Reflections on Conservation Education and Practice in Bhutan[*]

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Introduction

In July, 2006 we had the pleasure of working in Bhutan with the emerging Ugyen Wangchuck Environment and Forestry Institute (UWEFI). Along with others (i.e., several American academics, a Danish forester, and Bhutanese representatives from the Natural Resource Training Institute, government agencies and the private sector), we examined conservation education goals and institutional, faculty and curriculum development at UWEFI. The assessment included stakeholder workshops to identify priorities from the public and private sectors. We are inspired and optimistic about UWEFI possibilities because of Bhutan's commitment to "The Middle Path" in natural resource management, an approach built on Buddhist culture, traditions of sustainable forest and land management, and inclusion of people and human use in nature.

"The Middle Path" to conservation seeks a balance among cultural integrity, economic development and environmental protection. While sounding similar to the "three legged" concerns of "sustainable development" touted around the western world since the mid 1980s, "The Middle Path" carries demonstrably deeper political will towards social and ecological concerns on par with economic development, and

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respect for historic culture, beliefs, knowledge and practices. In our opinion, these conditions give Bhutan in general and UWEFI in particular the potential to become a regional if not global leader in professional forestry and environmental conservation education that integrates traditional culture, livelihood and resource management with scientific knowledge -- conservation education that will produce resilient, practical and socially just foresters, forestry and natural resource management.

While we see tremendous opportunities for UWEFI, we are concerned about global trends and ideologies that could lead UWEFI to the more conventional and, in our view, less innovative and productive direction in pursuit of sustainable livelihoods and biodiversity conservation. By conventional we are referring to Western European and American perspectives that have dominated conservation and forestry practices for centuries (Brown, 2003; Ghimire and Pimbert, 1997). Since the European Renaissance, Western societies and religions have treated humans as separate from nature and privileged empirical, objective science over other forms of knowledge (Gomez-Pompa and Kaus, 1992). These orientations justified the expropriation of land and forests from native peoples for the creation of British colonial hunting reserves in India and the establishment of the world's first national park (Yellowstone) in the U.S. in the late 19th century. In these and most subsequent protected area management efforts, traditional land use practices and native peoples were treated as incompatible with conservation and excluded from parks, and sometimes involuntarily resettled (Brechin et al., 2002; Grove, 1990).

The assumption that human use is inherently destructive and incompatible with biological diversity persists in the international conservation community. Moreover, the "big" global conservation organizations view biodiversity conservation as largely a biological enterprise and have been critical of the attention given to social processes and attempts to integrate conservation with human uses and development

(Alcorn, 2005). Contemporary conservation and development efforts are primarily "science-driven", that is they are based on objective, empirical, hypothesis-based forms of inquiry, typically favoring technological solutions, and practiced by disciplinary-trained experts (Brown, 2003; Easterly, 2006; Marten, 2006). Traditional, experiential ecological knowledge and community-based management systems, while often present in rhetoric and small, pilot projects, are not awarded equal consideration and standing as scientific knowledge and management, and are rarely integral subjects in professional forestry curricula or national land management policies and practices.

While there has been much talk within the global conservation community about "people-friendly" and "participatory" approaches to protected area management, as well as "community-based conservation," these perspectives remain marginal to global conservation agendas and funding allocations (Alcorn 2005; Chapin 2004). Many in the global conservation community advocate a "new protection paradigm" that while acknowledging a role for local community involvement, remains directed by scientists and professionals and can involve coercion (Kramer et al., 1997; Terborgh, 1999). In this perspective, conservation (and protected area management) is not seriously viewed as social and political practice influenced by local as well as extra-local actors and contextual forces (which may need to be managed along with particular species). This approach often involves models developed in Europe and the United States rather than slowly and interactively built from the particulars of people, place, history, religion, culture and local visions of the future (Brechin et al., 2002).

Our position is that conservation educators and practitioners in Bhutan need to remain steadfast in their commitment to 'The Middle Path,' especially in light of the growing influence of foreign conservation advisors, funders and global economic priorities. With few notable exceptions, global conservation policies remain biologically driven and often seek to eliminate

human uses in protected areas irrespective of their historical ecological role or social implications. Sustainable development rhetoric aside, western modernist development continues to prioritize productivity, yield and the "efficient" use of forest, water, land and other resources in areas outside of parks to the detriment of 'inefficient' traditional resource management practices that are essential to ecoregional and landscape-level conservation over the long-term. Conventional conservation education also favors disciplinary specialization, institutional departmentalization and theoretical-model building which privileges expert-driven, biophysical science education over the social sciences and traditional ecological knowledge and practice systems, including religiously-held, sacred ecologies (Berkes 1999; Brown, 2003; Marten, 2006).

