The early efforts to integrate TK and SSK, as exemplified by the Farmers First approach (Chambers *et al.*, 1989) and techniques such as rapid rural appraisal (McCracken, 1989), accepted the distinction between the two knowledges and set out to document TK in order to use it for more appropriate agricultural extension and sustainable development initiatives. The approach emphasized information transfer and saw "knowledge as a tangible stock, body, or store to be tapped, extracted, and documented" (Thompson and Scoones, 1994:63). The recording of detailed ethnobotanical information, indigenous crop mixes, and cropping patterns has successfully demonstrated that traditional knowledge is legitimate and sophisticated. This work has since informed a broader scientific community of scholars and practitioners concerned with designing sustainable programs for conservation and rural economic development. It has also, however, come under critique from a broad audience consisting of the Beyond Farmers First approach (Scoones and Thompson, 1994) and practioner/scholars in conservation and development. Early integration efforts are critiqued for abstracting TK from its context and for their assertion that TK and SSK are distinct knowledges.

In the rush to incorporate TK into scientific conservation the effort has been placed almost entirely in the collection of TK and its incorporation into a scientific framework. Detailed ethnobotanical information as well as knowledge regarding population and foraging characteristics of important species is considered proof that local communities have knowledge useful to the conservation agenda. Critics claim that abstracting TK from its context and placing it into scientific frameworks makes it less relevant to the process of formulating resource management plans (Baviskar, 2000:114) and is likely to lead to significant errors in interpretation, assimilation, and application (Thompson and Scoones, 1994). Agarwal (2002:293) expresses concern over such databases of indigenous knowledge on the grounds that

> the effort to document, and then particularise, validate (abstract) and generalise and finally to disseminate, misapprehends and works against the very characteristics of indigenous knowledge that are believed to render it indigenous.

By incorporating local ecological knowledge into current scientific management frameworks, we risk shedding TK of its context and reducing it to "bite-sized chunks of information that can be slotted into western paradigms, fragmented, [and] decontextualized" (Ellen *et al.*, 2000:15).

Many authors have gone further in their critique and subsequent modifications by questioning the very nature of the distinction between TK and SSK. Agarwal (1995) argues that

the dichotomy between TK and western science is not real. He argues that it is fruitless to assert a distinction between western and indigenous science in the absence of satisfactory verification criteria to distinguish science from non-science. There is tremendous heterogeneity within SSK and TK and too many similarities to suggest a strict difference. For instance, Robbins (2000), in his study of state and local environmental knowledge finds that knowledge alliances exist between state foresters trained in science and local farmers. He suggests that position within the political economy is a more important delimiter of epistemological differences. Furthermore, "some elements of farmers' science show strong parallels with conventional, positivist, empirically-based scientific approaches" (Thompson and Scoones, 1994:65). There is considerable overlap between SSK and TK in terms of method. Proponents of popular or indigenous science react to the earlier characterization of TK as passive adaptation and emphasize an understanding of TK as the product of active experimentation. They point out that local innovations are the result of careful experimentation through experience and report instances of systematic observation (e.g. Richards, 1985; Rocheleau, 1994). And in my own field site I found that farmers who had sufficient land and labor would often experiment with a new crop or technique.

The observed differences between SSK and TK may not, therefor, be the result of distinct ways of knowing, but may reflect their different contexts; their different positionings vis-à-vis the greater political economy of environmental management. Many proponents of the feminist critiques of science contribute to this perspective when they argue that western science is itself embedded in a culture, set of social relations, and a particular positionality (see Haraway, 1991; Harding, 1986). Both local and Western science are thus "anchored in their own particular socio-economic milieu: they are all indigenous to a particular context" (Ellen *et al.*, 2000:26). We need to treat both SSK and TK not merely as different databases of information but as integrated packages containing practices, beliefs, and politics. This paper accepts Berkes' proposed knowledge-practice-belief complex (see Table 1), but not only as relevant to the production of TK but also in the production of SSK. While there is significant overlap in the methods and approaches of traditional and scientific experts, their very different social and political positioning ensures the production of different kinds of knowledge and associated institutions of knowledge. It is thus the 'location' of knowledge production that makes the difference (Li, 2000). The different social, environmental, and political context makes the distinction between TK and formal science relevant. The observed differences between TK and SSK – in particular detailed versus general; adaptive versus dislocated and holistic versus segmented – while no less important, need to be understood, not as inherent oppositions but as differences intimately connected to thus far separate social and political contexts. The different knowledge characteristics are reflected in all aspects of the knowledge-practice-belief complex.

Berkes (1999) recognizes four realms[6] of ecological knowledge that I argue are relevant to both TK and SSK. Table 6.1 describes them each in turn. These four realms are not in any way separate from each other, they are instead always interacting and influencing each other and they are best thought of as an integrative package. My proposal to view both SSK and TK as being knowledge-practice-belief complexes both as produced through practice and embedded in culture, allows an evaluation of their differences, similarities, and complementarities as expressed in all realms of environmental knowledge.

Table 6.1 Four Realms of the Knowledge-Practice-Belief Complex[7].