As ecological and social scientist ourselves, we clearly see a role for (western) science in conservation education and practice in Bhutan. In this paper, we argue that UWEFI should focus its education on integrating interdisciplinary western science with traditional knowledge, teaching multiple knowledge systems through real world problems and case studies, and most fundamentally, recognizing and teaching the skills to understand and manage social and biological systems as co-evolved, complex and ultimately uncertain. The latter provides an excellent window into current global debates over the compatibility of human uses and biodiversity conservation, the contested role of protected areas, and challenges involved in building resiliency and adaptive management into conservation. Similar calls for integrated approaches to forest and environmental education, research and management are emerging around the world (Brown, 2003; Drew and Henne, 2006; Kates, et al., 2001; Marten, 2006). We see this approach as critical for the next cadre of environmental and forest scientists and practitioners in Bhutan to be able to implement their country's visionary 'Middle Path' to sustainable development. We think it also provides UWEFI with the opportunity to bridge the gap that has developed between Buddhist and modern ways of

learning in Bhutan (Phuntsho, 2000), and to develop an internationally unique and valuable approach to conservation and development.

Traditional Land Uses and Conservation

Debate over the relationship of humans in nature has raged for decades. On one hand are those who assert that biological diversity is incompatible with utilitarian human uses (Kramer, et al, 1997; Struhsaker, 1998; Terborgh, 1999). This perspective views humans as separate from nature, assumes that biodiversity must be protected from people, and advocates protectionist conservation approaches that eliminate human uses in protected areas. On the other hand, are those who argue that some human uses are compatible with biodiversity conservation and even integral to the development and maintenance of forest ecosystems (Anderson, 1990; Brechin, et al., 2002; Freese, 1997). That is, biodiversity conservation may require human (or anthropogenic) use and disturbance to be ecologically sustainable as well as socially acceptable.

Whether humans are integral to nature or not is more than an academic debate. It influences government policies and real peoples' lives and livelihoods. In recent decades, evidence of significant anthropogenic influence on the development and maintenance of previously perceived 'pristine' forest ecosystems has grown (Grove and Rackham, 2001; Willis, et al., 2004). In the tropics this includes the Amazon Basin (Denevan, 2001 & 2004), Central Africa (Weber, et al., 2001), Thailand (Kealhofer, 2003), New Guinea (Denham, et al., 2003; Haberle, 2007), and the Solomon Islands (Bayliss-Smith, et al., 2003). Empirical evidence suggests that virtually all contemporary Amazonian forests may actually be cultural artifacts reflecting human use and adaptation in the 500 years since the death of 95% of the original human inhabitants following western contact; and that at least 15% of the region's soils were created through Amerindian incorporation of charcoal (i.e., *indah preta*; Mann, 2005; Woods and Glaser, 2004). This evidence argues for a

more holistic "humanist environmentalism" in which humans are recognized as intrinsically involved in shaping nature (Berkes et al., 2003; Cronon, 1992; Grove and Rackham, 2001).

Debates over the role, magnitude and significance of humans in the creation and maintenance of global biological diversity will undoubtedly continue and influence conservation in Bhutan. However, there is little doubt that humans have been powerful ecological actors in most Bhutanese ecosystems for thousands of years. Three anthropogenic activities are both current and historically significant sources of ecological disturbance in Bhutan: non-timber forest product collecting, shifting agriculture and extensive livestock grazing. Around the world, these land uses are typically prohibited when strict protectionist measures are adopted. While there is relative tolerance for forest product collecting and grazing in protected areas of Bhutan, efforts are currently underway to eliminate shifting cultivation throughout all of Bhutan (Wangchuk, 2005).

Are forest product collecting, extensive livestock grazing and shifting cultivation compatible with biodiversity conservation in Bhutan? Could these anthropogenic disturbances support or even explain contemporary biological diversity? What livelihood practices are likely to replace these traditional land uses if they are banned, and what are their potential ecological and social effects? These and related questions are very relevant to program and curricula development at UWEFI, including potential topics for faculty and student research.

To begin to answer these questions it is useful is to consider ecological disturbances in terms of their specific attributes, that is their type, size, intensity, duration, frequency and pattern created. The ecological role and significance of shifting cultivation on forest ecosystems and its compatibility with biodiversity conservation is the most contentious of the three practices. It has been a controversial debate throughout

the tropics over the last century as it is Bhutan today. Two forms of shifting cultivation occur in Bhutan. Integral, long-fallow shifting cultivation, known locally as *tseri*, was until recently common in low to mid-elevation forests, particularly in southern and eastern Bhutan (Kerkhoff and Sharma, 2006; Roder, et al., 1992). This form of shifting cultivation was the second largest agricultural system in terms of land area in the late 1990s (Wangchuk, 2005). Another form of rotational agriculture, known as *pangzhing*, occurs in some high elevation environments (i.e., near the tree line) and incorporates grass and shrub fallows (Kerkhoff and Sharma, 2006; Roder, et al., 1992).

Research in lowland tropical forests suggests that the ecological disturbance resulting from integral, long-fallow shifting cultivation resembles that caused by natural tree falls. Both vary from about 0.25 to 0.5 ha in size, maintain the full suite of secondary plant successional pathways (i.e., advanced regeneration, stored seed, seed rain and stump sprout), are of comparable intensity, and preclude establishment of exotic species (Uhl, 1990). Furthermore, landslides and mass wasting are common, indeed normal, disturbances in the dynamic, steep, high rainfall Himalayan mountain environment (Bruiijnzeel, 1990). Thus, disturbed, early successional environments are natural in Bhutan; tree falls, landslides and shifting cultivation have occurred in low and middle elevation forests for thousands of years. In fact, some recently established national parks (e.g., Jigme Singye Wangchuck and Royal Manas) with high biodiversity and conservation significance have been utilized for shifting cultivation for centuries. This suggests that shifting cultivation as regulated through traditional management regimes may be compatible with biodiversity conservation.

Given the above, one might hypothesize that anthropogenic disturbances created through *tseri* and other land use practices create more complex landscape mosaics and greater plant species and habitat diversity than occur in 'natural' forests. If this is the case, traditional practices could be

responsible for maintaining or enhancing biological diversity. Conversely, cessation of all forest farming and fallow management might adversely affect biodiversity by reducing plant and habitat diversity and altering landscape vegetation patterns. At the least, this suggests that relationships between biological diversity and anthropogenic uses warrant empirical investigation, rather than simply assuming a relationship *a priori*.

In similar fashion, modifying extensive livestock grazing practices could significantly alter historical disturbance regimes. Plant communities throughout much of Bhutan have been grazed by livestock, at least seasonally, for centuries. The Government of Bhutan is now regulating livestock throughout the country. Reducing extensive grazing practices from historical norms will favor the establishment and growth of shade and grazing intolerant species and increase total plant biomass. This in turn could alter fire regimes, specifically fire frequencies and intensities, with potential wide-ranging effects on flora, fauna and ecosystem processes. Increasing fire potential and severity may be particularly problematic because in recent years Bhutan has attempted to suppress all forest fires and as a consequence fuel loads are increasing (Tshering, 2006). Furthermore, there is anecdotal evidence from farmers and government officials that the length and severity of the dry monsoon may be intensifying due to climate change.

Harvesting non-timber forest or wood products (NTFPs) such as fruits, canes, thatch and medicinal plants has been a fundamental component of rural household livelihood strategies throughout Bhutan since time immemorial, and continues to be of major significance through direct consumption and commercial (i.e., market) sales (Wangchuk, 2006). Indeed, one ancient name for Bhutan, *"Lho jhong Meen Jhong"* (Southern land of medicinal herbs), attests to its importance as a source of medicinal plants for Tibet and neighboring regions. NTFP harvesting is currently permitted in Bhutan's protected areas.

NTFP harvesting causes little ecological disturbance compared to other extractive forest activities (Putz, et al., 2001). Nevertheless, questions remain regarding the long-term effects of harvesting on plants and animals, as well as on broader ecosystem processes. Many ecologists contend that because it is impossible to ascertain all potential ecological effects associated with extraction at any acceptable level of probability, NTFP harvesting is neither ecologically sustainable nor economically viable (Struhsaker, 1998). Nonetheless, NTFPs have been extensively harvested throughout Bhutan for centuries, including in areas now set aside for the conservation of biological diversity. Furthermore, some NTFP harvesting in Bhutan has been regulated through community-based management regimes (Wangchuk, 2005). For example, the Monpas who have lived for centuries in what is now Jigme Singye Wangchuck N.P. have managed the amount, size and location of wild rattan harvesting on a species-specific basis for generations (Giri, 2004). This suggests the value of community-based resource management systems, and that regulated NTFP harvesting can be compatible with conservation.