Realm 1: **Environmental information**: knowledge of specific plant and animal species, their behavior and distribution as well as the system used to classify such knowledge

e.g.: medicinal plants, taxonomies, ecosystem functioning

Realm 2: **Environmental practices**: the practices, tools and techniques employed in resource use and management and the ecological knowledge needed to develop them

e.g.: ecosystem functioning, silviculture, harvest and planting techniques

Realm 3: **Social Institutions**: the rules of access, tenure and social relationships that govern use and management

e.g.: tenure arrangements, kinship systems

Realm 4: **World View**: the conceptual understanding of the world, including belief systems

e.g.: religion, perception, politics

In the attempt to use all the tools in the toolbox, we must avoid merely fitting detailed traditional environmental knowledge (Realm 1) into the environmental practices and social institutions (Realm 2 and 3) of scientific management. The documentation of TK for its use within a larger scientific framework, though it has come under critique, remains the most accepted means of incorporating TK into SSK. Conventional resource and conservation managers have, by and large, not recognized the value of traditional environmental practices, management systems, and social institutions, despite the large amount of research describing them (for example see Gibson *et al.*, 2000; Ostrom *et al.*, 2002). Recognizing the embeddedness of both SSK and TK makes us recognize that neither knowledge-practice-belief complex has interchangeable parts. A

[6] I have changed the term from Berkes's levels of ecological knowledge to realms of ecological knowledge to avoid the inference of a hierarchical scale.

[7] I have adapted the definitions from Berkes (1999) to make them applicable to both TK and SSK.

meaningful integration of TK and SSK will need to look at all realms of knowledge for elements of compatibility and convergence. We must pay attention to the knowledge expressed in the environmental practices and social institutions (Realm 2 and 3) of both traditional and scientific resource management with the goal of finding the means to fit the knowledge-practice-belief complexes together in a way which uses their recognized strengths. This paper analyzes the spatial dimension of environmental practices and social institutions with the aim of facilitating this goal.

Knowledge, Management Institutions[8] and Space

The examination of environmental knowledge expressed and maintained in management institutions requires a concurrent examination of the spatial dynamics underlying such institutions. Space and knowledge are both produced in interaction with immediate social and environmental processes. They are thus intimately connected through their mutual dependence upon, and enabling of, particular management institutions. Space is an important dimension of local and state knowledge and management institutions, and requires examination in order to develop means of meaningfully integrating SSK and TK.

Space is an under-researched aspect of resource management. While central to the way we experience life (Soja, 1980) and certainly to the functioning of management systems and social institutions, space has been taken for granted and simplistic two-dimensional cartographies of conservation have emerged. This paper understands space as produced through actions and interactions. It is a material space that cannot be understood as separate from the social relations that shaped its production and likewise, the social relations of conservation create distinct spatial forms (Lefebvre, 1991; Massey, 1993; Sack, 1974; Soja, 1980). Thus when thinking about how TK and SSK can be integrated we must also examine the spatial expression of such knowledge. More precisely we must examine the spatial organization of environmental practices and social institutions across scale. Environmental practices, such as the tools and techniques employed for harvesting non-timber forest products, grazing cattle, encouraging plant growth or protecting forest are expressed spatially as patterns of use and management. Social institutions such as rules of access, enforcement, and tenure arrangements are expressed spatially as zones and property boundaries along with the meanings attached to them. We need to ask questions such as: What kind of boundaries do different resource management strategies have? What processes do they enable? What is their meaning? How are they connected to social

[8] Management Institutions refers to both environmental practices and social institutions (Realms 2 and 3).

institutions? What are the seasonal patterns of resource management and use in different management institutions?

The different environmental practices and social institutions of state and local management have different spatial expressions. State-led conservation mechanisms employ a two-dimensional, static spatiality that facilitates management from afar, asserts firmly bounded zones and while aware of general land use patterns over a large area, is insensitive to the micro-scale complexity of human environment interactions. Meanwhile, local use and management involves a more flexible notion of space that is in tune with the dynamic and adaptive characteristics of local environmental practices and social institutions. Management institutions, their associated environmental knowledge, and their spatial expression are homologous: they are all produced through their embeddedness in the world.

I will now turn to a case study in Northern Thailand in order to elucidate how space, knowledge, and management institutions across scale interact in a landscape whose primary management authority is in transition from local to state hands. The investigation identifies three key aspect of traditional and scientific management and demonstrates how understanding their spatial organization is important to the integration of TK and SSK within the context of environmental conservation in inhabited forest landscapes.

Northern Thailand

The Thai government has been encouraging a rapid expansion of protected areas over the past decade. Currently 18 percent of Thai territory is contained within protected areas and the Royal Forestry Department (RFD)[9] has an official target of 25 percent (Nootong, 2000; Poffenberger, 1999). The expansion is concentrated in the north, where over 50 percent of the remaining forest cover in Thailand is located and where a number of ethnic minority groups inhabit the mountain forests (Wittayapak, 1996). Conflicts between highland and lowland farmers over the issue of watershed protection and between highland farmers and the RFD have been increasing in number and severity. In August 2000, lowland farmers from Nan province protested water shortages by attacking and burning Lychee plantations upstream from their farms (Vandergeest, 2003). And in February 2002, thousands of highland farmers gathered for up to one month at the provincial headquarters to bring attention to, among other things, the difficulties faced by highlanders enclosed within protected areas. The RFD is coming under increasing pressure to recognize the role local people can have in forest management. The 1997 constitution contains a clause which states that “the right of a person to participate with the State