We suggest that understanding ecological and biodiversity effects associated with shifting cultivation, extensive livestock grazing and NTFP harvesting, and potential means by which these activities might be managed by and with local resource users and communities are important subjects for UWEFI education and research. Investigations of these topics requires multidisciplinary approaches that are best pursued through integrating traditional ecology knowledge and management regimes with modern science, and will have direct bearing on Bhutan conservation policy and practice. As curricular and research enterprises, the starting point should be understanding historical disturbance regimes and the socio-cultural institutions by which land and forests in Bhutan have been managed over the centuries.

Toward Resilient Conservation

Another approach that we see as relevant to education and

research at UWEFI can be loosely referred to as resiliency studies. Resilience has been defined as maintaining the capacity to adapt, ecologically and socially, to unpredictable change (Berkes, et al., 2003). In short, it means managing to retain future options. Resilience is pursued by maintaining diversity, redundancy and memory (i.e., retaining knowledge over time) in both social and ecological realms (Berkes, et al., 2003). This implies retaining and nurturing cultural and biological diversity, fostering redundancies in everything from plant species composition to NTFP livelihood strategies, and valuing traditional ecological knowledge and practice (TEKP) as well as western science (Berkes, 1999). Traditional ecological knowledge and practice systems have developed over time to interpret and respond to feedbacks from the environment, and to address and manage uncertainty and unpredictability. Many societies and management regimes have emphasized adaptation over the long-term in contrast to the modern focus on maximizing production and profits in the short-term. In contemporary terms, this is 'adaptive ecosystem management' (Berkes, et al., 2000). The rationale for managing for resilience is rooted in surviving unknown and unpredictable change. Such perspectives are increasingly advocated in western science education, for example, "Sustainability Science" (Kates, et al., 2001), the integration of conservation biology with traditional ecological knowledge (Drew and Henne, 2006), and ecological and social resilience approaches (Berkes, et al., 2003).

Resilience and adaptive management are at a premium in dynamic and unpredictable mountain-monsoonal environments such as Bhutan. Furthermore, the importance of resilience is likely to increase in Bhutan as its economy and society open to the outside world, and the rate and extent of climate change accelerates. At the same time, Bhutan is experiencing rapid social, cultural, economic and political change. Traditional resource management regimes are increasingly challenged by national, regional and global economic market forces that exert growing pressure on resources. Understanding, investigating, collaborating with,

and building upon traditional ecological knowledge and resource management regimes, characterized by resilience and adaptive management, could provide tools to address future change and uncertainty. They also demonstrate the value of integrating Bhutanese customs and ways of learning with modern, western science education. For these reasons, incorporating traditional ecological knowledge, resource management regimes and resource practitioners themselves, along with western scientific methods of inquiry, should be basic components of UWEFI curricula.

Western conservation education and practice are also now being challenged to build resilience and integrated land management into professional schools and agencies. In our own country, the United States, Aldo Leopold (1935) exhorted society to embrace a nation-wide ethic of "land husbandry" in contrast to focusing conservation in protected areas alone when he observed that:

> "Parks are overcrowded hospitals trying to cope with an epidemic of esthetic rickets; the remedy lies not in hospitals, but in daily rations. The vast bulk of land beauty and landlife, dispersed as it is over a thousand hills, continues to waste away under the same forces as are undermining land utility."

More recently, Wendell Berry (2005) has urged western society to rediscover land 'husbandry', which he describes as "all of the practices that sustain life by connecting us conservingly to our places and our world." Berry observes that 20th Century America saw the replacement of husbandry with science (e.g., soil science, animal science, forest science, etc.) which

> "served too well the purpose of the industrial economy…transformed the United States from a country of many owners to a country of many employees…(and a)…focus upon productivity, genetic and technological uniformity and global trade."

In contrast, two paramount components of husbandry, Berry argues, are local adaptation and local coherence of form, what he describes as the "never-ending effort of fitting together diverse things…ecological, agricultural, economic, familial and neighborly".

We in the United States have so dramatically transformed our connections to the land and landscape that developing land husbandry ethics and practice represent formidable challenges, especially given our industrialized agriculture and largely urbanized culture. In contrast, most people in Bhutan remain closely connected to the land and in many cases to historic forms of agriculture. Of course these practices are not perfect and continually need to adapt to changing conditions, including the breakdown of customary management systems and seductions of the market. But such practices underlie rural livelihood strategies, community structure and community-based management regimes. They provide the time-tested, finely managed and resilient adaptations to the unpredictable and dynamic mountain-monsoonal environment of Bhutan and building blocks for future management systems that enable them to adapt to rapidly changing conditions. Again, the ability of UWEFI graduates to manage for resilient and adaptive conservation will require, we think, tools from both western science and traditional ecological knowledge honed through on the ground, problem-solving field exercises.

Social and Institutional Dynamics

Social processes influence resource use and management. Environmental social scientists have sought to understand and, where possible, build upon resource access and "rules-in-use" practices that sustain livelihoods, economies and ecosystems (Gibson, et al., 2000). The study of resource management and especially governance institutions, and the ways in which they are mediated by social processes such as political systems, economic class, gender, religion, ethnicity and race, are essential to professional forestry and environmental science education. However, these topics are

rarely emphasized in forestry and natural resource management curricula. A group of social scientists and resource managers recently wrote in *Conservation Biology* that "The real question for debate, of course, is not *whether* to integrate the social sciences into conservation but *how* to do so" (Mascia, et al., 2003:649).

We think there is a great opportunity for UWEFI to develop a dynamic conservation social science curriculum. In our opinion this would include topics related to socioeconomic and demographic processes, but would move beyond these topics to critically address the multiple and interactive ways culture, class, history and power influence how different individuals, households and communities use, value and manage natural resources. What are the opportunities and constraints for different rural people and communities to secure sustainable livelihoods? Under what social and ecological conditions can shifting cultivation and other types of farming, livestock rearing, and NTFP collecting serve conservation interests and produce sustainable livelihoods? What are the costs and benefits of seeking "alternative livelihood" strategies such as ecotourism which are usually introduced by outsiders and have not experienced the test of time? How can rural communities themselves build capacity to identify and foster their own sustainable livelihoods and participatory conservation, and in ways that also nurture Bhutanese culture and religion? What role can Buddhist monks and monasteries play in forest and environmental education and conservation in Bhutan? These are some of the critical issues we think confront resource managers in Bhutan today (especially in protected areas) and that should be keystones in UWEFI's curriculum. Enabling UWEFI students to develop the skills to address these issues will involve developing depth and breadth of understanding within and across the conservation social sciences -- including sociology, anthropology, geography, economics, law and history -- and connecting this understanding to the bio-physical sciences.

We believe gaining competency in the conservation social

sciences is best achieved through theoretically-informed practical experience. By this we mean that scientific knowledge needs to be complemented by on the ground experience. UWEFI has many opportunities for building curricula and field exercises on the real-life experiences of Bhutan's resource users, managers and communities. The opportunities are especially rich with regard to community-based resource management institutions and practices. This is due, in part, to the long history and growing literature on Bhutan's indigenous resource management practices and the proximity of the institute to rural producers and ecosystems.

Customary traditions and community-based property rights continue to govern peoples' access to and use of village forests across much of Bhutan (Wangchuk 2005). This includes practices that mark village boundaries, regulate sacred forests, and govern collection of tree litter, firewood, fodder and timber, and when and where cattle and yaks can be grazed. Despite the global trend towards forests designated as state or private property and managed for commercial timber, some forests in Bhutan continue to be held as common land and largely managed by local communities for multiple uses (Wangchuk, 2000). In other instances, forest management responsibility has shifted to the Forestry Division. Both of these situations provide extraordinarily rich contexts for UWEFI students and faculty to learn about resource management values and institutions, augmented through familiarity with international literature and debates. Educating future resource managers who can put ideas into technically proficient and socially acceptable practice requires social and natural science competences within the context of real world Bhutan.