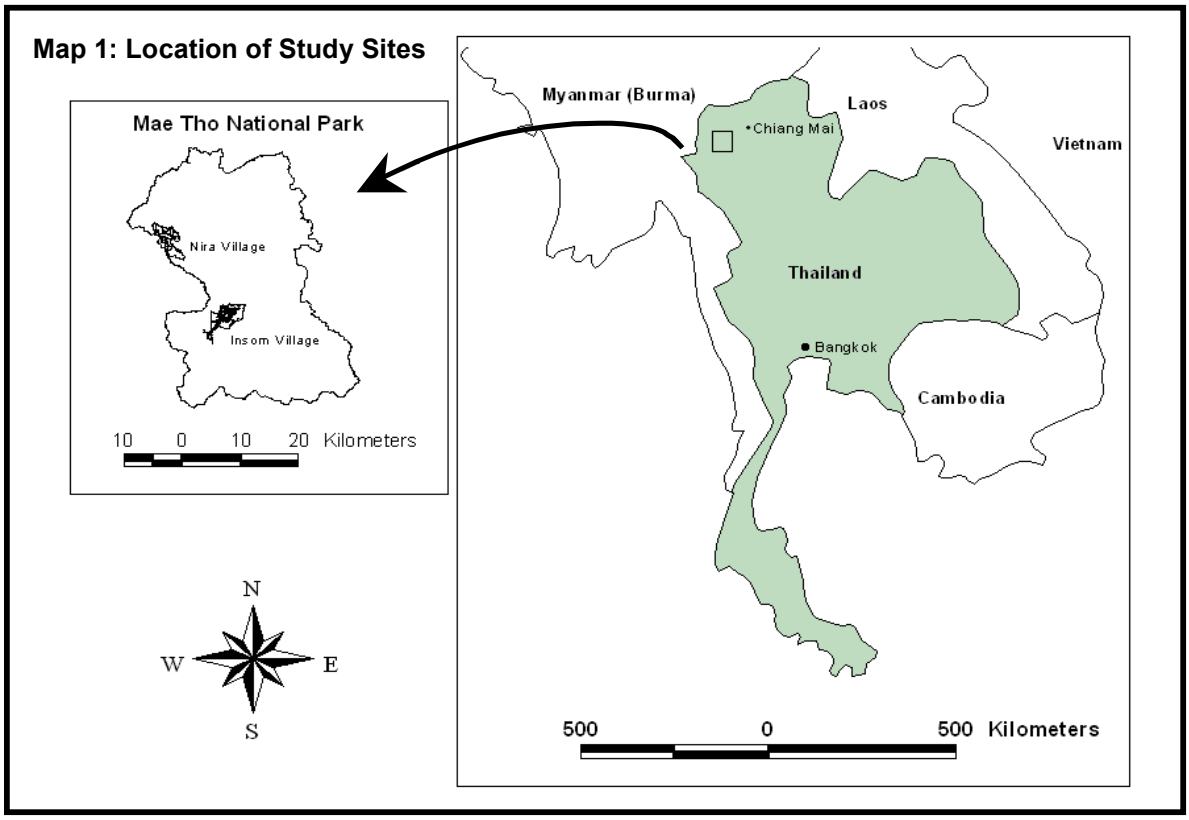
[9] The functions of the Royal Forestry Department were recently moved into a new Ministry of Natural Resources and Environment. I conducted field work in 2001-2002 and thus use the term ‘RFD’ in order to be historically consistent.

and with communities in the preservation and exploitation of natural resources and biological diversity… is protected, as provided by law" (Government of Thailand, 1997:14). In addition a community forest law has been in negotiation for more than a decade. Presently the senate has passed a version of the law that allows community forests to be established in forest reserve land but not in National Parks (Samabuddhi, 2002). With an increasingly active civil society, a new constitution, a strong conservation agenda and a community forestry law in development, greater participation by local communities in managing forests for a balance of local and global needs is on the horizon.

Mae Tho National Park

In an effort to understand the conflict between conventional conservation and highland livelihoods, I collected data over a 12-month period in a region of Northern Thailand slated to become a national park (See Map 1). One of the main conservation concerns linked to Mae Tho National Park is that of watershed conservation – the district in which it is located provides 40% of the water to the Ping River, a main tributary of the Chao Phraya River (ICRAF, 2001). The 990 km^2 area is extremely mountainous with an elevation ranging from 340 to 1720 meters. Yet it is home to approximately 60 villages, most of which practice some form of shifting cultivation on its steep slopes. According to RFD staff, a major goal of the National Park is to stabilize and increase the amount of area under forest cover in order to protect the watershed.