Power and Politics

There are compelling political reasons for Bhutan generally and UWEFI in particular to support "The Middle Path" to conservation education and practice. By all accounts, Bhutan has been blessed by the steadfast and enlightened leadership of a succession of kings who have emphasized connections

between environmental protection, national economic development and citizen happiness. Bhutan's kings have provided the intellectual roots and political commitment to "The Middle Path," eschewing capital accumulation if it compromised social and ecological values. Over the decades this commitment led to significant improvements in public health, life expectancy, literacy, and most other indices of general well-being, while simultaneously protecting the country's diverse environment and rich cultural traditions.

However, the Bhutanese political landscape is poised for dramatic change. The 4th King recently stepped down. In 2008 the country transitions from an absolute monarchy to a two-party parliamentary democracy. Potential political leaders, parties and interest groups are beginning to form. A fundamental characteristic of participatory democracy is responsiveness to popular public and powerful private interests. This has potentially profound implications for future Bhutanese conservation, development and educational policies and initiatives.

Biodiversity conservation and economic development are inherently political acts that reflect the interests of specific groups and result in programs, policies and activities that respond to those interests. Attention to how people of different ethnicities, ages, gender and class are differentially positioned in terms of access to and control over resources, at present and historically, is critical to understanding land use and management. It is also integral to the pursuit of socially acceptable, just and politically viable conservation and development efforts. Numerous case studies and grounded frameworks exist to inform conservation practitioners in the complex ways social and environmental change occurs, and how community, culture, ownership, knowledge, resource management, development and governance have been examined, understood and used (Brosius, et al, 2005; Stevens, 1997; Western and Wright, 1994).

We believe that the social justice and political implications of different conservation and protected area management

policies warrant careful consideration. If Bhutan moves towards a more protectionist approach in which human uses, specifically NTFP harvesting, extensive livestock grazing and shifting cultivation, are viewed as incompatible with conservation and prohibited, a large proportion of the rural population will lose access to long-held resources, livelihoods, and the material basis of their cultures. They will also lose essential links to the land that underlie land husbandry ethics. This could lead to a large socially and economically disenfranchised rural sector opposed to biodiversity conservation.

In the urban sector, Thimphu and Paro are currently experiencing rapid economic growth, population increase and construction. Rural to urban migration, particularly by young people, is increasing, and the country is experiencing growing income inequality, particularly between the urban and rural sectors. Profound tensions exist in many countries between biodiversity conservation and economic development, and this can lead to conflict between long-term residents and newcomers. In response to growing socioeconomic inequality and tensions, emerging political parties in Bhutan may seek political support by appealing to the interests and concerns of particular groups, such as disenfranchised rural populations. In short, the establishment of a two-party participatory democracy, emerging socio-economic inequalities and rural alienation resulting from protectionist conservation measures could result in public opposition to conservation efforts. This would be tragic given the Bhutanese tradition of unity and of 'working landscapes'.

A second political challenge to conservation in Bhutan is related to the national policy of devolving forest and resource management authority from the nation-state to local communities (i.e., Social Forestry/Community Forest programs, Penjore and Rapten, 2003). As Bhutan transitions from a monarchy to a participatory democracy, the needs, interests and concerns of local constituencies are likely to find quick expression in the political arena. In our opinion,

retaining and training for the Bhutanese model of working landscapes, demonstrated in current Social Forestry policies, is politically preferable to protectionist measures that close vast areas to utilitarian uses, prohibits or discourages traditional practices (e.g., shifting cultivation and extensive livestock grazing) and encourages more intensive, privatized land use outside of parks. Indeed, the maintenance of traditional, working landscapes and vibrant rural communities is essential to biodiversity conservation and public support for conservation.

A third challenge to conservation in Bhutan is rapid infrastructure development, specifically road construction, one of the most powerful underlying driving forces of forest conversion and resource exploitation throughout the world (Chomitz, 2007, Geist and Lambin, 2002). Pressure to extend and improve (i.e., pave) the Bhutanese road system will likely increase with democratization as political parties respond to rural and urban calls for more and better transportation. Roads typically accelerate urbanization and rural to urban migration, while increasing rural marketing opportunities and urban consumption of rural agricultural and forest products, such as food, NTFPs, and timber (Chomitz, 2007). This presents opportunities, as well as challenges. Potential adverse social and ecological effects associated with road development that warrant particular attention in Bhutan include: habitat fragmentation, erosion, runoff, sedimentation, and the loss of traditional ecological knowledge and management regimes through out-migration and acculturation.