Map 1: Location of Study Sites



The establishment of Mae Tho National Park started in 1991 but has met local resistance and thus was chosen as the site of a pilot project on park establishment and sustainable land use. The model used by the RFD, if fully implemented, constitutes a spatial re-organization of land-use, livelihoods, and landscape. The pilot project entails the negotiation with individual villages about the boundaries between village land and the park, effectively cutting out village exclusion zones in which each village could reside. Park managers wish to limit the size of the exclusion zones and so in connection to the negotiation of boundaries, they have encouraged a model of 'sustainable land use'. The model has four key components: classifying land into four categories; reducing shifting cultivation, encouraging permanent cash crop agriculture and encouraging private property. The model's goal is to intensify local livelihood activities in a smaller space while conserving newly freed forest land inside a National Park. There is a clear spatial component to this model: the imposition of static boundaries separating people from forests, individual household land holdings from each other and establishing separate spaces for separate uses. This is in contrast to traditional land use patterns in the region, which largely reflect communal management of a forest-farm mosaic, overlapping and nested tenure rights and no strict division between village land and forest land. The park landscape is in transition from local management and spatial organization to state management and spatial organization.

I conducted research in two villages at different stages of this spatial transition. Both villages are of Karen ethnic minority, practice shifting cultivation for primarily subsistence purposes, and have resided in their current locations for upwards of one-hundred years. Insom Village [10] has cooperated with the RFD (See Map 1). They have reclassified land, decreased shifting cultivation, increased permanent cultivation, formalized rules of forest access and moved towards private property ownership. Nira Village has resisted the RFD plans to reduce shifting cultivation and has instead re-asserted communal management of forest and agriculture land. Their rules of access and use remain largely transmitted through social institutions and relationships. The case can help illustrate how the spatial dimension of state and local knowledge shapes the management transition and resulting conflict. My analysis will focus on three themes where space, management institutions and knowledge intersect. First I will address the position of the manager vis-à-vis the knowledge being used to manage, second, the degree of integration amongst environmental and social issues in the management institutions, and third, the degree to which management institutions and knowledge are adapted to local circumstances and remain flexible in the face of change.

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[10] I have changed the names of the villages in accordance with confidentiality agreements.

Intersections of Space, Management Institutions and Knowledge: Theme 1 (Dis)placement and Management

National Park staff envision a landscape of forest with small islands of land-use contained within village exclusion zones. A swiss cheese park, if you will. The spatial vision of park management is of a strict separation of forest (managed by the RFD) from agricultural land (managed by local communities). A good example of this is a short-lived proposal by one park official to "take all the fields that the villagers in Insom Village are using [that are spread throughout the forest] and move them all close to the village. That way the rest of the forest can be cared for by the forest department." He went on to ask, "how can they care for all that forest by themselves anyhow? It is too large." This quotation demonstrates the desire to separate forests from people and it shows a lack of awareness of local management institutions. I will return to these points later in the paper. Notably, the plan was for a village that the RFD official had not visited. He was using the map to re-organize a landscape of which he had no first hand knowledge, indicating the displacement of the manager and his knowledge from the landscape in question. This displacement is a key aspect to state-led conservation and represents the first of three important differences between state and local knowledge-practice-belief complexes discussed in this section.

State management requires that the management of the park, and the knowledge associated with it, be legible and transferable to a manager with no first hand experience in the park territory. A process referred to by Scott (1998) as state legibility. It is policy in Thai government that the superintendent of the park, along with his/her management staff, change positions every 5 years. The new superintendent of the Mae Tho National Park had been there 10 months when I first met him. He claimed at the time that villagers in the area cut down primary forests for shifting cultivation, yet this was not possible for him to know first hand since he had not resided in the area during cutting season. This was knowledge learned from textbooks and from experience elsewhere in Northern Thailand and was hotly contested by villagers in the Mae Tho region.

Having a park manager whose knowledge and experience is dislocated from the landscape he now manages is a constant source of discontent for resident villagers. One key informant explains that "the leader of the park changes all the time. The last one was ok, he began to understand the lives of people in the mountains but then he had to leave and now we have a new one. Now we have to teach him. As soon as he begins to understand he will leave too." The theme of RFD officials not understanding the livelihood of villagers was prevalent in discussions. They asked how officials who do not have an intimate knowledge of the landscape could create

policy and make decisions about it. Many farmers recounted stories of foresters who could not identify many trees in the forest (while my research with villagers yielded names and uses for over two-hundred) and foresters who claimed that villagers were burning down the forest when they burnt their fallow agricultural fields. These stories served to demonstrate how little foresters knew about the forest and about the livelihood of villagers. They also point to a relationship between scale and knowledge: foresters produce general information about a large area, while villagers produce detailed information about a particular area. These knowledge characteristics emerge from the position of the resource manager vis-à-vis the production of knowledge about the landscape being managed.

In TK, the processes of knowledge production are located inside the landscape; there is no dislocation between the producer of TK and the manager of the environment in question. Whereas in SSK, the processes of knowledge production are located in a variety of landscapes and laboratories meant to mimic the landscape where it will eventually be employed. In scientific management the expert manages from the outside using supposedly objective, universal knowledge. This difference in positionality helps explain, in part, the predominance of strictly bounded static spatial categories, such as 'conservation forest' and 'village land', in state management. They can be easily delimited on a map and made legible to future officials. Village management space, conversely, does not take the shape of straight lines but instead follows streams and mountain ridges, is content with rough edges and often defines location in relation to another's field or a landscape marker. The prevalent use of geographic information technologies, such as GIS, maps and GPS, in state scientific management also exemplifies this difference. These tools are meant to enable the transfer of geographic knowledge and facilitate displaced management and decision making. In contrast, geographic information in most traditional systems is disseminated through dwelling in place and through an intimate exploration of the geography in question (Rundstrom, 1995).

Intersections of Space, Management Institutions and Knowledge: Theme 2
Integrated and Segmented Spaces

The goal to separate people spatially from forests is also indicative of the non-integrated management practices common in state management, which stem from a disregard for the role of human agency in shaping the forested landscape. Scientific resource management and conservation practice is roundly criticized for its adherence to a reductionist and mechanistic scientific framework that compartmentalizes human from non-human and enforces this dualism through policy and practice. Spatially this is reflected in strict boundaries where human habitation is permitted on one side of the divide and 'nature' is encouraged on the other, such as the plan

for a swiss cheese Mae Tho National Park (See Figure 5.3). Reflecting a forester's knowledge base in the (non-human) ecology of forested landscapes, land classifications – such as the watershed classification and eco-zones, are based solely on ecological principles yet carry social consequences. This segmented state of knowledge and management can also be witnessed in the structure of park management and park goals.

The primary goal of the park is to manage and protect the forest as it exists separately from the villages living in it. Thus when social concerns are brought to the park staff, they do not consider them part of their mandate. When questioned about how the villagers are supposed to support themselves on their holes in the swiss cheese, park officials frequently responded that this was a task for agricultural extension, not the forestry department. This lack of integration was seen as a problem by at least one, particularly progressive, RFD official.

> This area doesn't need to be a park. The RFD shouldn't be the only one managing it. State employees should manage it but maybe not the RFD. We need an organization equipped to deal with all aspects of land - not just the forest.

The lack of coordination and integration between other parts of the government that manage land is also a hindrance to meeting the park mandate. This is illustrated by an instance where the *Nay Amphoe* (appointed district official in the Ministry of Interior) approved the building of a new village and thus the clearing of forest for agriculture in an area slated for inclusion in the national park without first consulting the park officials. RFD staff, then, recognized the limitations of a segmented approach for a variety of reasons and expressed a desire to cooperate more with NGOs, researchers, and other parts of government so that different scientific expertise could be combined in management. They have yet to contemplate, however, what an integrated social-ecological approach might mean spatially.

TK has the potential to offer some guidance. Because it is produced in service of a livelihood very much intertwined with the forest and land, TK regularly does not compartmentalize its subject but instead stresses the relationships between nature and culture. For this reason, TK is interesting to scholars and practitioners searching for resource management models that can serve as holistic alternatives to the dominant models based on mechanistic, linear Newtonian science. Spatially, this holism is expressed by the integration of social and environmental criteria in forest classification. For example, Ban Insom village adopted the division between shifting cultivation land and community forest land but many find it confusing. They explained that they prefer to "take care of our forest as well as use it for agriculture." Before the separate categories of community forest and agriculture land, they had one unitary category of land in which forest land was potential agriculture land and vise versa. This is not to say that all forest could become agriculture; belief in forest and ancestral spirits enables some territorial conservation. The burial

forest is an obvious example of a traditional conservation mechanism that is rarely entered and is not used for gathering products. The villages I worked in also preserved forest near rivers and on mountaintops to facilitate the movement of forest, water and wind spirits[11].

Local patterns of use also reflect an integration of activities. Travelling to and from agricultural fields provide opportunities to observe the forest, collect NTFPs, gather firewood, and check in on cattle. Travel associated with activities is rarely focused on a single task but is instead associated with dwelling in a forest-farm matrix. Activity patterns, then, do not adhere to the two-dimensional zones set out by a eight-category land use classification scheme.

Intersections of Space, Management Institutions and Knowledge: Theme 3
Flexible and Static Spaces

The final key characteristic of state and local knowledge-practice-belief complexes, which demonstrates a relationship between management institutions, space, and knowledge is (in)flexibility. In local management, the inseparability of the manager from the producer of environmental knowledge ensures a detailed knowledge that is flexible and able to adapt to changing conditions (Berkes *et al.*, 2000; Conklin, 1954; Kunstadter, 1978). Environmental practices and social institutions are similarly flexible and adaptive, in particular they might change seasonally or with different market conditions. Tenure systems are often spatially complex, making distinctions between land and products of the land (Rocheleau and Edmonds, 1997; Vandergeest, 1996). For example, in both case study villages if a household plants bamboo within communally held land, the household retains rights to the bamboo, it does not become the property of the entire village. Scientific management, however, with its external manager prefers strict territorial arrangements where boundaries are static and zones of use and management are distinct and homogenous. Scientific management institutions are often criticized for their attempt to control the environments they manage in order to render them predictable and easier to manage (e.g. Holling and Gunderson, 2002). Local management can offer nuance and flexibility to complement the centralized control of scientific management.

The single largest problem, from the villagers' perspective, is the lack of flexibility in National Park design, management, and law. As one farmer volunteered,

> the park is just like a big stone. You can't take anything out, you can't move it, you can't change it. It can't be here with the village.