UWEFI can address potential opportunities and risks associated with infrastructure development, devolution of forest and resource management to local communities, and national conservation and protected area management through actively engaging rural constituencies and resource users (i.e., farmers, forest product collectors and livestock grazers) in program and curriculum development. This would not only contribute to more relevant education and research

initiatives, but could build political support for UWEFI. The latter is likely to be extremely important to the long-term viability of the institute as the country transitions to participatory democracy.

A final political reason for orienting conservation education around maintaining working landscapes in Bhutan is a legal one. Bhutan is a signatory to the 'Shillong Declaration on Shifting Cultivation in the Eastern Himalayas'. This document explicitly recognizes that shifting cultivation is an adaptive forest management practice based on sound scientific principles and recommends governments collaborate with shifting cultivators to enhance and adapt traditional farming systems to changing economic, social and environmental conditions (Kerkhoff and Sharma, 2006).

The International Centre for Integrated Mountain Development (ICIMOD) recently completed a comprehensive study of mountain agriculture in the Eastern Himalayas, including Bhutan, and concluded that shifting cultivation systems can be a productive means of using hill and mountain lands that conserve forest, soil and water resources; and that they are ecological preferable to alternative agricultural and forestry activities (Kerkhoff and Sharma, 2006). These same conclusions have been voiced by researchers elsewhere in Asia for decades (Conklin, 1957; Kunstadter, et al. 1978; Spencer, 1966). However, the ecological sustainability and economic productivity of traditional shifting cultivation have been largely ignored by governments and international institutions for political and economic reasons (Dove, 1983).

The breakdown of indigenous forest management systems and the cultures that developed and practiced them adversely affects both biodiversity and human livelihoods (Sodhi, et al., 2006). Bhutan retains well-functioning forest farming, NTFP gathering, and extensive livestock grazing practices and management regimes. Recognizing, collaborating with and building upon these land use systems in UWEFI educational

efforts would contribute to Bhutan's quest to chart 'The Middle Path" and offers great promise for conserving Bhutan's rich cultural and biological diversity over the long term. It also would provide a novel and potentially globally significant learning opportunity for the rest of the conservation world.

Approaches to Conservation Education at UWEFI

The development of UWEFI involves explicitly choosing programs, curricula and pedagogical approaches, developing faculty expertise for delivering them and maintaining funding support. Establishing, staffing and delivering forestry and environmental science education and research are expensive. Bhutan currently receives significant international support for conservation, in general, and for the development of UWEFI, in particular. However, this is occurring within the context of declining overall international support for conservation. International funding for conservation in developing countries declined by half between the mid-1990s and 2000 while aid to the forestry sector fell from about $2.0 billion in the early 1990s to $1.0 billion in 2000 (Cleary, 2006). Given growing international attention to climate change and public health, particularly HIV/Aids, it seems unlikely that funding for conservation and education will increase in the near future. Thus, UWEFI would be well advised to pursue educational and research programs that can be maintained through domestic funding sources.

Determining conservation education and research priorities is challenging. In a recent study, Cleary (2006) found that the large international conservation NGOs working in the Amazon Basin all portrayed themselves as "science-driven", emphasized eco-regional planning, and invested heavily in costly GIS technology and software, satellite imagery, and highly trained specialists. Cleary argues that while this has contributed to an improved understanding of Amazonian ecology, it has resulted in significantly less funding for actual on the ground conservation efforts and is ill-suited to addressing the most important biodiversity and forest conservation threats, namely infrastructure and agro-

industrial development.

In the case of Bhutan and the eastern Himalayas, more generally, biologically based eco-regional conservation efforts have been undertaken by WWF (WWF, 2005). Bhutan has explicitly embraced a holistic, integrated landscape-level approach to the management of protected areas and biological corridors through its B2C2 plan (Nature Conservation Division, 2004). We maintain that landscape-level conservation efforts need to be wary of overly abstract and generalized models, and scale up from information of particular places and peoples. Bhutan currently lacks detailed understanding, education and research regarding site and culturally specific conservation and development opportunities, constraints and implications, and how to build upon local, community-based dynamics to landscape and national levels. For example, The Director General of the Forestry Department recently noted that while NTFPs are of critical social and economic importance to a majority of Bhutanese, information regarding their amounts, densities, yields, harvesting effects, and general management are lacking (Wangchuk, 2006). UWEFI has the opportunity to engage both faculty and students in field research projects on contemporary topics such as this whose results could be immediately utilized in resource management.