[11] These are noted in ethnographic literature on the Karen as traditional land uses common to most Karen groups. ((Luangaramsri, 2001; McCaskill and Kampe, 1997; Trakarnsuphakorn, 1997)

The perceived inflexibility of park management manifests itself in a number of ways. First is the enforcement of park rules. While the forest guards I interviewed claimed to be very flexible in how they enforced laws and many said that when they saw villagers cutting trees they would not arrest them, villagers claimed that a park meant that 'you can't take a single stone' from the park. "If you go to the forest to get vegetables, the park will get the villagers - just like a tiger." The story of four villagers (from another village) who were caught with a deer, were sent to the police and had to each pay 200000 baht ($4000) was recounted on a number of occasions to illustrate their point. "The park uses their power - they could have dealt with it in a village setting. There was no need to send the hunters to the police." The villagers see this as an example of inflexibility in park rules. The story further demonstrates a challenge by villagers to the authority of park staff and police in matters of resource management. In this case, villagers thought that the hunters could be effectively reprimanded within the village. When asked why there could not be more flexibility in park rules, an important park official answered "rules are rules, if you let them get away with it once they will do it again." The deer, he explained, is a protected species in Thailand and no one is allowed to hunt it. Park management also reminded me that villagers are residing in Watershed Classification 1A and are thus technically illegal. Law, rules, and management institutions are effectively the same for all national parks in Thailand; the institution rarely adapts to changing local realities.

Local management, however, has demonstrated an ability to adapt rapidly to changing political and ecological conditions. During 1990 Nira Village decided to stop cultivating an upland area because they and neighboring villages had experienced a decrease in water flow. At the same time they collectively decided to ban hunting and cutting in the evergreen forest on the hill above their village. This was in reaction to a decrease in mammals and a concern over the recent extraction of timber for building the school in a neighboring village. Likewise, during my presence in the village, the villagers took a collective decision to begin forest patrols. This was to demonstrate to the RFD that they are capable and willing to take care of the forest on their own. Less dramatic decisions are taken more frequently when the seasonal rainfall, the presence of indicator species, temperature, and market conditions help inform villagers what and where to plant, where to go to look for a particular herb or when to prepare the fields for burning. The flexibility of local management is in distinct contrast to the inflexibility of state-led management.

The second way inflexibility is manifested is in the promotion of permanent agriculture and private ownership of land. Tenure arrangements in Nira Village are defined, yet flexible. Within each of six large agriculture plots, every family has a small plot that they plant and for which they are responsible. Each family's field is demarcated, often by planted trees or bamboo poles along the ground. However, these boundaries are very porous; labor sharing is common especially during weeding and harvesting seasons, and villagers gather vegetables from each other's fields

without the need to seek permission first. The boundaries are the most permeable for members of the immediate family. This privilege does not extend to rice, however, or to cash crops. Tenure is not static in that if one household does not have enough land they will 'borrow' land from another household. The 'borrowing' extends to families in neighboring villages as well. Inter- village relations further demonstrate this flexibility. While only villagers from Nira Village may cultivate crops or cut trees within their boundaries, villagers from outside may come in and collect forest products. Likewise, villagers from Nira Village may collect forest products and graze cattle outside their boundaries. The boundary then, is commonly understood to be a boundary of responsibility and control, not use. This flexible management arrangement is expressed spatially by multiple fuzzy and simultaneously overlapping boundaries and territories that are contingent upon changing circumstances.

Villagers in Insom Village are in transition from this flexible, communally managed shifting cultivation landscape to a more static, privately managed agricultural landscape. The RFD and NGO promotion of permanent cultivation and clearly demarcated boundaries results in ambiguity and flexibility being reduced for the sake of legibility. Tenure rules for fruit gardens and cash crop fields, land use types on the rise in Ban Insom, are more geared towards private ownership, as are the rules for Padi fields. Households do not lend or borrow permanent fields and they do not gather products from another's field. Padi, in particular, only changes hands with inheritance or money. Labor sharing has likewise decreased in the village and most households labor only on their own land or if they do work on another's field, direct reciprocity is expected.

An NGO created a landuse map for the village on which each current field and most recently used fallow was allocated to a household. The rational was to make ownership explicit and to thus increase the security of villagers in the face of a National Park. However, this static spatial demarcation has unintentionally led to the erosion of flexible land allocation institutions. In fact, many arguments ensued in the village as to whose land was whose, whether it had been borrowed or stolen and so on, so that the 'right' number could be put on the map. The strict demarcation of village boundaries has also changed land use patterns, with villagers not entering neighboring territories for collection of NTFPs or firewood. As one key informant explained, "we don't go to [*Noi Village*] the community forest there belongs to them. They have wild pig now but we don't go hunt them, but if one comes into our village, we can shoot it." This is in stark contrast to the explanation of boundaries given to me in Nira Village. "We collect firewood or vegetables near another village. We don't go to the village, only in a little in the area. We don't ask permission because it is not only theirs but it belongs to us too. It is nature."

Villagers in Ban Insom continually expressed a need to re-expand their agricultural fields sighting a decrease in rice yield as a serious concern. They also expressed, however, a real fear of the RFD. They are scared to plant in traditional spaces, spaces now allocated to forest, not

people. Some villagers mourn this loss of flexibility. “Before the park, we could do anything. We didn’t need to ask.” And a man from Nira Village "If I want something, I will have to ask the RFD first [once the park comes] and if I don't ask first, they will arrest me. I don't want money or anything. I just want to be able to cut what I need without asking."

In Transition From Local to State Management

In the case of Mae Tho National Park, no attention has been given to the above differences in state and local management institutions, knowledge, or spatial organization. And importantly, no thought up until very recently has been given to ways of incorporating different knowledges into the management of the park. The transition has been less than smooth and has been rife with conflict. During my sojourn villagers protested in the nearby town and on a separate occasion they blocked the road into the National Park headquarters for a period of three days. The RFD has been offered considerable resistance to any change in the landscape of Nira Village where the RFD wants to establish a subdistrict station. Two attempts to suggest a location were rejected in the first instance due to its proximity to a sacred forest and in the second instance because it blocked access to a critical bamboo gathering area. Most importantly, however, Insom Village is re-expanding their agricultural fields and attempting to negotiate for as much land as possible. They explain that their rice yields have decreased because they no longer have the choice where to plant. As one farmer explained,

> Before we could choose the land, we could choose land with good soil so we could plant. Wherever the soil was good we could farm there. Now we cannot do that. Now we farm on a three-year cycle. This is not good but the park will not let us do longer than that.

Villagers feared having their land-use fixed, yet they understood the fixidity to be part of the process of park establishment. Villagers understood that whatever land was allocated to forest and not agriculture in the current mapping, would forever be lost to them. “If we don’t cut the big trees now [in order to clear agricultural fields], we won’t be able to.”

The transition from local to state management then, constitutes a transition from flexible, complex spatial organization compatible with the integrated, connected, and adaptive characteristics of TK to the static, bounded spatial organization compatible with the segmented, displaced, and universal characteristics of SSK. Conducting a transition from local to state management that is blind to the spatial and knowledge dimensions can result, as it has thus far in Mae Tho National Park, in dissatisfaction, fear and a consequent resistance to state conservation plans. The reification of once flexible management systems has lessened community cooperation and choice in farming activities, increased inter-community conflict, and eroded community

institutions for land allocation. Consequently villagers wish to re-establish old territories, thwarting government efforts to establish a National Park.

With the expansion of state-led conservation initiatives in inhabited forests it is critical that we take into account the differences discussed above and outlined in Table 1 and shift our focus towards integrating SSK and TK in conservation management. In order to identify possible strategies for integration we must first examine some instances of similarity and complementarity between village level knowledge and state knowledge in Mae Tho National Park.

TABLE 1	Characteristics	Associated Management practices and institutions	Associated Spatial Organization
TK	• Detailed • Adaptive to context • Holistic	• Producer = user of knowledge • Flexible depending on context • Integrated management practices	• Dynamic • Overlapping
SSK	• General • Universally relevant • Segmented	• Producer dislocated from user of knowledge • Homogeneously applied; slow to change • Social and Environmental management separate	• Fixed • Bounded

Similarity, Complementarity and Conflict

Despite the differences between state and local knowledge embedded in environmental practices and social institutions, there are some similarities. First, both state foresters and villagers in Ban Nira identify the forest on the hill above the village as an example of a healthy forest. The village has already adopted hunting and logging bans in the late 1980s for this forest and villagers justified it as an example of a healthy forest because it gave shade, it was cool in the summer, the trees were big and it gave lots of vegetables. Foresters have different criteria but the same message. They designate the forest as healthy because it is hill evergreen forest – an increasingly rare forest type in this region. In addition, the trees are large, and have not been cut in living memory. Regardless of differences in criteria, this points to the possibility that agreement can be reached on the kind of forest both foresters and villagers wish to preserve. With further negotiations, a set of functional criteria could likely be agreed upon, such as maintenance of certain species, cutting and hunting bans, and so on.

Both TK and SSK, while having different rationales, contain forms of territorial management. Conventional conservation privileges the territorial form of management, but limits its use of this mechanism to firmly bounded, homogeneously managed spaces, such as National Parks or ‘Conservation Forests’. In Ban Insom, many villagers understood the idea of a conservation forest as “the home for animals”. This is a concept that is readily understood by the Karen

because the forest is their home. “The forest is the life of the village” explained one woman. In addition, traditional territorial conservation is common in Karen culture and often for the purposes of giving a home to ancestral spirits or the spirits of land, water, and forest. Traditional conservation territories of the Karen range from small, one tree spiritual sites, to burial forests and to hill and riverine forests. These special places all have different sets of rules; some are rarely visited, others are places to collect NTFPs or firewood but none of them permit cutting of trees.

Understanding the present spatial expression of environmental practices and social institutions can help to design legible land use systems compatible with the knowledge of the village. Obvious examples include avoiding classifying fallow as a forest that can never be a field and maintaining traditional conservation spaces. If outside management is not aware of seasonal changes in resource use patterns, they can mistakenly cut off access to a crucial site that villagers only access for a few weeks or months of the year. This happened in Ban Nira when the RFD wanted to build a subdistrict station in a place that would cut off access to the only place in their landscape where a certain variety of bamboo could be found. A less obvious example is that since villagers collect foodstuffs on the way to and from cultivated fields, these forests should not be placed in a strict reserve. Likewise, if a strict reserve is located on the way to cultivated fields, it is more likely be used for NTFP harvesting or firewood collection.