Applied, active problem-solving approaches would be novel in Bhutan and in forestry education in general (Brown, 2003; Burch, 2006). For example, a course on NTFPs could be organized around species and site-specific collection, use, management and marketing issues, and the challenges confronted by actual NTFP collectors and communities. Subjects such as growth and yield, population dynamics, gender roles, resource tenure and sampling methods (both ecological and social) could be addressed within the context of the species being harvested, existing resource management rules and regimes, and the concerns faced by collectors and users in their actual contexts.

Promoting teaching and research that integrates spiritual, material and practical, problem-solving is a new direction in professional forestry and conservation education. Phuntsho (2000) provides detailed analysis of the conflict that has emerged in Bhutan over the past several decades between religious learning with its spiritual and moral focus and pedagogical emphasis on memorization, exposition, contemplation and debate, and modern education with its secular, technical and largely materialist focus and pedagogical emphasis on rational enquiry and critical scrutiny. Religious and modern education need not conflict. In the case of conservation and development, they complement one another quite well. Queen Ashi Dorji Wangmo Wangchuck (2006) observed that conservation has been a success in Bhutan precisely because of the strong spiritual and religious values that shape the relationship Bhutanese have with their environment. By integrating traditional ecological knowledge and practice, including Buddhism and other cultural traditions in curriculum and research, UWEFI could help bridge the gap between traditional and modern education in Bhutan, facilitate integration of modern technology and science with local culture and society, and insure that locally identified, real-world opportunities and challenges are addressed by the institute.

At the National Stakeholders Consultative Workshop and subsequent Core Working Group Retreat in 2006, workshop participants identified NTFP use, ecology and management, sustainable rural livelihoods such as ecotourism, and soils and watershed management, as subjects insufficiently taught at NRTI, and important for UWEFI's future curricula and research attention. Efforts are being planned to develop the faculty expertise for teaching these subjects. Burch (2006) makes the important case that "Programs and people, not buildings and physical resources, are the critical dimension for any adaptive and sustainable education program". UWEFI faces crucial decisions as to which subject areas to train faculty and courses to offer.

Most fundamentally, UWEFI faces the decision whether to base its curriculum on the 'ologies' (i.e., biology, zoology, ornithology, anthropology, sociology, etc.) or to incorporate disciplinary-based sciences within the context of locally relevant and applied conservation and management problems. The choice is profoundly important. The question is, in what context are the disciplines most effectively engaged? We suggest that UWEFI's professional education and conservation mission would be best pursued through an applied, problem-based focus that builds bridges from an array of social and ecological sciences to resource users and managers themselves (e.g., local forest product collectors and farmers as well as those in the emerging urban, private sector).

Conclusion

We believe UWEFI has a wonderful opportunity to pursue conservation education and practice that respects Bhutan's historic land uses and resource management institutions, and that builds upon them as rich 'cultural working landscapes' while meeting the challenges of resource management in a ever changing and increasingly global world. Bhutan's political commitment to "The Middle Path" and its Buddhist religion make it uniquely positioned for developing such an educational approach. Bhutan's Buddhist respect for the interdependencies among all life forms and commitment to 'gross national happiness' instead of 'gross national product' values multiple knowledge systems and cultural connections with the past. 'The Middle Path' necessarily upholds traditional ecological knowledge and local resource management regimes. It also implies retaining and adaptively managing livelihood practices, such as NTFP harvesting, shifting cultivation and extensive livestock grazing, not just because they are an integral part of Bhutanese cultural traditions, but because they work – that is, they have proven productive, sustainable, and compatible with biodiversity conservation for centuries. These practices are also invaluable because they are resilient; they retain

future options in an age of rapid, unprecedented and uncertain change.

UWEFI has the opportunity to chart an innovative path in conservation education and practice. We think this path would be best pursued by recognizing and building upon the culturally and biologically diverse, locally adapted working landscapes; by understanding and building upon local land use traditions and resource management regimes; and through selective and judicious incorporation of science and technology. At the 2006 National Level Stakeholder Consultative Workshop, Dr. William Burch exhorted the audience to pursue *"Buddhist forestry with a Bhutanese twist"*. These reflections are our interpretation of what this might mean, and some of the promises and pitfalls of their realization at UWEFI. We are thankful for the opportunity to share our views.

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