The most important step in cooperation and integration is to recognize where SSK and TK complement one another and where they diverge. Park management exhibited general knowledge about the whole area of the park, but when questioned about specific sites they knew little detail. Villagers exhibited detailed information about the landscapes they use on a daily basis but had little detailed knowledge about other areas within the park. Clearly, the knowledges cannot replace each other but must complement each other. Fitting the two together could mean that villagers and RFD would negotiate a conservation framework of principles or criteria and allow local management the flexibility to meet them how they wish. This arrangement would allow the larger scale vision of the RFD with its focus on providing for the regional and global commons to effectively interface with the local scale vision of livelihood security. This arrangement would also address the largest concern of villagers that was that the park represented a fixed, controlled-from-headquarters land-use pattern. One possibility here is instead of fixing the swidden plots in space, the village could negotiate with the RFD on the percent of land that is to be maintained as forest cover, not *where* it is to be maintained but how much[12]. This allows the villagers, who value their forest-farm matrix for both its farm products and its forest products, to decide for themselves, based on current conditions, where to plant. It also enables a continuation of the flexible land allocation strategy that acts as a social safety net for those in need and a

[12] Currently, 49% of Ban Nira’s territory is under forest cover, not including fallow stages.

redistribution mechanism for those with more than they need. An arrangement such as this, however, would require forestry management to abandon the delineation of sharp boundaries between households and between villages and, importantly, would require a real transfer of authority to the local level.

One of the largest challenges to overcome in a movement towards co-management is the lack of mutual respect and trust and this would require both time and an institutional structure to enable interaction between state and local managers. Like the official asking "how can they care for all that forest by themselves anyhow? It is too large," most park officials do not believe that the villagers can take care of the forest. As long as the RFD works from a position of displaced management, they will have little knowledge as to how people dwell in the park landscape. In fact, the periodic replacement of management is meant precisely to ensure that no close relationship develops between park officials and local residents or powerful outsiders, due to the potential that such a relationship may lead to corruption. While a valid concern, given the history of partnership between RFD officials and log poachers,[13] if cooperation between highland farmers and park management is sought, a relationship of mutual understanding must be given time to develop. Just as the villagers indicated, the longer management stays in the area, the more they understand. This was evident with one RFD official who spent the most time with villagers demarcating boundaries. Villagers believed he and he alone understood their livelihood strategies and there was growing trust, which, if it were more widespread, could be the beginning of a working partnership. Meanwhile villagers fear RFD inflexibility and power. There was a general belief that the park officials did not care about the problems of the villagers and just wanted to claim as much forest land as possible in order to get money. As one woman put it "if the RFD love us, we will love the RFD." There is evidently a need for the RFD to move towards more integrated management – managing the forests as separate from the people living in them does not only fail to make sense to highland villagers but it flies in the face of the history of the forests in the region. A council of forest managers with representation from the RFD, other government and non-government organizations and villages alike would facilitate the familiarization of all groups to the goals, knowledge, and tools of other participants. This institutional arrangement would at least set the conditions for building trust and mutual respect while addressing the problem of overly segmented management and knowledge.

[13] A most famous example of such corruption is the Salween scandal where a number of RFD officials were found guilty of collaborating for years in the poaching of logs, their removal to Burma and their re-purchase into Thailand.

Conclusion

Moving towards the integration of SSK and TK into viable conservation arrangements capable of managing for the needs of local communities and the global commons is no easy task. Undoubtedly, however, such a task can neither be reached with only community based knowledge and management nor can it be reached with only state based scientific management and knowledge. Moreover, as this paper has demonstrated, space is an important dimension of local and state knowledge and management institutions. In attempting to 'scale up' we need to respect the spatial complexity of local use and management and attempt to incorporate this through true partnerships. There are times when, regardless of the scale at which we operate, we need to deal with complexity and uncertainty – local mechanisms have shown an ability to do so.[14] It is not merely a question of inserting ethnobotanical information into a scientific framework; global science must recognize its status as complementary to local knowledge-practice-belief complexes, and not as a replacement for them. Instead what lies ahead is a long process of building joint institutions and knowledges that mobilize a wider range of practices, tools and knowledge than currently used in conventional conservation.

The investigation into Mae Tho National Park demonstrates that a thorough investigation of spatial organization and its links to social institutions is necessary to fully understand resource management strategies. Moreover, it has demonstrated that state policies re-organize local resource management institutions, knowledge, and spatial structure, often with detrimental results. In this case, the blind re-organization underway has endangered local livelihoods and efforts to establish a protected area. With an investigation of the differences and similarities between TK and SSK, along with their spatial expression there is potential to create a preferable organization within which environmental goods and services for both the global commons and the local population can be met. In order to do so, we must abandon the simplistic solution of spatially separating people from forest and instead build partnerships of co-management where conservation and livelihood objectives are sought in the same space. The latter will require a complex spatial organization with flexible categories of use and management negotiated across scale, which reflect the dynamic environmental and social context within which they are embedded.

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[14] The two volumes edited by Fikret Berkes and Carl Folke titled *Linking Social and Ecological Systems,* and *Navigating Social and Ecological Systems,* go a long way in documenting local practices that exhibit the ability to deal with uncertainty and to maintain ecosystem resilience in the face of change.

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